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u **sing Information Systems as** a U **nifying Influence in an Integrated Business Curriculum**

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Abstract

The integrated business curriculum of a College of Business at a public university in the northwestern United States uses semester projects and thematic examples to demonstrate that most business problems transcend functional areas. Information systems have proven to be especially useful for this purpose. The focus of the article is to describe the integrated business curriculum in general and, more specifically, the role of information systems as an integrative force within this curriculum. Specifically, the use of information systems models to develop thematic slides for reference purposes during class lectures and integrative information system student projects are described. Examples of these thematic slides and integrative projects are provided. Also presented are recommendations regarding how these techniques can be used in information systems courses.

Keywords: Integrated Business Curriculum; IS Projects; Integration, IS, **and** cross-functional approaches

I. INTRODUCTION

In the early nineties, the faculty of the business program at the University of Idaho undertook a major review and revision of its undergraduate business curriculum. This revision was in response to concerns raised by the business community in general (e.g. Byme 1993; *HarvardBusiness Review*, 1992) and to those specifically directed from the college's own advisory board. The thrust of the revision focused on the common body of knowledge courses at the junior level. Primarily, the revision sought to address the concern that contemporary business graduates, while competent in the functional areas of their majors, did not adequately understand the operation of the entire business as a whole.

The outgrowth of this review was the development of a new curriculum model labeled the Integrated Business Curriculum (IBC). This new approach integrated the traditional core courses into a set of six course modules delivered sequentially over two semesters in blocks of nine

credits each tenD. IBC has nine hours of lecture each week during the semester. Students register for the entire nine- credit block each semester and typically remain with the same cohort group for the entire academic year. IBC focuses on the business process rather than on individual functional areas such as marketing or finance.

While the specific curriculum model described here may not yet be widespread, the lessons learned should be of wide interest to information systems (IS) faculty. Just as information systems are a major unifying force in modem businesses, IS can be a unifying force in business curriculum development. In particular, IS related projects and themes have been used in IBC as a means of demonstrating that there are no pure production, nor marketing, nor finance, nor, for that matter, IS problems. Rather, there are only business problems. The projects and thematic slides used in IBC illustrate the interrelations between the various business functions.

The IBC course is taught by an interdisciplinary faculty team of five or six members drawn from several functional

areas within the college. The faculty team selects a business with which to partner. The partner business provides executives as classroom guest speakers as well as corporate data and management issues that provide the basis for student projects as well as for many of the class lectures and discussions. To date Harley Davidson Motor Company, Micron Technologies, and Columbia Sportswear have served as partner firms. Specific details of the IBC approach and its development are given in Stover Morris, Pharr, Reyes, and Byers (1997) and Pharr, Morris, Stover, Byers, and Reyes (1998).

Each IBC module begins with a thematic slide to illustrate the issues covered in that specific module. These thematic slides are designed to reflect the integrated nature of the material in the module and to serve as a unifying theme or framework for the module. Faculty lectures are tied to the thematic slide to demonstrate added connectivity of their topics to other material in the module.

A significant portion of a student's time and subsequent module grades are based on exercises and problem solving done in teams. Each semester, students are assigned a major group project centered on the business partner's firm. One intent of these projects is to demonstrate the notion that there is no such thing as a "marketing" problem or a "production" problem, but rather that there are only business problems. A faculty team member is assigned to each student team as a mentor for the project. Each team meets with its mentor at defined intervals for advice on the team project or other team assignments.

Both the thematic slides and the projects have proven to be effective tools in achieving the course goal of cross- functional integration of material. The thematic slides often focus on information processing. Further, the projects frequently have had an IS orientation. The remainder of this paper discusses two issues. The first is how IS themes and projects can be used to help schools achieve a higher degree of integration of material across the various functional disciplines to assist in "breaking down the silos" existing in many business programs today. The second is how these thematic slides and integrated projects can be used in IS courses to encourage student appreciation of the business aspects of problem solving in IS.

2.

INFORMA TION SYSTEMS THEMES AND PROJECTS

To illustrate the general issues, the faculty develops a thematic slide for each module. A good theme slide illustrates the issues of the module and indicates how these issues interact. For example, a theme slide for a module emphasizing product development would illustrate the need to communicate with customers about their desires and with appropriate people in the business about product design and engineering, manufacturing engineering, and distribution.

Information systems models, in particular data flow diagrams (DFDs), have proven useful as tools for developing module themes since DFDs are easy to understand as they are composed of a few, simple symbols. They also nicely illustrate the communication links between business functions as well as the interdependence among these functional areas. The use of this IS tool for such purposes also conveys the clear message that IS is about solving business problem, not just about computers and other technical issues. It is an important lesson for all business majors, but especially so for the IS majors.

Designing projects is a major problem for the faculty team. Good projects need to be realistic to spur student interest, doable in the available time, and sufficiently broad in scope to span several functional areas. During the five academic years in which this course has been offered, three faculty teams (with some overlap of members) have been involved. In each team, faculty have independently designed and assigned projects focused on information systems development. Typically the projects have involved a high-Ievel design of an information system component. Deliverables have included models of business rules using entity relationship diagrams and data flow diagrams, application development using some software tool, and the generation of reports or manuals related to the project scenario.

There are several advantages to such projects. Students are very interested in information technology (IT) because it is such an important part of the economy. In addition, employers expect increasing knowledge of IT from university graduates. As a result, such projects tend to be self-motivating for many students. The focus of the projects is typically on the *business* problem rather than on coding or data entry. Thus, an IT design project is fairly easy to design so that it spans several functional areas while still being doable in the available time. Further, the business focus supports the thesis of the course and helps ensure that all faculty can provide adequate support to the students.

When the students analyze problems of a business spanning several functional areas, they see not only the value of IS, but also the relationships between the various parts of a business. For example, in an electronic commerce order entry system, students see the tight relationship between the marketing function and production. They also get a sense for how IT can change the way companies do business. From a more parochial point of view, such projects demonstrate that IS is about solving business problems, not just computers. This is a difficult lesson to convey in conventional MIS principles courses because of the context. In the IBC, the motivation for such projects comes not from the IS faculty, but rather from the other members of the faculty team. The result is that IS is presented as a means of solving business problems rather than a set of computer skills.

3.

THEME EXAMPLES

While the topics displayed on the thematic slides are not information system topics, the methods typically used to display these have a very strong IS orientation, often employing techniques such as data flow diagrams. Again, these slides are used during class lectures to illustrate the linkages among lectures throughout the module. Two examples of these thematic slides are presented and described below.

Planning and Decision-Making Figure I presents a thematic slide used by a faculty team in the Planning and Decision-Making module in mc. This slide provides each lecturer in the module an anchor point for his or her individual lecture topic. The slide takes the general systems theory framework of Input, Transformation, Output and Feedback and couples it with a general planning framework. For example, the review of probability lectures ties well to the Evaluate Alternatives block, as do the topics on causal modeling and Monte Carlo simulation. Lectures on Organizational Structure tie to the Mission and Establish Goals and Objectives blocks. The diagram provides a visual schematic for the discussions of the lecture material presented.

Electronic Market Thematic Slide Another module theme was a model of an electronic market. The model was a simplified order entry system that also included promotion, payment, and new product design elements. The representing thematic slide made use of a DFD and is shown in Figure 2. This model and thematic slide provided each lecturer in the module a means of indicating how the topic of the day fits into the "bigger

picture." It clearly demonstrates the interaction among the functional areas.

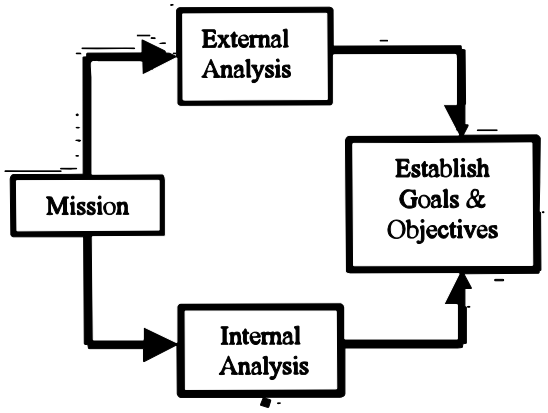
4.

PROJECT EXAMPLES

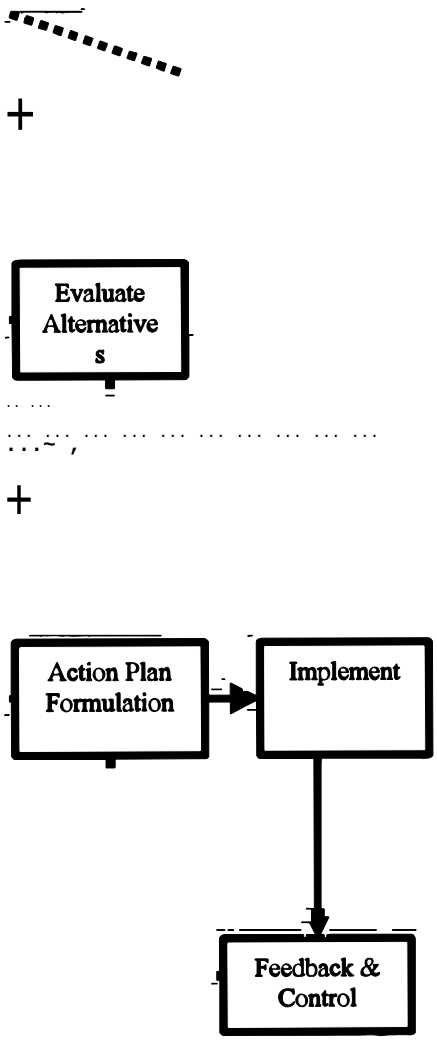
Each section of IBC requires students to complete, in teams, one or more significant projects each semester. Over the five years that IBC has existed, several IS oriented projects have been used. Four examples of these IS projects are described below.

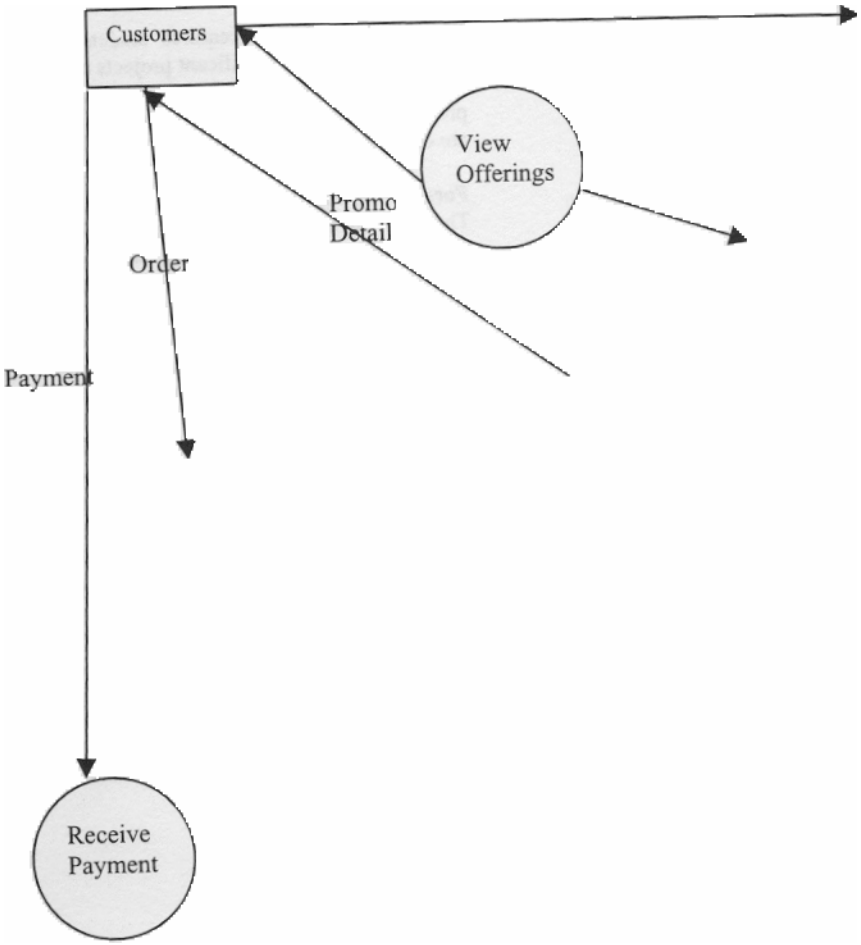
Forecasting Database Project The heart of the project was an order entry and tracking system that stored information about customers. It was loosely based on a comparable system at Columbia Sportswear. Four milestones or project installments with deliverables were set. The first two were to develop an overall logical design expressed by an Entity Relationship Diagram (ERD), and to enter instructor provided data into a Microsoft Access database. The third installment was to develop, using the data from the team's system, sales forecasts for the case company both by sales regions and in aggregate. This was to be done by developing queries against the database and exporting the output into Microsoft Excel for analysis. The forecasts were created using an exponentially weighted moving average model. The deliverables for this installment were a brief sales report explaining the forecasts and the Microsoft Excel files used to produce the forecasts. The fourth and final installment for the project was to use the resulting sales forecast and instructor provided data to build a cash budget for the company. The deliverables for this installment were a report containing the cash budget and the Excel files used for the analysis.

Figure 1 **An Example of an IS Thematic Slide**



,


Evaluate Alternatives
Action Plan Formulation
Implement
Feedback & Control

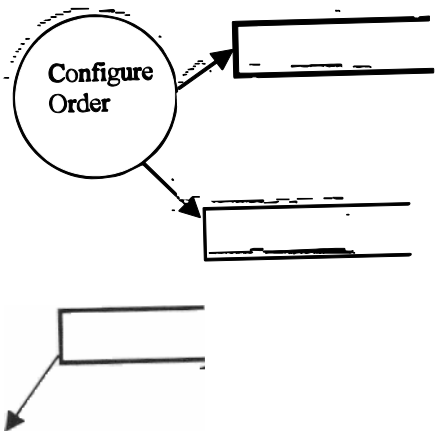


Customers

View Offerings

`Receive` **`Payment`**

Figure 2 A **Second Example of an IS Thematic Slide**

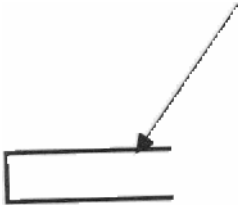


E!:

Catalog

Get Customer Data

I *t* ~ **~HistO~** , **Order**



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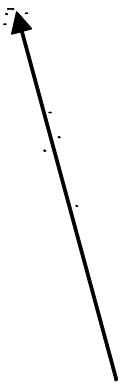
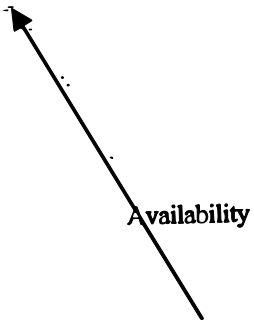
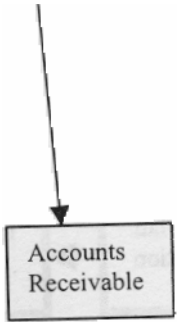


Customer Data



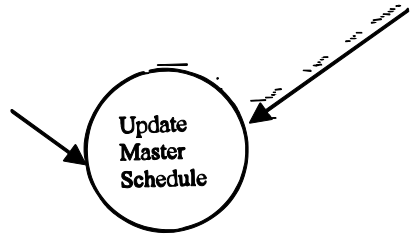
Customer Data

Pending Orders

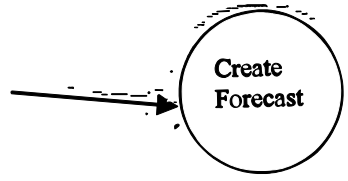


Accounts Receivable

/



Order Details



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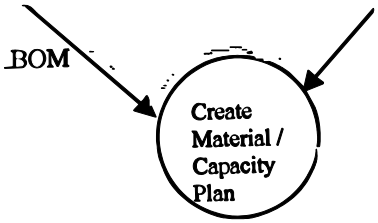

Schedul e Detail

Detail

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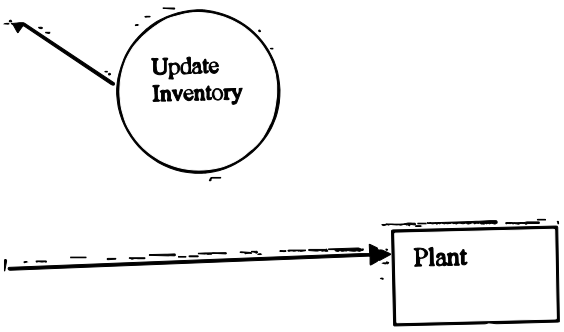
E= .-

Inventory Detail



Prod Schedule

Inventory Changes

Several comments regarding the logistics for this project are required. First, each project installment was graded individually and returned to the student

teams with guidelines for "good" or "appropriate" answers before the teams moved on to the next installment. This allowed a team that moved in the

"wrong direction" to recover on the remaining installments. Also note that the first two installments focused on systems development while the last two on the integration of marketing and finance using information systems.

Customer Database Project Another IBC project involved the development of a Microsoft Access database to track relationships (e.g., business, education, or governrnent customers) for Micron Electronics, Inc. (MEI). Students were provided a two-page scenario describing the basic features of the MEI direct sales operation and the characteristics of relationship and transactional (typically individual) customers. The scenario was designed to provide the information needed to establish the essential elements of the database. In this scenario, links between the sales group, the credit group and production group were identified that the students needed to resolve. Since MEI is a major division of an IBC partner firm, the students were familiar with the general operations and organization of MEI. Limitations were placed on the scope of the issues examined so that the project was doable for the level of the course and the time allotted.

Three project milestones were established. The first was the development of the overall logical design using an ERD. Students were asked only to identify key entities and the corresponding relationships (e.g. one to many). Students were also instructed not to use Microsoft Access at this stage, but rather to focus on identifying the correct entities and relationships. This first milestone allowed the project mentors to redirect teams that had taken an inappropriate initial focus. The second milestone involved the implementation of the database with limited sample data. Once the entities were set after the first milestone, this step proceeded quite efficiently. The third and last milestone was the preparation of a *Users' Manual* approximately ten pages in length explaining key steps to undertake when using the team's database. The *Users' Manual* was delivered with a cover page signed by **all** team members indicating their agreement with the content of the *Users , Manual.*

The project demonstrated that different groups, while having different data needs, could share common information in a database environment. It provided all students, regardless of major, a better overall understanding of the operations of a relational database system. While its scope was limited, the nature of the project was the same as ones commonly occurring in organizations where cross- functional groups meet to design such applications.

Web Site Development Project Version 1 Another project required student teams to build a team Web site. The assignment forced the student teams to reach agreement on several issues regarding how their team was to function (i.e. a team charter). Examples of these issues included a descriptive team name and logo, how work

would be divided and assigned among team members, what rule would be used to make a decision when unanimity was not possible, and how shirking by a team member was to be addressed. Given these decisions, as well as several others, the team was to develop their own Web site providing their team charter. **All** technical development was to be done to make the site attractive, entertaining, and easy to use. The sole deliverable was a functioning Web site that contained the team charter.

Web Site Development Project Version 2 In this project, each team developed a Web site for the IBC course (as opposed to a site for the team). The assignment required an analysis of the current site using a house of quality framework. In order to complete this analysis, students had to determine the purpose of the site and identify the interested constituencies for the Web site. Next, they had to accumulate and analyze data from each of these groups and use the results to design the new Web site. Instead of focusing on writing code, students first had to develop and execute a marketing research program that they then translated into market specifications. Since one of the constituent groups was the faculty team, issues like maintainability (that seem to be frequently ignored by real product designers) were significant. The deliverable was a functioning Web site.

5. RECOMMENDATIONS

The traditional business core courses as well as the IBC courses have two distinct audiences, IS majors and non-IS majors. While these groups have different interests and needs, both must understand two key ideas. First, businesses are systems and, as a result, are inherently inter-functional. In this sense, few decisions, if any, can be made that do not cross boundaries to some other functional area. Thus, to make good decisions, it is necessary to understand their impacts throughout the business. This means it is important to understand the business as a system. The second, related issue is that technology in general, and information technology in particular, must serve to advance the objectives of the entire business. Too often students see IS as a collection of unrelated technologies rather than as a unifying infrastructure linking together the business's various functions. The objective of using integrative IS projects and thematic slides in either IS or IBC courses is to encourage students that the technology serves the interests of the whole rather than to focus on technology for technology's sake.

The advantages achieved in IBC and presented here may be achieved in a conventional I.S. course. The traditional junior-level MIS course remains challenging to teach given the nature of the student audience (Kroenke 1988). One major advantage of using these projects in IBC is that the case for IS investment is made not by the IS faculty, but by those in other specialties. Such themes and cross-functional projects support pedagogical concepts important for both

the IS and non-IS majors in the junior level IS course. In a conventional course, a colleague from outside IS could be invited to give a guest lecture in support of a project assignment. Pursuing this mode further, an IS class could be assigned to develop a system to support business activities in other functional areas. One such example is for an IS faculty member to partner with a finance professor to have the IS students develop a system for a portfolio management class (Pendegraft and Reyes, 1987). As a third possibility, faculty teaching non-IS principles courses could be persuaded to use IS type models (e.g., DFDs) to illustrate key processes in their courses. In some sense all of these ideas are precursors to full integration, but given the essential role of IS in unifying businesses it seems reasonable that leadership in unifying business curricula should come from the IS faculty.

6. SUMMARY

From the experiences of several faculty teaching teams, it has been found that the use of IS models are beneficial as module themes and as semester projects in the integrated core curriculum. These models and projects serve both to illustrate information technology related issues as well as to demonstrate the pervasiveness and importance of IS in a modem business organization. They also tie together apparently separate business functions and help demonstrate that all IS problems are really business problems.

7. **ACKNOWLEDGEMENT**

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