ILM Thinking Model for Building Student's Intelligent Learning Map Systems

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Abstract: With the rapid development of the Internet technologies, the employment shifts to a highly specialized and skills-based service jobs. However, the reality is that the challenges and opportunities faced by students in this century are unlike those of any previous generation. All students today require specific knowledge and skills in education and career/life planning to support them in making sound choices throughout their lives. By linking education and the world of work, higher education has to find a powerful tool for delivering education that makes their students to meet the requirements of the local economy. Learning map is a quite an innovative approach in education, therefore, it is urge to have a model to let students and educators to know more about it. Thus, this paper presents an ILM (Intelligent Learning Map) thinking model and develops a computer system which combines rigorous classroom instructions with preparation relevant to students' future careers.

Key words: Learning map, career development, style, intelligent learning system.

1. Introduction

The computer, the Internet, and other technological changes have transformed our lives at school, work, and home. Higher education is absolutely essential to the livelihood of our future workforce and the competitiveness of global businesses. Universities offer a wide courses selection to students studying in different fields which will generate various unintended problems. Students may choose a specific course based on the reputation of the teacher, the course time, the course difficulty, or other factors but not directly related to a specific field of study [1]. However, the reality is that the challenges and opportunities faced by students in this century are unlike those of any previous generation. All students today require specific knowledge and skills in education and career/life planning to support them in making sound choices throughout their lives [2].

There are challenges both in constructing a learning map and creating a pathway to success responds to the realities of a complex, rapidly changing world [3]. When you're a freshman, start planning a career change, on your journey of getting to know yourself better, finding your best career fit, and making a plan that puts your goals within reach [4]. Thus, it is necessary and urges to build an intelligent system where education and career/life program has been designed to ensure that all students develop the capacity to achieve their personal goals for work and life, make successful transitions throughout life, and make positive contributions to their communities. In addition, the focused approach to planning will support students in selecting the courses and programs they need to complete their university education.

2. Perspectives on Learning Map and Career Planning

In the face of such sweeping changes, school offers a wide course selection to students studying in different fields to cultivate their humanistic, occupational and

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technological perspectives [5]. There are plenty of courses included in these three perspectives. It is necessary to have a good approach to support students in selecting the courses and programs they need to complete.

Fiske [1] presents a model (see Fig. 1) for how to help students make informed decisions about their future career direction, and then conduct a successful job search. The model suggests that a successful job search encompasses four basic steps: (1) It begins with Self-Assessment—knowing who you are; (2) Exploration of what is out there in terms of interesting industries, fields and occupations; (3) Focusing on specific industries, fields and companies that appeal to you; (4) Job Search stage—sending out resumes, interviewing, and negotiating job offers.

2.1 Career Pathway and Learning Map Model

Current research identifies significant positive outcomes when clearly articulated education and career/life planning programs are implemented across an education system [4]. There is agreement on fundamental principles and concepts, specific learning goals, and the need for a strong commitment to programming that responds to the interests, strengths, needs, and aspirations of all students. Although those improvements are also found in areas such as student engagement, the achievement of personal goals, and the development of independence/resilience, there still is no universal model of a successful education and career/life planning program. It is necessary to have a career pathway systems not only can individualize instruction and guidance to fit students' interests and

talents, but also can increase schools' abilities to target workforce development to meet the local community's economic needs [6]. Rigorous coursework is intellectually demanding coursework that engages students in the essential core knowledge and skills of a discipline and contains appropriately sophisticated content [4]. The main purpose of designing a learning map was to facilitate the instructional design of an online interactive learning content to make learning topics more engaging for students [5]. Learning map is a quite an innovative approach in education, therefore, it is urge to have a model or framework to let students and educators to know more about it.

2.2 Thinking Model of Intelligent Learning Map

Since the steps of designing a useful learning map are too complicated to be explicated through a cognitive process, we developed a three layered matrix model to analyze the stages of the design process (Fig. 2). The tasks of intelligent learning map system design include determining the ILM (intelligent learning mapping) style, task, and interface. But how to determine should base on the curriculum goal. Thus, on the pedagogic level, the curriculum goals need to be transformed from departmental core competencies and workforce within the competitiveness of global business goals. The students' previous skills and the knowledge enhanced also require included [4]. The criterion for selecting the students' learning style is translated courses selection activities into ILM tasks. The purpose of the ILM's tasks is to enhance the students' knowledge and skills through the provision of challenges.

Fig. 1 Career development pyramid [1].

Fig. 2 Thinking model of intelligent learning map.

The screenshot shows the '資訊管理系' (Information Management Department) page on the '東南科技大學 全校學習地圖平台' (TNU Learning Map Platform). It displays the '教育目標與核心能力' (Educational Objectives and Core Competencies) section.

教育目標 (Educational Objectives):

培育敬業樂群、善用資訊科技，有效解決問題的資訊管理專業人才

核心能力與校基本素養 (Core Competencies and Basic Qualities):

核心能力	人文素養	職場素養	科技素養
1. 具統計分析與科學管理知識之應用能力			✓
2. 具資訊科技與工程知識之整合應用能力			✓
3. 分析並掌握企業資訊化需求以符合國際標準工作規範之能力			✓
4. 具整合應用資訊技術以解決企業問題能力			✓
5. 對壓力之自我審視、評估與檢討因應能力		✓	✓
6. 創新、探索並勇於嘗試解決問題能力		✓	✓
7. 洞悉社會環境、科技發展及技術變遷能力		✓	✓
8. 務實求知、主動積極之永續學習能力	✓	✓	✓

Fig. 3 Linking departmental core competency with course leaning objectives.

3. Validating the Model: ILM Systems

In order to explain how the above model is useful in supporting students in selecting the courses and programs, a computer system was developed. The ILM Systems include modules for supporting students in identifying their personal needs and in using this knowledge of themselves to inform their choices of programs both in and outside the classroom, that meet their interests.

The web site is <http://cmap.tnu.edu.tw>. The key features on usage based on the design instruction are listed as follows [7]:

(1) Linking departmental core competencies with whole leaning perspectives (see Fig. 3). Every department has their own core competencies and every core competency corresponds to different learning perspectives. Student can use this information when considering a course selection for cultivating their humanistic, occupational or technological abilities.

(2) Comprehensive course information and courses map (see Fig. 4). A course map is a template for creating an “at a glance” representation view of a course or module and a well-defined course map can put students on track for their better learning outcomes.

(3) Linking departmental core competency with

courses (see Fig. 5). These departmental core competencies can be applied in many contexts and must be developed over a lifetime. They specify how learning can be expressed and assessed in practice.

Linking departmental core competency with courses can provide the information to student who completes the course program should have achieved the listing outcomes:

課程地圖 > 課程時序表			
課程時序表			
【入學學年】 102 學年度 ▾ 【圖示說明】 必修課程 選修課程 (學分)			
		上學期	下學期
大一	共同科目	體育 I (0) 英文 I (3) 國文 I (2) 大學入門 (2)	體育 II (0) 英文 II (3) 服務教育 I (0) 國文 II (2) 管理數學 (3)
	專業基本核心科目	動畫設計 (3)	網頁設計 (3)
	校訂必修	計算機概論 (3) 經濟學 (3)	資訊道德與法律 (2) 程式設計 I (3)
	選修	管理學 (3)	
大二	共同科目	體育 III (0) 服務教育 II (0) 英文聽力 (2)	體育 IV (0) 世界文明與多元文化 (2)
	專業基本核心科目	腳本企劃與動畫實務 (3) 網路管理 I (2) 數位攝影 (2)	配銷管理系統 (3) 數位影像處理 (3)
	校訂必修	程式設計 II (3) 會計學 (3) 資料結構 (3)	統計學 (3) 動態網頁程式設計 (3)

Fig. 4 Course information and course map.

教育目標與核心能力 課程地圖 就業發展 證照地圖			
課程地圖 > 能力與課程			
【入學學年】 103 學年度 ▾ ※按告系規定，每學年可能有不一樣的資訊※ 【操作說明】 請點選欲查詢核心能力(可複選)並按下查詢將列出所有相關課程。 【圖示說明】 必修課程 選修課程 (學分)			
核心能力與對應課程查詢			
系核心能力	對應課程		
		上學期	下學期
✓ 具統計分析與科學管理知識之應用能力	大一	動畫設計 (3)	
具資訊科技與工程知識之整合應用能力		經濟學 (3)	
分析並掌握企業資訊化需求以符合國際標準工作規範之能力		管理學 (3)	
具整合應用資訊技術以解決企業問題能力			
對壓力之自我審視、評估與檢討因應能力	大二		3D 角色動畫 (3)
創新、探索並勇於嘗試解決問題能力		統計學 (3)	網路管理 III (3)
洞悉社會環境、科技發展及技術變遷能力			企業資源規劃 (3)
務實求知、主動積極之永續學習能力			
	大三	人機介面 (3)	資訊安全 (3)
		系統分析與設計 (3)	網路管理 IV (3)

Fig. 5 Linking departmental core competency with courses.

(4) License course: practical training map (see Fig. 6). The module expresses what courses curriculum has been covered the specific licenses.

(5) Linking occupations with course program (see Fig. 7). The module shows the relationships between course programs and occupations. Higher education program helps prepare students for life after graduation.

A course program contains a series of courses in various technical and vocational subjects to provide students with the skills and knowledge necessary to enter an occupation.

(6) Linking occupations with departmental core competency (see Fig. 8). The relationships between core competencies and occupations are illustrated by

教育目標與核心能力		課程地圖	就業發展	證照地圖
證照地圖				
課程與證照				
【圖示說明】 必修課程 選修課程 (學分) ※游標指向證照可觀看詳細內容				
證照名稱		輔導課程		
TQC-PD Java 程式設計(JDK 1.4) 實用級		程式設計 I (3) 程式設計 II (3)		
TQC-DK 電子商務概論 專業級		電子商務網站建置 (3)		
TQC-DK 電子商務概論 實用級		電子商務網站建置 (3)		
TQC 專業資訊管理工程師		管理資訊系統 (3)		
(PMP)Project Management Professional[國際專業管理師]		專案管理 (3)		
TQC-OS Linux 系統管理 專業級		作業系統與伺服器管理 (3)		
TQC-DA MySQL(5) 專業級		資料庫管理系統 (3)		
TQC-PD Java 程式設計(JDK 1.4) 進修級		程式設計 II (3) 程式設計 I (3)		
		統計學 (2)		

Fig. 6 License course: practical training map.

教育目標與核心能力

課程地圖

就業發展

證照地圖

就業發展 > 職業與課程

【入學學年】

104 學年度

※按各系規定，每學年可能有不一樣的資訊※

【操作說明】

請點選欲查詢相關職業，將列出該系科所有相關課程。

【圖示說明】

必修課程

選修課程

(學分)

相關職業與對應課程查詢

相關職業

✓ 多媒體動畫設計人員 (2D/3D動畫師)

多媒體動畫設計師

MIS工程師

ERP專案師

行政助理

網路管理工程師

對應課程

【選擇職業】多媒體動畫設計人員 (2D/3D動畫師)

104職缺查詢

1111職缺查詢

		上學期	下學期
大一	專業基本核心科目	必修 動畫設計 (3)	必修 網頁設計 (3)
	校訂必修	必修 經濟學 (3) 必修 程式設計 I (3)	必修 程式設計 II (3)
	選修		
大二	專業基本核心科目		
	校訂必修		
	選修		
大三	專業基本核心科目		
	校訂必修		
	選修		

Fig. 7 Linking occupations with course program.

Fig. 8 Linking occupations with departmental core competency.

Fig. 9 Linking occupations with human resource headhunters.

the radar chart. Students can understand which and how many core capacities they should have to an occupation.

(7) Linking occupations with human resource headhunters (see Fig. 9). When students are interested or looking for an occupation, the modules provide a hyper link to a popular headhunter agent [8] and show the potential job opportunities.

Students who enroll as a freshman starting coursework selecting with ILM learning map system which offers a procedure to empower students to design and plan their own learning lives on campus, they are engaged, they achieve, and they find themselves applying their learning in their daily lives. In an environment that encourages such learning, students develop confidence in knowing that their

school programs are created with them in mind, that the world beyond school has something to offer them, and that they have something to offer the world [4].

4. Conclusions

Construct a well learning map is a complicated task. One must consider numerous factors such as education organizational goals, departmental core competencies, course curriculum, course program design, career challenges, etc. Much effort exerted in the designing of ILM should also be targeted at achieving the curriculum goal through relevant learning theories, contexts and learners' characteristics. The primary intention of this paper is to present an ILM thinking model that makes designing and evaluating higher educational learning map less complicated and more effective. This model stresses the importance of focusing on the purposes in each step and their relationships to achieve of students requiring specific knowledge and skills in education and career/life planning.

By using the model, a computer system called ILM learning map system was built to facilitate student's course selection. Departmental core competencies, course programs, and related job occupations can be easily reached using different system interfaces that produce specific results to students.

Due to the constraints imposed by the budget and the learning platform, the model in the study was only applied in my school. In order to measure the program

effectiveness to ensure student success, there is lack of students' satisfaction investigation and feedback to the system for modification. Currently, the learning map is a very popular subject. We expect that in the future, this paper's model can be further applied in the different higher education institutes.

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