INTEGRATION OF MANUFACTURING AND COMMERCE CURRICULUM- A FUNDAMENTAL TEACHING PLATFORM IN TAIWAN

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Abstract- *In order to enhance innovation education for the engineering and business students, a web-based interactive Fundamental Teaching Platform(hereafter as FTP) ,has recently been proposed in the campus of Ta Hwa Institute of Technology in Taiwan. FTP is a collaborative scheme that involves teachers from widely different backgrounds to work on an interdisciplinary curriculum. Under a grant support from government, Ta Hwa has started to implement a cross curriculum arrangement in the areas of Manufacturing and Commerce. Three departments in those areas, Business, Information Management and Automation Engineering, have been designated to develop course materials for this purpose.*

Though this FTP program is still in its early stage (whole project runs into three years), much anticipated and even unanticipated benefits have already emerged. This paper will present some preliminary results in the course development and discuss its impact to the methodology in developing integrative curriculum that cuts across traditional disciplinary boundaries.

Index Terms- Fundamental Teaching Platform, Integration of Manufacturing and Commerce Curriculum, Web-based teaching

DEMAND FOR INTEGRATIVE CURRICULUM

In the much-cited knowledge-based economy age, universities are supposed to provide business and society with talented human resources who can integrate knowledge and thus add potential value to their jobs 1 . However, traditional technical education system, which is based upon the concept of vocational training and skill-development, usually fails to meet this challenge.

Yet as shown by TABLE I, (overleaf) environments drivers have made the need for integrative capabilities covering both engineering and business fields more imperative than ever. Universities nowadays have to invest great effort to formulate a curriculum, which can be suitable for business as well as engineering students.

Of course, functional-oriented departmental curriculum also sets out to include some of the courses in TABLE.1 (such as Supply-Chain-Management and Customer Relationship Management). But none, until very recently, has started to build up an independent curriculum around the core concept of integrative manufacturing and commerce process.

Thus as an overall project to improve our fundamental technology education here in Taiwan, government has put integrative education of manufacturing and commerce high priority on education agenda. With grant from this agenda, together with Ta-Hwa's own matching fund, we then can experiment on this three-year innovative project, totaling $0.3m.

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TABLE.1

REQUIREMENTS FOR INTEGRATION OF MANUFACTURING AND COMMERCE

Drivers / Fields	Environments Drivers	Technology Requirements
1.Automation	1.1.Globalization of Market and Speed-driven management 1.2.Shorter life-cycle for high-tech products	¼ Integrative logistics ¼ Just-in-time operation ¼ Agile manufacturing system
2.Electronic Commerce (short as EC)	2.1.EC is taking place everywhere 2.2.E-market is replacing traditional market	¼ Business models(B2B or B2C) ¼ Supply-chain-management
3.Knowledge-Intensive Industry	3.1.Innovation is key to competitiveness 3.2.Increasing value through IPR (Intellectual Property Rights)	¼ Knowledge-management ¼ Innovation education & ¼ Customer Relationship Management

Source adapted from 2

In the Table.1 above , it is not very hard for us to understand why the traditional engineering or business education, based upon isolated training and learning courses, often fails to provide the industry with qualified and suitable graduates.

All the new technology or skill requirements in the present highly competitive environments often cut across traditional disciplinary boundaries. Take the technology of Integrative Logistics for example. It not only covers engineering fields such as automation warehousing and product standardization, but also deals with the business areas such as material and distribution management. So a new approach in course planning and teaching method is in urgent. 3

It is based upon this recognition thus our School has set out to design and implement the above-mentioned FTP. Also for the purpose of reaching as many students as possible, this FTP is basically web-enhanced and can be accessed by students in real-time and on-line basis.

CONFIGURATION OF FTP

Though many see web-based teaching only as a supplement rather than a substitute to traditional teaching 4 , e-learning and its related technology still dominate most of the so-called “teaching innovation” in these days.

Our original thinking is to design an interdisciplinary curriculum schema, addressing to issue of the integrative capability development, which is so urgently needed in modern industry. Web-based or not is not our main concern, initially. But the economy and flexibility nature associated with e- learning 5 has made the choice an unavoidable one. Essentially, our FTP schema includes the following three parts:

- Setting up a web-based teaching data base, including interactive curriculum covering essential business and manufacturing topics.(See FIGURE.1, overleaf, for detailed)
- Building an on-line learning intranet, functioning as an intelligent learning agent which can be accessed by user as useful tools in self-evaluation and self-study planning.
- Coordinating a comprehensive course development plan which reorganizes and streamlines traditional function-oriented courses in a business process-oriented way.(See TABLE.2, overleaf, for detailed)

Process-orientated rather than function-oriented

One drawback of traditional technical education is that effort of students is channeled to the narrow field knowledge of a specific topic only. While seeing each tree clearly, they fail to recognize the picture of whole forest. So later in career development, they usually stop at technical position and cannot move forward to senior posts requiring integrative skill. Seeing this and realizing that process-oriented organizational reengineering is the dominant trend in modern business, priority in FTP has been assigned to design of a curriculum that cuts across traditional curriculums boundaries. The core concept of this curriculum is that business knowledge whether related with manufacturing or with commerce, should be aligned with actual value-added process in the real world. Thus course such as marketing research should not be learned and taught in an isolated way, rather it should be arranged collaboratively with manufacturing course such as

Product Design and Analysis. As the output from the former topic is often fed into the latter as input.

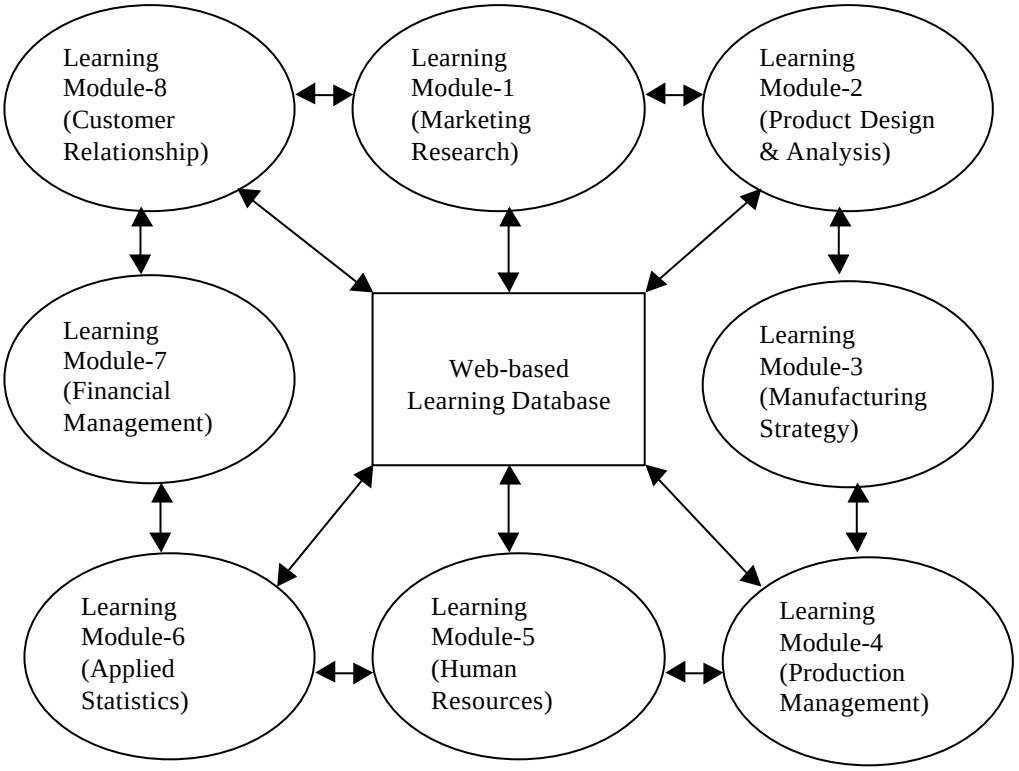

FIGURE.1

WEB-ENHANCED LEARNING DATABASE

Course Planning for FTP

As the business process-oriented curriculum, such as one shown by FIGURE.1 above, is currently not available in Ta-Hwa, so a brand-new course planning is again needed in this FTP. The course planning is interdisciplinary in nature as can be easily seen in TABLE.2 below. Each of three participating departments will tailor its original courses to fit them into the whole process-oriented curriculum structure.

The course planning includes three main parts.

- Turning the usual classroom materials into electronic format(in power point form)
- Modularizing the course structure, so each part can be independently learned and taught.
- Accompanying the electronic format of teaching material with video-audio supplements (mainly to explain the key content by participant teachers)

In such an arrangement, we hope the whole curriculum can be run on a VOD (Video on Demand) basis as a supplementary to the traditional class teaching.

TABLE 2

INTEGRATIVE COURSE SCHEMA

Departments	Basic	Advanced	Comprehensive
Automation Engineering	Introduction to Engineering Mechanics	Quality Engineering Product Design & Analysis CAD Manufacturing Strategy	Practice & Graduation Project (This course applies to all three departments)
International Trade	Economics Applied Statistics	Marketing Research Customer Relationship Management Financial Management Human Resources Management	
Information Management	Data Base Management System Analysis & Design	Production Management Operation Research E-Commerce	

Currently, the designated requirement for this FTP program is 21 credit hours. When undergraduates, either from engineering or business background, register in this program, they will need to finish these 21 credits besides their original department's requirement. In such an arrangement, students will be encouraged to study basic and advanced courses beyond their original scope, therefore enrich their knowledge basis.

INITIAL RESULTS AND DISCUSSION

The whole program is just in its first-year stage. How students as well as teachers in Ta-Hwa would react to this FTP remains to be seen. Still, there are a few points worthy of further notice

- Interdepartmental interactions among teachers are increasing, and information sharing (such as teaching tips, cases material) is a common thing.
- School budgeting process is being run on a more rational and systematic way. Priority is now assigned to those hardware and software investment, which can be fitted into the whole FTP program.
- Schedule of online-learning materials (text and cases) are being developed on schedule. Teachers from above three departments benefit by once-again re-arranging their teaching outlines and notes. This gives them a rather rare chance to reflect upon how to modularize their teaching schedule, so students from different backgrounds can learn in a self-paced mode.

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