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Development of a Competency Questionnaire for LIS

Undergraduates at Fu-Jen Catholic University\*

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# Development of a Competency Questionnaire for LIS Undergraduates at Fu-Jen Catholic University\*

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## Abstract

*The LIS workplace demands that graduates can function optimally and keep up with technological developments. To prepare students for Library and Information Science (LIS) practice, educators are challenged by the need to adapt their curricula to changes taking place in the practice of library and information science. Coping with the changing needs of LIS professionals, the Department of Library and Information Science at Fu-Jen Catholic University has shifted from a focus of traditional library science toward a balance with information technology. In 2008, 31 competencies for undergraduate level were set up by faculty members as a partial requirement for "Teaching Excellence Project". These competencies were translated into a questionnaire format for assessing students' perception about their capabilities. To test its reliability and the appropriateness of its competence constructs, factor analysis was conducted based on 216 data gathered. Findings revealed a simple five-factor competence structure (Library Information Services, Media Literacy, Network Literacy, Computer Literacy, and System-Development). T-test indicated that students with more years in LIS perceived themselves as being more competent in most competence constructs ( $p < 0.05$ ).*

**Keywords:** LIS education; Competency standard; Core competencies; Higher education; Professional education

## Introduction

Planning for change and addressing emerging challenges is critical in various professions. Higher education should recognize and respond to new challenges in the external environment to cope with the changing conditions, for example, advances in information technology, new definitions of academic quality (with a focus on student learning and program effectiveness) and new emphasis on the contribution of higher education to the globalization and leadership (Norris & Poulton, 2008). To cope with current technologies, Library

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and Information Science (LIS) professions have recognized the importance of new skills and competencies required in today's society. In this era of information explosion, the nature of library and information services requires that library staff update their work knowledge and skills regularly (Haley, 2008). Preparing for future professional practice, students majoring in LIS should develop various competencies to accommodate changes in society.

Competencies are defined as the knowledge, skills, and abilities that define and contribute performance in a particular profession. They are described so that they can be described, observed, measured, and rated (FLICC, 2008). In higher education, competencies create a common bond of understanding and a common language for defining curricular standards. For professional formulation, measurement of educational outcomes is a critical component of curriculum evaluation and is increasingly being required by various accrediting agencies (Foley, 2008). However, competence for professional practice is not static. Rather, it is determined by society and professional practice (Krichel, 2009). Setting requirements is challenging to measure as an outcome for an undergraduate program due to the diverse job opportunities for baccalaureate graduates' career options, including libraries, schools, colleges and universities, museums, corporations, government agencies, and profit or non-profit organizations. These tasks may require skills in selecting, acquiring, cataloguing, classifying, circulating, and maintaining library materials as well as furnishing reference, bibliographical, and readers' advisory services (O\*net Information Network, 2008). In addition to these competencies, with the advancement of library technologies, professionals require competencies related to Unicode, XML, XML Schema and XSTL, CSS, SQL, operating system skills, basic knowledge of networking, and knowledge of a scripting language such as Perl or PHP. A deep understanding of these areas and programming competence is required, especially when working toward servicing a digital library (Krichel, 2009).

To serve the needs of organizing, managing, and providing resources to patrons in the information age, the Federal Library and Information Center Committee (FLICC, 2008) has developed the "Federal Librarian Competencies" to define the knowledge, skills, and abilities needed to perform successfully as a federal librarian. Also, the ALA Office for Accreditation has prepared a list of statements of knowledge and competencies or educational policy statements developed by relevant professional organizations. Core competences of the librarianship statement prepared by the Presidential Task Force on Library Education was approved and adopted as policy by the ALA during the 2009 midwinter meeting (American Library Association, 2009).

Core competencies are defined as collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies (Prahalad & Hamel, 1990). Nadler and Tushman (1999) emphasized core competence as a key organizational resource that could be exploited to gain competitive advantage. For LIS professions, in conjunction with the accreditations of program in library and information science, a number of information professional associations have developed statements of competencies that set forth their expectations for the preparation of entrants to their segments of the information field. The use of these competency statements by schools of library and information studies is an indication of the strength of the ties between education and practice, as these statements express the perspective of LIS practitioners. On the other hand, use of these statements by practitioners can be considered an indication of the degree of influence exercised by the level of expectations for competencies of library professionals on various practices (Lester & Fleet, 2008). For professional development, LIS education needs to specify students' skills in accordance with future practice. The use of core competencies in education provides an indication of the strength of connection between professional formulations and actual practice. As addressed, students are expected to master the content associated with a degree, and required to demonstrate the competencies associated with core "abilities" needed for effectiveness in the worlds of work from their professional training. The college's ability-based curriculum makes explicit the expectation that the student should be able to act on what he/she knows (Savagian, 2009).

Setting core competencies requires careful considerations about how to help students become qualified with the skills they need to support the use of current technology trends (Blower & Reed, 2007). Curricula in LIS education need to help students keep up with new and emerging technologies. Along with the advent of information technology, the focus of training of library and information science professions has shifted from providing traditional print-based services to utilizing technological devices and information tools for organizing, managing, and providing various electronic resources and services to patrons (Rettig, 2008). In various communities, library and information professionals help members, students, citizens, and college students, learn to recognize the need to find and evaluate information, and help them learn how to do so. It is noted that setting competencies emphasizes knowledge, skills, and experience that librarians and other information professionals need. The competency statements should be written to show how knowledge is acquired to reflect "an individual capacity to perform certain activity" (McKinney, 2006).

In the technological world, students in LIS are expected to develop competencies required for their future careers. Specifying core competencies might be helpful for students to identify skills needed and achievements for their college years. The competencies are set up as building blocks for students to provide them with a firm foundation to achieve their academic goals.

In this study, a set of competency items for baccalaureate program at the Department of Library and Information Science at Fu-Jen Catholic University were identified among course committee. Specifically, the purposes of this study were: 1. to use these competency items to assess self-perceived competency among LIS students; 2. to determine whether these competencies could be categorized through factor analysis into particular constructs; and 3. to compare competence rating between different years-in-LIS groups. It is suggested that it is possible to develop some specific competence constructs for assessing students' skills and knowledge in schooling.

### **Method**

The undergraduate competencies were established by the Department of Library and Information Science at Fu-Jen Catholic University during 2007-2008 as a partial requirement for the "Teaching Excellence Project" (Fu-Jen Catholic University, 2009). The Department was established in 1970, taking its current name in 1992. With its change of name, the department shifted its curricular focus from traditional library science to library and information science. Since Ministry of Education for Higher Education has continually pressed for new methods of teaching and learning, the demand for engaged students and a faculty more attentive to the needs of the individual learners was emphasized. In order to tailor a set of curriculum to fit the individual needs, the Department has conducted an assessment by holding discussions across disciplines in order to direct an innovative curriculum. During the past ten years, curricula for the department has been reviewed and re-adjusted to meet the needs of the technological society. Students' competencies for baccalaureate program were also determined based on the set education and curricular goals.

To determine students' competencies, various competencies for LIS professionals identified from various organizations were considered, including the American Library Association (2009), Federal Library and Information Center Committee (2008), O\*net Information Network (2008), and Information competency standards for higher education (Association of College & Research Library, 2008). However, in order to address various competencies required for today technology world, visual, multiple, interactive, computational competencies were discussed among faculty members. As referred, the need to

fit various areas of literacy into workplace for knowledge workers should be emphasized. Various elements in library literacy, computer literacy, media literacy, and network literacy (Marcum, 2002; McClure, 1994; Engeldinger, 1998) were included as components in constructing the competency list. With reference to curricular goals, competencies for baccalaureate program were identified among course committee (including faculty members and student representatives) after thorough discussion. Tentatively, competencies for the Department were drawn from the following areas: library and information service, media literacy, computer literacy, and network literacy. A total of thirty one competency items were identified as listed below:

#### **Library information services**

1. Access various forms of information
2. Process information systematically
3. Integrate information, find problems, and solve problems
4. Preserve and manage various forms of information
5. Provide information to patrons
6. Provide information services
7. Serve patrons professionally
8. Provide point-of-need information and resources
9. Use searching strategies to search for information

#### **Media literacy**

1. Differentiate characteristics of media, and provide appropriate media to users
2. Manage multimedia materials
3. Manage and plan media service sites
4. Operate various media facilities
5. Produce media
6. Use media to solve life, school, and work problems
7. Maintain media and solve media problems

#### **Computer literacy**

1. Use and operate printers, scanners, and various network hardware
2. Use computer to manage various documents, such as word processing, graphics, spreadsheets, and databases
3. Manage and maintain computer and peripheral devices
4. Use computer skills to solve problems in daily life, school, and work
5. Solve problems related to computer malfunction
6. Plan appropriate information systems for practical use
7. Be knowledgeable about issues related to computer ethics, computer safety, intellectual property, privacy, and computer criminal activities

8. Computer programming
9. Design database systems
10. Analyze systems

#### **Network literacy**

1. Be knowledgeable about local networks and wide area networks
2. Be knowledgeable about network devices and terminology
3. Practice network services
4. Organize, evaluate, utilize and provide patrons with various web-based resources and web-services
5. Utilize network capabilities to solve problems in life, school, and work

The thirty one items were then designed into a questionnaire format to assess the feasibility of a set of competencies among LIS students. In the questionnaire, the rating scale ranging from 1 to 5 points to indicate students' competency level was used. Students in the department were requested to fill out the questionnaires, and factor analysis was used to analyze the collected data. Process of factor analysis involved the following steps: 1. selected the variables to be analyzed, 2. computed the correlation matrix and determine whether or not to proceed with factor analysis, 3. estimate communalities, 4. rotated the factor axes, and 5. explained the factors.

### **Results**

The study subjects were undergraduate students. A total of 216 complete on-line questionnaires were obtained (83% of total student population). Among these students, 58(28.9%) were freshmen, 55(25.5%) were sophomores, 54(25%) were juniors, and 49(22.7%) were seniors. Factor analysis was used to determine the competency constructs for the questionnaire. Means for each construct were also analyzed and compared between two different years-in-LIS groups.

The thirty one competency items were subjected to factor analysis using the principal factor method to extract the factors, followed by a promax (oblique) rotation. A scree test and proportion of variance suggested five meaningful factors, and only these factors were retained for rotation if the loading was 0.5 or greater for that factor, and was less than 0.5 for the other factors. Factors and item loadings are shown in Table 1. From the analysis, five major factors were elicited, and all 31 items were selected.

Nine items loaded on Factor I, which was labeled "Information-Service Competence". Factor II, labeled "Media Competence", included seven items. Five items loaded on Factor III, labeled "Network Competence"; seven items loaded on Factor IV, labeled "Computer Competence"; and three items loaded



**Table 1 Factor analysis of LIS competencies for Fu-Jen Catholic University**

Item	Loading	Accumulated Variance (%)	Alpha Value
<b>Factor 1: Library Information Services</b>		41.112	0.905
1. Access various forms of information	0.752		
2. Process information systematically	0.785		
3. Integrate information, find problems, and solve problems	0.776		
4. Preserve and manage various forms of information	0.768		
5. Provide information to patrons	0.748		
6. Provide information services	0.717		
7. Serve patrons professionally	0.717		
8. Provide point-of-need information and resources	0.762		
9. Use searching strategies to search for information	0.712		
<b>Factor 2: Media Literacy</b>		50.334	0.885
1. Differentiate characteristics of media, and provide appropriate media to users	0.699		
2. Manage multimedia materials	0.779		
3. Manage and plan media service sites	0.715		
4. Operate various media facilities	0.793		
5. Produce media	0.820		
6. Use media to solve life, school, and work problems	0.682		
7. Maintain media and solve media problems	0.767		
<b>Factor 3: Network Literacy</b>		56.328	0.876
1. Be knowledgeable about local networks and wide area networks	0.821		
2. Be knowledgeable about network devices and terminology	0.811		
3. Practice network services	0.840		
4. Organize, evaluate, utilize and provide patrons with various web-based resources and web-services	0.810		
5. Utilize network capabilities to solve problems in life, school, and work	0.674		
<b>Factor 4: Computer Literacy</b>		61.456	0.893
1. Use and operate printers, scanners, and various network hardware	0.817		
2. Use computer to manage various documents, such as word processing, graphics, spreadsheets, and databases	0.771		
3. Manage and maintain computer and peripheral devices	0.688		
4. Use computer skills to solve problems in daily life, school, and work	0.820		
5. Solve problems related to computer malfunction	0.624		
6. Plan appropriate information systems for practical use	0.520		
7. Be knowledgeable about issues related to computer ethics, computer safety, intellectual property, privacy, and computer criminal activities	0.588		
<b>Factor 5: System Development</b>		65.319	0.871
1. Computer programming	0.834		
2. Design database systems	0.897		
3. Analyze systems	0.872		

Extraction Method: Principal Component Analysis;  
 Rotation Method: Promax with Kaiser Normalization



on Factor V, labeled “System-Development Competence”. The accumulated variance reached 65.319. The homogeneity of each factor was examined using Cronbach alpha. Reliability analysis revealed that all factors had satisfactory reliability (Table 1).

Factor I “Library Information Services” involves the knowledge and skills to enable LIS students to access and process information, integrate and solve problems, preserve and manage information, use search strategies, and provide various services needed by their clients. These competencies emphasize the abilities needed to serve by helping them to access various resources and needed information. Factor II “Media Literacy”, encompasses skills that enable students to use, plan, manage, operate media, solve media problems, and produce media resource to meet clients’ media needs. These competencies emphasize the abilities related to production and use of media to provide clients with needed services.

Factor III, “Network Literacy” refers to the ability of students to use network technology. Knowledge related to local and wide area networks and the practical use of network devices and services in solving problems are essential for LIS professionals to provide clients related web services. Factor VI, “Computer Literacy”, focuses on skills necessary for utilizing and managing various documents and data. These competencies also help students use computers to effectively solve their life and work problems efficiently and properly. Factor V, “System Development”, involves the knowledge and skills to enable LIS students to program and design systems to serve specific institutional purposes. These competencies are critical for designing library management systems for information services.

The mean competence rating for each construct was analyzed. Among these five constructs, “Library Information Services” (Mean=3.195, SD=0.583) was the highest, and “System Development” (Mean=2.412, SD=0.816) was the lowest (Table 2). To further examine whether students with more years in LIS were more positive in rating these competencies, t-test was conducted to compare students’ ratings between two different year groups: 1-2 years,

**Table 2 Mean Rating for Five Competency Constructs among Students**

Competency Construct	Mean	SD
Library Information Services	3.195	0.583
Media Literacy	3.044	0.632
Network Literacy	3.056	0.721
Computer Literacy	3.185	0.685
System Development	2.412	0.816

and 3-4 years in LIS program. The results of t-test for five competency constructs are listed in Table 3. From these analyses, significant differences were found in “Information-Service Competence” ( $p=0.000$ ), “Media Literacy” ( $p=0.049$ ), “Network Literacy” ( $p=0.012$ ), and “System Development” ( $p=0.014$ ). No significant difference was found in “Computer Literacy” ( $p=0.324$ ).

**Table 3 Comparison of Rated Competency between Different Years in LIS Groups**

Competence Construct	Mean Competency Level		T-test Comparison	
	1-2 years in LIS	3-4 years in LIS	t	p
Library Information Services	3.061 ± 0.563	3.324 ± 0.571	3.637	0.000***
Media Literacy	2.963 ± 0.615	3.133 ± 0.642	1.981	0.049*
Network Literacy	2.938 ± 0.731	3.185 ± 0.690	2.547	0.012*
Computer Literacy	3.140 ± 0.653	3.233 ± 0.717	0.990	0.324
System Development	2.283 ± 0.854	2.553 ± 0.752	2.473	0.014*

\*\*\*  $p<0.001$ ; \*  $p<0.05$

## Discussion

An examination of competencies is helpful in assessing individuals' skills and knowledge in specific professional qualifications. It is also helpful for LIS educators to reexamine curricular structures related to the competencies students perceive (Lester & Fleet, 2008). In this study, a competency questionnaire was developed. The study aimed to provide more reliable support for the questionnaire developed to examine the items of competence in LIS professional development. A total of 216 undergraduate students filled out the questionnaire based on 31 items constructed by the faculty members of the Department of Library Information Science at Fu-Jen Catholic University. From factor analysis, five major competence constructs were elicited and named: “Library Information Services”, “Media Literacy”, “Network Literacy”, “Computer Literacy”, and “System Development”. The results of analysis indicated that most competence items in factor constructs followed the structure determined previously. However, based on the proportion of variance suggested in the factor analysis, one new construct, named “System Development” was formed. This constructs includes three factors that were originally in the facet of “Computer Literacy”. “System Development” includes: computer programming, designing database system and analyzing systems.

The results of this research indicated that students perceived that they were most competent in “Library Information Services”, and lowest in “System Development”. Most students felt more competent in providing various information services, and less competent in developing systems with programming

skills. Although students are aware of the importance of information technology in LIS professionals, many LIS students still considered system development competence and programming skills to be overwhelming.

Since computerized library systems are widely used in many libraries, library professionals need to update their knowledge to follow emerging information technologies (Uwaifo, 2008). To catch up technological trends, this department has experienced various stages of curricular restructuring to enable students to design, analyze, and develop computer systems. However, this research shows that most students felt incompetent in system development. Similar concerns related to this finding are addressed by Krichel (2009) for the barriers in introducing more technology-related courses into library school curricula. Factor analysis in the competence structure also suggests that "System Development" separate from the construct of "Computer Literacy".

From the comparison of different years in LIS groups, the group of juniors and seniors rated significantly higher than the group of freshmen and sophomores in "Library Information Service", "Media Literacy", "Network Literacy", and "System Development"; and insignificantly higher in "Computer Literacy". This indicates that students who had more years of experience in LIS perceived themselves as being more competent in the servicing their patrons with various forms of resources, acquainted with the use of different media, and knowledgeable with system development. That no difference found in "Computer Literacy" is because this competence has become a part of general skills for each individual majoring in LIS.

Although generalizations about the findings of this study to other populations might be inferred, it is not the intent of this study to apply this knowledge to undergraduate students in different universities. Different undergraduate programs in LIS might have their own curricular structures and competence constructs. In determining professional skills needed, consensus among faculty members and job analysis were used to identify competency needs from various related competency statements related to LIS fields. To provide innovative learning environments, ongoing planning on different time frames and schedules is needed for higher education (Norris & Poulton, 2008, p. 1). Also, an ongoing review of competencies based on the job trend in specific professions needs to be integrated into curricula (Utley-Smith, 2004). In this study, descriptive statistics were used only for exploratory purposes for our own reflection on practice to assist in developing hypotheses for future studies of LIS competence. Further study is needed on in-depth assessment from the LIS professionals to obtain updated job trend and required competencies.

## Conclusion

In this study, a competency questionnaire was developed and tested to provide more reliable support for the instrument to examine the items of competence in LIS professional development. In conclusion, it is believed that the use of competence questionnaire for this department proved to be a reliable instrument to assess students' competencies. Although this study focuses on LIS competencies, similar research could be performed in any program that is complementary to educational objectives of information service programs or disciplines. As detailed in the responses to each of the questions, elements related to the curricular structure of specific educational programs need to be considered. These considerations identified the key curriculum components of the program and expanded upon them, suggesting that the educational goals could be adjusted accordingly in both content and design to support the needs of LIS professionals and the competency standards for higher education specifically and to elicit critical thought during learning in general. Just as important, the components used for assessment of competence needs to reflect on practice. The knowledge gained from this study helps to further examine the curriculum, while continuing to focus in new ways on both critical reflection and competent standards. The usefulness of the five competence constructs or dimensions for LIS professional training needs to be tested in future research. In this study, summarizing interrelationships of competencies through factor analysis helped improve conceptualization and clarification of underlying meanings of competence constructs. It is hoped that this research can be repeated every two to three years to monitor changes in the LIS curriculum.

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# 輔仁大學圖書資訊學系 能力檢測問卷之開發

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摘要

圖書資訊學的職場亟需畢業的學生具備科技的能力以因應職場實務之表現。面臨未來學生專業之需求，圖書資訊教育必須隨時調整專業課程，以因應職場需求之變化。在專業訓練上，畢業的學生必須有優秀的表現，以跟上科技的趨勢。為了因應圖書資訊之專業需求，輔仁大學圖書資訊學系歷年來已由傳統以圖書為主的科學而轉變成為與資訊科技並重的學系。2008年為配合輔仁大學卓越計畫各學系能力指標之訂定，系所教師共同研討，訂定31項能力指標。為了測試這31項能力指標的信度與適用性，這31項能力指標的內涵轉為問卷的形式，而由學生填寫，以反映學生自我評量的能力水準。依據216位大學部生所填寫的資料進行因素分析的結果，本研究萃取出五個主要因素，依序為：圖書資訊服務、媒體素養、網路素養、電腦素養，以及系統開發能。以高、低年級進行t檢定結果，高年級學生對於大部分的自評能力檢測項目之反應皆高於低年級學生 ( $p < 0.05$ )。

關鍵詞：圖書資訊教育，能力指標，核心能力，高等教育，專業教育