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Student Learning Outcome Assessment for an Information Organization Curriculum Based on the Kirkpatrick Framework

Mei-Ling Wang and Ai-Chi Chang
Graduate Institute of Library, Information and Archival Studies, National Cheng-chi University, Taiwan (R.O.C)

Abstract. This study aimed to use the Kirkpartick four-stage model to evaluate the learning outcomes of information organization (IO) courses. The objectives of the study were as follows: (1) to evaluate the learning outcome of information organization courses using the Kirkpatrick model; (2) to apply cataloging core competencies to course design for information organization curricula; (3) to explore the learning process and learning outcome of graduate students on information organization courses. The study used the learning outcome evaluation method and case studies; the evaluation method was used to transform the expected achievement and course goal according to cataloging competency. The "information organization" (IO) and the students on the course at National Chengchi University during 2016 fall semester were selected as the case study. The study population consisted of 33 graduate students of two classes. Cataloging competencies were transformed into learning objectives and ten course units of 14 sessions for the IO course, including information organization concept, descriptive cataloging, subject analysis, authority control, cataloging management and technology. The study used the 4–stage Kirkpatrick model to evaluate the student learning outcome of the IO course, including evaluation level 1 reaction, level 2 learning, level 3 behavior and level 4 results. The empirical data collected from the course tasks was used to evaluate level 2 through three assignments, four tests, and final examination. A questionnaire survey was used to evaluate level 1, 3, 4. The results of student satisfaction score was 4.51, showing with the IO course. As the average student achievement score was 83.48 points, the post-test scores of two classes' graduate students were significantly higher than the pre-test scores, the study thus proved that students learn effective results. In conclusion, the results demonstrated that students were more confident in their study and work, their behavior changed and positive learning results were gained after studying on the IO course. Based on the Kirkpatrick model, the results provide favorable evidence for course effectiveness and its value and the students learned well on the information organization course.

KeywordsCataloging, Organization of Information Curriculum, Cataloging Competency,

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Learning Outcome Assessment, Cataloging Evaluation

1. Introduction

Cataloging is the core of the library profession, and the key to help users effectively search online library catalogues. Its essence is the applying of cataloging rules and control vocabularies to provide library catalogue information, to promote information retrieval and access of OPAC. Cataloging librarians must be proficient in establishing bibliographic records and applying cataloging rules, classification scheme, subject headings, and machine-readable cataloging format. Consequently, cataloging education is important but difficult. From 1876, beginning with a library school in Columbia University, cataloging was the core course in library science programs. Since the 1990s, the name of cataloging courses has changed to "information organization." Joudrey and McGinnis (2014) surveyed 58 library and information(LIS) schools accredited by the American Library Association, and found that 54 schools (93%) offered "Information Organization" or "Basic Cataloging" courses as required courses. It showed cataloging and information organization courses were important to library and information science education.

In recent years, library directors have often complained that the ability of novice catalogers is declining. Cabonero (2013) explored whether LIS graduates had suitable cataloging competency and were cable of cataloging work. They surveyed five librarians at the University of the Philippines and evaluated their performance with regards descriptive cataloging, subject analysis, and classifying. The research showed that the evaluated librarians had less of a problem in descriptive cataloging ability, but there was a problem with the subject cataloging, especially cataloging quality and depth. The responders felt difficulty in subject analysis: determining the subject matter of the books; deciding subject terms of the books with multiple subjects; and understanding the content of books. In addition, there were many problems, such as the descriptive cataloging requiring a lot of time, a wide range of information resources, lack of knowledge and vocabulary skills. The study suggested LIS programs to enhance the competencies of cataloging librarians; therefore, it is more important to explore the effectiveness of student learning information organization course and to assess whether the objectives and value of education are achieved.

In the past, research on information organization curricula mainly focused on teaching design and curriculum development, with less discussing of teaching methods, curriculum assessment, and student learning outcomes. Recently, higher education regards outcome-based education and learning outcome assessment as important. The evaluation of learning outcomes emphasizes the development of curriculum objectives based on student expectations. At the same time, teachers are encouraged to study teaching and learning, set the criteria for assessing students' learning outcomes, effectively examine students' learning outcomes, promote teaching quality, and ensure the ability of students

to achieve (Li, 2011). Learning outcome assessment is a process of collecting and discussing multiple data from multiple sources in order to understand in detail what students learn from the course and what they can apply it to. The ultimate goal is to use the evaluation results to improve follow-up learning.
Kirkpatrick (2006) proposed a four-level evaluation framework, and advocated that education and training should be used to review the efficiency of implementation, and an evaluation mechanism must be set up. Education and training needs assessment to determine whether the goal of education is reached, assess the effectiveness of education, identify learner performance, assess the value of investment, and improve education. Education evaluation should have a set of procedures with regards four aspects, including the learner's reaction, learning, behavior and results, to determine the effectiveness of education. As information organization education is evaluated by a learner-centered approach the learners' reaction and learning outcomes can demonstrate the effectiveness of education. The purpose of this study is to explore the evaluation of the learning outcomes of an information organization curriculum, to transform the cataloging competencies into course objectives, guide the course development and learning activities, and show the students' learning outcome. The Kirkpatrick evaluation model will be used to show the learning process and outcome of student learning information organization courses.

2. Literature Review

2.1. Cataloging and Information Organization Curriculum

Gorman (2002) proposed that the cataloguing curriculum for first year students covers all aspects of bibliographic principles and standards, and their application in libraries and library services. The topics should include descriptive cataloguing, subject headings, classification, authority control, indexing and abstracting principles and practice, the organization and management of the cataloguing, and cooperative cataloguing. Given that thorough knowledge, the students will then be equipped to take on the elective courses of the second year, which include classification theory, history of cataloguing, advanced descriptive and subject cataloguing, indexing theory, online catalogues design, bibliographic control of electronic resources, and archival cataloguing.

Joudrey and McGinnis (2014) studied the state of information organization (IO) education and provided an overview of the curricula of the 58 library and information science graduate programs in the United States and Canada accredited by the American Library Association (ALA). It examined the current status in 2012–2013 and compared them to data from earlier studies. In the 2012 study, 298 IO courses were offered and the range of IO courses was from 1 to 14 courses, with an average of 5.1 courses per school. Of the 298 courses offered, 60 courses (20%) were required courses; 238 courses (80%) were elective courses. This meant that the average number of required IO courses was 1 per school, with an average of 4.1 elective IO courses per school. Of the 238 courses actually taught, 60 courses (25%) were required IO courses and the remaining 178 (75%) were IO electives. Compared with the 2000 survey, this

study offered a wide range of IO courses, a significant increase in the number of metadata courses, and a reduction in cataloging courses. 50 LIS schools provided basic cataloging courses, 44 LIS schools provided IO fundamental courses, clearly showing that IO courses were still common.

Wang (2007) studied information organization and metadata education in Taiwan, and surveyed the state of cataloging and metadata education in nine library and information science programs in Taiwan. Questionnaires were sent to nine LIS programs in 2006. The survey showed there were seventy-four courses on cataloging and metadata provided, including twenty-two basic courses, forty-six advanced courses, and six internet and digital information organizing courses. Among those courses, there were two metadata courses provided by Fu-Jen Catholic University and the Hsuang Chuang University. Metadata topics were starting to be well integrated into information organization curriculum. Although educators agreed on the inclusion of knowledge and skills in metadata instruction, they didn't think that it was necessary to provide metadata courses. They also agreed that there were gaps between cataloging and metadata education.

As the content of cataloging and information organization courses are increasingly diverse, teaching and learning are more difficult; students not only learn cataloging theory, but also the application of standards to establish bibliographic records; teacher must take into account the theory and practice in their teaching. Al-Hijjia and Fadlallahb (2013) surveyed how students of Oman's of library and information school viewed the theory and practice of cataloging education. The study showed that students believed there was a great gap between cataloging theory and practice, more attention to the theory and lack of practice; thus, it made some suggestions for more practical operation on cataloging, more assistance from catalogers, with more cataloging exercises, and using the library automation system to establish bibliographic records.

2.2. Learning Outcome Assessment

The learning outcome centered curriculum were focused on learning outcomes, emphasizing learners' learning outcomes, goals and learning activities, and evaluating learning outcomes after course studied to understand how changes of students' knowledge, skills, attitudes. The educational goals and core competencies were the basis of the learning objectives, core competencies and curriculum development, to guide curriculum development and to evaluate course. Therefore, educational goals, basic competencies and competency indicators were related. The core competencies represent the knowledge, skills and attitudes that students should achieve in their career or professional achievement. Roger elaborated on core competencies and competency indicators, core competencies focused on the expected assessment of the course, competency indicators are developed from completion of the course and present the learning performance (Li, 2011). The learning outcome assessment was a process of collecting and discussing from multiple sources in order to gain

insight into what students learn from their learning process and what they can learn. The ultimate goal was to use the assessment results to improve follow-up learning (Peng, 2010).

Zhan (2014) provided a case study on learning outcome-based instruction and assessment. This model was applied in a "Teaching Principle" course taught in 2012. The purpose of the study was to reconstruct the course, teaching methods, and assessment activities based on the student-learning outcomes. Student feedback received after the conclusion of the course indicated that most of the students supported the learning outcome-assessment model. The study confirmed learning objectives facilitated student learning; and combined theory and practice enabled students to apply what they learned. The result showed a high level of student classroom participation improved student-teacher interactions; teachers and students jointly established and applied scoring rubrics during peer assessment.

Since Kirkpatrick(2006) first created the four-level evaluation model including reaction, learning, behavior, and result, it has been adopted as a well-known and widely accepted industry standard across the human resources and training community. Chang & Chen（2014）used the Kirkpatrick four-stage framework to evaluate the learning effectiveness of the online general education information literacy materials "Library and Information Utilization," in Taiwan. The study population consisted of 206 students at Tatung University and the course evaluation spanned two academic years. It produced a total of 194 online questionnaires used to evaluate levels 1–4 in the Kirkpatrick model. The study used a mixed method approach, including a mainly quantitative online questionnaire, followed by ten semi-structured interviews of students who took the course between the 2010 fall semester and the 2012 fall semester, to evaluate level 3 and level 4. Empirical data collected from the course tasks was also used to evaluate level 2. In general, the results demonstrated that students were more confident in their future study and daily life after studying the online material. Based on the Kirkpatrick model, the results provides favorable evidence for course effectiveness and its value. This study suggested that the Kirkpatrick model was a workable instrument to measure the effectiveness of an IL course and to evaluate if the information competencies had been maintained.

3. Course Design

The course was conducted using a learning outcome-oriented curriculum which emphasized learners' learning outcomes, design objective, and learning activities with learning outcomes, and evaluated learning outcome of students to understand their cataloging knowledge, skills, and attitudes changed the course.As the course was learning outcome-centered and guided by cataloging competencies, therefore, learning objectives, core competencies and competency indicators were interrelated. Based on the cataloging core competencies the course was developed in accordance with learning objectives, and was evaluated for the learning outcome of students. The information

organization course covered five core cataloging competencies referring to WebJunction (2014) ”Competency Index for the Library Field.” and Wang’s (2017) study, including information organization concept, descriptive cataloging, subject analysis and authority control, cataloging management and technology, and related 23 competency indicators. Four cataloging core competencies were transformed into expected learning performance, ten course units, learning objectives, course handouts, and learning activities as listed in Table 1.

Table 1 Cataloging competencies and information organization course design

Competency	Unit topic	Learning objectives	Activities
Information Organization Concept	1.Introduction to Information Organization	1 Understand the nature of information and types of information resources 2. Understand the meaning and functions of information organization 3. Discuss information organization methods and metadata 4. Describe catalog and structure of library OPAC 6. Learn about user needs and information retrieval tools	instruction; pre-test test assignment1
Descriptive Cataloging	2.Descriptive Cataloging theory	1. Understand historical development of cataloging rules 2. Understand cataloging principles 3 Understand the items and description methods	instruction; test
	3.Cataloging rules	1. Understand Chinese Cataloging Rules 2.Apply cataloging rules to establish bibliographic records 3. Select and decide access points	instruction; assignment2-1
	4.MARC and Cataloging automation / with hands-on exercise	1 Learn about machine readable cataloging format 2. Apply the MARC21 bibliographic format to establish bibliographic records 3. Understand functions of cataloging automation systems 4. Use catalog system for copying cataloging or original cataloging	instruction; test assignment2-2
	5.Introduction to FRBR and RDA	1. Understand the concept of subject analysis 2. Understand the relationship between subject search and subject analysis 3. Understand authority control	instruction; test
Subject Analysis and Authority Control	6.Subject analysis and authority control	1. Understand classification theories 2.Enumerate classification systems 3. Understand Classification Scheme for Libraries	instruction; test

		4.Apply Classification Scheme for cataloging	
	7.Chinese Classification	1. Understands Chinese Classification 2. Apply Chinese Classification scheme to classifying	instruction; assignment3-1
	8.Western Classification	1. Understand Dewey Decimal Classification 2. Apply Dewey Decimal Classification scheme to classifying 3. Understand LCC	instruction; assignment3-2
	9.Subject Headings	1. Understand theory of Subject Headings 2. Understand Chinese Subject Headings 3. Apply Chinese subject Headings to the subject cataloging 4. Understand LCSH 5. Apply LCSH to subject cataloging	instruction; assignment3-3 test
Cataloging Management & Technology	10.Information Technology & Catalog Management	1. Understand the development and maintenance of bibliographic databases 2. Understand cooperation cataloging and bibliographic utilities 3. Learn new technologies and methods regarding information organization	instruction; final exam

This study defined the core competencies of cataloging, including the concept of information organization, descriptive cataloging, subject analysis and authority control, and cataloging management and technology. Information organization conceptual competency refers to knowledge of information organization and access, knowledge of structure, relationship and importance of library catalog systems, and knowledge of digital resources and organization. Descriptive cataloging competency refers to the understanding of the description, identification and display of data between the relevance of the theory and methods, and applying cataloging standards to perform copy cataloging or original cataloging. Subject analysis and authority control competencies are competencies for understanding the theory and method of subject analysis, applying taxonomy and providing classification numbers, developing and applying appropriate keywords, and understanding the authority to control knowledge and systems. The Cataloging management and technology competencies are competencies regarding understanding and applying the library catalog automation system, understanding the relevance of the database bibliography, the design and management of the database system, the application skills of bibliographic utilitize for resource tools, and cataloging work management.

Based on the above four cataloging competencies and competency indicators, ten course units of information organization were developed as shown in Table 1, including concept of information organization, descriptive cataloging, subject analysis and authority control(4 units), cataloging management and

technology(1 unit). Learning outcome evaluation was undertaken with multiple assessment methods, including direct assessment and indirect assessment in the class, and student learning assignment measurement according to the four core competencies. Finally, the researchers conducted the evaluation of learning outcomes with regards students learning evidence and learning performance.

4. Research Method

This study aimed to use the Kirkpatrick four-stage model to evaluate the learning outcomes of the information organization (IO) courses. The objectives of the study were as follows: (1) evaluate learning outcome of an information organization course with the Kirkpatrick model; (2) apply cataloging core competencies into course design for information organization curriculum ; (3) explore learning process and learning outcome of graduate students taking information organization course.

The study used a mixed method approach, including learning outcome evaluation and questionnaire survey. The study explored the learning outcome of an information organization course referring to Driscoll's Outcomes-based Assessment Model for General Education as follows: (1)Preparation: Determine purpose(s) and definition of assessment; examine mission and values.(2)Design assessment: articulate goals, develop clear outcomes, evidence, criteria, and standards.(3) Alignment of curriculum with learning outcomes.(4)Make outcomes, evidence, criteria, and standards.(5) Collect evidence of student achievement.(6)Review and analyze student evidence.(7)Revise outcomes and criteria, improve pedagogy and curriculum for learner success (Zhan, 2014).

The information organization course determined course goals and developed student expected outcomes referring to the four cataloging core competencies, including information organization concept, descriptive cataloging, subject analysis and authority control, cataloging management and technology. Based on the cataloging competency and competency indicators, the study developed curriculum learning objectives and activities. Curriculum design was from the students learning needs, to confirm the learning outcomes, into the expected learning outcomes, learning activities, and learning assessment, and finally collect evidence of the core competence to learn, review and analyze student evidence and the impact of course teaching as shown in Figure 1.

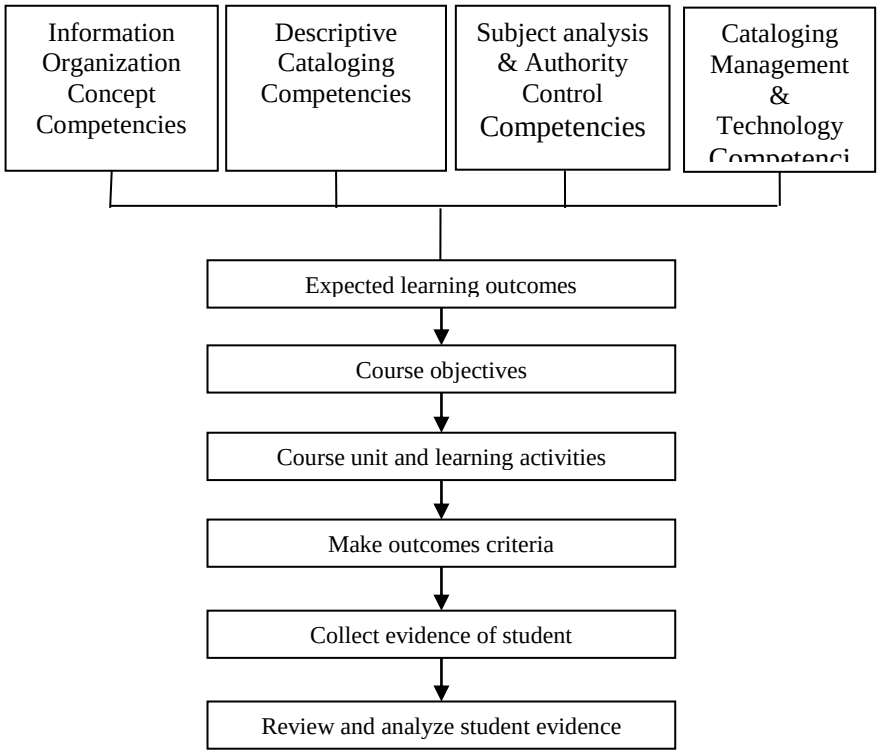

Figure 1 Research framework of learning outcome assessment of an information organization course

The study population consisted of 33 graduate students from two classes who took the Information Organization course during 2016 fall semester at the Graduate Institute of Library, Information and Archival Studies, National Cheng-chi University. One class was a master's program and the other class was an e-learning master's program. Researchers in the master's program provided the "Information Organization" course including ten course units for 17 weeks (referred to as master's class), which 11 graduate students attended. In the meantime, researchers also in the library and information science e-learning master program provided the "knowledge organization and information access " course, including 8 information organization course units, for 11 weeks, which 22 graduate students attended (referred to as the e-learning class), and course units of Western classification and Western subject analysis were not taught.

Kirkpatrick (2006) published his four-level training evaluation model including reaction learning, behavior, results. Level 1: measure how students reacted to the training, such as the instructor, the topic, the material, its presentation, and

the venue. Level 2: measure what students learned and how much has their cataloging competencies increased as a result of the course. Level 3: evaluate how far students have changed their behavior, based on the education they received. Level 4: analyze the final results of course. In the study, a behavior evaluation is the extent to which a change in behavior has occurred in studying or work; a result evaluation is the effect on the study or work resulting from the improved performance of students.

Table 2 Outline of Kirkpatrick four-level model

Level	Evaluation focus	Tool	Evaluation time
Level 1 reaction	How students felt about the course learning experience	Questionnaire	At the end of the course
Level 2 learning	The measurement of the increase in cataloging competency from before to after the learning experience	Three assignments, 4 tests, Pre-test and post-test, Final examinations	During and the end of the course
Level 3 behavior	The extent to which a change in behavior has occurred in studying or work	Self - assessment of learning outcomes, Questionnaires	At the end of the course
Level 4 result	The effect on the study or work resulting from the improved performance students.	Questionnaires	At the end of the course

Researchers conducted learning outcome evaluation of information organization courses and collected data for Kirkpatrick Level 2 learning including the following: (1) tests: pre-test and four formal tests, each test for the 10 multiple choice questions, four tests on concept of information organization, descriptive cataloging, subject analysis and authority control, and information organization integration. (2) Assignment document analysis: assignment 1, Information organization and information retrieval, assignment 2, descriptive cataloging, assignment 3, classification and subject headings. (3) Final examination. The final exam adopted the topic questions integrating the information organization concept, descriptive cataloging,and subject analysis.

At the end of the course, students were requested to complete a survey questionnaire for collecting data according to the Kirkpatrick (2006) model, namely level 1, reaction; level 3, behavior; level 4, results. All questions were measured via a 5-point scale ranging from 1(strongly disagree) to 5(strongly agree). The survey consisted of six parts: (1) personal profile; (2) previous learning experience in IO; (3) reaction of IO course (code A1-A7); (4) behavior change after learning (code B1-B3); (5) learning results (code C1-2). The study set two criteria for learning achievement evaluation; one was a post-test score of students' higher than pre-test score; and another one was the goal of 85% of students achieving a passing score.

5. Evaluating Learning Outcome of Information Organization Course

5.1. Research Data

The study population consisted of 33 graduate students from two classes, 11 students of a master's class and 22 students of an e-learning class. Female respondents (12.1%) were more than men (87.9%), and most of them were first year master's students (96.9%). Most of the respondents did not have experience of IO course study; 13 respondents (39.4%) who had not studied and 42.4% of students had a less than 50% familiarity with the course materials. The previous experience of the majority of students were from self-study, university courses, and work as shown in Table 3.

Table 3 Respondent population

		Master class(N=11)	E-learning class(N=22)	All (N=33)
gender	male	2(18.2%)	2(13.6%)	4(12.1%)
	female	9(81.8%)	19(86.4%)	29(87.9%)
grade	first year	10(90.9%)	22(100%)	32(96.9%)
	second year	1(9.09%)	0(100%)	1(3.03%)
learning experience	Have not learned yet	4(36.4%)	9(40.9)	13(39.4%)
	Less than 50%	5(45.5%)	9(40.9%)	14(42.4%)
	50% familiarity	2(18.2%)	3(13.6%)	5(15.2%)
	80% familiarity	0(0%)	1(4.5%)	1(3%)
experience source	No	5(45.5%)	9(40.9%)	14(42.4%)
	University course	2(18.2%)	4(18.2%)	6(18.2%)
	Self-study	3(27.3%)	7(21.2%)	10(30.3%)
	other	1(9.1%)	2(9.1%)	3(9.1%)

5.2. The Kirkpatrick Model Level 1

Level 1 measured the reaction of students to the learning course to ensure that students were motivated and interested in learning. This study investigated student satisfaction with the course with seven questions, from very dissatisfied (1 point) to very satisfy (5 points). The average all-student satisfaction rate was 4.51 points, 4.60 points for the master's class, and 4.32 points for the e-learning class, showing that students were satisfied with the information organization course. The respondents strongly agreed that the materials motivated them and drew their interest in learning more IO; materials arrangement started from beginner to advanced, and matched their learning needs. The instruction and

assignments were helpful for their study. Teachers regarded learning interaction important and encouraged students to ask or express their opinions. The resources download helped them to increase IO knowledge and skills and collect more relevant and useful information. E-learning courses and materials made learning easier. The average satisfaction rate was 4.03 for "the amount of effort needed to study the materials is fair," which was the lower of the seven reactions; as shown in Table 4. There were no significant differences in the satisfaction of the two classes, with independent sample T-test and two classes of satisfaction.

Table 4 Survey results of level 1: reaction

	Master class(N=11)		E-learning class(N=22)		All (N=33)	
	Average	SD	Average	SD	Average	SD
A1.The materials motivate me and draw my interest in learning more IO	4.18	0.60	4.59	0.59	4.45	0.62
A2 The materials arrangement starts form beginner to advanced, and fits my learning needs	4.45	0.52	4.55	0.60	4.52	0.57
A3. The instruction and assignments are helpful for my study.	4.45	0.69	4.64	0.58	4.58	0.61
A4.The amount of effort needed to study the materials is fair	3.73	0.79	4.18	0.91	4.03	0.88
A5 Teachers regard learning interaction important and encourage students to ask or express their opinions	4.73	0.47	4.86	0.35	4.82	0.39
A6. The resources download help me to increase my IO knowledge and skills and collect more relevant and useful information.	4.45	0.69	4.77	0.43	4.67	0.54
A7 E-learning courses and materials make learning easier.	4.27	0.79	4.64	0.49	4.52	0.62
Average	4.32		4.60		4.51	

5.3. The Kirkpatrick Model Level 2

Level 2 measured the knowledge acquired, improved skills or attitudes changed as a result of the learning IO course. We collected a total of 33 students' tests

and assignments as assessment information, including four tests, pre-test and post-test, three assignments, the final exam, and the total score, as shown in Table 5. The average grade score of the 11 respondents of the master's class was 82.55 points and 83.95 points for 22 respondents of the e-learning class. The graduate students of the master's class studied ten units of information organization courses, and completed a full set of 3 assignments. The e-learning class studied eight units of IO courses and did partial assignments, not containing MARC cataloging and subject analysis of western materials.

Table 5 Tests and assignments scores of respondents

		Master class(N=11)	E-learning class(N=22)
Information organization 20%	Assignment 1(10%)	88.00	87.40
	Test 1 (10%)	62.72	86.80
Descriptive Cataloging 30%	Assignment 2(10%)	88.00	86.10
	Test 2 (10%)	82.70	89.10
Subject analysis 30%	Assignment 3 (20%)	90.00	86.00
	Test 3 (10%)	68.18	89.50
Integrated application 20%	Assignment 4 (10%)	82.27	77.30
	Test 4 (10%)	80.00	73.00
Pre-test		65.42	69.00
Total		82.55	83.95

We analyzed the score of student assignments and tests according to four cataloging competencies, as shown in table 6. Subject analysis score for the e-learning class (87.21) was the highest, and integration application score for the e-learning class (75) was the lowest. Using the T-test, the results showed that the total score of assignment and test scores between the two classes was not significantly different, but there was significant difference in the information organization score and integrated application score.

Table 6 T- test of total score and cataloging core competencies of two - class respondents

	Total score	Information organization	Descriptive Cataloging	Subject analysis	Integrated application
Master class average	82.55	75.36	86.24	84.61	81.14

E-learning class average	83.95	87.09	84.55	87.21	75.00
P value	0.54	**0.00*** **	0.69	0.34	**0.02***

*P<.05 **P<.01 ***P<.001

Table 7 showed the pre-test and post-test results of respondents; the pre-test average score was 67.58 points, and post-test was 75.15 points. Master's class students had an average pre-test score of 65.46 points, and post-test score of 80 points; while the e-learning class students' average pre-test score was 68.64 points, and post-test average score 72.73 points. Using independent sample T-test, post-test scores were significantly higher than the pre-test results, demonstrating that all students made progress after taking the courses.

Table 7 T-test of pre-test and post-test of two-class respondents

	Master class N=11	ELearning class N=22	All=33
Pre-test	65.46	68.64	67.58
Post-test	80.00	72.73	75.15
P value	0.66	0.06	0.05*

*P<.05 **P<.01 ***P<.001

5.4. The Kirkpatrick Model Level 3

Level 3 measured the transfer of learning or if students were applying new knowledge, skills or attitudes to study and work. We defined questions code B1-B3 to level 3 in the Kirkpatrick model . The respondents strongly agreed that course was practical and enriched their information analysis and organizational skills, with an average score of 4.79 points. The respondents strongly agreed that they had integrated the IO knowledge and skills learned from the course into studies and work, with an average of score 4.45 points. In addition, the respondents agreed that they were willing to participate in cataloging certification by the ROC Library Association, with an average of 4.12 points. The responses of the three questions showed students' behavior changed as shown in table 8.

Table8 Survey results of level 3: behavior

	Master class(N=11)		E-learning class(N=22)		All (N=33)	
	Average	SD	Average	SD	Average	SD
B1. Course is practical and enriches my information analysis and organizational skills.	4.64	0.51	4.86	0.35	4.79	0.42
B2. I have integrated the IO knowledge and skills learned	4.36	0.51	4.50	0.74	4.45	0.67

from the course into studies and work.						
B3. I am willing to participate in cataloging certification by the ROC Library Association	4.09	0.83	4.14	0.89	4.12	0.88
Total	4.36		4.50		4.45	

5.4. The Kirkpatrick Model Level 4

Level 4 measured the result of learning as it related to factors such as productivity, improved performance. We defined question code C1-2 to level 4 in the Kirkpatrick model. The respondents strongly agreed that the information organization competencies learnt from the course improved their learning and work efficiency, with an average of 4.55 points. The respondents strongly agreed that they would recommend this course to their classmates, with an average of 4.73. Table 9 showed that students believed that IO course learning produced positive results for themselves.

Table 9 Survey results of level 4: results

	Master class(N=11)		E-learning class(N=22)		All (N=33)	
	Average	SD	Average	SD	Average	SD
C1 Information organization competency learnt from the course improves my learning and work efficiency	4.36	0.67	4.64	0.58	4.55	0.62
C2 I will recommend this course to my classmates.	4.64	0.51	4.77	0.43	4.73	0.45
Total	4.50		4.71		4.64	

6. Conclusions

This study effectively explored the learning outcome evaluation of IO courses and applied an evaluation instrument based on the Kirkpatrick four-stage framework. The Kirkpatrick model was used to collect the evidence of students' learning achievements in the learning outcome evaluation study. The researchers transformed the core cataloging competencies to the student's expected achievement and the curriculum teaching objectives. The case study was carried out to implement the course and the learning activities to evaluate the learning outcome of students studing on the information organization courses. The evaluation of the information organization courses showed that the student's learning achievement proved the progress of the study and provided feedback for adjustment to the teacher.

Based on the core cataloging competencies, covering the concept of information organization, descriptive cataloging, subject analysis and authority control,

catalog management & technology, the study designed a ten-unit information organization course with learning objectives, learning materials, and learning activities to effectively support student learning.

The results of the study met two criteria for learning: one was post-test score of students' being larger than pre-test score; and another one was the goal of 85% of students passing the course. The study proved students achieve the goal of learning outcome.

This study effectively used the Kirkpatrick evaluation model to collect evidence of student's learning outcomes from an information organization course. The Kirkpatrick four levels were reaction, learning, behavior, results. Level 1 reaction: how students felt about the course learning experience. Level 2 learning, the measurement of the increase in cataloging competencies from before to after the learning experience. Level 3 behavior, the extent to which a change in behavior had occurred in studying or work. Level 4 result, the effect on the study or work resulting from the improved performance of students. In this study, we collected Kirkpatrick's four-stage assessment data to prove that students had a good learning outcome from the information organization courses.

These respondents were satisfied with the learning information organization courses as the Kirkpatrick level assessment of student satisfaction was 4.51 points. The study showed that respondents had good learning outcomes from the learning information organization courses and performed well with regards to the core cataloging competencies. Kirkpatrick level 2 evaluation obtained an average student achievement score of 83.48 points, the highest score of the subject analysis, with information organization concept and descriptive cataloging second, and integration application score the lowest. The post-test scores of the two classes' students were significantly higher than the pre-test scores, which showed that students made significant progress after course learning .The cataloging competencies of the students of the master's class were the same as the cataloging competencies of the students of the e-learning class.

The results showed that students change their behavior after learning information organization. Students believed that there were three changes of their behavior: enhanced ability to organize information and to apply what they have learned to study and work, as well as the willingness to obtain the library association's cataloging certificate. This study showed that students had positive results after taking the IO course. Students demonstrated the knowledge gained from the course enhanced the efficiency of learning and work, and were willing to recommend this course to classmates.

Further research recommendations are proposed by the study as follows:

i. It is recommended that the learning outcomes be applied to other library and information science courses to promote students' learning

outcomes and to help teachers improve their curriculum, such as information literacy education, collection development and management, and information services.

ii. It is suggested further studies on the perception and evaluation of catalogue librarians are carried out to understand whether cataloging librarians are capable of implemented tasks, and to provide continuing education to improve cataloging skills.

iii. The Kirkpatrick assessment model can be applied in the curriculum of library and information science and continuing education to help review the effectiveness of education, training and advanced teaching, to enhance learners learning effectiveness.

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