Experimental Learning: Competitive Intelligence, Knowledge Management, And Technology Transfer

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ABSTRACT

The academic Information Technology (IT) curriculum is evolving to respond to the globalization and diversification of information space. IT educators continue to (1) expand traditional definitions of information work and (2) offer courses and opportunities for experiential learning that extend beyond the boundaries of contemporary use of IT. This is key to the continued long-term relevance of IT programs in traditional academic institutions. This paper presents a discussion of competitive intelligence (CI) education embedded in one university's IT program. Focus is placed on the student's (co-author Doug Adams) experimental learning activity implemented by his field experience in a nearby technology transfer center that integrated course content and business objectives with particular emphasis on adding value to the technology transfer process itself. Despite the existence of innovative CI software, such applications have not traditionally been part of the basic IT curriculum. That is why the use of technology transfer centers provides a good substitute. This paper concludes with a discussion of the resulting benefits to the student, to the institutions involved and to the technology transfer process as a whole. These benefits were the direct result of this student's subsequent engagement in independent problem-solving activities that grew out of his experiential learning activities.

Keywords: Experimental Learning, Cross-Disciplinary, Common Platform, Technology Transfer, Poster Session

1. COMPETITIVE INTELLIGENCE EDUCATION

The mission of Drexel University's College of Information Science and Technology is to advance, through teaching and research, the information field - integrating its human, social, and technological aspects and laying its intellectual foundations. The establishment of CI education with a strong IT component has proven to be a popular and effective means of building bridges between faculty in different disciplines, building academic corporate partnerships, and reinforcing the value gained through multidisciplinary approaches and the inclusion of diverse points of view. The CI curriculum at the graduate level consists of a series of course-length modules delivered both on-site and on-line, resulting in a Certificate for those who successfully complete the program. It has proven to be a popular means of introducing students to various career options, by including a variety of fieldwork experiences.

Competitive Intelligence (CI) is briefly defined as the systematic creation and selective dissemination of knowledge derived from the identification, extraction and analysis of relevant information. The members of the Society of Competitive Intelligence Professionals (SCIP) work in a broad variety of industries and have backgrounds in areas such as accounting and finance, market research, government intelligence, information systems, law and library science. Use of information systems provides a common denominator, although the capabilities and specifics of these systems and the supporting technologies varies widely. Experiential learning related to the CI function encourages students to (1) investigate a number of career options and (2) support the business objectives of employers. The process encourages mutual awareness-building that supports both curriculum development, student interests and employers.

To ensure that the curriculum aligns with the needs of organizations, the Drexel University CI program integrates the insights and recommendations of practitioners and consultants and the core competencies identified by SCIP and its local membership into the curriculum development effort. Practitioners and corporate executives are actively involved in each component at all levels. They are encouraged to comment and advise on course content, instructor effectiveness and student work. The program has created new opportunities for collaboration with industry as well as with other academic disciplines and sister universities. We believe that this is a result of increased industry awareness of the strategic synergies and co-branding potential of the content, and that experiential learning supports this process.

The CI process is viewed as a continuum leading to the development of actionable intelligence--or recommendations for action that are based on scenarios and forecasts. CI utilizes skills found in a number of IS-related programs. For example, librarianship contributes online database searching, organizing and surrogating information, query negotiation, resource validation, data analysis, content representation and information dissemination. The secondary sources utilized in CI are those that are covered in many of the resources or "tools" components of library education. These include the general and trade press, company and industry information, external (secondary) databases, and government documents, science and systems and gray literature. Information systems and technology programs contribute systems requirements analysis, human computer interaction, database design, data warehousing, data mining, strategic focus on internets, intranets and extranets, knowledge management and project management. These concepts, combined with content from other disciplines, can help students develop critical thinking skills and innovative approaches that relate IT to the functional imperatives and competitive needs of an organization. It is increasingly more difficult to determine which of many important skills should be included in the IT curriculum (Gower 1999). As a result, experiential learning helps students and employers to participate in curriculum development. However, there are several difficulties that impede the inclusion of experiential learning in a CI program:

- Projects are generally proprietary
- Projects require substantial knowledge of a given industry
- Results must be presented in a fashion appropriate to and must be appropriate to the corporate culture.

In addition, recent innovations in high-end, multi-agent collaborative systems are rarely available to students in the educational setting, and many expensive sources of market and industry information are not available in the academic setting. For example, CI requires skills such as benchmarking, product costing, technical forecasting, modeling, and sophisticated database development and data mining techniques. Many of these continue to be infrequently offered. Projects are often small, of limited duration, do not depend on expensive information resources, and the organizational culture is at least somewhat familiar to students.

CI certification is awarded to graduate students in the Information systems, Software Engineering, and Library Science Masters Degree programs, upon completion of a similar sequence of courses. This certificate is also available to practicing information professionals involved in strategic decision-making through an on-line continuing education program.

One Student's Educational Journey

Doug Adams (previously identified as the student co-author of this paper) received his B.A. in History. Many of his College peers were engineers, which gave him a unique appreciation of their information and research needs. Following his graduation, he worked in two law firms as a paralegal, where he was assigned a variety of research projects on such topics as bioremediation techniques employed by environmental engineers, reconstructing public and private company histories, and analyzing the historical role of expert witnesses in patent claim construction.

In 1998, Doug realized that he needed to learn how and where information was stored, how to gain access, and how to effectively share his research results. Additionally, once this information was gained, he wanted to find effective ways to archive it for future reference and analysis. Ultimately, his goal was to participate in creating a bridge that linked humanities and science and supported collaborative approaches to problem-solving. For this reason, he enrolled in a graduate program that allowed him to combine courses in library science with courses in IT.

Both authors of this paper have been, as the student co-author phrases it, "lifelong advocates of integrating the world of humanities with the breadth of science." Both advocate the use of experiential learning to support and enhance classroom learning. As the student explains it, "the educational requirements are markedly different in their respective professions, but practitioners of humanities and science share several skills. Research, collection development, data analysis, perception and context of information under study are activities required by the humanities and science. A historian may research the origins of the ideas contained in the Declaration of Independence and a scientist may investigate gene chromosomes to predict future predilection to a disease; but each practitioner utilizes, or should utilize, the same research activities."

Doug's position is that many of today's knowledge workers must be as comfortable reading the origins of the US Constitution as they are with analyzing the positive role that microorganisms can play in our environment. This position is not always appreciated by either IT educators or students, although the faculty co-author of this paper (who has advanced graduate work in the humanities) completely agrees! As the example in this paper demonstrates, there is considerable long-term residual value in promoting this belief. The balance of this paper focuses on the student co-author's involvement with experiential learning, and the resulting benefits that have accrued to date.

2. THE VALUE OF EXPERIMENTAL LEARNING - A TECHNOLOGY TRANSFER EXAMPLE

To help Doug integrate his background work experience, career goals and classroom learning, he chose to participate in experiential learning activities. As Doug puts it, "Upon completion of the first year of the program, I felt that I had gained sufficient education to implement what I had learned. Once a week I volunteered my services to the local technology transfer center (TTC) of a nearby university, where I assisted market research directors by identifying, analyzing and packaging intelligence regarding the market potential for new technologies and drugs in discovery."

As an aside, this local TTC field experience has its own history. Initially, the TTC market research director learned of the CI program through a friend who was affiliated with the College. The first student to be placed met the requirement of a hard science (in this case, biology) background. However, the student found that this environment was not ideal (also an important positive outcome of experiential learning) and the work product did not completely meet the employer's needs. The instructor was encouraged to suggest an individual with different background and sent the co-author of this paper. The placement substantially met the employer's expectations, and the bar was raised for the next student placed!

At the center, Doug learned that "technology transfer is a process by which inventions or intellectual property from academia are licensed for industry use. TTCs aid this commercializing process by creating relationships with appropriate industries. At the same time, TTCs develop an entrepreneurial environment by blending the needs of academia and industry. University research is primarily structured for long-term, sometimes high-risk research, without careful scrutiny of shareholders. In contrast, industry focuses on the user, therefore necessitating short-term product development in order to create profit. These two environments do not need to be isolated from each other. A symbiotic relationship beneficial to the needs of both parties can exist through participation in TTCs. Through careful market research by the staff of TTCs, academia and industry can profit from properly delivering academic research to the commercial world." a result of the success of Doug's field experience, both he and the technology transfer center found that information specialists can play a valuable supporting role in:

- Evaluating and marketing inventions to industry.
- Determining royalty fees by researching comparative deals.
- Measuring the success of TTCs.

As previously discussed, the CI program embedded within the Drexel IT curriculum is actually a series of three courses. The first course covers business information resources across some ten separate topical areas. According to Doug, "My experience taught me that information specialists are a natural fit within technology transfer centers because of their familiarity with information resources. The scope of research topics includes business, demographics, physical and life science, and technology. An information specialist's repertoire includes reference books, journals (print and electronic), databases, associations and usenet newsgroups. To help wade through all these possible resources; an information specialist must first employ a search strategy. Secondly, an evaluation of these resources must be employed to in order to answer the question. By helping to package critical market intelligence, information specialists can help link academia and industry and, thus fulfilling the university's mission."

Doug came to realize that the amount of technology transferred to industry is directly related to the amount of research conducted by universities. However, he also found that the determination made by TTCs as to which research is transferable and what royalty rate to charge is not an exact science. TTC staffs operate within short time frames and have budget and staff limitations. Their budgets generally prohibit basic access to fee-based time-sensitive information, and the underlying research and development is dynamic and discontinuous. As a result, traditional market models for intelligence gathering and library-based research simply do not work. This is important, as research of products and markets is an essential component of technology transfer centers. Information specialists help to package this critical market intelligence in the form of market reports as well as provide current awareness by referring TTC staff to specific print and electronic forms of intelligence gathering. As a result, many TTCs are beginning to recognize the benefits of employing information specialists with strong IT skills.

EXPERIMENTAL LEARNING - PUTTING IDEAS INTO PRACTICE

The value of experiential learning has been widely discussed, of course, but the authors of this paper wish to emphasize that experiential learning is life-changing for some students, including the student co-author of this paper. As a result, the experience should be carefully structuring and there should be close communication with the interested parties, regardless of whether academic credit is involved. In this case, the value of the experience was in the student's willingness to undertake independent, non-credited, research endeavors and investigate the issues and problems that face technology transfer centers. Even though Doug completed the CI program, he remained concerned about the problems he encountered that were related to the "fuzziness" of the technology transfer process. He spent time learning more about it. This interest surfaced again in the final (capstone) course of his graduate program. In the capstone course, students are required to work as a team on a project negotiated with the instructor. In this instance, the instructor deliberately provided minimal guidance to encourage student creativity:

1. Do something IT-related that will solve a real problem and make a positive contribution to the community and/or the school.
2. Do it in such a way that it demonstrates mastery of the graduate program's course content as a whole.
3. Do it as a team.

Doug formed a team and persuaded them to focus their project on technology transfer. This team included two students in library science and two students in the IT program. Their work experience was (1) serials librarian, (2) chemical engineer, (3) software developer; and (4) paralegal. The team developed and built a prototype database (Poster-Link™) that monitors posters presented worldwide at conferences. Poster-Link electronically archives and tracks poster abstracts. Data can be mined and profiles generated by selecting one or more fields contained in each poster abstract. Customers can track research conducted at the grass roots level, evaluate historical trends and spot cross-disciplinary research opportunities. It provides potential investors with better insights. It encourages researchers to find others at the cutting edge through cross-institutional and divergent disciplines. The value of this knowledge is that it is an early warning of trends that is pre-publication and pre-patent.

Sometimes, the simple IT solutions are best! This simple solution provides a number of benefits. It eliminates the motivational problems attached to forcing researchers to compile, submit and update research profiles in national databases. It captures research activities of those who choose not to complete such profiles. It provides profiles of research activities across institutions and across disciplines. It provides the poster session sponsors with simple, easily managed, inexpensive solutions to the logistical difficulties associated with poster session paperwork.

3. Common Platform

The IT graduate program, along with his applied experience, taught Doug that if a conversation occurred between the world of humanities and science, problems could be identified and solutions could be found. He reports that "a conversation among various practitioners can be enabled through careful structuring of a common IT platform." According to Doug, "At the heart of such a platform is records management. Subject analysis, classification systems, indexing methods and systems, natural language vs. vocabulary control must be considered before a records management system is implemented. A thorough review of the stakeholders must be conducted because each practitioner's point of reference may contradict or overlap."

4. Complementary Skills

Both authors agree with Doug's assessment: A common platform is best built by incorporating cross-disciplinary skills. Poster-Link originated from a class project consisting of a team of two graduate students from the library and information science program and two graduate students from the information systems program. Issues such as content representation, user needs, visual display of the database, identification of fields contained in each abstract, and identification of the data elements contained in the database needed to be thought out in advance of database construction. The team gathered requirements to develop better user derived interfaces as well as a robustly performing electronic data archive. Periodically, the team reanalyzed the layout of the poster-link environment, such as system processes, system management, data flow, data storage, data-warehouse, activity flow, assumptions, and rules and regulations. In addition, the team had to weigh the benefits and pit falls of various software packages and programming languages when selecting the software for development or publishing implementation.

5. CONCLUSION

On a final note, this faculty member believes that experiential learning has yet to reach its full potential in IT education. When students are encouraged to become involved in interesting environments that challenge their creativity as well as their IT skills, it is possible to derive tremendous, long-lasting (and often unanticipated) benefits.

6. ACKNOWLEDGMENTS

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7. References

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