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ABSTRACT

In 1998, faculty members at the University of Cincinnati started a project as an interdepartmental collaboration to investigate the use of World Wide Web-based instructional (WBI) tools. The project team included representatives from various areas such as information engineering technology, mechanical engineering technology, chemical technology, professional practice and career placement, and humanities and social science, thereby providing an objective multi-disciplinary performance of the project and evaluation of its result. The project goal was to form a kernel of instructors who acquired the know-how of distance education (DE), including Web-based education (WBE) and WBI tools and were, therefore, ready to provide faculty development on the use of WBI tools and WBE through a series of workshops and training seminars. Activities included individual faculty development, regular faculty interdepartmental group discussions, hands-on training and workshops/seminars, and team-working/peer-to-peer mentoring. Main project outcomes included: faculty "brainware" on DE systems, including identification of various aspects of DE and WBE systems worldwide; and faculty "brainware" on WBI tools, including identification of features and capabilities of various WBI tools that can enable an instructor to design, develop, maintain, and manage WBE curricula and courses. (MES)

Faculty Collaboration on Multidisciplinary Web-Based Education

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Paper Abstract

Teaching, learning, and doing business online through the Internet and World Wide Web (WWW) are bound to change the structure of our traditional educational and business institutions. However, the effects will be more greatly felt by those who are directly involved in education. This motivated six professors of five different departments of the OMI College of Applied Science, University of Cincinnati (UC), for the interdepartmental collaboration in enhancing the professional development of OCAS faculty on WWW-based education. The paper describes in details the main outcome of the UC Faculty Development Grant – i.e. OCAS faculty "brainware" on WWW-based education, which enabled several OCAS professors to create WWW-based courseware in various technological areas.

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1. Motivation

The Internet is having a profound impact on the delivery of instruction and the means for conducting business. Each day, millions of users harness its interconnectivity to access forums or databases, enroll in online courses, and supply information online to clients, vendors, and staff. In increasing numbers, organizations are implementing corporate-wide Web sites and Intranets. Intranets, which are implemented via Local Area Networks (LAN) and Wide Area networks (WAN), utilize many of the same Internet services and features *internally* within the organization (and hence the name for this type of networks) – and therefore more securely.

Whether over the Web or over an intranet, a variety of instructional tools are becoming commercially available to help instructors in preparing for the delivery of courses online, either in support of distance education goals or as complimentary to a traditional course offering. On the business side, collaboration tools are being developed to enable engineers to cooperatively design a product over the Web, regardless of their "physical" presence in the world. Web-based tools being developed for both areas of instruction (teaching/learning) and engineering (product development/project management) have one objective in common: to provide sufficient features and software functions that would enable a group of individuals to communicate online in pursuit of their common goal – either instruction or product development.

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2. Interdepartmental Collaboration

Project Team. The authors, faculty members in several departments of the OMI College of Applied Science (OCAS) at University of Cincinnati (UC), started a project in 1998 as an interdepartmental collaboration to investigate the use of Web-Based Instructional (WBI) tools at our college [1]. The project team included representatives from various areas such as Information Engineering Technology, Mechanical Engineering Technology, Chemical Technology, Professional Practice and Career Placement, and Humanities and Social Science, thereby providing an objective multi-disciplinary performance of the project and evaluation of its results.

Goals. Two project goals were set since the beginning of our project:

a. As an interdepartmental and multi-disciplinary team, to form *a kernel* of instructors at OCAS who acquired the *know-how* of Distance Education (DE), including Web-Based Education (WBE), and WBI tools, and therefore ready to
b. develop *a pool* of faculty at OCAS and at UC on the use of WBI tools at WBE through a series of workshops and training seminars.

Methods. The following set of activities were deemed necessary to achieve both goals:

1. individual faculty development on various WBI tools, DE and WBE-related aspects, such as organizational models of DE systems, DE hardware, DE software, DE courseware, DE students, DE teachers, DE facilitators and administrators, grants and funding in the DE area;
2. regular faculty interdepartmental group discussions on instructional technology and pedagogical methodology of Web-Based Education, and demonstrations of WBI tools;
3. attending hands-on training and workshops/seminars on Web-Based Instructional tools, and
4. team-working, peer-to-peer mentoring system, and individual instruction and consulting with participating OCAS faculty.

Faculty Development. As a result of this project each faculty - project participant, succeeded to:

a. Develop himself independently on various selected topics of DE, WBE and WBI tools, and make a minimum of one presentation at an OCAS faculty meeting, thereby providing an interdepartmental faculty development and collaboration.
b. Attend a minimum of one DE or WBE-related national training seminar and a minimum one top-ranked national/international related conference during the project period. Make a presentation about this seminar and conference for the OCAS faculty.
c. Attend meetings twice a month to discuss findings and generate ideas/solutions on various topics/problems of WBE. In particular: pedagogical methodology, instructional technology, "student-teacher" and "student-student" communications in virtual classrooms, Web page and WBE courseware design and development, various WBI tools, suitable forms of video-, audio-, and

data-conferencing via the Internet, as well as other topics.
d. Submit at least one proposal to present a project-related paper at a professional conference in 1999.
e. Submit a minimum of one project-related article to a scholarly journal for possible publication in 1999-2000.
f. Acquire necessary hardware, software, and textbooks on DE, WBE, and WBI tools, as well as books on different educational technologies and pedagogical aspects of DE and WBE.

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3. Main Project Outcomes

Outcome # 1 - Faculty "brainware" on DE systems. The project team conducted research to identify various aspects of DE, WBE, and DE systems worldwide. Particularly, the list of research topics included but was not limited to:1) the examples of well-known *international* and *national* (USA) DE systems, as well as smaller *local* DE systems, 2) models of DE systems (international, national (USA), local), 3) generations of DE related technology, and popular DE media /support technologies, 4) organizational aspects of DE, 5) DE degree programs, DE credit/noncredit courses, 6) DE teachers, and DE facilitators, 7) DE classrooms and equipment, 8) DE targeted student body – i.e. DE students, 9) DE tuition fee, 10) DE administrators, 11) list of features of common DE system (international, national (USA), and local), 12) costs of DE hardware, courseware, and software, 13) financial support/initial investments to DE systems, 14) DE students, DE teachers, and DE facilitators, and 15) "No Significant Phenomenon" of DE education. Numerous DE systems worldwide have been analyzed such as:

1) Well-known international DE systems: National Technological University (USA) [http://www.ntu.edu], The Open University of the United Kingdom (UK) [http://www.open.ac.uk], British Columbia DE System (Canada) [http://www.etc.bc.ca], The Open University of The Netherlands (The Netherlands) [http://www.ouh.nl], The University of South Africa - UNISA (South Africa) [http://www.unisa.ac.za], The Open Learning Agency of Australia (Australia) [http://www.ola.edu.au], Open Learning Institute of Hong Kong [http://www.oli.hk], Centro de Ensenanza a Distancia (Spain) [http://www.ceac.com], and other international DE systems.

2) Well-known national DE systems: The Pennsylvania State University (USA) [http://www.cde.psu.edu], The Indiana State University [http://www.ind.net], The INTEC College (South Africa) [http://www.intec.edi.za], Monash University (Australia) [http://www.monash.edu.au], Instituto Nacional de Educacao a Distancia (Brazil) [http://www.ibase.org.br/~inld], Horizons University (France) [http://www.h-university.com], and other national DE systems.

3) Local (USA) DE systems: Bellevue Community College (CC) [http://online.bcc.ctc.edu], Clackamas CC [http://dl.clackamas.cc.or.us], Laramie County CC [http://www.lcc.whecn.edu], Cerro Coso CC [http://www.cc.cc.ca.us], Cosumnes River College [http://crc.losrios.cc.ca.us/online], Contact South – a Consortium of Ontario Colleges (Canada) [http://www.contactsouth.org], and other local DE systems. A library of on-line courses in the information Technology area can also be found at the University of Cincinnati [http://gartner.uc.edu/gartner].

The detailed results of our investigation on DE systems are presented in [2].

Outcome # 2 - Faculty "brainware" on WBI tools. We conducted research to identify the features and capabilities of various WBI tools that can enable an instructor to design, develop, maintain and manage WBE curricula and courses. Vendors were contacted for demo versions of products. Members of the project team met regularly to discuss various WBE-related issues and, specifically: advantages, disadvantages, features, and problems encountered during pilot course creation. More than twenty available WBE tools were selected for analysis on the first stage of research. They were ToolBook Assistant/Librarian [http://www.asymetrix.com], AuthorWare [http://www.macromedia.com], ClassWare [http://classware.uc.edu], Convene [http://www.convene.com], CourseInfo [http://www.blackboard.net/courseinfo], Director [http://www.macromedia.com], FirstClass Collaborative Classroom [http://www.education.softarc.com], Front Page'98 [http://www.microsoft.com], Intrakal [http://www.anlon.com], Learning Space [http://www.lotus.com/learningspace], MentorWare [http://www.mentorware.com], TopClass [http://www.wbtsystems.comindex.html], Virtual-U [http://virtual-u.cs.sfu.ca/vuweb], Web Course in a Box [http://www.madduck.com/wcbinfo.wcb.html], WebCT [http://www.webct.com], Webmentor Enterprise [http://avilar.adasoft.com], as well as Norton Connect, Allaire Forum, Team Wave, WebBoard, QuestionMark, and PlaceWare.

Features of WBI tools, usually, fall under three categories [3], specifically, 1) WBI tools for WBE courseware design and development, 2) WBI tools for WBE courseware management, and 3) WBI tools for "student-student" and "student(s)-teacher" communications via the Internet.

Course design tools include: 1) *course templates* to maintain consistency to the course format and provide the instructor with the tool to easily publish a course on the Web by focusing on the content that will be entered in the template, without having to worry about learning HTML, 2) *search tools* to provide a topic- or keyword-based search of course material, and 3*) course-related links*: to refer students to other web sites with information pertaining to the course, without having to exit the course site.

Course management tools include 1) *on-line assessment tools* such as quiz/test generation, administration, and grading – based upon a bank of test questions, and 2*) student tracking tools* to track student access of course material as well as student progress on assignments and tests.

Course communication/collaboration tools [4] include 1) *synchronous communication* – support for live interaction such as chat rooms, shared whiteboards, audio- and video- conferencing, and 2) *asynchronous communication* such as built-in email, file sharing, threaded discussions, bulletin boards, and workgroups.

As a result of our research, the variety of available WBE tools was reduced to several applications for further careful and in-depth consideration and utilization by OCAS faculty. These applications fall under two categories:

1. WBI tools for instructors with *limited software development background*: Macromedia AuthorWare, ClassWare, Blackboard, WebCT, and Asymetrix ToolBook II Assistant.
2. WBI tools for instructors with *strong programming skills* and *strong background in computer science*: WebCT, Asymetrix ToolBook II Librarian, and Macromedia Director.

The second group of applications offers more advanced tools/features for the creation of Web-based courses at the expense of learning how to utilize those tools/features.

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4. Other findings

While our project has primarily focused on DE, WBE and WBI tools, our investigation had led us to conclude that features of WBI tools can be readily deployed in a collaborative multidisciplinary engineering environment. Nowadays, many engineering companies cannot have the experts needed for the development of a given product under the same roof. For instance, a number of engineering disciplines come together in order to develop and produce an electromechanical device (e.g. a cellular telephone), such as: digital electronics, mechanical engineering, production engineering, and even environmental engineering – to decide on which environmentally-friendly materials can be used for the product. Experts in each field can utilize an on-line collaboration tool to interact while designing the product, therefore breaking the barrier of distance between them. It is therefore extremely beneficial for the students of our College to learn how to deploy and use WBI tools, since such skills will be highly valued by their future employers. Going forward, our objective is therefore to first get students familiar with these tools through the learning experience of a course that utilizes them. The next step would be to require them to master one of these tools, augment it, and then deploy it as a collaboration tool in an engineering setting for cooperative multidisciplinary problem-solving.

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5. Future Work

Future activities of the project team in 1999-2000 deal with a design and development of pilot WBE courseware in various technological areas that are appropriate for the College of Applied Science, University of Cincinnati.

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