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A Framework for MIS Curriculum Interdisciplinarity: A Vietnamese University Case

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ABSTRACT

The traditional approach to Management Information Systems (MIS) curricula development is technology-oriented, but MIS in nature is interdisciplinary. Interdisciplinary programs can be rewarding for faculty as they can expand research and teaching capabilities into new areas. Students find that such programs also enrich the curriculum. However, the cost and the hurdles for developing interdisciplinary courses and curricula are substantial. A systems approach to building an interdisciplinary MIS curriculum is needed. We use Heinz Heckhousen's six-level framework to understand MIS as an interdisciplinary field and propose implementation strategies for creating an interdisciplinary MIS curriculum. Finally, a case of MIS curriculum development using the proposed framework and implementation strategies at a Vietnamese university is analyzed.

Keywords: Information Systems Education, MIS Curriculum, Interdisciplinarity, MIS Knowledge, Developing Countries, IT Education in Vietnam, MIS Curriculum Transfer

1. INTRODUCTION

Universities are traditionally organized into disciplines such as the natural sciences, the social sciences, business studies, the fine arts, and so forth (Brewer, 1999). These disciplines are often further divided into subdisciplines. Sociology, for example, includes psychology, political science, anthropology and others. Business studies are divided into accounting, marketing, business administration, management information systems, operations research and others. Unfortunately, this fragmentation can preclude providing students with a unified view and application of subject areas as expected by society (Houseman, 1979). Graduates with fragmented knowledge will not be able to reach their maximum potential as a human or a professional in society. This situation is further complicated by the increasing complexity of

the problems facing modern society that require knowledge of multiple frameworks of (fragmented) disciplines. Interdisciplinary programs can be rewarding as they can expand faculty research and teaching capabilities into new areas as well as enriching the curriculum for students. However, the cost and the hurdles for interdisciplinary courses and curricula are substantial (Vargo, 1993).

Management Information Systems (MIS) is a relatively new discipline as compared to other disciplines typically found in business schools. "Information systems as a field of academic study encompasses the concepts, principles, and processes for two broad areas of activity within organizations: (1) acquisition, deployment, and management of information technology resources and services and (2) development, operation, and evolution of infrastructure and systems for use in organizational processes" (Gorgone et al., 2002, p 11). A typical MIS curriculum includes both IS/information technology (IT) courses and business core courses (Gupta and Wachter, 1998). Gupta and Wachter (1998) argue that the requirements for MIS professionals include effective and efficient applications of information technology to solve business problems, a firm grasp of business functions, and interpersonal and management skills to work with their functional peers. Similarly, Gorgone et al. (2002) state four significant assumptions about the MIS profession:

1. MIS professionals must have a broad business and real world perspective.
2. MIS professionals must have strong analytical and critical thinking skills.
3. MIS professionals must exhibit strong ethical principles and have good interpersonal communication and team skills.
4. MIS professionals must design and implement information technology solutions that enhance organizational performance.

Based on these assumptions, a model curriculum and guidelines for undergraduate degree programs in information systems has been developed by a number of leading experts (Gorgone et al., 2002).

MIS is interdisciplinary by nature, containing multiple fields such as computer science, business and management, systems theory and approach, and others. (Gorgone et al., 2002). MIS graduates are required to possess different capabilities and knowledge: analytical and critical thinking; business fundamentals; interpersonal, communication and team skills; and technological expertise.

But the traditional approach to MIS curricula development is criticized as too technologically oriented (Williams and Heinrichs, 1993) and the connection of MIS courses with "business/management" is tenuous (Mutch, 1996). Many MIS courses or curricula focus on technical skills (e.g., database, telecommunication, and programming) at the expense of developing skills for analyzing the impact of the technology on organizational structure, work, and people (Gupta and Wachter, 1998). Thus, many current proposed MIS curricula lack the integrative and pragmatic MIS education most demanded by business professionals (Burn and Ma, 1997; Gupta and Wachter, 1998; Lee et al., 1996; Lee et al., 2002; Zack, 1998).

Research has shown that MIS practitioners are not satisfied with the quality and skill training of MIS graduates (Lee et al., 1996). Most employers prefer graduates with highly technical skills but often complain that they lack business and interpersonal skills. From an academic perspective, many concerns remain with the curriculum (Gupta and Wachter, 1998; Lee et al., 1996; Mutch, 1996; Vargo, 1993; Williams and Heinrichs, 1993). Williams and Heinrichs (1993) argue that past and present models tend to organize course content around technologies and methodologies. In response, they propose an MIS curriculum modelled on Anthony's pyramid. Their proposed course structure is organized by type of problem: operations, management, or strategic. Lee et al. (1996) propose a market segmentation

approach to MIS curricula. Gupta and Wachter (1998) propose a capstone course in the MIS curriculum to develop students' abilities and skills.

In this paper, we argue that MIS is interdisciplinary and the problem with many current MIS curricula is the lack of a framework to understand how to present MIS as an interdisciplinary field. A systems approach to MIS curriculum development is needed; one that responds to the needs of various stakeholders. Its quality is guaranteed from the perspectives of those stakeholders: students, instructors, and organizations that employ graduates of the program. In addition, we need to understand how the knowledge and competence of multiple disciplines can be integrated into an MIS curriculum. We use Heinz Heckhousen's (1972) six-level framework to assess the integration level. At the highest (i.e., most comprehensive) level, an MIS curriculum provides MIS graduates with a balanced inventory of both technical and business skills.

2. A FRAMEWORK FOR INTERDISCIPLINARITY

Interdisciplinarity refers to the appropriate combination of knowledge from many different disciplines – especially as a means to shed new light on an actual problem (Brewer, 1999). Interdisciplinary education attempts to facilitate student and faculty inquiry across disciplinary boundaries to broaden the limit of a particular field of study (Vargo, 1993). There are many ways that interdisciplinary work can be organized, but MIS curricula currently lack any framework to facilitate understanding the different levels of multiple discipline integration that may be attained. In this paper, we propose the use of Heckhousen's (1972) six-level framework to assess the extent of integration achieved in an interdisciplinary curriculum.

A short description for each category, based on Vargo's (1993) work, is as follows:

Level 1. *Indiscriminate interdisciplinary.* This is a "teach them a bit of everything" or "potpourri" approach without specifying the interrelationships among the things being taught. In this simplest level, contents are delivered with a menu of topics (multiple disciplines) at the appropriate time without any theoretical foundation for integration. This approach is also referred to as multi-disciplinary. Many early implementations of multiple discipline programs (e.g., MBA programs) are organized in this way.

Level 2. *Pseudo-interdisciplinary.* This is the provision of the common tools and knowledge of a discipline across a variety of other disciplines in a single course. For example, providing business students with a course in IT for personal productivity is pseudo-interdisciplinary. Professors are expected to tell students how they can apply the information technology skills in such a course in their major. Unfortunately, professors often delegate this responsibility to students by asking them to find ways to apply the course material in their chosen discipline.

Level 3. *Auxiliary interdisciplinary.* This is the use of methods from one discipline to assist research or teaching in another discipline. For example, the use of multi-criteria decision making techniques (from decision sciences) to solve problems in general management, production management, and engineering management is auxiliary interdisciplinary. The provision of information technology tools (such as spreadsheets, databases, simulations, or project management) to business students to solve some business problems in organizations is a common example in many MIS courses.

Level 4. *Composite interdisciplinary.* This is the application of multiple disciplines to solve problems in organizations or society. For example, the application of marketing, operations management, and human resources management

to solve a problem with sales or the application of architecture, engineering, economics, psychology, and management to resolve a city planning issue are composite interdisciplinary approaches. Developing an MIS for an organization can be considered an opportunity to solve composite interdisciplinary work by including various stakeholders.

Level 5. *Supplementary interdisciplinary.* This is the overlapping of multiple disciplines in terms of the subject matter covered, but with substantial theoretical and practical discontinuities between the disciplines concerned. A course or a curriculum that is developed jointly by faculty of related departments (e.g., an MIS course or curriculum jointly developed by faculty from several business school departments) is supplementary interdisciplinary.

Level 6. *Unifying interdisciplinary.* This is the integration of multiple disciplines into one cohesive course or curriculum content. Examples are mechatronics (Ume and Timmerman 1995), biochemistry, and potentially MIS.

Heckhousen's (1972) framework provides the MIS curriculum developer with an idea of what needs to be done to obtain a highly integrated interdisciplinary course or curriculum. For example, as Gupta and Wachter (1998) pointed out, the traditional MIS curriculum has a major limitation: many business functional areas and many technology courses are taught independently of one another. Thus, many MIS curricula are indiscriminate or pseudo-disciplinary (i.e., level 1 or 2), while they are believed to be (or at least represented as being) unifying disciplinary (level 6 in this framework). To promote to a higher level of interdisciplinary integration, guidelines are needed.

3. IMPLEMENTATION GUIDELINES

There are different ways to promote a course or a curriculum to a higher level in this interdisciplinary framework. Gupta and Wachter's (1998) comments on the limitations of traditional MIS curricula suggest that most are at least pseudo-interdisciplinary (level 2). They observe that in many traditional MIS curricula, technology courses are taught independently of one another; business functional areas are taught independently of one another; business functional areas are taught before technology or are not taught at all; and, business functional areas are taught independently of technology courses. Mutch (1996) has a similar observation: information technology is not yet a generally accepted part of the teaching in non-MIS business areas (e.g., marketing, personnel, finance, and production).

Given these observed limitations, the general guideline for MIS as an interdisciplinary field is to increase the integration level of information technology within business functional areas, business within technology courses, and between business functional areas and technology courses. There are four strategies that may help advance an interdisciplinary curriculum or course to a higher level. They are called the auxiliary strategy, the composite strategy, the supplementary strategy and the unifying strategy.

The auxiliary strategy is designed to promote a course or curriculum to auxiliary interdisciplinary (level 3) in the interdisciplinary hierarchy. To implement this strategy, some faculty members must try to understand other disciplines at a level at which they can explain conceptual linkages with other courses' contents. This level requires increased content integration in terms of course materials. Michaelsen (1999) calls this strategy "content analysis". The advantage of this strategy is its simplicity. Note that no faculty coordination is required. Its major disadvantage is that students and faculty often lack enthusiasm for this approach. Benbunan-Fich et al. (2001) present an example for integrating information technology into the marketing curriculum of an undergraduate business program.

The composite strategy is designed to promote a course or curriculum to composite interdisciplinary (level 4) in the hierarchy. This can be done in a number of ways. First, it may be achieved through a diversified target student populace. For example, a course in accounting information systems may be open to both accounting and information systems major students. Students can learn from each other via a variety of learning activities such as group discussion, team self-tutoring, or a group project. Due to its increased interdisciplinary nature, it may be that a professor will not know everything that is needed to solve a problem introduced in a composite course. Consequently, to implement this strategy for a course, a professor may not only need material coordination, but also may need to coordinate with other experts.

Second, the composite strategy can be done with the case study method or a major integrative project. Case study has been a popular teaching method used extensively at business schools. Integrative case study is the most common approach. The normal approach to the case method begins with a system description, followed by some guidelines and questions. Subsequently the participants will be required to design alternative policies and structures. Participants learn through analyzing and discussing the case from different views across disciplines. Case study methods can enhance learners' mental models of realistic or complex environments by exposing them to multiple views of a situation. The advantage of this strategy lies in its ability to expose students to real world and critical issues that demand a high level of interdisciplinary work. Burn and Ma's study (1997) shows that action case studies contained in a graduate MIS program are proven to be highly useful for the appreciation of theory and its application in students' working lives.

Case studies are particularly effective ways to present MIS students with real situations of sufficient complexity for them to study and analyze the impact of information technology throughout the organization. IS-focused case studies in particular can improve students' analytical, critical thinking, and creative skills in the context of applying MIS to solving business problems and understanding its impact on the organization. The main requirement is to design the cases so that they can be used across multiple courses. Case studies at this integration level may require faculty coordination (but significantly less than in the next level).

A major integrative project can be used to deal with real life problems faced by an organization. The scope of such a project in MIS may vary including database implementation, website construction, investigation of networking options and groupware solutions. The objectives of the project should be threefold (Gupta and Wachter, 1998). First, students should have to learn to deal with multiple MIS tasks and make tradeoffs between them. Second, students should work in project teams and practice collaborative and interpersonal skills to make the team's efforts successful. Finally, they should learn how to work successfully under deadlines and other pressures.

Integrative projects demand a great deal of effort from faculty in supervising student progress and helping them solve many practical problems. Such projects may be supervised or guided by experts of different areas to solve the composite problems inherent in them. When integrative projects can be implemented, however, benefits for both students and faculty are substantial. Faculty are satisfied and proud of their courses. Students enjoy the hands on skills gained throughout the project, the practical experience of building information systems for real businesses, and most importantly the sense of a major accomplishment after the completion of the project.

A combination of the above approaches may enhance the quality of integration, but will certainly require more coordination efforts. An example of such a course is given in the work of Gupta and Wachter (1998).

The supplementary strategy is designed to promote a course or curriculum to supplementary interdisciplinary (level 5) in the hierarchy. Strong faculty coordination is needed to implement this strategy. A common approach uses a faculty team to teach multiple cross-disciplinary courses. A good example of this level of achievement is presented in the work of Vargo (1993). That paper reported an effort to connect materials, professors, and students from computer science and business departments. This approach has shown a high level of risk as it can result in confusion on the part of the student participants and discouragement from professors. The key lessons learned are 1) an electronic bulletin board and early feedback system can be used to improve communication between the students and the professors; 2) professors can attend each other's lectures to enhance the integration of the material presentation of the course; and 3) teams should include students from different disciplines, but a ground for good communication is needed (a computer and commerce dictionary and self tutoring groups).

Michaelsen (1999) calls this strategy "combined courses". Its advantage is that it has a better effect on student learning as it tries to develop a conceptual framework of cross-functional issues via interactions among faculty. However, it may create more problems than the benefit it can offer because it requires a high level of faculty effort for building things from scratch, coordination, and conflict resolution. Students often see more problems in this approach than the benefit that they can receive by understanding the big picture.

Finally, the unifying strategy is designed to promote a course or curriculum to unifying interdisciplinary (level 6) in the hierarchy. There are no existing guidelines for reaching this level, except an obvious option to combine all of the above strategies until the course or curriculum is well accepted by all stakeholders that it is, in fact, unifying. No documented case has been found of a unifying interdisciplinary program. Once a program has attained the unifying interdisciplinary level, it would seem that an effective and efficient way to produce other programs at that level would be to hire faculty trained in such environments. Hiring faculty from these programs would also be an effective way to "import" a high level of interdisciplinarity into a program in a developing country, especially one such as Vietnam which contains few, if any, true MIS curricula.

In Vietnam, there is no real MIS curriculum at a high level of integration. The country primarily educates students in technology through computer science programs. Some computer science graduates learn MIS concepts and skills through other experiences. However, most Vietnamese universities are starting to build MIS programs, but these MIS programs are currently at a low level of integration. To reduce the cost and accelerate the pace Vietnam could follow a model of technology transfer by starting with what is available from established MIS programs in the developed countries like the United States, the United Kingdom and Australia. This approach could overlook the particular needs of Vietnam or put in place a program of study that is not as well suited to Vietnam's needs as it could be. The alternative is to increase the level of integration in their programs by moving step by step along the interdisciplinary hierarchy. This approach may be more costly and time consuming, but is likely to result in a curriculum better suited to their needs.

4. THE MIS CURRICULUM AT HO CHI MINH CITY UNIVERSITY OF ECONOMICS (HUE)

In this section, we discuss a case in light of the suggested framework. In this case, we analyze the development of the MIS curriculum at Ho Chi Minh City University of Economics (HUE), Vietnam, and offer suggestions for increasing the level of interdisciplinarity in the curriculum.

"Data Processing in Economics" (DPE) was established at HUE in 1978, focusing primarily on mainframe-based applications. In the early 1980s, the curriculum focused on programming languages, analytical courses, hardware and software, compilers, and operating systems skills (eventually on microcomputers). In 1986, it was renamed "IT for

Management". Many graduates have become data processing personnel, programmers and technicians. In the mid-1990s, the focus shifted towards business and the managerial role of computer-based information systems to support decision-making processes in organizations. To respond to the change, the Ministry of Education and Training (MOET) of Vietnam established a new MIS department within HUE in 2002.

The department currently has 18 faculty members. About 70% of them were graduated from HUE's MIS program and have an advanced degree in computer science because there is no MIS master/Ph.D. program available in Vietnam. The department's mission is to promote applications of information technology in business and organizations but it emphasizes mastering technology.

HUE's current MIS curriculum is designed as a semester-based, four-year program to cover the common knowledge of Business (Accounting, Finance, Economics, Marketing, Management, Business Law, Statistics, Organizational Theory, Structure, and Functions), Knowledge of Information Technology (Computer Systems Hardware, Operating Systems Management, Fundamentals of Programming, Algorithmic Design, Networking (LAN/WAN) and telecommunications), and knowledge and skills related to using a business application development language (Application Development, Client-Server Software Development, Web Page Development, E-Commerce, DB Systems, Software Engineering, Systems Analysis and Design, MIS Project Management).

Business functional courses are provided to MIS students by other departments of HUE. They are designed to provide students with various concepts of how typical business functions operate so that MIS students will be able to identify problems or opportunities that information technology or MIS can support. In reality, these functional courses would be taught the same way even if no MIS students were enrolled in them. They are taught as if all of the students will ultimately work in these functional areas. There is no cooperation between the MIS department and other departments on the objectives, content and structure of these functional courses. When examining the syllabi of various courses, we find that the objectives often are to achieve technical knowledge and skills related to some technologies without relating these technologies to supporting business and organization functional decisions. Weak linkages also occur between technology courses. In design, technology courses are linked in sequence. In reality, many technology courses are taught independently of each other (see Table 1). In fact, this is very unfortunate. In assessment against our framework, HUE's MIS curriculum evaluates as a pseudo-interdisciplinary (level 2) curriculum (or perhaps somewhere between pseudo- and auxiliary interdisciplinary) for four reasons:

First, HUE's MIS curriculum is organized around information technology as a traditional curriculum (Williams and Heinrichs, 1993). The focus of HUE's MIS curriculum design is to prepare students with strong technical skills and current technology knowledge, with some basic concepts of business and the management environment interwoven where they are believed to be relevant. Students and faculty members are primarily concerned with producing optimized solutions for organizations using new technologies. Little concern is given to business and organizational problems.

Second, as the only MIS program provider in Vietnam, HUE has been developing its curriculum in an ill-defined environment. Although the fundamental idea of the MIS curriculum at HUE is to apply information technology tools and technology in supporting businesses and organizational decisions, outside of HUE MIS is thought to be a technical career, where the role of technology is more important. While the MIS profession exists in a practical sense in Vietnam, the concept of MIS is not well communicated in Vietnamese society or among Vietnamese employers. As a result, HUE's MIS students do not have a very clear understanding of their potential career paths or their profession. This situation is

exacerbated by the fact that most of the instructors come from computer science, thus, students have a tendency to identify and choose careers as programmers, system analysts, and software engineers. In fact, some MIS graduates have tried to get into Vietnamese software firms and the majority of them have failed to be recruited. These students thought that their technical knowledge and skills were low. When this information is fed back to HUE, HUE's faculty members feel pressure to increase technology use and technical knowledge in the curriculum to compete with students from technical universities. As this cycle is reinforced, students and faculty members at HUE depart from the department's mission. The lack of awareness of the MIS concept in Vietnamese society has created a reinforcing loop that has diverted the HUE MIS curriculum emphasis from its original intention and expectation.

Third, as compared to the current model curriculum developed by leading experts in the field (Gorgone et al., 2002), HUE's MIS curriculum is lacking coverage of Interpersonal Skills, Teamwork, and Communications Skills, which are found to be the most important MIS skills by both MIS practitioners and MIS academics (Lee et al., 2002; Todd et al., 1995). This is one of the factors that prevents HUE's MIS curriculum from reaching composite interdisciplinarity (level 4). This is an obvious consequence of the two previous reasons.

Fourth, HUE is large and has an inflexible departmental structure, which creates difficulty in coordination with other business departments within HUE in providing MIS students with knowledge in business functional areas. As Brewer (1999) put it: "The world has problems, but universities have departments". Traditional Vietnamese universities are built on the concept of specialization. Interdisciplinary programs like MIS are a new concept and not widely accepted in many Vietnamese universities. Departments are traditionally centers of specialized knowledge. They are not supposed to know about other departments' fields and vice versa. In this environment, the university's top management and departments at HUE generally do not support interdisciplinarity. Departmental structure favors individual achievement, while interdisciplinary curricula demand collaboration.

HUE's MIS curriculum is under revision to increase its level of integration. HUE's goal is to reach composite interdisciplinarity (level 4) within three years. Table 1 provides a summary of the MIS curriculum at HUE. Purely technical courses (such as computer architecture, data structure, operating systems, etc.) have their origin in computer science and are currently at the level of indiscriminate interdisciplinarity (level 1). Some of these courses could be combined into a single course that provides MIS students with the basic concepts in computer systems. Pseudo- or auxiliary level interdisciplinarity of integration (level 2 or 3) is possible.

Foundation courses (such as database, visual programming, software engineering, system analysis and design etc.) that are supposed to be used in later courses are currently at the pseudo-interdisciplinary level (level 2). These courses can potentially move to auxiliary or composite level interdisciplinarity (level 3 or 4) if they are able to integrate with other technical courses (to reach auxiliary interdisciplinarity), or able to integrate projects in business functional courses (to reach composite interdisciplinarity).

Some MIS courses (such as e-commerce, software project management, decision support systems, etc.) that are supposed to integrate with knowledge in other fields are also at the pseudo- or auxiliary interdisciplinarity level of integration (level 2 or 3). These courses can potentially move to composite or even interdisciplinarity levels (levels 4 or 5), if they focus on a particular problem in business (to reach composite interdisciplinarity), or if they integrate problems from another field (to reach supplementary interdisciplinarity).

Table 1. Summary of HUE MIS Curricula

Course	Current characteristics	Semester	Current level (*)	Potential changes	Potential level
Computer Architecture	Purely technical; no connection with other courses	2	1	Indicate how the knowledge of this course can be used in other courses	2-3
Fundamentals of Computer Programming	Purely technical course	2	1	Change assignments to require solutions to business problems	3
Data Structures	Purely technical; no connection with other courses	3	1	Design data structures for systems that address business problems	3
Operating Systems	Purely technical course	3	1	Indicate how this knowledge can be used in other technical courses	2
Object Oriented Programming	Foundation/technical course	4	2	Design project for business problems	3
Data Communi-cations and Networks I	Purely technical; no connection with other courses	5	1	Combine with E-commerce	3
Database Systems I	No connection with other courses	5	1	Make connections with other related courses (such as database, visual programming etc.)	3
Database I	Foundation/technical course	5	2	Integrate design with project from systems analysis course; Require design of database for some non-MIS course	4 -5
Visual Programming	Foundation/technical course	5	2	Design project for business problems; combine with database courses	4
Database II	Advanced issues in database.	6	1	Integrate design with project from systems analysis course;	2 - 3
Database Systems II	Taught independently of related courses	6	1	Make connections with other related courses (such as database and programming courses)	3
Data Communi-cations and Networks II	Taught independently of all other courses	6	1	Combine with E-commerce	3
Decision Support Systems	Introduces DSS tools Uses knowledge from database and programming courses	6	2	Require design of DSS tools to support managerial/functional decisions; integrate with management science courses	4-5
Software Engineering	Taught independently of all other courses	6	2	Integrate design with project from systems analysis course; software project management	4 -5
Systems Analysis & Design	Taught after programming, database, and data structure courses. Related to some managerial functions at operational levels	7	2-3	Require design of system for another functional area of business (e.g., marketing); Make this requirement for MIS students in non-MIS (e.g., marketing) class	4 -5
Software Project Management	No connection with software project courses	7	3	Require a major project from other courses such as system analysis and design or E-commerce	5
Electronic Commerce	Managerial approach; no connection with technical courses	7	2	Require design of an E-commerce site for E-commerce course	4 -5
Web Program-ming & Database Application	No connection with related courses	7	2	Require design of an E-commerce site for E-commerce course	3 - 4

5. DISCUSSION

Developing an interdisciplinary course or curriculum may raise some issues regarding faculty coordination, instructional materials, curricular compatibility (Williams and Heinrichs, 1993) and the student populace (Vargo, 1993).

First, an interdisciplinary course or curriculum requires strong coordination among faculty within a department and across departments, which may cause considerable cost and substantial hurdles. For a new interdisciplinary course, multiple faculty members from multiple disciplines need to coordinate to develop and deliver the course, ideally in a *team teaching environment* where there is considerable harmony in the theory and application of the whole subject or program. It also requires multiple professors to be present at each other's lectures and challenge each other's viewpoints (Vargo 1993). As the course becomes stable, knowledge of multiple disciplines is harmonically integrated into the course content and a single faculty member may deliver the entire course, but multiple faculty must remain involved in the course to keep it updated. Faculty coordination is required to reach supplementary interdisciplinarity (level 5) of the integration framework.

Integrative case study seems to be the best candidate for teaching cross-disciplinary course contents to reach composite interdisciplinarity (level 4) integration. However, one of the main weaknesses of the case method is that the integration of knowledge across different disciplines is not systematic and no documented guidelines for the method exist. As the Vietnamese students traditionally have been considering problems in isolation, they likely will have difficulty in grasping multi-dimensional problems that involve not just technology, but also human and organizational factors (Gupta and Wachter, 1998). As a result, beginning applications of the case study method in the HUE MIS courses may arouse a great deal of frustration in the students.

Offering a course to a composite target student populace, for example, students from different departments such as computer science and business, may help achieve composite interdisciplinarity (level 4) integration in early stages of course or curriculum development. Vargo (1993) provides three levels of student populace. The first has a high level of harmony in their theoretic and applications framework. This is the case that all students are from a single department or discipline. The second reflects multiple disciplines, but with similar theoretic and applications frameworks (e.g., students from the various disciplines within business). The third also reflects multiple disciplines, but with significant differences in terms of theoretic and applications frameworks (e.g., business students and engineering students). To achieve composite interdisciplinarity (level 4) integration using a target student populace, the most diverse student population is needed.

To implement a successful interdisciplinary course, good interdisciplinary material is needed. However, many current textbooks or teaching materials are not interdisciplinary. Thus, to develop the material for interdisciplinary courses several faculty must be involved. Increasing the number of faculty involved raises the cost of the development effort and requires greater coordination.

At the highest level of integration, materials from multiple disciplines are harmoniously integrated into the course content and process which can be delivered by a single professor to a student populace from a single discipline. The difficulty in delivering such a unifying interdisciplinary course is minimum. At the other extreme, we may have materials from multiple disciplines with considerable discontinuity in the underlying framework. Also, professors that are "team teaching" have different mindsets and the student populace is from multiple disciplines with substantial discontinuities. There are many combinations that may take place between these two extremes. Practical application of the framework needs to take these factors into consideration.

Finally, there may be some compatibility issues when students taking some courses in an interdisciplinary course or curriculum want to transfer to other MIS programs built on less interdisciplinary curricula.

6. CONCLUSION

MIS is an emerging, interdisciplinary field. MIS professionals are expected to possess various and integrative skills and knowledge in multiple areas (Burn and Ma, 1997; Lee et al., 2002; Todd et al., 1995; Zack, 1998). "Knowledge does not come in pieces: to understand an aspect of [IS] nature is to see it through "all" the ways of imagery" (Churchman, 1971, p. 198).

However, most proposed MIS curricula lack the integrative and pragmatic MIS education demanded by MIS practitioners. From their recent empirical study using the survey data from both MIS practitioners and academics, Lee and others (2002) claim "the MIS education system is known to be somewhat ineffective".

To respond to this, it is important to establish a framework of interdisciplinary course or curriculum development for MIS. However, the situation is that there is no extant theory for building an interdisciplinary course or curriculum.

In this paper, we use Heckhousen's (1972) six levels of interdisciplinary and Williams and Heinrichs's (1993) approach to understand the level of interdisciplinarity to develop implementation guidelines for curriculum developers. The most challenging for many interdisciplinary courses/curricula is at level 4 (composite) and 5 (supplementary) and how to move to the highest level (unifying). A case of MIS curriculum efforts in Vietnam was introduced to illustrate the application of the proposed framework.

While it is too early to say conclusively, the case of MIS curriculum development at Vietnam's Ho Chi Minh City University of Economics seems to reveal that the process of developing an interdisciplinary MIS curriculum appears to be not a simple conversion process, but rather a complex, socio-technical process which influences and is highly influenced by other institutional arrangements such as existing MIS curriculum and departmental structures. The progress of the MIS curriculum effort in Vietnam is expected to offer more insights and lessons in how to develop MIS curriculum interdisciplinarity. These will be reported in future work.

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