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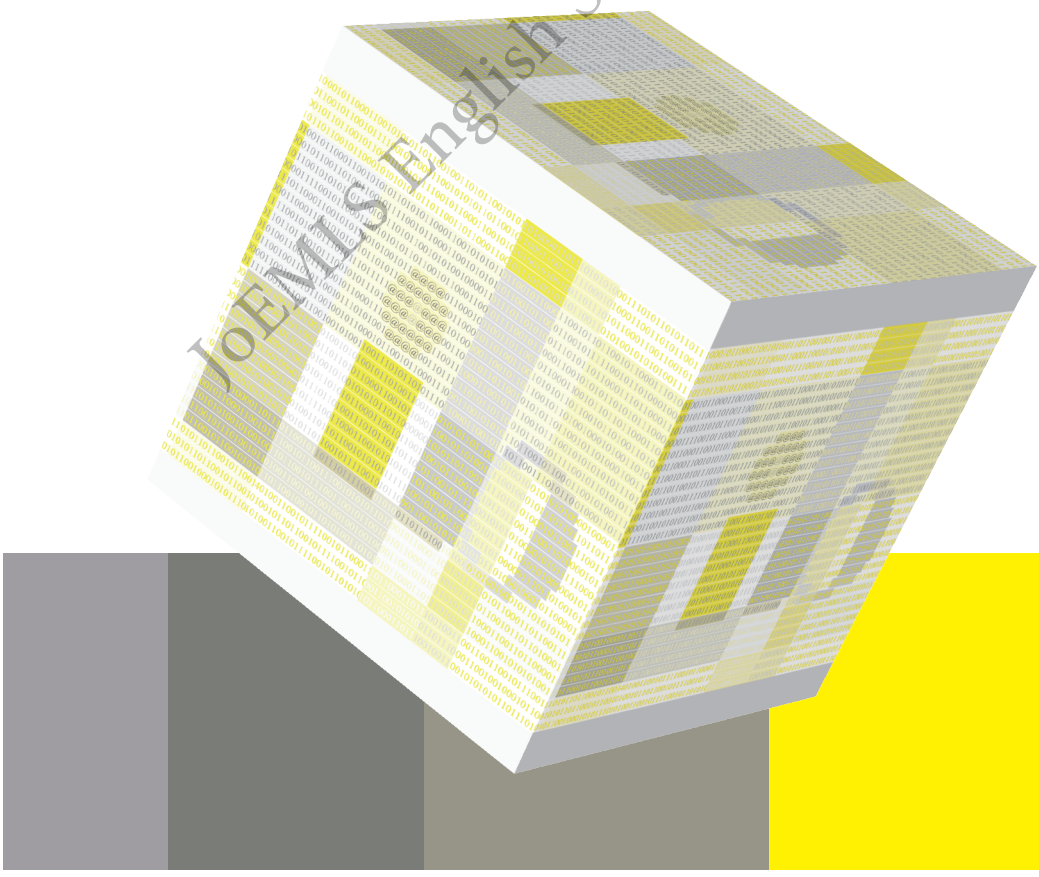

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教育資料與圖書館學 JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES Vol. 55, No.1, 2018

教育資料與圖書館學，始於1970年3月創刊之**教育資料科學月刊**，其間於1980年9月更名為**教育資料科學**，並改以季刊發行。自1982年9月起易今名。另自2016年11月起，改以一年出版三期（3月、7月、11月）。現由淡江大學出版中心出版，淡江大學資訊與圖書館學系和覺生紀念圖書館合作策劃編輯。本刊為國際學術期刊，2008年獲國科會學術期刊評比為第一級，2015年獲科技部人文社會科學研究中心評定為教育學門專業類A級期刊。並廣為海內外知名資料庫所收錄(如下英文所列)。

The JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES *(JoEMLS)*, published by the Tamkang University Press and co-published with the Department of Information & Library Science (DILS) and Chueh Sheng Memorial Library, was formerly the ***Bulletin of Educational Media Science*** (March 1970 – June 1980) and the ***Journal of Educational Media Science*** (September 1980 – June 1982). In 2015, The *JoEMLS* is acknowledged as the A class scholarly journal in Taiwan by Ministry of Science and Technology (MOST). Since November 2016, the *JoEMLS* has been changed from quarterly to a tri-annual journal, published in March, July, and November.

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JEMLS Editorial System

教育資料與圖書館學 封面意義：躍升於紙本印象上的數位與網路化圖書資訊圖騰。
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L (Librarianship); **I** (Information Technology); **B** (Bibliophile and the Book trade)

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本刊係採開放存取（Open Access）與商業資料庫付費途徑，雙軌發行之國際學術期刊，兼具電子版與紙本之平行出版模式。本刊除秉持學術規範與同儕評閱精神外，亦積極邁向InfoLibrary寓意之學域整合與資訊數位化理念，以反映當代圖書資訊學研究趨勢、圖書館典藏內容與應用服務為本；且以探討國內外相關學術領域之理論與實務發展，包括圖書館學、資訊科學與科技、書業與出版研究等，並旁及符合圖書資訊應用發展之教學科技與資訊傳播論述。

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EDITORIAL

In and Beyond This Issue

The well known founder of Faculty of 1000 (abbreviated F1000), Vitek Tracz, has been regarded as a prophet in the journal publishing field. He predicted in 2013 that peer-review journals in print will disappear within a decade, because individual academic papers have gradually become direct targets of searches and notations (such as using Digital Object Identifier). In other words, there will be no existence of "journals" as academic publications, and journal articles will be independently existing objects. These independently existing journal articles might be still attached to some journal in format, but in essence they are endowed with more space for creative publishing, and their value might be even more highlighted through the new form of open peer review system.

Our *JoEMLS* has been cooperating with Airiti company since 2004 to conduct practical analysis on the peer review system. We also worked with Airiti to design, test, and promote the mode of online submission and review system platform that met the needs of both the company and the academic field. We had completed the empowerment through technology transfer, and further realized the ideal entire-process electronic journal management system. The outcome and effectiveness of the implementation of this platform were naturally the focus of the academic publishing market in Taiwan then. Was such an electronic journal editing and incorporated platform having enough market potential and worth developing? Was the economic scale large enough to attract more business or non-business institutes for developing such a platform? These questions had a decisive impact on the popularity and quality of these products. Today, fourteen years after then, many concepts and applications are different. The concepts of Open Access, Web 2.0, Bibliometrics, and academic social media have become well-known, and the process of traditional peer-review journals has been questioned and doubted.

In the short-term future, is it feasible to apply the new form of journal submission and review platforms, such as *F1000 Research* or *PubPeer*, to the field of humanities and social science (including library and information science) journals? Will the companies of academic value-added information or database vendors be willing to participate in the development and service of this new and innovative mechanism of open peer review system? The key factor of realizing this expectation relies on the test of human nature — whether we are willing to change old habits, break through traditional limits, and accept new challenges.

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In this issue (Volume 55, Issue 1), we received only 15 manuscripts, and only six of them had gone through the review process. Three of the six manuscripts were accepted, with a rejection rate of 50%. The manuscripts published in this issue include: "Faculty-Librarian Collaborative Culture and Current Development in the Colleges and Universities in Taiwan" by Ti Yu and Chao-Chen Chen, "The Reuse of Quantitative Data in Social Sciences in Taiwan: 2001-2015" by Chi-Shiou Lin and Ching-Yi Lai, and "Level of Information Literacy among Upper-Secondary School Students in Thailand and the Problems They Encounter" by Thai scholars, Chumchit Saechan and Vorasiri Siriwipat.

With a mission of pursuing journal quality and promoting academic communication, our *Journal* has been facing the problem of manuscript insufficiency. In the future, can we rely on the new form of journal system platform for keeping innovative publishing and changing the process of journal editing and management? This is definitely a big challenge for us.

Jeong-Yeou Chiu
JoEMLS Chief Editor

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Research Article

Faculty-Librarian Collaborative Culture and Current Development in the Colleges and Universities in Taiwan

Ti Yu[a*] Chao-Chen Chen[b]

Abstract

This study explored the concept of faculty-librarian collaboration from the perspective of culture. Five research purposes are proposed in this study. They are: 1. to discover the elements that can be utilized to construct the concept of faculty-librarian collaborative culture; 2. to explore the value levels of faculty-librarian collaborative culture in the colleges and universities of Taiwan; 3. to measure the differences in the value levels of faculty-librarian collaborative culture between faculty members and librarians; 4. to understand the current development of faculty-librarian collaboration in the colleges and universities of Taiwan; and 5. to examine the impact relationship between faculty-librarian collaborative culture and the current development of faculty-librarian collaboration. This study adopted Schein's three-level model of organizational culture as the conceptual structure to explore the dimensions and factors that are utilized to construct collaborative culture between librarians and faculty members and to develop a questionnaire. An online survey tool, Survey Monkey, was used to collect data via internet in this study. In order to obtain as many replies as possible, the researchers adopted the purposive sampling approach and the snowball sampling approach to actively ask colleagues, friends and friends' friends for helping to distribute the questionnaires. As a result, 279 respondents answered the online questionnaire in total from December 2015 to May 2016. However, 88 responses were highly incomplete. This resulted in 191 valid responses, for an overall valid response rate of 68.5%. This study finally explored seven key elements that can represent and construct the content and concept of faculty-librarian collaborative culture of Taiwan. The seven elements are: 1. Organizational Collaborative Environment, 2. Mutual Benefit and Responsibility in Collaboration, 3. Mutual Understanding and Communication, 4. Collaborative Commitment, 5. Collaborative Leadership, 6. Mutual Respect and Trust, and 7. Collaborative Relationship and Interaction.

DEMO English Summary

Keywords: *Faculty, Librarian, Collaboration, Collaborative culture, Colleges and universities, Taiwan*

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SUMMARY

Over the past few decades, higher education institutions have faced various challenges and changes, such as the rapid development of information technology, cost reduction, manpower constraints, rigid evaluation, and increased competition. Due to these challenges and changes, numerous faculty and administrative staff members in higher education institutions have come to recognize the problems and stresses involved in the transformation of teaching methods, and the tasks of enhancing student learning outcomes and improving institutional performances. As a result, collaboration has gradually become a beneficial approach for employees in numerous universities to cope with these challenges and problems.

The researchers consider that 'collaborative culture' is probably the basis for faculty members and librarians to work together in a higher education institution, and the key to the long-term collaborative relationships and successful collaborative projects. However, few studies have mentioned the importance of collaborative culture in collaborations between faculty members and librarians, and few studies on the topic of faculty-librarian collaborative culture have been conducted by librarians or scholars in Taiwan. Therefore, this study decides to explore the concept of faculty-librarian collaboration from the perspective of culture.

Five research purposes are proposed in this study. They are: 1. to discover the elements that can be utilized to construct the concept of faculty-librarian collaborative culture; 2. to explore the value levels of faculty-librarian collaborative culture in the colleges and universities in Taiwan; 3. to measure the differences in the value levels of faculty-librarian collaborative culture between faculty members and librarians in Taiwan; 4. to understand the current development of faculty-librarian collaboration in the colleges and universities in Taiwan, including the reasons for developing faculty-librarian collaboration, methods for building faculty-librarian collaborative relationships, models for developing faculty-librarian collaboration, success factors and difficulties faced by faculty members and librarians to conduct collaborative projects; and 5. to examine the impact relationship between faculty-librarian collaborative culture and the current development of faculty-librarian collaboration.

This study adopted Schein's three-level model of organizational culture as the conceptual structure to explore the dimensions and factors that are utilized to construct collaborative culture between librarians and faculty members. For this study, two survey questionnaires entitled "Faculty-librarian Collaboration

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Survey—Librarian" and "Faculty-librarian Collaboration Survey—Faculty" were designed and developed by the researchers to collect data. Basically, the questionnaire comprises three parts. The first part is demographic and background information, which includes seven question items. The second part is the Faculty-librarian Collaborative Culture Questionnaire (FLCCQ) with 38 question items. The third part is composed of five question items to explore the perceptions and/or experiences of faculty members and librarians regarding current development of faculty-librarian collaboration. Part II and III are designed in a five-point Likert-type format. Finally, an open-ended question is designed at the end of the third part to ask respondents to talk about their personal experience in faculty-librarian collaborative projects and to provide some comments and ideas.

The researchers invited two senior professional librarians and three scholars in librarianship in Taiwan to response to the questionnaires for measuring content validity. The questionnaires were revised and edited based on their opinions and comments. Next, a pilot study was conducted. 28 librarians and 35 faculty members were asked to pretest the questionnaires at several colleges and universities in Taiwan. Finally, the reliability of FLCCQ had a Cronbach's alpha of 0.943. In addition, the reliability of Q1, Q2, Q3, Q4, and Q5 for the third part of the questionnaire had a Cronbach's alpha of 0.870, 0.885, 0.890, and 0.906, respectively. These statistics indicated that the data were appropriate for factor analysis and construct validity for the full questionnaire reached an acceptable level.

An online survey tool, Survey Monkey, was used to collect data via internet in this study. In order to obtain as many replies as possible, the researchers adopted the purposive sampling approach and the snowball sampling approach and actively ask colleagues, friends and friends' friends to help with distributing the questionnaires. As a result, 279 respondents answered the online questionnaire in total from December 2015 to May 2016. However, 88 responses were highly incomplete. This resulted in 191 valid responses, for an overall valid response rate of 68.5%.

A number of important findings and results are summarized as follows:

1. This study explores seven key elements that can represent the content and concept of faculty-librarian collaborative culture of Taiwan. The seven elements are: (1) Organizational Collaborative Environment, (2) Mutual Benefit and Responsibility in Collaboration, (3) Mutual Understanding and Communication, (4) Collaborative Commitment, (5) Collaborative Leadership, (6) Mutual Respect and Trust, and (7) Collaborative Relationship and Interaction.

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2. It is evident that most of the responding faculty members and librarians in the colleges and universities in Taiwan highly respect and trust each other. Most of them also clearly understand what benefits they can obtain and what responsibilities they should assume in a faculty-librarian collaborative project. Nevertheless, most administrative leaders either in academic departments or libraries have not yet demonstrated strong support for their faculty and staff members to collaborate with each other. It is obvious that a collaborative atmosphere and environment between faculty members and librarians probably has not yet been formally built up in most of the respondents' institutions in Taiwan currently.

3. The responding faculty members demonstrates a higher level of motivation and commitment than the responding librarians in performing faculty-librarian collaborative projects. In addition, the responding librarians exhibited a lower level of familiarity with faculty members. Therefore, how to develop a better understanding with faculty members seems to be a critical issue for librarians in the colleges and universities in Taiwan to deal with currently.

4. The collaborative models of 'Promoting library use and/or information literacy', 'organizing a workshop or seminar', 'Developing the library collection', and 'Co-teaching in a class' are more frequently adopted by the responding faculty members and librarians in Taiwan. In addition, 'The library establishes a liaison librarian program' and 'Faculty members frequently take part in the library's seminars or promotion activities' are the most prevalent two methods adopted by the responding faculty members and librarians to build up their collaborative relationship. The highest level of difficulty for the responding faculty to work together in the collaborative projects is 'Not having enough time to work together' and 'Unfamiliar with each other.'

5. This study finds that the levels of faculty-librarian collaborative culture valued by the responding faculty members and librarians in the dimensions of 'Mutual Benefit and Responsibility in Collaboration', 'Mutual Respect and Trust', and 'Collaborative Relationship and Interaction' have a significantly higher impact on their experiences/perceptions toward the current development of faculty-librarian collaboration.

Finally, some practical implications and suggestions are proposed by the researchers based on the findings and results of this study for the future development of faculty-librarian collaboration. They are: (1) Mutual respect, mutual trust, and mutual benefit are the basis for librarians and faculty members to build their collaborative relationships upon; (2) Librarians and faculty members need to improve communication channels and create more communication

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opportunities for them to work with each other; (3) Conducting a simple and easy collaborative project is a good start for librarians and faculty members to initiate and join in the project; (4) Librarians may try to find key persons (faculty members) who are enthusiastically interested in working with librarians; (5) Developing student-oriented collaboration for improving teaching and learning can attract more faculty members to participate in faculty-librarian collaborative projects; (6) Both librarians and faculty members need to gain leadership support for developing faculty-librarian collaboration in institutions; and (7) Librarians need to market and promote themselves more.

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

于第（2007）。教師與館員合作推廣學生利用圖書館資源之研究—以景文技術學院為例。大學圖書館，*11*(1)，53-72。【Yu, Ti (2007). The study of faculty-librarian collaboration on promoting library resources use to students: A case of Jin-Wen Institute of Technology. *University Library Journal*, *11*(1), 53-72. (in Chinese)】

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The Reuse of Quantitative Data in Social Sciences in Taiwan: 2001-2015

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Research Article

Abstract

This study explored the reuse of existing quantitative data in original social sciences research in Taiwan. Using the 2015 TSSCI List as the basis of journal selection, this study focused on 57 journals listed under the subject divisions of economics, political science, sociology, education, and psychology. Journal issues published between 2001 and 2015 were manually scanned to identify data reuse papers. The characteristics of the reuse papers and the cited data were recorded for the subsequent subject division-level and subject discipline-level analyses. A total of 1,484 reuse papers were identified, which accounted for 17.38% of the total empirical study papers. Among the five subject divisions, economics and political science had the highest percentages of data reuse, while psychology had the lowest. Those reuse papers together cited 2,990 datasets. Most of the datasets were used in economics and political science papers. Further, these two subject divisions had noticeably larger proportions of papers that use more than one dataset. In contrast, papers using only one dataset were the majority for the rest. In regards to data source and data type, datasets originated from government agencies as well as data generated from business operations accounted for the majority of the cited data, but significant differences existed among those subjects. As opposed to the frequently used business and series survey data, data generated from independent research projects as well as data that were non-continuous and one-time in nature were rarely reused in social sciences research. Based on the study findings, it is recommended that data services for social sciences research should focus more on large-scaled continuous data generated from governments and research institutions. A service mechanism that bridges users and data providers from public and private sectors would also enhance data reuse and increase the value of existing data.

JoEMLS Abstract Summary

Keywords: *Data reuse, Data citation, Quantitative data, Social sciences*

SUMMARY

The rise of e-science and data curation in the recent decades has prompted the sharing and reuse of research data in sciences. However, investigations on how and to what extent the existing data have been used for derivative, original

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research are still rare. Among the limited number of research, most has focused on data reuse in science disciplines, particularly, in genetics and astronomy. Rarely has the existing research examined data reuse in social sciences.

Further, due to the lack of standardized data citation practices in current academic writings, most of the existing data reuse studies have identified data reuse papers based on the presence of data registry keys (e.g., the DOIs of datasets of a particular data repository) in the references and/or the main texts of research papers. While this method works well for some scientific disciplines that have data sources that are well archived by one or two data repositories, it is less effective for identifying data reuse papers in social sciences as the potential data sources are more disperse and sporadically distributed. Moreover, not all of the datasets in social science papers are deposited in data repositories and there might not be registry keys for those datasets that have actually been reused. For social science research outside of the English-speaking world, relying on data registry keys is even more impractical as most of the reused datasets may have never been registered in international data repositories or data citation indexes.

This study thus adopted another approach. The authors manually scanned the empirical research papers published within a body of social science journals to identify all papers that have empirical analysis which were based wholly or partially on existing datasets. With the papers drawn from a time span of 15 years (2001-2015), this study sought to answer the following questions:

1. To what extent have data reuse papers accounted for the social science research papers? Were there observable growths in data reuse in social sciences over the 15 years?

2. How many datasets have been used in the data reuse papers? Were there observable growths in dataset usage?

3. What were the major sources of data for the social sciences disciplines? Where there significant differences in data sources among various social sciences disciplines?

4. What were the major data types for social science disciplines? Were there significant differences in data types among various social sciences disciplines?

This study employed content analysis on the papers published by 57 journals that were included in the 2015 journal list from the Taiwan Social Sciences Citation Index (TSSCI). The 57 journals together represented five larger subject divisions (i.e., economics, political sciences, social sciences, education, and psychology) or eleven smaller subject disciplines. Each paper published between 2001 and 2015 was examined to ascertain if it constituted a data reuse paper. For each data reuse paper, the data reuse characteristics as well as the characteristics of the used datasets were systematically recorded for later analysis.

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Based on the analyses, it was found that data reuse papers accounted for 11.99% of the entire sample of research papers (including empirical and non-empirical research papers) and 17.38% for the empirical study papers. The subject division of economics constituted the largest user group of existing data in empirical research; it claimed 40.23% of the total data reuse papers (Table 1). However, the analysis of chronological distributions of the data reuse papers showed no obvious increase or decrease of data reuse in the entire sample or by subject division/discipline.

Table 1 The Distribution of Data Reuse Papers in Taiwan Social Sciences Research, 2001-2015

Subject Division/ Subject Discipline	Number of research papers	Number of empirical papers	No. of the data reuse papers (% for the total reuse papers)	% - total research papers	% - total empirical papers	Rank 1*	Rank 2*
Total	**12,381**	**8,541**	**1,484(100.00)**	**11.99**	**17.38**		
Economics Div.	**1,125**	**750**	**597(40.23)**	**53.07**	**79.60**		
Economics	764	469	395	51.70	84.22	1	1
Agri. Eco.	361	281	202	55.96	71.89	2	2
Political Sci. Div.	**2,265**	**836**	**341(26.62)**	**15.06**	**40.79**		
Political Science	1,216	442	187	15.38	42.31	4	4
Public Admin. & Int'l Affairs	1,049	394	154	14.68	39.09	6	5
Social Sci. Div.	**1,690**	**1,045**	**243(16.37)**	**14.38**	**23.25**		
Sociology	602	381	195	32.39	51.18	3	3
Social Work	292	208	30	10.27	14.42	9	6
Communication	796	456	18	2.26	3.95	10	10
Education Div.	**5,304**	**4,131**	**226(15.23)**	**4.26**	**5.47**		
Education	3,541	2,535	186	5.25	7.34	5	7
Physical Education	1,306	1,219	34	2.60	2.79	8	9
Library & Info Sci.	457	377	6	1.31	1.59	11	11
Psychology Div.	**1,997**	**1,779**	**77(5.19)**	**3.86**	**4.33**		
Psychology	1,997	1,779	77	3.86	4.33	7	8

* Rank 1: ranks for the subject divisions; Rank 2: ranks for the subject disciplines based on the proportions of data reuse papers divided by empirical study papers.

The 1,484 data reuse papers together have used 2,990 datasets; that is, each paper has used an average of 2.01 datasets with a standard deviation of 2.02. Observing data usages at the subject division and subject discipline levels, economics research again topped the other subjects (Table 2). Chronological distributions of the dataset usages again showed that there was no obvious increase or decrease of per-paper dataset usages from 2001 to 2015.

In regards to the distributions of data sources and data types, Table 3 shows that data outsourced from government agencies constituted 53.88% of the entire used data, followed by those from academic institutions (18.70%).

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Table 2 The Distribution of Dataset Usages among the Data Reuse Papers, 2001-2015

Subject Division/ Subject Discipline	No. of reuse papers (% - total reuse papers)	No. of datasets (% - total datasets)	Avg.	St.D.	Rank 1*	Rank 2*	Rank 3*
Total	**1,484**(100.00)	**2,990**(100.00)	**2.01**	**2.02**			
Economics Div.	**597**(40.23)	**1,504**(50.30)	**2.52**	**2.38**	**1**		
Economics	395	1,001	2.53	2.21		1	1
Agricultural Eco.	202	503	2.49	2.68		2	2
Political Sci. Div.	**341**(26.62)	**694**(23.21)	**2.04**	**2.11**	**2**		
Politi Sci.	187	389	2.08	2.31		3	3
Publical Admin. & Int'l Affairs	154	305	1.98	1.85		4	5
Social Sci. Div.	**243**(16.37)	**385**(12.88)	**1.58**	**1.39**	**3**		
Sociology	195	291	1.49	1.16		5	7
Social Work	30	57	1.90	2.07		8	6
Communication	18	37	2.06	2.07		10	4
Education Div.	**226**(15.23)	**297**(9.93)	**1.31**	**1.12**	**5**		
Education	186	243	1.31	1.20		6	10
Physical Education	34	45	1.32	0.68		9	11
Library & Info Sci.	6	9	1.50	0.84		11	7
Psychology Div.	**77**(5.19)	**110**(3.68)	**1.43**	**1.13**	**4**		
Psychology	77	110	1.43	1.13		7	9

* Rank 1: ranks for the subject divisions by the average dataset usage;
Rank 2: ranks for the subject disciplines by the total number of dataset;
Rank 3: ranks for the subject disciplines by the average dataset usage.

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As to data type, Table 4 shows that business data constituted the majority of the used data (54.31%), followed by series surveys (32.31%). The use of one-time data was extremely rare (11.97%).

Based on the analysis, this study concluded that, from 2001 to 2015, slightly lower than one fifth (17.38%) of the social science empirical research in Taiwan was based on the reuse of existing datasets. During the 15 years, both paper production based on data reuse as well as the quantity of datasets used have remained steady. This is possibly the capacity limit of data reuse in generating novel analysis for Taiwan social science research.

Chi-square tests showed that, for both data source and data type of the reused datasets, significant differences existed among the five social sciences subject divisions as well as six major subject disciplines. This means that the data needs and the data reuse behaviors are highly diverse and heterogeneous in different social science subject fields. Economics and political science research constituted the major users of existing data. It was possibly due to the prevalent macro-level research inquiries in those fields, and outsourcing became the only means for data acquisition, particularly for the large-scaled datasets.

Table 3 The Distribution of Data Sources for the Data Reuse Papers, 2001-2015

Data Source / Div./Discipline	Government Agencies		Academic Institutions		Private Sectors		Individual Researchers		Un-recognized	
	n.	%	n.	%	n.	%	n.	%	n.	%
Total (N=2,990)	**1,611**	**53.88**	**559**	**18.70**	**458**	**15.32**	**255**	**8.53**	**107**	**3.58**
Eco. Div. (n=1,504)	**1,001**	**66.56**	**75**	**4.99**	**302**	**20.08**	**58**	**3.86**	**68**	**4.52**
Economics (n=1,001)	666	66.53	51	5.09	224	22.38	24	2.40	36	3.60
Agri, Eco. (n=503)	335	66.60	24	4.77	78	15.51	34	6.76	32	6.36
Poli. Sci. Div. (n=694)	**255**	**36.74**	**239**	**34.44**	**62**	**8.93**	**117**	**16.86**	**21**	**3.03**
Poli. Sci. (n=389)	119	30.59	132	33.93	41	10.54	87	22.37	10	2.57
Pub. Admin. & Int'l Affairs (n=305)	136	44.59	107	35.08	21	6.89	30	9.84	11	3.61
Social Sci. Div. (n=385)	**202**	**52.47**	**125**	**32.47**	**28**	**7.27**	**23**	**5.97**	**7**	**1.82**
Sociology (n=291)	138	47.42	114	39.18	14	4.81	19	6.53	6	2.06
Soc. Work (n=57)	51	89.47	3	5.26	1	1.75	1	1.75	1	1.75
Comm. (n=37)	13	35.14	8	21.62	13	35.14	3	8.11	0	0.00
Edu. Div. (n=297)	**118**	**39.73**	**78**	**26.26**	**49**	**16.50**	**43**	**14.48**	**9**	**3.03**
Education (n=243)	93	38.27	77	31.69	27	11.11	43	17.70	3	1.23
Phy. Edu, (n=45)	21	46.67	0	0.00	18	40.00	0	0.00	6	13.33
Lib & Info (n=9)	4	44.44	1	11.11	4	44.44	0	0.00	0	0.00
Psycho. Div. (n=110)	**35**	**31.82**	**42**	**38.18**	**17**	**15.45**	**14**	**12.73**	**2**	**1.82**
Psychology (n=110)	35	31.82	42	38.18	17	15.45	14	12.73	2	1.82

Table 4 The Distribution of Data Types in the Data Reuse Papers, 2001-2015

Data Type / Div./Discipline	Business Data		Series Surveys		One-time Data		Un-recognized	
	n.	%	n.	%	n.	%	n.	%
Total (N=2,990)	**1,624**	**54.31**	**966**	**32.31**	**358**	**11.97**	**42**	**1.40**
Eco. Div. (n=1,504)	**1,126**	**74.87**	**266**	**17.69**	**85**	**5.65**	**27**	**1.80**
Economics (n=1,001)	739	73.83	197	19.68	42	4.20	23	2.30
Agri. Eco. (n=503)	387	76.94	69	13.72	43	8.55	4	0.80
Poli. Sci. Div. (n=694)	**241**	**34.73**	**273**	**39.34**	**174**	**25.07**	**6**	**0.86**
Poli. Sci. (n=389)	95	24.42	174	44.73	115	29.56	5	1.29
Pub. Admin. & Int'l Affairs (n=305)	146	47.87	99	32.46	59	19.34	1	0.33
Social Sci. Div. (n=385)	**121**	**31.43**	**208**	**54.03**	**54**	**14.03**	**2**	**0.52**
Sociology (n=291)	74	25.43	172	59.11	43	14.78	2	0.69
Soc. Work (n=57)	29	50.88	20	35.09	8	14.04	0	0.00
Comm. (n=37)	18	48.65	16	43.24	3	8.11	0	0.00
Education Div. (n=297)	**100**	**33.67**	**161**	**54.21**	**32**	**10.77**	**4**	**1.35**
Education (n=243)	59	24.28	151	62.14	30	12.35	3	1.23
Phy. Edu. (n=45)	35	77.78	8	17.78	1	2.22	1	2.22
Lib. & Info. (n=9)	6	66.67	2	22.22	1	11.11	0	0.00
Psychology Div. (n=110)	**36**	**32.73**	**58**	**52.73**	**13**	**11.82**	**3**	**2.73**
Psychology (n=110)	36	32.73	58	52.73	13	11.82	3	2.73

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Also note that data from previous individual research as well as data that were one-time in nature (non-continuous, slice-of-time data) were found to be rarely reused in social sciences. A policy implication from this finding is that the collection development of data repositories for social sciences should focus on acquiring large-scaled surveys as well as business transaction data generated from important governments and private sectors rather than focusing on individual research data that provide very limited reuse opportunities for future researchers.

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Research Article

Level of Information Literacy among Upper-Secondary School Students in Thailand and the Problems They Encounter

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Abstract

The research work described in this paper investigated the information literacy (IL) level of upper-secondary students in the southernmost provinces of Thailand and the problems that they encounter with respect to IL. Data were collected from a sample comprising of 390 students, who were selected by employing stratified random sampling. The research instruments included an IL test and a questionnaire concerning the problems encountered pertaining to IL. The data were analyzed based on percentages, means, and standard deviations. Moreover, significant differences were tested using t-tests, F-tests and a Scheffé test. The results revealed that, overall, the students' average level of IL, based on the seven standards, was at the Pass level. However, some students demonstrated Fail level of IL in Standard 3 (able to analyze, evaluate, and select the information required), as well as Standard 7 (have knowledge and the necessary skills to use ICT). Overall, the students encountered problems pertaining to IL at a moderate level. All variables, including sex, stream of study, GPA, and school location, affected the students' level of IL. However, only school location significantly impacted problems pertaining to IL. The researchers propose that teaching and learning activities should be redesigned utilizing collaborative teaching involving teachers, librarians, and ICT personnel in order to enhance students' IL. The Educational Supervisory Unit and the administrators of upper-secondary schools should set guidelines/ standards for providing modern ICT equipment to students, which they can use in classrooms, libraries, and computer rooms.

JoEMLS English Summary

Keywords: *Information literacy, Southernmost Thailand, High school students, Library Science, Assessment, Problems of information literacy*

Introduction

The need for people to be able to function effectively in a knowledge-driven society and to cope with continuous social, economic, and technological change has triggered an array of arguments about the competencies people require to have a successful life and career in the 21st century. The European Council

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and the European Parliament have adopted a framework of key competencies necessary for lifelong learning. The framework identifies and defines the key competencies that citizens need for ensuring personal fulfillment, social inclusion, active citizenship, and employability in a knowledge-driven society. The framework includes competence in "traditional" subjects, such as mother-tongue literacy, numeracy, and knowledge of foreign languages, science, and technology. Furthermore, it covers other competencies such as learning to learn, digital competence, social and civic competence, initiative-taking, entrepreneurship, cultural awareness, and self-expression (European Commission, 2017).

The American Library Association (ALA, 2017) states that "literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society." Correia (2002) suggests that literacy is active and effective, and it promotes responsible citizenship, while Boekhorst (2003) adds the aspect of self-actualization and Bundy (2004) gives importance to social responsibility in this regard. These competencies are referred to as "information literacy" (IL) in library science. Proponents of IL believe that it is the most critical kind of literacy for the 21st century, which is of utmost importance for the realization of not only most personal, academic, and professional goals but also for economic development. The Association of College and Research Libraries (ACRL, 2000) highlights IL as an educational goal that is "common to all disciplines, to all learning environments, and to all levels of education." Moreover, it is an important factor in the workplace and is perceived to be an ongoing process that should be facilitated throughout one's life (Boekhorst, 2003).

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In modern society, every individual requires an increasingly sophisticated set of competencies in order to find, handle, and use information effectively. Facilitating the development of IL, as an essential competency in the 21st century, is therefore a task of the utmost importance. It has also created a need for a re-conceptualization of the roles and responsibilities of professionals involved with libraries and imparting information in a new learning environment (Virkus, 2006). Librarians have always endeavored to assist library users to develop the ability of locating and finding information. However, in an increasingly complex information environment, students are presented with diverse and abundant choices with regard to sources of information that is "available in different forms, places, and increasingly in unfiltered forms and in uncertain quality" (Wilson, 2001, p. 2). Students have been found to possess insufficient IL in a series of studies (Centre for Information Behaviour and the Evaluation of Research, British Library, & Joint Information Systems Committee, 2008; Cole & Kelsey, 2004; Hepworth, 1999; Lonsdale et al., 2003; Pejova, 2002; Ray & Day, 1998; Stern, 2003).

The southernmost region of Thailand is located near Malaysia, which covers five provinces, including Narathiwat, Yala, Pattani, Satun, and Songkla. Majority of the population in this area comprises of Muslims. There are various kinds of schools that students can attend, but based on the Muslim way of life, the most popular ones in this region are Islamic private schools. Additionally, a number of studies have revealed low educational quality to be a major problem in this area, which includes an inefficacious learning process owing to a severe lack of effective communication, analytical thinking, teaching personnel, and cultural diversity (Farrungsang, Uttayawalee, Sungtong, & Haji-Awang, 2011; Wae-u-sengn, 2013).

Hence, the study concerning upper-secondary school students' IL and the problems they encounter in developing their IL is necessary, in order to improve the educational quality and management. This is exceedingly important, as it contributes to the limited knowledge available about IL of upper-secondary school students. Furthermore, empowering students by developing their IL is an important way of enhancing their ability to live in a global community, and this research will help teachers and librarians prepare their students to use information for supporting their studies appropriately.

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Objectives of the Study

The primary objectives of the study were as follows:

1. Investigate the IL level of upper-secondary students in the southernmost provinces of Thailand.
2. Examine the problems that upper-secondary students studying in the southernmost provinces encounter with respect to IL development.
3. Analyze the students' level of IL and the problems that they encounter, by taking other variables into consideration, namely sex, stream of study, GPA, and school location.

Hypotheses

This research set out to test the following hypotheses:

1. The level of IL of upper-secondary students in the southernmost provinces of Thailand would differ based on the following variables: sex, stream of study, GPA, and school location.
2. The problems concerning IL encountered by upper-secondary students studying in the southernmost provinces would differ based on the following variables: sex, stream of study, GPA, and school location.

Literature Review

Many definitions and concepts pertaining to IL have been offered by different information organizations and professionals. According to ACRL (2000), IL is a set of abilities that require individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." On the other hand, according to Doyle (1994), IL is an intellectual framework employed for understanding, finding, and evaluating information and implies the ability to access, evaluate, and use information from a variety of sources; it also involves one's ability to recognize when information is needed and know the way to learn. UNESCO (2016) suggests that IL "empowers people in all walks of life to seek, evaluate, use, and create information effectively to achieve their personal, social, occupational, and educational goals. It is a basic human right in a digital world and promotes social inclusion in all nations."

Information literacy level and variables concerning upper-secondary school students

While many upper-secondary school students profess to be confident in at least a few aspects of IL (Herring, 2009; Latham & Gross, 2008), in reality, when their IL skills are tested or assessed in college, the majority of them receive poor scores or fail to acquire passing marks (Maughan, 2001). In their study, Smith, Given, Julien, Ouellette, and DeLong (2013) found that the IL skills of upper-secondary school students were insufficient, as they lacked skills that are required to effectively and efficiently complete undergraduate course work. Several students were unable to demonstrate sophisticated information searching and critical evaluation skills (Julien & Barker, 2009). Furthermore, Adams (1999) found that upper-secondary school students faced difficulty in evaluating information while writing their science assignments. While Brem, Russell, and Weems (2001) discovered that upper-secondary school students could not decide on the reliability and correctness of websites, Brill, Falk, and Yarden (2004) found that upper-secondary school students studying biology read through science documents superficially, without thinking about them intently or analyzing their content. In addition, Heinstrom (2006) found that most students tended to ascertain the relevance of information based on easy accessibility and regarded only superficial criteria for considering information. Head and Eisenberg (2009), along with Denison and Montgomery (2012), found that the participants of their study encountered difficulties while conducing their research and expressed their frustration concerning the information search process, especially in the digital age.

The findings of Chang et al. (2012), who studied IL skills of students studying in secondary schools in Singapore, asserted that students needed to

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develop their skills in order to use, synthesize, and evaluate information. A case study of a secondary school in Hong Kong revealed certain significant findings stating that the strength pertaining to students' IL was the ability to identify potential sources of information, whereas the weakness was the ability to use information responsibly and ethically (Chu, Yeung, & Chu, 2012). Furthermore, a study of Kuwaiti upper-secondary school students found that the majority of students lacked skills with regard to catalog searching as well as use and selection of information sources (Rehman & Alfaresi, 2009).

The literature available worldwide revealed that demographic differences exert an influence on the use of information (Martin, 2011). Liu and Sun's (2012) findings revealed that males were better off than females regarding certain aspects concerning IL, namely information consciousness, information competence, and information ethics. Certain studies also indicate a connection between IL and students' performance as well as academic achievement. Levels of information competency are associated with higher GPAs and both short-term and long-term students' success (Cameron, Wise, & Lottridge, 2007; Glendale Community College, 2007; Katz et al., 2008). Foo et al. (2014) indicated that the types of schools and academic streams of study seemed to exert significant influences on IL. Harrison and Newton's (2010) research concluded that a strong relationship existed between performance of IL skills and students' academic performance throughout their degree program. One's intelligence or cognitive ability is considered to be the most significant indicator of academic success (Jensen, 1998; Kuncel, Ones, & Hezlett, 2001; Mayer, 2011). Some researchers argue that information searching requires the same set of skills to a certain extent at least, which is measured by common intelligence tests, including several analytical ones (Lenox & Walker, 1993).

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Research findings, concerning IL assessment of school students and undergraduate students in Thailand, found that the existent levels of IL were different; overall, they were moderate (Maitongthong, 2011). With respect to IL of upper-secondary school students, in terms of information retrieval, information use, information evaluation, and their ability to access information, it was found that each was different. However, they were mostly measured to be at the moderate level (Busabung, 2007; Cheunwinya, 2011; Dourungkul, 1997; Saengsoda, 2010). Moreover, it is important to note that Songsaengchan, Chansawang, and Prapinpongsakorn (2008) determined that female students had a higher IL level than male ones.

Problems pertaining to promoting information literacy

Most teachers agreed that IL was extremely important for students. Information literacy helps students attain lifelong learning; it also helps them

to learn on their own in a better manner. Thus, students do require IL skills (Aroonsri, Loipha, & Vongprasert, 2014). Studies addressing the problems encountered when promoting IL asserted that teaching and learning IL in schools was not available as a course (Cheunwinya, 2011). Integration of IL into each subject course is necessary and of utmost importance (Aroonsri et al., 2014). The findings of Pakhathiratien and Siriwipat (2012) indicate that students from the three southernmost provinces of Thailand experienced moderate-level problems when using the Internet. Moreover, in their opinion, not enough computers were available, and they experienced problems while accessing the Internet.

To summarize, IL of upper-secondary school students preparing to enroll in colleges is important. However, poor research skills still seem to be the norm not only in Thailand but also throughout the world. In addition, while promoting IL, most schools in Thailand experience problems with respect to internet access, and no educational courses on IL are available.

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Conceptual Framework

Numerous professional organizations have developed standards and rubrics, which offer a framework to those who are involved in teaching information skills. These include ACRL and the American Association of School Librarians (AASL), which makes use of "Standards for the 21st Century Learner" (American Association of School Librarians [AASL], 2017). Furthermore, Sacchanand's study (2011) concerning Thailand suggested six standards and indicators of IL for Thai students, which are as follows: 1) Students perceive the importance and necessity of information; 2) Students are aware of various sources of information and capable of using information retrieving tools; 3) Students can analyze, evaluate, and select the information that they need; 4) Students have the ability to compile, organize, and synthesize information; 5) Students are able to use information to produce and present their work; 6) Students are moral, obey laws, and possess a sense of social responsibility pertaining to information. In addition, the Ministry of Education, Thailand (2008) has issued technology standards and indicators for upper-secondary students. Overall, the standard for IL and problems pertaining to IL for upper-secondary students have been established in the conceptual framework of this research, as illustrated below.

Method

Participants

The population of this study included 16,228 upper-secondary students studying in schools located in five southern provinces of Thailand, namely Narathiwat (4,349), Yala (3,719), Pattani (6,020), Satun (950), and the Songkhla

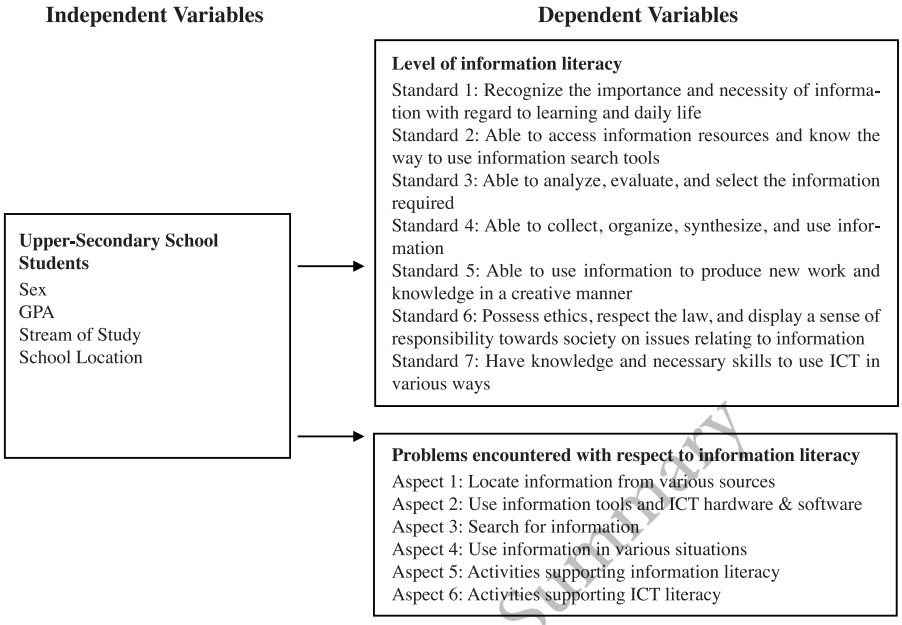

Figure 1 Conceptual Framework of Upper-Secondary School Students: Variables, Levels of IL, and Problems Encountered Concerning IL

districts of Thapa, Jana, Nathavee, and Sabayoi (1,190). One sample included 390 students, where the sample's size was determined using Yamane's formula; it was selected by stratified simple random sampling, according to the students' province, sex, GPA, stream of learning, based on the ratio of the population.

Instruments

Data were collected using two research instruments, namely an IL test and a questionnaire, which were designed according to the Indicator of Information Literacy of Thai Students (Sacchanand, 2011) and the Indicator of ICT for Upper-Secondary Students (refer to Figure 1 for details; Ministry of Education, Thailand, 2008). The IL test provided four multiple-choice options for each question and contained a total of 56 items, covering seven standards; there were eight items in each standard.

The questionnaire collected demographic information relevant to the variables of interest to the study and the problems pertaining to IL, which were collected according to the information obtained from the reviewed literature and suggestions from experts. Subsequently, they were divided into six aspects, which are as follows: locating information from various sources, using information tools and ICT hardware and software, searching for information, utlizing information in various situations, activities supporting IL, and activities supporting ICT literacy.

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In each aspect, five items were included, to form a total of 30 items. The Likert 5-point rating scale (5 = very high, 4 = high, 3 = moderate, 2 = low, 1 = very low) was employed to determine the level of the problems encountered by students pertaining to IL.

These two research instruments were checked for content validity by six experts: four from a university, one from a school, and one from the Educational Supervisory Unit. In order to determine the validity of this study, the Cronbach method was employed with respect to the IOC (Index of Consistency); an item with scores between 0.5-1.00 was accepted, an item with scores lower than 0.5 was deleted. Subsequently, the instruments were tested for reliability by 40 students, who were not included in the sample of this study. The reliability of the instruments was analyzed by α- Coefficient; the instruments' total reliability was calculated to be 0.93.

Data collection and analysis

The researchers contacted school administrators and requested for their participation and permission to conduct the research, following which they administered the IL test and questionnaire with assistance from the assigned class teacher. Data from the 390 participants were analyzed using SPSS Statistics, a software for conducting statistical analysis, according to the research objectives. The descriptive statistics that were used included percentages, means, and standard deviations, while t-tests, F-tests, and a Scheffé test were employed to check for significant differences in the data. To ascertain a clear finding, the very high, high, moderate, low, and very low levels of IL problems from the questionnaire were grouped to form three levels: low, moderate, and high, using absolute criteria to justify the mean score of the IL problems.

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Data from the test were checked and collected. Each correct answer added one point to the score, while a wrong answer added zero points. Two criteria were used to interpret the scores obtained from the test and the level of IL. Furthermore, five levels of IL were set up to categorize the sample, and the level of scores from 0-56 and 0-8 was calculated according to the five levels. The first criterion was concerned with the overall seven standards of IL (all 56 items in the test), and the second one included each of the seven standards (eight items each), which have been provided in the table below. Moreover, the data obtained from the questionnaire were thoroughly analyzed.

Results

In this section, the findings and discussions of the research have been presented in the following five parts: 1) sample demographics, 2) information literacy level of upper-secondary students in schools, 3) problems pertaining to

Table 1 Criteria Used to Justify the Scores Obtained from the Test Conducted for Ascertaining All Seven Standards of IL and Each of the Seven Standards Individually

Score		Level of information literacy
I. Seven standards of information literacy (all 56 items)	II. Each of the seven standards individually (8 items each)	
44.8-56.0	6.4-8.0	Excellent
39.2-44.7	5.6-6.3	Good
33.6-39.1	4.8-5.5	Fair
28.0-33.5	4.0-4.7	Pass
0-27.9	0-3.9	Fail

information literacy encountered by upper-secondary students studying in schools located in the southernmost provinces, 4) hypotheses tests, 5) opinions of and suggestions from the upper-secondary school students, concerning information literacy, obtained from the open-ended section of the questionnaire.

Sample Demographics

The demographic characteristics of the sample revealed that 70% of the students in schools were female, whereas the males constituted only 30% of the smaple population. Their GPA levels were as follows: Excellent (12.3%), Good (63.9%), and Fair (23.8%); 80% students studied in the science-mathematics stream, while 20% studied in the arts stream; 37.2% students studied in schools located in the province Pattani, 26.7% in Narathiwat, 22.8% in Yala, 5.9% in Satun, and 7.4% in Songkhla (see Table 2).

Table 2 Sample Demographics

Sample Demographics		No.	Percentage
	Total	390	100.00
Sex	Male	117	30.0
	Female	273	70.0
Stream of study	Science-mathematics	312	80.0
	Arts	78	20.0
GPA	Excellent (3.01-4.00)	48	12.3
	Good (2.01-3.00)	249	63.9
	Fair (1.01-2.00)	93	23.8
Province (school location)	Narathiwat	104	26.7
	Pattani	145	37.2
	Yala	89	22.8
	Satun	23	5.9
	Songkhla	29	7.4

Information literacy level of upper-secondary school students

The primary finding with regard to the students' IL was that overall, as

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shown in Table 3, among the seven standards, most students achieved a Pass level (average score 31.45 out of 56). Based on each standard, they achieved a Pass level in Standard 1: Able to recognize the importance and necessity of information in learning and daily life (average score 4.34) and in Standard 6: Possess ethics, respect the law, and display a sense of responsibility towards society on issues pertaining to information (average score 4.15). The students achieved a Moderate level in Standard 4: Able to collect, organize, synthesize, and use information (average score 4.96), and Standard 5: Able to use information to produce new work and knowledge in a creative manner (average score 4.83). Furthermore, they achieved a Good level in Standard 2: Able to access information resources and possess knowledge about the way to use information search tools (average score 5.92).

However, for Standard 3: Able to analyze, evaluate, and select the information required, the average score was only 3.93, which represents the Fail level. The students in this study also achieved the Fail level in Standard 7: Have knowledge and necessary skills to use ICT in various ways (average score 3.33) (refer to Table 3).

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Table 3 IL of Upper-Secondary School Students, Overall and in Each Standard n = 390

Level of information literacy		Mean	S.D.	Level
Total		31.45	5.76	Pass
Standard 1:	Recognize the importance and necessity of information in learning and daily life	4.34	1.30	Pass
Standard 2:	Able to access information resources and know the way to use information search tools	5.92	1.58	Fair
Standard 3:	Able to analyze, evaluate, and select the information required	3.93	1.26	Fail
Standard 4:	Able to collect, organize, synthesize, and use information	4.96	1.46	Moderate
Standard 5:	Able to use information to produce new work and knowledge in a creative manner	4.83	1.66	Moderate
Standard 6:	Possess ethics, respect the law, and display a sense of responsibility towards society on issues pertaining to information	4.15	1.64	Pass

Standard 7:	Have knowledge and necessary skills to use ICT in various ways	3.33	1.20	Fail

Problems pertaining to information literacy of upper-secondary school students

Overall, the students encountered problems concerning information literacy at a moderate level (Mean, 2.69). They faced problems in Aspect 1: Locate information from various sources, Aspect 2: Use information tools and ICT hardware and software, Aspect 3: Search for information, Aspect 4: Use information in various situations, Aspect 5: Activities supporting IL, and Aspect 6: Activities supporting ICT literacy, at a moderate level (see Table 4).

Table 4 Problems Concerning IL of Upper-Secondary School Students, Overall and in Each Aspect n = 390

Problems concerning information literacy	Mean	S.D.	Level
Overall	2.69	0.76	Moderate
Aspect 1: Locate information from various sources	2.51	0.79	Moderate
Aspect 2: Use information tools and ICT hardware & software	2.91	0.97	Moderate
Aspect 3: Search for information	2.71	0.97	Moderate
Aspect 4: Use information in various situations	2.46	0.95	Moderate
Aspect 5: Activities supporting information literacy	2.70	0.99	Moderate
Aspect 6: Activities supporting ICT literacy	2.83	1.07	Moderate

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Hypotheses tests

1. Levels of information literacy and variables

The levels of overall IL were compared on the basis of the variable sex, which found that there were significant differences at the 0.001 level; female students had higher levels of IL than male students. In Standard 1 and Standard 7, it was found that no differences existed between the two groups. However, in Standard 2, 3, 4, 5, and 6, it was found that there was a significant difference at the 0.001 level.

The levels of overall IL were compared based on the variable stream of study, which revealed that a significant difference was present at the 0.05 level; students in the science-mathematics stream depicted higher levels of IL than art students. In Standard 2, 3 and 7, no significant differences were found between the two groups. However, in Standard 1, 4, 5, and 6, a significant difference was identified at the 0.05 level.

Furthermore, the levels of overall IL were compared based on the variable GPA, which demonstrated that there was a significant difference at the 0.05 level; students with different GPAs had different levels of IL. In Standard 3, no difference was found. However, in Standard 1, 2, 4, 5, 6, and 7, a significant difference was identified at the 0.05 level. The students who had GPA at the

Table 5 Results of Comparison between the Overall Level of IL, Sex, and Stream of Study

Standard	Variables	*N*	$\overline{X}$	S.D.	*t*	Sig
Overall	Sex	390	31.45	5.76	3.95	0.000***
	Male	117	29.56	6.59		
	Female	273	32.26	5.17		
Standard 3	Male	117	3.57	1.36	3.74	0.000***
	Female	273	4.08	1.18		
Standard 4	Male	117	4.62	1.61	3.06	0.002**
	Female	273	5.10	1.36		
Standard 5	Male	117	4.31	1.70	4.16	0.000***
	Female	273	5.05	1.59		
Standard 6	Male	117	3.85	1.71	2.33	0.020**
	Female	273	4.27	1.59		
Overall	Stream of study	390	5.10	1.36		
	Science-math	312	31.98	5.28	3.12	0.002**
	Art	78	29.33	7.01		
Standard 1	Science-math	312	4.41	1.28	2.30	0.022**
	Art	78	4.04	1.34		
Standard 4	Science-math	312	5.06	1.39	2.86	0.004**
	Art	78	4.54	1.62		
Standard 5	Science-math	312	4.98	1.53	3.03	0.003**
	Art	78	4.24	1.99		
Standard 6	Science-math	312	4.23	1.64	1.99	0.048*
	Art	78	3.82	1.59		

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

Table 6 Results of Comparison between the Overall Level of IL and GPA

Standard	Variables	Total of variation	*df*	*SS*	*MS*	*F*	Sig
Overall	GPA	Between groups	2	1,355.39	667.70	22.71	0.000***
		Within group	387	1,549.18	29.84		
		Total	389	2,904.57			
Standard 1		Between groups	2	22.28	11.14	6.81	0.001***
		Within group	387	633.04			
		Total	389	655.32			
Standard 2		Between groups	2	26.84	13.42	5.46	0.005**
		Within group	387	950.53	2.46		
Standard 4		Between groups	2	43.73	21.86	10.84	0.000***
		Within group	387	780.53	2.02		
Standard 5		Between groups	2	72.23	36.11	13.97	0.000***
		Within group	387	1,000.60	2.59		
Standard 6		Between groups	2	37.27	18.64	7.17	0.001***
		Within group	387	1,006.10	2.60		
Standard 7		Between groups	2	18.97	9.49	6.76	0.001***
		Within group	387	543.02	1.40		

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

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Excellent and Good level showed higher levels of IL compared to the students who had GPA at the Fair level, with significant differences at the 0.05 level.

Subsequently, the levels of overall IL were compared based on the variable school location, which revealed that there was a significant difference at the 0.05 level; students from Narathiwat had higher levels of IL than students from Yala and Pattani. Moreover, the students from Yala had lower levels of IL than the students from Satun and Songkhla, with a significant difference at the 0.05 level.

Table 7 Results of Comparison between the Overall Level of IL and School Location

Standard	Variables	Total of variation	*df*	*SS*	*MS*	*F*	Sig
Overall	School location	Between groups	4	783.37	95.84	6.22	0.000***
		Within group	385	2,121.21	32.48		
		Total	389	12,904.57			
Standard 1		Between groups	4	31.42	7.86	4.85	0.001***
		Within group	385	623.90	1.62		
		Total	389	655.32			
Standard 2		Between groups	4	56.02	14.01	5.85	0.000***
		Within group	385	921.35	2.39		
Standard 4		Between groups	4	27.97	6.99	3.38	0.010**
		Within group	385	796.29	2.07		
Standard 5		Between groups	4	38.18	9.55	3.55	0.007**
		Within group	385	1,034.65	2.69		
Standard 7		Between groups	4	14.98	3.75	2.64	0.034*
		Within group	385	547.01	1.42		

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

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2. Problems pertaining to information literacy and variables

With regard to problems pertaining to IL, based on the following variables: sex, stream of study, and GPA, it was found that no significant differences existed at the 0.05 level. However, a significant difference was present at the 0.001 level based on the variable school location; the students from Narathiwat faced higher level of problems concerning information literacy compared to the students from Yala. The students from Pattani had higher level of problems concerning IL than the students from Yala and Songkhla.

Opinions of and suggestions from upper-secondary school students, concerning information literacy, obtained from the open-ended section of the questionnaire

There were 54 topics of opinions and suggestions from the upper-secondary school students, and 184 frequencies were included in this section. The ten most frequent problems highlighted by students with respect to developing IL were as follows: 1) Not enough computers with internet access for students, 2) Poor

Table 8 Results of Testing Paired Groups of Overall Problems Pertaining to IL and School Location

School Location	$\overline{X}$	Differences between the Mean				
		Narathiwat	Pattani	Yala	Satun	Songkhla
Narathiwat	2.73	—	–0.11	0.30*	–0.05	0.33
Pattani	2.84		—	0.41***	0.06	0.44*
Yala	2.43			—	0.35	0.03
Satun	2.79				—	0.38
Songkhla	2.41					—

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$

Internet and Wi-Fi signal, 3) Limited time for internet and Wi-Fi access; books not up-to-date, 4) No earphones available, 5) No loudspeakers available, 6) Not enough books available, 7) Small libraries without enough rooms, 8) Not enough workshops conducted on new computer programs, 9) Not enough scanners; plenty of report assignments, 10) Faced difficulties searching OPAC; sufficient book exhibition not available.

Table 9 Number, Percentage, and Rank of Opinions and Suggestions on Problems Pertaining to IL

Topics of problems pertaining to IL	Frequency	Percentage	Rank
Not enough computers with internet access available for students	15	8.15	1
Poor Internet and Wi-Fi signal	14	7.60	2
Limited time for internet and Wi-Fi access	11	5.97	3
Books not up-to-date	11	5.97	3
No earphones available	10	5.43	4
No loudspeakers available	9	4.84	5
Not enough books available	8	4.34	6
Small libraries without enough rooms	7	3.80	7
Not enough workshops conducted on new computer programs	6	3.26	8
Not enough scanners	5	2.71	9
Plenty of report assignments	5	2.71	9
Difficulties operating OPAC	4	2.17	10
Sufficient book exhibition not available	4	2.17	10

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Conclusion

Conclusion and discussion

The results of this study indicate that upper-secondary school students in the southernmost province of Thailand lack abilities in Standard 3: Able to analyze, evaluate, and select the information needed and in Standard 7: Possess knowledge and necessary skills to use ICT. This is similar to the findings of Foo et al. (2014) who studied IL skills in secondary schools in Singapore, arriving at the conclusion that the students needed to develop their skills to use and evaluate information.

Furthermore, studies from western countries also showed that students studying in secondary schools lacked the skills pertaining to evaluating information. Adams (1999) found that upper-secondary school students faced difficulties in evaluating information while writing science assignments, whereas Brem et al. (2001) revealed that upper-secondary school students could not decide on the reliability and correctness of websites. Brill et al. (2004) found that upper-secondary school students studying biology read science documents superficially, without thinking about them intently or analyzing their content, and Heinstrom (2006) found that most students tended to ascertain the relevance of information based on easy accessibility and used only superficial criteria for considering information.

The students, overall, experienced problems concerning IL at a moderate level. To elaborate, they faced problems at a moderate level in Aspect 1: Locate information from various sources, Aspect 2: Use information tools and ICT hardware and software, Aspect 3: Search for information, Aspect 5: Activities supporting IL, and Aspect 6: Activities supporting ICT literacy. The five most frequently mentioned problems pertaining to developing the students' IL were as follows: 1) Not enough computers for students, 2) Poor Internet and Wi-Fi signal, 3) Limited time for internet and Wi-Fi access; books not up-to-date, 4) No earphones available, and 5) No loudspeakers available. Clearly, the problems most frequently identified by students with respect to developing IL concerned technological equipment, showing that the students were alert to the advantages of technology, had positive attitudes, and wanted to use it. According to Parang, Raine, and Stevenson (2000), IL involved the integration of several concepts, such as library literacy, computer literacy, media literacy, information ethics, critical thinking, and communication skills, and IL is closely related to information technology skills. This is relevant to the findings of the students' level of IL in Standard 7, which denotes that the students lacked enough knowledge and necessary skills to use ICT. Thus, it is a good opportunity for teachers and librarians to provide activities and facilities concerning ICT.

In conclusion, this research's findings presented interesting results, which ascertained that sex, GPA, stream of study, and school location play important roles in IL. This is relevant to Martin's (2011) study, which found demographics influencing student learning outcomes, and Foo et al.'s (2014) study, which indicated that types of school and academic stream of study seemed to have significant influences on IL. Harrison and Newton's (2010) research concluded that a strong relationship existed between the performance on the IL skills and students' academic performance throughout their degree program. With regard to the GPA and stream of study hypothesis, a positive relation between intelligence and information literacy was confirmed by many studies (Cameron et al., 2007;

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Glendale Community College, 2007; Katz et al., 2008). Intelligence or cognitive ability was considered to be the most important indicator of academic success (Jensen, 1998; Kuncel et al., 2001; Mayer, 2011).

Moreover, this present study found that only school location had an impact on problems pertaining to IL. Obviously, schools located in urban areas seemed to have few problems compared to schools in rural areas. However, this subject requires further in-depth research to identify the differences of each school that impact students' IL development.

Implications

Based on the results of this study, the researchers propose that teaching and learning activities should be redesigned using collaborative teaching methods to enhance students' IL. The model of collaboration should include teachers who are responsible for discussing the topic or content of knowledge, librarians who provide learning materials from inside and outside the libraries, computer personnel who provide hardware and software for students' presentation. All the involved people, teachers; librarians; and computer personnel should take part in evaluating upper-secondary school students' learning process. The information science literature clearly demonstrates that collaborative efforts between librarians and academics lead to better results in students' acquisition of literacy skills (Boff & Johnson, 2002; Cunningham & Lanning, 2002; Korobili, Maliari, & Christodoulou, 2008). Additionally, the Educational Supervisory Unit and upper-secondary school administrators should set guidelines and standards for providing modern ICT equipment to students, which they can use in classrooms, libraries, and computer rooms. These implications would help improve the students' abilities to evaluate information as well as obtain knowledge and necessary skills to use ICT.

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Moreover, more activities and programs on IL should be provided to students studying arts, male students, students who had GPA at Fair level, and schools located in Narathiwat and Pattani.

Further studies

The researchers also suggest that further studies need to be conducted with the aim of enhancing the IL of upper-secondary school students in the southernmost provinces of Thailand, while focusing on the issues concerning activities/games to support each of the seven standards of IL and promote awareness of the importance of IL among students as well as teachers. In addition, more studies on library management, librarians' roles, and technology in libraries and computer rooms in schools need to be conducted. Lastly, the learning and teaching process needs to be explored and investigated further in order to promote effective student IL.

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Appendix

I. Sample items of the test (Standard I, item1–8; Standard II, item 9–16; Standard III, item 17–24)

Direction: Please tick the correct answer by marking ✓on the letter in each question**.**

1. Which option is correct about "information"?
   A. Information is important for students
   B. Information is for administrators
   C. Information is for researchers
   D. Information is for everyone
2. Which option states the correct objective of information usage?
   A. For news and information
   B. For recreation
   C. For studies and research
   D. All of them
3. Which option is correct about using information?
   A. Use information from the Internet, because it is free.
   B. Use information from newspaper, because it is reliable.
   C. Use information from the library, because it provides systematic services.
   D. Use information from people who live in villages, because it is free.
4. If students want to search for up-to-date information pertaining to a research report, which is the best source among the options given below?
   A. Magazine
   B. Academic journal
   C. Dictionary
   D. Book
5. Students can use and search for information free of cost from which of the following?
   A. Public library
   B. Internet café/shop
   C. Academic library
   D. Corporate information center
6. Which option shows that a person is aware of the importance of information concerning taking care of one's health?
   A. Always reading the newspaper "Kom Chad Luek"
   B. Always reading the magazine "Chivajit"
   C. Always reading "Sally's Happiness"
   D. Always following "Suthichai" on Twitter
7. Which answer represents important sources of information in Southern Border Provinces?
   A. Thonchang Waterfall, Yarang Ancient City, Baetong Centre, and Tarutuan Island
   B. Arawan Waterfall, Chiya Ancient City, Baetong Centre, and Tarutuan Island
   C. Samela cape, Saerung Waterfall, Ancient City, Baetong Centre, and Tarutuan Island
   D. Thonchang Waterfall, Saithong Castle, Baetong centre, Khoyo Island, and Pratad Temple

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8. Which is the correct scope of a study on "Internet usage for education"?
   A. Internet
   B. Internet and education
   C. Education
   D. Education and technology

9. If you want to retrieve information from the OPAC, you should start searching which of the following options?
   A. Author and publisher
   B. Author and keyword
   C. Author and year
   D. Author and place of printing

10. If you want to search for information about "Dangerous things on the Internet for Thai teenagers", which is the best search term to acquire specific information?
   A. Dangerous
   B. Thai teenager
   C. Information and teenager
   D. Internet and Thai teenager

11. Which program does not require the Internet?
   A. Internet Explorer
   B. Yahoo
   C. Google
   D. PowerPoint

12. Search Engine is a tool for searching which of the following?
   A. CD-ROM information
   B. Books from libraries
   C. WWW
   D. Interlibrary loan

13. Which of the following is a tool used to search for information on the Internet?
   A. Altavista
   B. Yahoo
   C. Google
   D. All of them

14. Which option includes the most suitable places for conducting a report on "multi-culture"?
   A. Narathat Beach, Samila Beach, and Central Mosque
   B. Big C, Lotus, and Sirorot Market
   C. Mont Tanguay, Koh Lipe Island, and Limgonael
   D. Central Mosque, Changhai Temple, and Limtokiem Shrine

15. Which is the best source to find information about organic agriculture?
   A. Owner of organic agriculture shop
   B. Vegetable seller
   C. Organic agriculture consumer
   D. Awarded organic agriculturist

16. Aminoh wants to write a report about "How to make fish sauce", which is an OTOP product of the community. Who is the best source for her to acquire information?
   A. Mrs. Fatimah, Head of the OTOP product
   B. Mr. Maeae, Fish specialist
   C. Miss Wana, Food specialist
   D. Dr. Wichai, Health specialist

From the following extract of a news piece, please answer question 17 and 18:

The new epidemic disease spreads from person to person; some sources said, "students need to wear tiny nanotechnology products, costing 2,000 baht, in order to be safe".

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17. Which of the following is the correct conclusion?
    A. There is a new epidemic disease.
    B. Nanotechnology is expensive.
    C. Students need to wear nanotechnology products.
    D. Many people have died.

18. Students can check the reliability of information from which of the following options?
    A. Friend
    B. Health specialist
    C. Teacher
    D. Police

19. Which website URL is suitable for citations?
    A. .com
    B. .org
    C. .edu
    D. .net

20. If you receive information from an email, you should do which of the following?
    A. Check for reliability
    B. Forward it to your friend
    C. Use it immediately
    D. Find the sender

21. Why do you have to evaluate information obtained from the World Wide Web (WWW)?
    A. The information is complicated.
    B. The information is not relevant to what you want.
    C. The information is not checked by experts, whether it is correct or not.
    D. The information is not up-to-date.

22. Information obtained from searching the Prince of Songkla University's website (www.psu.ac.th) is reliable, because of which of the following options?
    A. It is created by an educational institution.
    B. It is recognized by people around the world.
    C. Many people use it.
    D. No correct answer.

23. Information from the website shoponline.com is reliable because of which of the following options?
    A. It is created by an educational institution.
    B. It is recognized by people around the world.
    C. Many people use it.
    D. No correct answer.

24. Which of the following criteria is used for evaluating information gathered from a book?
    A. Price
    B. Author's expertise
    C. Illustration
    D. Author's age

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II. Samples of questionnaire on problems concerning information literacy

Instruction: Please put a tick mark (✓) beside specific levels of problems pertaining to information literacy, which you encounter.

Level 1 indicates problems are very low
Level 2 indicates problems are low
Level 3 indicates problems are moderate
Level 4 indicates problems are high
Level 5 indicates problems are very high

1. Levels of problems pertaining to locating information from various sources

Topic	Level of problems					Add more information if needed
	1	2	3	4	5	
1.1 Printed materials: books, journals, newspapers, etc.						
1.2 Electronic materials: e-book, e-journal, e-newspaper, website, etc.						
1.3 Social media platforms: Facebook, YouTube, etc.						
1.4 Audio-Visual materials, etc.						
1.5 People: librarians, teachers, friends						
1.6 Other (please specify)……						

2. Levels of problems pertaining to using information tools and ICT hardware & software

Topic	Level of problems					Add more information if needed
	1	2	3	4	5	
1.1 Software						
1.2 Computers						
1.3 Internet access						
1.4 Printers						
1.5 Scanners						
1.6 Other (please specify) ……						

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JoEMLS 註釋（Notes）暨參考文獻（References）羅馬化英譯說明

2015年1月31日修訂

1. 本刊針對部分國外西文專業資料庫之引文索引建檔與中文辨讀之需求，凡屬中文稿件之英文摘錄末，特別增列中文羅馬化拼音之「註釋」（或「參考文獻」）一式。
2. 作者（含團體作者）、機構名稱（出版者）、地名（出版地）：依事實與習慣為英譯，如無法查證時，中國大陸地區作者以漢語拼音處理，台灣以威妥瑪拼音（Wade-Giles system）處理。
3. 出版品、篇名：採用（登載於原刊名、篇名等之正式英譯）照錄原則；若原刊文無英譯，則由本刊依漢語拼音音譯著錄之。
   e.g. 南京大學學報 *Journal of Nanjing University*
   e.g. 中國科學引文數據庫 *Chinese Science Citation Database*
   e.g. 玉山國家公園解說志工工作滿足之研究 *Yushan National Park jieshuo zhigong gongzuo manzu zhi yanjiu*
   e.g. 教育資料與圖書館學 *Journal of Educational Media and Library Sciences*
4. 混用狀況：地名、機構、人名與其他事實描述，交錯共同構成篇名之一部分時，為避免冗長拼音難以辨讀，可將該名詞中之「地名、機構、人名」依事實與習慣英譯，其餘字詞則由本刊補以漢語拼音處理。
   e.g.「中國科學院與湯姆森科技資訊集團聯手推出中國科學引文索引」
   "Chinese Academy of Sciences yu Thomson Scientific Lianshou Tuichu *Chinese Science Citation Database*"
5. 本刊文章註釋（Notes）或參考文獻（References）羅馬化英譯規則，仍遵循Chicago（Turabian）或APA之精神及原則，進行必要且相對應之編排處理。**此羅馬化作業屬權宜措施，不可取代原有正式之引文規範。**
6. 羅馬化範例：
   範例1 －註釋（Notes）
   林信成、陳瑩潔、游忠諺，「Wiki協作系統應用於數位典藏之內容加值與知識匯集」，教育資料與圖書館學 43卷，3期（2006）：285-307。【Sinn-Cheng Lin, Ying-Chieh Chen, and Chung-Yen Yu, "Application of Wiki Collaboration System for Value Adding and Knowledge Aggregation in a Digital Archive Project," *Journal of Educational Media & Library Sciences 43*, no. 3 (2006): 285-307. (in Chinese)】
   範例2 －參考文獻（References）
   林雯瑤、邱炯友（2012）。教育資料與圖書館學四十年之書目計量分析。教育資料與圖書館學，*49*（3），297-314。【Lin, Wen-Yau Cathy, & Chiu, Jeong-Yeou (2012) A bibliometric study of the *Journal of Educational Media & Library Sciences,* 1970-2010. *Journal of Educational Media & Library Sciences*, *49*(3), 297-314. (in Chinese)】

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