教育資料與圖書館學

JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES

第五十卷 第四期　二〇一三年夏季號

Vol. 50, No. 4, Summer 2013

JoEMLS English Summary

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。
The cover design of *JoEMLS* signifies:
L (Librarianship); **I** (Information Technology); **B** (Bibliophile and the Book trade)

教育資料與圖書館學
JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES

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JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES

Volume 50 Number 4   Summer 2013

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EDITORIAL

In and Beyond This Issue

With the publication frequency of once every three months, publishing the *Journal of Educational Media & Information Science (JoEMLS)* quarterly means pressed for time. Our editorial team meets regularly every week and discusses manuscripts submitted and reviews the progress of various editorial tasks. Moreover we plan for possible improvement diligently. Fortunately the editorial team members are all deeply interested in publishing, particularly "scholarly communication and publishing." It is with this passion and spirit the team devotes more time and effort. Many team members are able to gain experience through participating the editorial process; and the process serves as a platform for the team members to be creative in order come up with more and better strategies and plans, hence moving towards the direction of evaluating and practicing their studies. This juncture comes from the awareness that academic journal "publishing" is a profession; it nurtures the knowledge sharing and development of an academic discipline. For years, it's because we have such professional belief and interest, we persevere and adhere to our aspirations and continue to manage this publication; more so than other journal publishers. In a way it is hard work. But I would like to think that we are extremely fortunate.

So far there isn't an association or a learned society that can unite all academic journal publishers in Taiwan; provide academic services, professional consultation and serve as a channel of communication with other groups within and outside of JoEMLS. To archive that goal, if the academic journal publishers in Taiwan could reach consensus, we can perhaps initiate something like an Association of academic journals and slowly broaden the Association's reach and then transform it to a professional organization. If we establish such structure in the future, it will be able to assist and foster more journal publishing groups. Thus empowers the groups with professional knowledge in order to improve the quality of scholarly publishing and serve more individuals in the academic community.

For this issue (Vol. 50, no 4) we completed reviews and revisions for a total of sixteen manuscripts. Eleven manuscripts were rejected, which resulted in a rejection rate of 68.75%. There are also more than 10 manuscripts that are currently under review. Different than the previous issue, it's interesting that the articles published in this issue went back to the broad sense of library and information science—the articles apply service strategies, organizational behavior management, electronic database performance analysis, network structure analysis

and research topic visualization, to address library or network issues. Our sincere thanks to these authors for their contribution and for enhancing the content of this issue.

Jeong-Yeou Chiu
JoEMLS Chief Editor

A Study on University Circulation Librarian's Service Strategy to Cope with Aggressive Patron: The Perspective of Emotional Labor

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Abstract

The aggressive patrons' outrageous and unreasonable behavior would have serious influence on circulation librarians. However, in order to maintain the service quality, "emotional labor" is usually performed by the librarians when encounter aggressive patrons. Emotional labor is the manipulation of the required emotional expression, and the strategies used to maintain the service quality. To understand circulation librarians' service strategies coping with aggressive patrons from the perspective of emotional labor, semi-structured in-depth interviews were conducted in this study. The interviewees consisted of 15 university circulation librarians all over Taiwan. The findings revealed that the factors which may elicit aggressive reaction included library services and the patrons' personal traits. And to cope with the aggressive patrons, the circulation librarians would employ self-controlling, surface acting, and other service strategies such as persuasion or active listening.

Keywords: *Aggressive patron; Service strategy; Emotional labor; Circulation librarian; University library*

SUMMARY

When encountering aggressive patrons expressing angers with irrational behaviors, librarians providing circulation service often have difficulties dealing with the aggressive behaviors and would affect their library service quality. However, for maintaining library service quality, librarians need to put more efforts on "emotional labor", withholding personal feelings including anger, grievance, and depression, and showing pleasant and friendly attitudes. The efforts of service members' adjusting personal feelings and expressing pleasant emotions required by institutions are called "emotional labor". For the long run, such suppression might have a negative influence on librarians' work efficiency, and placing great burdens on their body-mind wellbeing, evolving negative symptoms, such as job burnout, emotional disorders, and emotional exhaustion.

It is a critical issue deserving attention from library management personnel. For addressing this problem, in this study the researcher adopted semi-structured in-depth interview approach of qualitative research to investigate possible strategies for academic librarians in Taiwan to deal with aggressive patrons. It is hoped that from the findings of this study, circulation librarians would pay attention to personal emotional labor conditions in library environments, and develop service policies to cope with aggressive patrons, for enhancing overall performance of reader service of university libraries.

The researcher set libraries of ten general and technology-oriented universities as the study setting, and recruited participants with purposive sampling approach. The researcher contacted familiar university librarians through telephone calls, and then asked these librarians to recommend other circulation librarians for participating in interviews. This study was conducted during the period from March to May, 2008. Fifteen librarians ever encountered aggressive patrons were interviewed, including 12 females and three males, at ages ranged from 27 to 60 years old, with an average of 40. In this study, 34 cases of aggressive patrons were collected.

From the findings of interviews, it is shown that if circulation librarians could not right away respond to the requests from aggressive patrons, or if librarians' responses do not match patrons' expectations, patrons would feel being given a hard time and develop discontented feelings, and the aggressive patrons would express negative feelings in direct or indirect ways. Based on the interview data regarding characteristics of aggressive patrons' behaviors, the researcher categorized aggressive behaviors into direct and indirect aggressive types. Patrons of direct aggressive type would express emotions by showing angry expressions, attacking librarians with aggressive verbal languages, or scolding. Some patrons even resort to violence and get physical conflicts with librarians. On the other hand, patrons of indirect aggressive type tend to express discontents through mocking, deriding, slandering, rumor mongering, or speaking sarcastically and scornfully. Some would adopt indifferent attitudes, keep silence, or deliberately refuse to react, for making circulation librarians feel embarrassed or lost self-confidence.

The summary of findings and conclusions will be presented as below.

1. The causes of patrons' aggressive behaviors

Among the 34 cases of aggressive patrons, 24 were involved with library contexts, and could be categorized into factors regarding library regulations and system, library service, librarian attitudes, and other patrons. Another 10 cases were resulted from patrons' personal traits, regarding relatively more sensitive feelings that misled patrons to feel provoked or harassed by librarians. Some

patrons aggressively interacted with librarians because they were biased against libraries, or just in a low mood at the particular moment.

2. Service strategies of how circulation librarians dealing with aggressive patrons

Service strategies of how circulation librarians dealing with aggressive patrons could be categories into three: dealing with one's own negative feelings, expressing positive emotions, and dealing with others' negative emotions.

(1) Dealing with negative personal emotions

Withholding and suppressing negative feelings is how the interviewed librarians usually coped with aggressive patrons. Among the interviewed librarians, only one ever really got involved in direct conflicts with patrons. When feeling offended by patrons' behaviors and attitudes, some interviewed librarians would adopt a more serious manner and tone, indirectly revealing one's own negative feelings.

(2) Displaying positive personal emotions

When encountering aggressive patrons, some interviewed librarians would employ strategies of "surface acting" and "deep acting". "Surface acting" refers to showing positive emotions even though privately being dissatisfied with patrons' manners and behaviors. Meanwhile, some librarians adopted "deep acting" strategy by evoking sympathy and changing one's conceptions and interpretations toward patrons' aggressive behaviors, in a way of showing positive attitudes as though evolved from the deep of their hearts.

(3) Dealing with others' negative emotions

Most of the interviewed librarian of this study adopted the "persuasion" strategy. When encountering aggressive patrons at circulation desks, some librarians would manage to ask the patrons to leave the public area first, and resume negotiation in a more private setting, for not causing inconvenience to other patrons. When not being able to handle situations involving aggressive patrons, some interviewed patrons would refer to assistance from others, such as colleagues or departments that should be responsible. The findings also revealed that the interviewed librarians would incorporate different service strategies depending on situations. For example, when aggressive patrons showed overly excited or strong attitudes, some librarians would first show willingness to listen for calming the patrons, and then find appropriate time to reason with the patrons.

Based on findings of this study, the researcher made suggestions below for circulation librarians. (1) Making self-management of conceptions: librarians should keep positive thinking, understanding that the core value of library work is serving patrons and pointing out possible solutions to their problems; (2) Adopting strategies of deep acting and empathy: librarians should try to understand patrons'

thinking and uneasiness, and express positive emotions as if from the bottom of hearts; (3) Showing willingness to listen for building partnership with patrons: librarians should attentively listen to patrons' complaints for showing concerns and respect, and making patrons realize that librarians are willing to addressing problems with them; (4) using "I-statement" and appropriate body languages: librarians should make sentences of "when I (hear/see)…, I feel…, because …, please…" to express self-declaration messages, and use appropriate body languages, such as courteously standing up, adopting calm and sincere voice tone, giving friendly looks, and making mild hand gestures.

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

史特勞斯（Strauss, A.）、蔻屏（Corbin, J.）（1997）。質性研究概論（*Basics of qualitative research: Grounded theory procedures and techniques*）（徐宗國譯）[(T.-K. Hsu, Trans.)] 台北市 [Taipei]：巨流 [Chuliu]。（原作1990年出版）[Original work published 1990]

吳宗祐 [Wu, Tsung-Yu]（2003）。工作中的情緒勞動：概念發展、相關變項分析、心理歷程議題探討 [*Emotional labor at work: Development of concept, analysis of related variables, and exploration of psychological process issues*]。未出版之博士論文 [Unpublished doctoral dissertation]，國立臺灣大學心理學研究所 [Department of Psychology, National Taiwan University]。台北市 [Taipei]。

陳書梅 [Sheih, Chen Su-may]（2009）。刁難讀者類型之質化研究—以大學圖書館為例 [A qualitative study of the types and characteristics of difficult patrons in university libraries]。圖書資訊學研究 [*Journal of Library and Information Science Research*]，*4*（1），99-132。

陳書梅 [Sheih, Chen Su-may]（2012）。流通館員面對刁難讀者之因應策略研究—以大學圖書館為例 [An exploratory study on coping strategies of confronting difficult patrons: The case of university circulation librarians]。圖書資訊學研究 [*Journal of Library and Information Science Research*]，*7*（1），85-127。

黃文正 [Huang, Wen-Cheng]（2009年7月13日）[July 13, 2009]。罵粗話 可減輕身體痛苦 [Macuhua ke jianqing shentitongku]。中國時報 [*Chinatimes*]，A3版 [A3]。

黃囇莉 [Huang, Li-Li]（2006）。人際和諧與衝突：本土化的理論與研究 [*Renjihexie yu chongtu: Bentuhua de lilun yu yanjiu*]。台北市 [Taipei]：揚智文化 [Yang-Chih Book Co.]。

劉心瑜 [Liu, Hsin-Yu]、吳宗祐 [Wu, Tsung-Yu]（2012）。負向顧客事件頻次與樂觀性格對情緒勞動的預測效果：服務關係長短的調節效果 [The effects of frequency of negative customer events and optimistic personality on emotional labor: The moderating effect of length of service relationship]。人力資源管理學報 [*Journal of Human Resource Management*]，*12*（4），1-28。

賴惠德 [Lai, Hwei-Der]（2011）。情緒勞務與管理 [Qingxu laowu yu guanli]。在 [In] 管理心理學 [*Guanli xinlixue*]（第八章，頁187-210）[Chap. 8, pp. 187-210]。新北市 [New Taipei City]：國立空中大學 [National Open University]。

Arbuckle, K. (2008). Emotion and knowledge: Partners in library service? *Feliciter*, *54*(5),

219-221.

Archer, J. (2004). Sex differences in aggression in real-world settings: A meta-analytic review. *Review of General Psychology*, *8*, 291-322.

Arndt Jr., D. A. (2001). Problem patrons and library security. *Legal Reference Services Quarterly, 19*(1/2), 19-40.

Ashforth, B. E., & Humphrey, R. H. (1993). Emotional labor in service roles: The influence of identity. *Academy of Management Review, 18*(1), 88-115.

Blessinger, K. D. (2002). The nature of the problem: Definitions, scope and extent, historical perspectives, and diverse clientele. *The Reference Librarian, 36*(75/76), 3-10.

Bramson, R. M. (1981). *Coping with difficult people*. Garden City, NY: Anchor Press/ Doubleday.

Bullard, S. W. (2002). Gypsies, tramps and rage: Coping with difficult patrons. *The Reference Librarian, 36*(75/76), 245-252.

Burr, W. R. (1990). Beyond I-statements in family communication. *Family Relations, 39*(3), 266-273.

Cargile, A. C. (2010). Adding without contradiction: The challenge of opening up interracial dialogue. *The Education Forum, 74*(2), 130-142.

Chattoo, C. D. (2002). The problem patron: Is there one in your library? *The Reference Librarian, 36*(75/76), 11-22.

Chen, C.-F., & Kau, Y.-L. (2012). Investigating the antecedents and consequences of burnout and isolation among flight attendants. *Tourism Management, 33*(4), 868-874.

Dodge, K. A., & Coie, J. D. (1987). Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology, 53*(6), 1146-1158.

Grandey, A. A. (2000). Emotional regulation in the workplace: A new way to conceptualize emotional labor. *Journal of Occupational Health Psychology*, *5*(1), 95-110.

Hochschild, A. R. (1983). *The managed heart: Commercialization of human feeling*. Berkeley, CA: University of California Press.

Julien, H., & Genuis, S. K. (2009). Emotional labour in librarians' instructional work. *Journal of Documentation, 65*(6), 926-937.

Kean, C., & McKoy-Johnson, F. (2009). Patron aggression in the academic library: A study of the main library at the University of the West Indies, Mona. *New Library World, 110*(7/8), 373-384.

Kempes, M., Matthys, W., de Vries, H., & van Engeland, H. (2005). Reactive and proactive aggression in children: A review of theory, findings, and the relevance for child and adolescent psychiatry. *European Child and Adolescent Psychiatry, 14*(1), 11-19.

Matteson, M. L., & Miller S. S. (2012). Emotional labor in librarianship: A research agenda. *Library & Information Science Research, 34*(3), 176-183.

Matteson, M. L., & Miller, S. S. (2013). A study of emotional labor in librarianship. *Library & Information Science Research, 35*(1), 54-62.

McGrath, H., & Goulding, A. (1996). Part of the job: Violence in public libraries. *New Library World, 97*(3). 4-13.

McGuigan, G. S. (2002).The common sense of customer service: Employing advice from the trade and popular literature of business to interactions with irate patrons in libraries. *The Reference Librarian*, *36*(75/76), 197-204.

Mesmer-Magnus, J. R., DeChurch , L. A., & Wax, A. (2011). Moving emotional labor beyond surface and deep acting: A discordance-congruence perspective. *Organizational Psychology Review, 2*(1), 6-53.

Messer, S. B. (1999). Coping with the angry patient. *Journal of Psychotherapy Integration*, *9*(2),151-156.

Morris, J. A., & Feldman, D. C. (1996). The dimensions, antecedents, and consequences of emotional labor. *Academy of Management Review, 21*(4), 986-1010.

Nixon, A. E., Yang, L.-Q., Spector, P. E., & Zhang, X. (2011). Emotional labor in China: Do perceived organizational support and gender moderate the process? *Stress and Health, 27*(4), 289-305.

Osa, J. O. (2002). The difficult patron situation: Competency-based training to empower frontline staff. *The Reference Librarian, 36*(75/76), 263-276.

Oxman, M. (2006). *The how to easily handle difficult people handbook: Everything problem-people don't want you to know*. Naperville, IL: Sourcebooks.

Quinn, B. (2002). How psychotherapists handle difficult clients: Lessons for librarians. *The Reference Librarian, 36*(75/76), 181-196.

Rubin, R. J. (2010). *Defusing the angry patron: A how-to-do-it manual for librarians*. (2nd ed.). New York: Neal-Schuman.

Shuman, B. A. (1989). Problem patrons in libraries: A review article. *Library and Archival Security, 9*(2), 3-19.

Smith, K. (1994). *Serving the difficult customer: A how-to-do-it manual for library staff*. New York: Neal-Schuman.

Toot, L. (2002). Zen and the art of dealing with difficult patron. *The Reference Librarian, 36*(75/76), 217-233.

Willis, M. R. (1999). *Dealing with difficult people in the library*. Chicago: American Library Association.

A Study of the Relationship among Leader-Member Exchange, Job Autonomy and Organizational Citizenship Behavior of the University Librarians in Taiwan

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Abstract

The directors of university libraries must inspire librarians to engage organizational citizenship behaviors to enhance organizational performance and service quality. Based on a structural equation modeling, this study examines the relationship among leader-member exchange, job autonomy and organizational citizenship behavior of the university librarians in Taiwan. Findings indicated that leader-member exchange is positively related to job autonomy, and job autonomy is positively related to organizational citizenship behavior. Job autonomy plays a partial mediating role in the relationship between leader-member exchange and organizational citizenship behavior. Finally, the study provides the conclusions and implications for the library profession.

Keywords: Leader-member exchange theory (LMX); Job autonomy; Organizational citizenship behavior(OCB); University librarians

SUMMARY

Enhancing university librarians' behavioral perfomance through appropriate leadership is a worth-noticing research topic in management studies field. Due to the increasing environmental unpredictability, organizations get more concerned about whether members could perform tasks beyond basic requirements of job, for coping with unexpected environmental changes (Katz, & Kahn, 1978). This capability is named "organizational citizenship behavior (OCB)" by Smith, Organ, and Near (1983). If members perform higher-level organizational citizenship behaviors, it could enhance organizational performance (Organ, Podsakoff, & MacKenzie, 2005) and service quality (Castro, 2004; Schneider, Ehrhart, Mayer, Saltz, & Nilles-Jolly, 2005; Yoon, & Suh, 2003). Therefore, it is important for university library administrators to encourage librarians' organizational citizenship behaviors. Leadership is an important antecedent variable (Podsakoff et al., 2000), thus the focus of this study is "learder-member exchnage theory"

(LMX), which emphasizes that the quality of exchange relationship between leaders and members would affect members' work attitudes and performance (Liden, Sparrowe, & Wayne, 1997), and have positive impacts on variables of organizational behaviors, such as organizational effectiveness, member performance, and attendance rates (Graen, & Scandura, 1987). Through what kind of mechanism does the exchange relationship between leaders and members affect members' organizational citizenship behaviors? Does job autonomy have a mediation effect on the relationship between members' exchange (antecedence) and organizational citizenship behaviors (consequence)? Based on the reasoning above, the research goals of this study include:

1. building the relationship mode among leader-member exchange (LMX), job autonomy and organizational citizenship behaviors(OCB) of university librarians.

2. investigating whether university librarians' awareness of job autonomy has a mediation effect on the relationship between leader-member exchange (LMX) and organizational citizenship behaviors (OCB).

Literature Review and Hypothesis Building

1. LMX

LMX is based on social exchange theory, claiming that learders tend to develop mutual exchange relationships of support, trust and loyalty with some trustable members, and would evolve to two-way reciprocal relationships (Dienesch, & Liden, 1986). Leaders tend to expect members to willingly undertake extra-job duties, and would reward members who perform non-structural tasks with personal and job-related resources (Graen, & Cashman, 1975). For rewarding and maintaining high-quality leader-member exchange relationships, members would develop more positive work attitudes and present higher-level task effectiveness and contextual effectiveness (Erdogan, & Enders, 2007).

2. Job Autonomy

Job autonomy is an indicator of whether librarians have freedom and rights for job-related decision making (Lim, 2008; Rockman, 1984), and is also deemed as an important management approach for leaders to affect members' work effectiveness (Smirchch, & Morgan, 1982). Leaders could enhance members' awareness of job autonomy through seeking new work perspectives, developing new working methods, or providing personal guidance (Piccolo, & Colquitt, 2006). If members and leaders have high-quality relationships, learders are more able to carry out the leadership behaviors mentioned above for enhancing members' awareness of job autonomy.

Hypothesis 1: When university librarians have higher level of perceived leader-member exchange relationships, they tend to have higher-level awareness of job autonomy.

3. Organizational Citizenship Behaviors (OCB)

When members have higher-level awareness of job autonomy, they tend to have more opportunities to adopt positive behaviors that are beneficial to organizations, and are able to present higher-level organizational citizenship behaviors. This is because members have greater freedom on deciding how to perform job tasks, and thus have greater flexibility on carrying out tasks (Dierdorff, & Morgeson, 2007).

Hypothesis 2: When university librarians have higher-level awareness of job autonomy, they tend to have higher level of organizational citizenship behaviors.

4. Relationship among leader-member exchange (LMX), job autonomy, and organizational citizenship behaviors (OCB)

Members need to perceive greater freedom on making decisions about carring out creative ideas. They must have higher level of job autonomy for them to apply personal unique working methods and knowledge in carring out tasks, and engage in higher-level organizational citizenship behaviors (contextual effectiveness). Leaders' capacities and rights regarding job design would affect their abilities of enhancing members' work effectiveness (Jensen, 1997). When members and leaders have high-quality leader-member exchange relationship, and when leaders have capabilities and rights to design and offer tasks of higher-level job autonomy, members are more likely to present higher-level organizaitonal citizenship behaviors (contextual effectiveness).

Hypothesis 3: University librarians' awareness of job autonomy has a mediation effect on relationships of leader-member exchange and organizational citizenship behaviors.

Research Methods
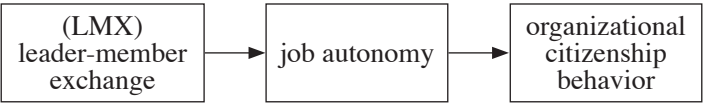
Fig. 1 Research Framework

Measurement variables include leader-member exchange, job autonomy, organizational citizenship behaviors, and population statistics variables. Methods of data analysis include descriptive statistics, valitidy and reliability analysis, and structural equation modeling.

Research Findings and Analysis

Most of participants in this study are married female librarians at their thirties with higher-education degrees or diplomas. Two-stage strcutional equation model (SEM) is used for data analysis.

The first stage involves testing the validity, reliability and goodness of fit of the tested model. The second stage involves testing of hypotheses and the mediation effect of job autonomy through SEM. The goodness-of-fit of construct measurement models is revealed in the results of NCI(χ^2/df)、NFI、CFI, which is acceptable. The construct validity and convergent validity of the measuring scale are established. Goodness-of-fit of structural modeling is within an acceptable range. Hypothesese 1, 2 and 3 are supported.
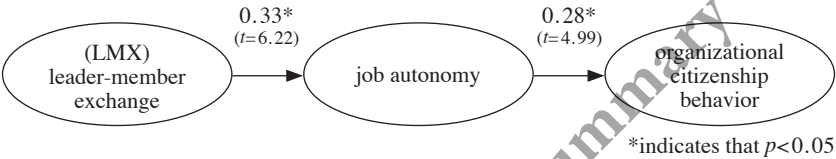
Fig. 2 Empirical Analysis of the Theoretical Model
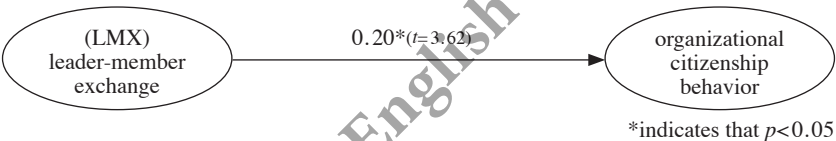
Fig. 3 Relationship Model of Leader-Member Exchange (LMX) and Organizational Citizenship Behaviors (OCB)
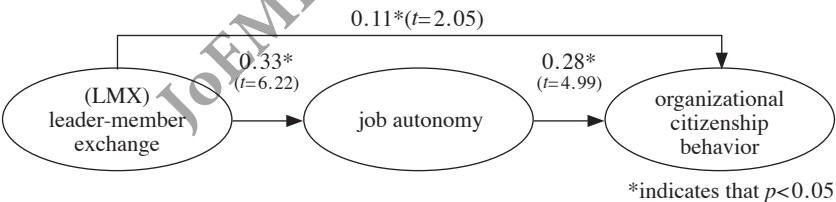
Fig. 4 Mediation Model of Job Autonomy on Relationships of Leader-Member Exchange and Organizational Citizenship Behaviors

Table 1 Direct, Indirect and Overall Effects of Leader-Member Exchange on Organizational Citizenship Behaviors

route	direct effect		Indirect effect		overall effect
	γ_a	t	$\gamma_b * \beta_c$	Sobel's z	
OCB					0.189
LMX → OCB	0.11	2.05*			
LMX → job autonomy → OCB			0.079	3.39*	

Notes 1. γ_a is correlation coefficient between the independent variable and the dependant variable; γ_b is correlation coefficient between the independent variable and the intervening variable; β_c is correlation coefficient between the intervening variable and the dependant variable.

       2. *indicates that $p<0.05$

Conclusions and Suggestions

Results of Hypothesis 1 reveal that there is a positive relationship between leader-member exchange and job aunonomy among university librarians. Results of Hypothesis 2 show that when university librarians have higher-level awareness of job autonomy, they tend to have more opportunities of choosing higher-level organizational citizenship behaviors. Results of Hypothesis 3 indicate that job autonomy has part mediation effect on relationships of leader-member exchange and organizational citizenship behaviors. It is suggested that leaders should reinforce leader-member exchange, enhance librarians' job autonomy, and enourage organizational citizenship behaviors.

Thanks

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

呂春嬌[Lu, Chung-Chiao]（2003）。大學圖書館館長領導風格之質性研究[The study of the director's leadership style in the university library]。師大學報：人文與社會科學類[*Journal of Taiwan Normal University: Humanities & Social Science*]，48（1），39-54。

呂春嬌[Lu, Chung-Chiao]、陳雪華[Chen, Hsueh-Hua]、謝雨生[Hsieh, Yeu-Sheng]（2009a）。大學圖書館中階主管領導效能之研究[The leadership effectiveness of middle managers in the university libraries]。國家圖書館館刊[*National Central Library Bulletin*]，98（1），23-54。

呂春嬌[Lu, Chung-Chiao]、謝雨生[Hsieh, Yeu-Sheng]、陳雪華[Chen, Hsueh-Hua]（2009b）。大學圖書館中階主管女性領導特質研究[The feminine leadership characteristics of middle managers in the university libraries]。圖書與資訊學刊[*Journal of Librarianship and Information Studies*]，1（4），62-86。

沈寶環[Shen, Baohuan]（1994）。圖書館事業的領導問題[Tushuguan shiye de lingdao wenti]。在[In]王振鵠教授七秩榮慶祝壽論文集編輯小組編著[Dr. Wang Chen-Ku qizhi rongqing zhushou lunwenji bianji xiaozu (Eds.)]，當代圖書館事業論集：慶祝王振鵠教授七秩榮慶論文集（頁11-32）[*Dangdai tushuguan shiye lunji: Qingzhu Dr. Wang Chen-Ku qizhi rongqing lunwenji* (pp.11-32)]。台北市[Taipei]：正中書局[Cheng Chung Book]。

邱皓政[Chiou, Hawjeng]（1996）。量化研究與統計分析[*Quantitative research and statistical analysis*]。台北市[Taipei]：五南[Wunan]。

胡歐蘭[Chou, Oulan Nancy]（2005，11月）[2005, November]。圖書館團隊領導績效之探討[A study of the achievements in the library team leadership]。圖書與資訊學刊[*Journal of Librarianship and Information Studies*]，55，1-8。

國家教育研究院[National Academy for Educational Research]（2013）。雙語詞彙、學術名詞暨辭書資訊網[*Shuangyu cihui, xueshu mingci ji cishu zixunwang*]。上網日期：2013年6月4日[Retrieved June 4, 2013]，檢自 [from]：http://terms.naer.edu.tw/

張慧銖[Chang, Hui-Chu]（2009，9月）[2009, September]。圖書館管理：領導與溝通 [Library management: Leadership and communication]。國立成功大學圖書館館刊 [*National Cheng Kung University Library Journal*]，*18*，1-25。

陳書梅[Sheih, Su-May Chen]（2002，12月）[2002, December]。大學圖書館館員對館長領導風格之認知研究[The perceived leadership style of university library directors]。圖書資訊學刊 [*Journal of Library and Information Studies*]，*17*，49-69。

陳書梅[Sheih, Su-May Chen]（2008）。台灣地區大學圖書館中階主管領導風格之實證研究[An empirical study of leadership style of middle managers in Taiwan's university libraries]。圖書資訊學刊 [*Journal of Library and Information Studies*]，*6*（1/2），29-56。

彭台光[Peng, T. K.]、高月慈[Kao, Y. T.]、林鉦棽[Lin, Cheng-Chen]（2006）。管理研究中的共同方法變異：問題本質、影響、測試和補救[Common method variance in management research: Its nature, effects, detection, and remedies]。管理學報 [*Journal of Management*]，*23*（1），77-98。

羅清俊[Luor, Ching-Jyuhn]（2007）。社會科學研究方法-如何做好研究 [*Qualitative research methods for the social sciences*]。台北市 [Taipei]：威仕曼文化[Wiseman Publishing Co.]。

Allner, I. (2008). Managerial leadership in academic libraries: Roadblocks to success. *Library Administration & Management, 22*(2), 69-78.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423.

Andrews, A. M., & Ellis, D. (2005). The changing nature of work in library and information services in the UK: An analysis. *Education for Information, 23*(1), 57-77.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation model. *Journal of the Academy of Marketing Sciences, 16*(1), 74-94.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Bell, S. J., & Menguc, B. (2002). The employee-organization relationship, organizational citizenship behaviors, and superior service quality. *Journal of Retailing, 78*(2), 131-146.

Bridgland, A. (1999). To fill, or how to fill: That is the question succession planning and leadership development in academic libraries. *Australian Academic and Research Libraries, 30*(1), 20-29.

Castro, C. B., Armario, E. M., & Ruiz, D. M. (2004). The influence of employee organizational citizenship behavior on customer loyalty. *International Journal of Service Industry Management, 15*(1), 27-53.

Cawthorne, J. E. (2010). Leading from the middle of the organization: An examination of shared leadership in academic libraries. *The Journal of Academic Librarianship, 36*(2), 151-157.

Coleman, V. I., & Borman, W. C. (2000). Investigating the underlying structure of the citizenship performance domain. *Human Resource Management Review, 10*(1), 25-44.

Coyle-Shapiro, J. A-M. (2002). A psychological contract perspective on organizational citizenship behavior. *Journal of Organizational Behavior, 23*(8), 927-946.

Danserean, F., Graen, G., & Haga, W. J. (1975). A vertical dyad linkage approach to leadership within formal organizations: A longitudinal investigation of the role making process. *Organizational Behavior and Human Performance, 13*(1), 46-78.

De Witte, H., Verhofstadt, E., & Omey, E. (2007). Testing Karasek's learning and strain hypotheses on young workers in their first job. *Work & Stress: An International Journal of Work, Health & Organisations, 21*(2), 131-141.

Deluga, R. J. (1994). Supervisor trust building, leader-member exchange and organizational citizenship behavior. *Journal of Occupational and Organizational Psychology, 67*(4), 315-326.

Deluga, R. J. (1998). Leader-member exchange quality and effectiveness ratings: The role of subordinate-supervisor conscientiousness similarity. *Group and Organization Management, 23*(2), 189-216.

Dienesch, R. M., & Liden, R. C. (1986). Leader-member exchange model of leadership: A critique and further development. *The Academy of Management Review, 11*(3), 618-634.

Dierdorff, E. C., & Morgeson, F. P. (2007). Consensus in work role requirements: The influence of discrete occupational context on role expectations. *Journal of Applied Psychology, 92*(5), 1228-1241.

Dodd, N. G., & Ganster, D. C. (1996). The interactive effects of variety, autonomy, and feedback on attitudes and performance. *Journal of Organizational Behavior, 17*(4), 329-347.

Erdogan, B., & Enders, J. (2007). Support from the top: Supervisors' perceived organizational support as a moderator of leader-member exchange to satisfaction and performance relationships. *Journal of Applied Psychology, 92*(2), 321-330.

Farh, J.-L., Earley, P. C., & Lin, S.-C. (1997). Impetus for action: A cultural analysis of justice and organizational citizenship behavior in Chinese society. *Administrative Science Quarterly, 42*(3), 421-444.

Farh, J.-L., Zhong, C.-B., & Organ, D. W. (2004). Organizational citizenship behavior in the people Republic of China. *Organizational Science, 15*(2), 241-253.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Gerstner, C. R., & Day, D. V. (1997). Meta-analytic review of leader–member exchange theory: Correlates and construct issues. *Journal of Applied Psychology, 82*(6), 827-844.

Graen, G. B., & Cashman, J. F. (1975). A role-making model of leadership in organizations: A development approach. In J. G. Hunt, & L. L. Larson (Eds.), *Leadership Frontiers*. Kent, OH: Kent State University Press.

Graen, G. B., & Scandura, T. A. (1987). Toward a psychology of dyadic organizing. *Research in Organizational Behavior, 9*, 175-208.

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development

of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level, multi-domain perspective. *Leadership Quarterly, 6*(2), 219-247.

Graen, G. B., Novak, M. A., & Sommerkamp, P. (1982). The effects of leader-member exchange and job design on productivity and satisfaction: Testing a dual attachment model. Organizational *Behavior and Human performance, 30*(1), 109-131.

Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied Psychology, 60*(2), 159-170.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Reading, MA: Addison Wesley.

Hair, J. F. Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1992). *Multivariate data analysis with readings* (3rd ed.). New York, NY: Macmillan.

Hernon, P., & Schwartz, C. (2008). Leadership: Developing a research agenda for academic libraries. *Library & Information Science Research, 30*(4), 243-249.

Hernon, P., Powell, R. R., & Young, A. P. (2001). University library directors in the association of research libraries: The next generation, part one. *College & Research Libraries, 62*(2), 116-146.

Hofmann, D. A., Morgeson, F. P., & Gerras, S. J. (2003). Climate as a moderator of the relationship between leader-member exchange and content specific citizenship: Safety climate as an exemplar. *Journal of Applied Psychology, 88*(1), 170-178.

Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology, 92*(5), 1332-1356.

Ilies, R., Dimotakis, N., & De Pater, I. E. (2010). Psychological and physiological reactions to high workloads: Implications for well-being. *Personnel Psychology, 63*(2),407-436.

Jensen, J. L., Olberding, J. C., & Rodgers, R. (1997, August). The quality of leader-member exchange (LMX) and member performance: A meta analytic review. *Academy of Management Proceedings*, 1997, 320-324.

Jöreskog, K. G., & Sörbom, D. (1992). *LISEREL: A guide to the Program and Applications* (3rd ed.). Chicago, IL: Scientific Software International, Inc.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language* (2nd ed.). Lincolnwood, IL: Scientific Software International Inc.

Kanter, R. (1988). When a thousand flowers bloom: Structural, collective, and social conditions for innovation in organizations. In *Research in organizational Behavior: An annual series of analytical essays and critical reviews* (B. M. Staw, & L. L. Cummings, Eds., pp.169-211). (Research in organizational Behavior, Vol.10). Greenwich, CT: JAI Press.

Katz, D. (1964). The motivational basis of organizational behavior. *Behavioral Science, 9*(2), 131-146.

Katz, D., & Kahn, R. L. (1966). *The Social Psychology of Organizations*. New York, NY: Wiley.

Katz, D., & Kahn, R. L. (1978). *The Social Psychology of Organizations* (2nd ed.). New York, NY: Wiley.

Kim, S., O'Neill, J. W., & Cho, H.-M. (2010). When does an employee not help coworkers?

The effect of leader–member exchange on employee envy and organizational citizenship behavior. *International Journal of Hospitality Management, 29*(3), 530-537.

Korsgaard, M. A., Meglino, B. M., Lester, S. W., & Jeong, S. S. (2010). Paying you back or paying me forward: Understanding rewarded and unrewarded organizational citizenship behavior. *Journal of Applied Psychology, 95*(2), 277-290.

Langfred, C. W., & Moye, N. A. (2004). Effects of task autonomy on performance: An extended model considering motivational, informational, and structural mechanisms. *Journal of Applied Psychology, 89*(6), 934-945.

Liden, R. C., Sparrowe, R. T., & Wayne, S. J. (1997). Leader-member exchange theory: The past and potential for the future. In G. R. Ferris (Ed.), *Personnel and Human Resources Management* (Vol.15, pp. 47-119). Greenwich, CT: JAI Press.

Lim, S. (2007). Library informational technology workers: Their sense of belonging role, job autonomy, and job satisfaction. *Journal of Academic Librarianship, 33*(4), 492-500.

Lim, S. (2008). Job satisfaction of information technology workers in academic libraries. *Library & Information Science Research, 30*(2), 115-121.

Liu, C., Spector, P. E., & Jex, S. M. (2005). The relation of job control with job strains: A comparison of multiple data sources. *Journal of Occupational and Organizational Psychology, 78*(3), 325-336.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First and higher order factor models and their invariance across groups. *Psychological Bulletin, 97*(3), 562-582.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*(3), 391-410.

Morgeson, F. P., Delaney-Klinger, K., & Hemingway, M. A. (2005). The importance of job autonomy, cognitive ability, and job-related skill for predicting role breadth and job performance. *Journal of Applied Psychology, 90*(2), 399-406.

Organ, D. W. (1988). A restatement of the satisfaction-performance hypothesis. *Journal of Management, 14*(4), 547-557.

Organ, D. W., Podsakoff, P. M., & MacKenzie, S. B. (2006). *Organizational citizenship behavior: Its nature, antecedent, and consequences* (Foundations for Organizational Science: A Sage publication series). Thousand Oak, CA: Sage.

Ozer, M. (2008). Personal and task-related moderators of leader–member exchange among software developers. *Journal of Applied Psychology, 93*(5), 1174-1182.

Patillo, E. J., Moran, B. B., & Morgan, J. C. (2009). The job itself: The effects of functional units on work autonomy among public and academic librarians. *Library Trends, 58*(2), 276-290.

Piccolo, R. F., & Colquitt, J. A. (2006). Transformational leadership and job behaviors: The mediating role of core job characteristics. *Academy of Management Journal, 49*(2), 327-340.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *The Leadership Quarterly, 1*(2), 107-142.

Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical andempirical literature and suggestions for future research. *Journal of Management, 26*(3), 513-563.

Renaud, R., & Murray, A. (2003). Organizing for leadership: How university libraries can meet the leadership challenge in higher education. In C. E. Regenstein, & B. I. Dewey (Eds.), *Leadership, higher education, and the information age: A new era for information technology and libraries* (chap. 9, pp.163-180). New York, NY: Neal-Schuman.

Riggs, D. E. (1997). What's in store for academic libraries? Leadership and management issues. *Journal of Academic Librarianship, 23*(1), 3-8.

Riggs, D. E. (2001). The crisis and opportunities in library leadership. *Journal of Library Administration, 32*(3/4), 5-17.

Riggs, D. E. (2003). Writing for LIS profession: Introductory comments and questions. In *How to get published in LIS journals: A practical guide* (L. J. Hinchliffe, & J. Dorner, Eds., p.2). (LibraryConnect: Partnering with the Library Community, pamphlet 2). New York, NY: Elsevier.

Rockman, I. F. (1984). Job satisfaction among faculty and librarians: A study of gender, autonomy, and decision making opportunities. *Journal of Library Administration, 5*(3), 43-56.

Schneider, B., Ehrhart, M. G., Mayer, D. M., Saltz, J. L., & Nilles-Jolly, K. (2005). Understanding organization–customer links in service settings. *Academy of Management Journal, 48*(6), 1017-1032.

Schriesheim, C. A., Castro, S. L., & Cogliser, C. C. (1999). Leader-member exchange (LMX) research: A comprehensive review of theory, measurement, and data-analytic practices. *Leadership Quarterly, 10*(1), 63-113.

Schriesheim, C. A., Neider, L. L., & Scandura, T. A. (1998). Delegation and leader-member exchanges: Main effects, moderators, and measurement issues. *Academy of Management Journal, 41*(3), 298-318.

Shalley, C. E., & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The Leadership Quarterly, 15*(1), 33-53.

Sheldon, B. E. (1991). *Leaders in Libraries: Styles and strategies for success*. Chicago, IL: American Library Association.

Smircich, L., & Morgan, G. (1982). Leadership: The management of meaning. *The Journal of Applied Behavioral Science, 18*(3), 257-273.

Smith, C. A., Organ, D. W., & Near, J. P. (1983). Organizational citizenship behavior: Its nature and antecedents. *Journal of Applied Psychology, 68*(4), 653-663.

Stephens, D., & Russell, K. (2004). Organizational development, leadership, change, and the future of libraries. *Library Trends, 52*(1), 238-257.

Suwannarat, P. (1994). *Library Leadership in Research University Libraries*. Unpublished

doctoral dissertation, Vanderbilt University, Tennessee.

Uhl-Bien, M., & Maslyn, J. M. (2003). Reciprocity in manager-subordinate relationships: Components, configurations, and outcomes. *Journal of Management, 29*(4), 511-532.

Wang, A.-C., & Cheng, B.-S. (2010). When does benevolent leadership lead to creativity? The moderating role of creative role identity and job autonomy. *Journal of Organizational Behavior, 31*(1), 106-121.

Ward, P. L. (2001). Management and the management of information and library services 2000. *Library Management, 22*(3), 131-155.

Wayne, S. J., Shore, L. M., Bommer, W. H., & Tetrick, L. E. (2002). The role of fair treatment and rewards in perceptions of organizational support and leader–member exchange. *Journal of Applied Psychology, 87*(3), 590-598.

Wayne, S. J., Shore, L. M., & Liden, R. C. (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. *Academy of Management Journal, 40*(1), 82-111.

Wech, B. A. (2002). Trust context：Effect on organizational citizenship behavior, supervisory fairness, and job satisfaction beyond the influence of leader-member exchange. *Business & Society, 41*(3), 353-360.

Weiner, S. G. (2003). Leadership of academic libraries: A literature review. *Education Libraries, 26*(2), 5-18.

Yoon, M. H., & Suh, J. (2003). Organizational citizenship behaviors and service quality as external effectiveness of contact employees. *Journal of Business Research, 56*(8), 597-611.

A Study on Using Performance of Electronic Databases with Combination of Relative Efficiency and Criteria Weighting Perspectives

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Abstract

Past studies on library performance evaluation mainly investigate the physical resource utilization. However, the popularization of the internet has increased the deed and investment in electronic database day by day, as well as the need for assessment on the usage efficiency of electronic database. This study took a military university library for example, and used the data envelopment analysis (DEA) where multiple inputs and outputs can be concurrently assessed to introduce Fuzzy AHP to obtain the relative weights of various input and outputs, in order to assess the usage performance of library electronic database. This study found that the cause for the overall technical inefficiency was pure technical inefficiency. To improve the inefficiency, it is necessary to adjust the management and allocation of resources. In terms of the change in total productivity in a longitudinal aspect, a declining trend was observed in the databases, such as ASME, SDOL and EBSCO that the main cause was the decline in technical efficiency change. The research model with combination of relative efficiency and criteria weighting perspectives can be provided as reference to libraries for the practical assessment and modification of databases.

Keywords: *Performance evaluation; Electronic database; Fuzzy analytic hierarchy process; Slack-based measure; Data envelopment analysis*

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SUMMARY

Introduction

Under the double pressure of library budget cuts and increasing cost on electronic database creation year by year, this study tries to build a performance evaluation model of electronic databases, for libraries to consider when evaluating the performance of purchased electronic databases. Most previous studies used the "relative efficiency" concept from data envelopment analysis (DEA) as the main approach to assess the overall library performance; however, few studies ever focused exclusively on evaluation of electronic databases. Furthermore, the radial efficiency of DEA is often questioned with the problem of over-estimating efficiency values and overlooking the weighing of input and output values, which would affect the objectivity of evaluation outcomes. Thus, non-oriented slack-based measure (SBM) is adopted in this study to evaluate the utilization efficiency of electronic databases. SBM-based Malmquist Index is used to track the longitudinal performance of databases for investigating the efficiency stability of databases in different time-periods. In addition, because the environments and users' characteristics of university libraries are varied widely, these factors would influence how much each library values the input and output factors of its databases. Therefore, fuzzy analytic hierarchy process (FAHP) is used to obtain the relative weights of various inputs and outputs. Lastly, relative efficiency and Malmquist index (MI) are incorporated to build management decision matrix, for decision makers' reference.

Research Design and Empirical Findings

1. Decision Making Unit (DMU) defined

From the list of electronic databases purchased by some university library during the year of 2011-2012, after crossing out databases with incomplete data on inputs and outputs, twelve electronic databases of full-text in English were selected for evaluation. However, for corresponding to rules of thumb for the number of DMU, the concept of window analysis is adopted, the two-year period was divided into 24 DMUs for analysis.

2. Selection of Inputs and Outputs

Inputs

(1) Number of database usage: statistics on the number of users who use the electronic databases for academic and research purposes.

(2) Acquisition cost: the price that database servers charge on one or a bunch of databases.

(3) Number of journals included: the number of journals included in the electronic database

Outputs

(1) Number of session: the number of users' successful connections to the database or online public access catalogues.

(2) Number of search: the number of users' searches in databases or online public access catalogues.

(3) Number of download: the number of users' downloads of electronic part or full texts.

3. DEA and Productivity Change Analysis

The results showed that four databases including ACM had the best overall technical efficiency (OTE) values over two consecutive years, and the cause of overall technical inefficiency was pure technical inefficiency. Meanwhile, variable returns to scale (VRS) of non-oriented SBM was used to compute slack variables, for understanding how each decision making unit could improve and adjust directions and percentages regarding DMU inputs and outputs.

As to dynamic efficiency analysis, twelve electronic databases were analyzed for their productivity change, technical change, and technical efficiency change during the two-year period on a seasonal basis, with a total of six inter-season units. The results showed that the average of total factor productivity Change was 1.220, indicating that there was a progressive trend in the total factor productivity of library electronic database usage, with only two inter-season units having averages lower than 1. The regressive trend at the end of the analyzed period was caused by a regressive technical change (a regressive efficiency frontier); while the regressive trend at the beginning of the analyzed period was caused by a regressive technical efficiency change, which was mainly resulted from a regressive scale efficiency change.

**Table 1. Malmquist Indices (September 2011-2012)
of electronic databases**

Database	Technical efficiency change	Technical change	Pure technical efficiency change	Scale efficiency change	Total factor productivity change(MI)
ACM	1.063	1.091	1.073	0.991	1.161
ACS	1.046	1.326	1.049	0.997	1.426
AIP	1.007	1.239	0.993	1.014	1.259
ASCE	1.120	1.122	1.310	0.855	1.271
ASME	0.784	1.149	0.968	0.810	0.851
EBSCO	0.794	0.838	1.977	0.402	0.664
IEL	0.966	1.035	0.975	0.991	1.002
JAS	1.046	1.090	1.066	0.981	1.134
OSA	1.126	1.267	1.270	0.887	1.301
PAC/PIC	2.202	0.991	2.085	1.056	2.473
PQRL	1.124	1.059	1.105	1.017	1.122
SDOL	0.978	0.990	1.025	0.954	0.981
Average	1.105 ↑	1.100 ↑	1.241 ↑	0.913 ↓	1.220 ↑

In terms of the total factor productivity change analysis, nine databases including ACM showed a progressive growth in productivity (MI>1). Three databases (ASME, EBSCO, SDOL) showed a regression, with the EBSCO database having a significantly low value (0.664), which was caused by a low technical efficiency change (0.794) resulted from a massive regression of scale efficiency change (0.402). Therefore, it is suggested that when evaluating the EBSCO database, the efforts should be put on increasing the output scale (such as increasing the number of session or download), which might be helpful to efficiency improvement. Lastly, with relative efficiency as the lateral axis and MI the vertical axis, management decision matrix was created as Figure 1, for library decision makers' reference when considering in enhancing library performance and allocating resources.
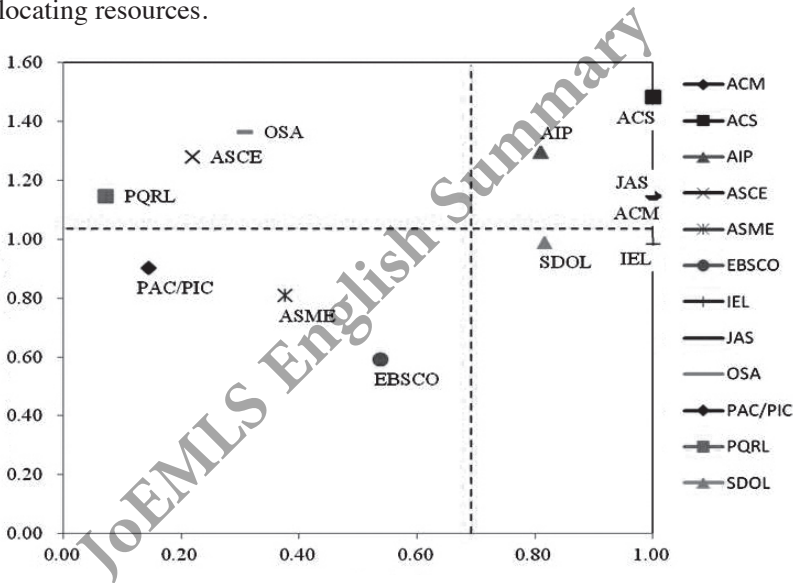
Fig. 1 Management Decision Matrix

Conclusion

The results of this study showed that the cause of overall technical inefficiency was pure technical inefficiency, while three DMUs including EBSCO-2 had the poorest performance of pure technical efficiency, indicating that the allocation of inputs and outputs of these three DMUs should be reviewed and adjusted immediately, for not further wasting resources. Practical methods include making a smart purchase decision with consideration of numbers of users and journals included. Furthermore, in addition to making a comprehensive collection policy and making it a priority to purchase for library's core collection, it is also important to conduct systematic studies on patrons or users' information needs and information seeking behaviors, for enhancing the overall technical

efficiency of database usage. As to the total factor productivity change of inter-season efficiency, the results showed that nine databases including ACM had a progressive trend in total factor productivity change (TFPC), while three databases including ASME had a growth regression caused by a regressive technical efficiency change, which was resulted from a massive regression of scale efficiency change.

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王怡心[Wang, I-Hsin]、賴郁蕙[Lai, Yu-Hui]、文惠瓊[Wen, Hui-Chiung]（2009，12月）[December, 2009]。電子資源之效益評估[Performance evaluation for the e-resource]。中華圖書資訊館際合作協會通訊[*Interlibrary Cooperation Association Newsletter*]，*51/52*，2-13。

王梅玲[Wang, Mei-Ling]（2006，5月）[May, 2006]。電子計量應用在電子期刊評鑑[The application of e-metrics to electronic journal evaluation]。圖書與資訊學刊[*Journal of Librarianship and Information Studies*]，*57*，1-18。

行政院主計總處[Directorate General of Budget, Accounting and Statistics, Executive Yuan]（2012）。101年度中央政府總預算案[2012 *Central government final accounting and subsidiary agencies final accounting*]。台北市[Taipei]：行政院主計總處[[Directorate General of Budget, Accounting and Statistics, Executive Yuan]。

吳萬益[Wu, Wann-Yih]、林清河[Lin, Chin-Ho]（2001）。企業研究方法[*Business research methods*]。台北市[Taipei]：華泰書局[Hwatai]。

吳濟華[Wu, Jih-Haw]、何柏正[Ho, Ber-Jenq]（2008）。組織效率與生產力評估：資料包絡分析法[*Organization efficiency and productivity assessment: Date envelopment analysis*]。台北市[Taipei]：前程文化[Future Career Management Corporation]。

李勅毅[Lee, Chih-Yi]、陳昭珍[Chen, Chao-Chen]、楊智晶[Yang, Chih-Ching Emily]（2010）。圖書館電子資源投資報酬率評量研究：以南台科技大學為例[The ROI of electronic resources: A case study of southern Taiwan university library]。大學圖書館[*University Library Quarterly*]，*14*（2），174-188。

林巧敏[Lin, Chiao-Min]（2008）。國家圖書館電子資源館藏發展之研究[*The study of electronic resources collection development in National Central Library*]。未出版之碩士論文[Unpublished master's thesis]，國立臺灣大學圖書資訊學研究所[Department and Graduate Institute of Library and Information Science, National Taiwan University]，台北市[Taipei]。

林呈潢[Lin, Cheng-Huang]（2009）。圖書館統計標準（*CNS13151*）使用手冊[*Library statistics standard (CNS13151) manual*]。台北市[Taipei]：國家圖書館[National Central Library]。

高強[Kao, Chiang]（1998，4月）[April, 1998]。由非營利單位之效率評估談圖書館績效評量[You feiyingli danwei zhi xiaolu pinggu tan tushuguan jixiao pingliang]。國立成功大學圖書館館刊[*National Cheng Kung University Library Journal*]，*1*，2-9。

高強[Kao, Chiang]、黃旭男、Sueyoshi, T.（2003）。管理績效評估：資料包絡分析法[*Management performance evaluation: Data envelopment analysis*]。台北[Taipei]：華

泰文化[Hwatai]。

曾繁絹[Tseng, Fan-Chuan]、李宗翰[Li, Tsung-Han]（2008）。圖書館電子資源整合查詢系統評估之研究[A study of assessment of library e-resource metasearch system]。圖書資訊學刊[*Journal of Library and Information Studies*]，*6*（1/2），111-142。

黃明居[Hwang, Ming-Jiu]、謝建成[Shieh, Jiann-Cherng]、謝志佳[Hsieh, Chih-Chia]（2012）。資料包絡分析法應用於圖書館電子資料庫使用績效之研究[Envelopment analysis to evaluate library electronic databases]。教育資料與圖書館學[*Journal of Educational Media & Library Sciences*]，*49*（3），343-368。

黃鴻珠[Huang, Hong-Chu]（2011）。大專校院圖書館[University and College Libraries]。在[In]國家圖書館輔導組編[Counseling and Training Department, National Central Library (Ed.)]，中華民國一百年圖書館年鑑（頁95-108）[*Yearbook of the Libraries of the R.O.C. 2011* (pp.95-108)]。台北市[Taipei]：國家圖書館[National Central Library]。

葉譓歆[Yeh, Hui-Hsin]（2006）。從電子資源統計問題看COUNTER計畫之發展與應用[Statistical problems of electronic resources and the development and application of COUNTER project]。教育資料與圖書館學[*Journal of Educational Media & Library Sciences*]，*43*（4），453-469。

詹麗萍[Chen, Li-Ping]（2005）。電子資源與圖書館館藏發展[*Electronic resources and library collection development*]。台北市[Taipei]：麥田[Rye Field Publishing Co.]。

鄧振源[Deng, Junn-Yuan]、曾國雄[Tzeng, Gwo-Hshiung]（1989）。層級分析法(AHP)的內涵特性與應用（上）[The analytic hierarchy process: Concepts, techniques and applications (I)]。中國統計學報[*Journal of the Chinese Statistical Association*]，*27*（6），13707-13724。

謝寶煖[Hsieh, Pao-Nuan]（2000）。公共圖書館績效評估模式之研究-競爭性標竿之觀點[*Gonggongtushuguan jixiaopinggu moshi zhi yanjiu: Jingzhengxing–biaogan zhi guandian*]（國科會專題研究計畫成果報告[National Science Council research project report]，NSC89-2413-H-002-021）。台北市[Taipei]：國立臺灣大學圖書館學系[Department of Library and Information Science, National Taiwan University]。

Aida, K., Cooper, W. W., Pastor, J. T., & Sueyoshi, T. (1998). Evaluating water supply services in Japan with RAM: A range-adjusted measure of inefficiency. *Omega, 26*(2), 207-232.

Alidi, A. S. (1996). Use of the analytic hierarchy process to measure the initial viability of industrial projects. *International Journal of Project Management, 14*(4), 205-208.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Estimating most productive scale size using data envelopment analysis. *Management Science, 30*, 1078-1092.

Bowlin, W. F. (1985). *Use of data envelopment analysis in cost analysis and estimating*. Wright-Patterson Air Force Base, OH: School of Systems and Logistics, Air Force Institute of Technology. (DTIC No. ADA162377)

Bowlin, W. F. (1998). Measuring performance: An introduction to data envelopment analysis (DEA). *The Journal of Cost Analysis, 15*(2), 3-27.

Buckley, J. J. (1985). Fuzzy hierarchical analysis. *Fuzzy Sets and Systems, 17*(3), 233-247.

Charnes, A., Clark, C. T., Cooper, W. W., & Golany, B. (1985). A developmental study of data envelopment analysis in measuring the efficiency of maintenance units in the U.S. air forces. *Annals of Operations Research, 2*(1), 95-112.

Charnes, A., Cooper, W. W. (1962). Programming with Linear Fractional Functionals. *Naval Research Logistics Quarterly, 9*(3/4), 181-186.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research, 2*(6), 429-444.

Choi, J.-H., Kwak, S.-J., & Kim, J.-T. (2007). Application of performance indicators for digital library services focusing on the analysis of ISO/DIS 11620: 2007. *Journal of the Korean Society for Library and Information Science, 41*(3), 81-102.

Cooper, W. W., Park, K. S., & Pastor, J. T. (1999). RAM: A range adjusted measure of inefficiency for use with additive models, and relations to other models and measures in DEA. *Journal of Productivity Analysis, 11*(1), 5-42.

Cooper, W. W., Seiford, L. M., Tone, K. (2006). *Data envelopment analysis: A comprehensive text with models, applications, references and DEA-solver software*. New York, NY: Springer.

COUNTER (2003), Release 1 of the COUNTER code of practice for journals and databases. Retrieved May 14, 2012, fromhttp://www.projectcounter.org/code_practice_r1.html.

COUNTER (2005). The COUNTER code of practice for journals and databases: Release 2. Retrieved May 14, 2012, from http://www.projectcounter.org/r2/COUNTER_COP_Release_2.pdf.

COUNTER (2008). The COUNTER code of practice for journals and databases: Release 3. Retrieved May 14, 2012, from http://www.projectcounter.org/r3/Release3D9.pdf.

Färe, R., & Knox Lovell, C. A. (1978). Measuring the technical efficiency of production. *Journal of Economic Theory, 19*(1), 150-162.

Färe, R., Grosskopf, S., & Knox Lovell, C. A. (1994). *Production Frontiers*. Cambridge: Cambridge University Press.

Flynn, A. (2004). *Performance indicators for electronic library services*. Retrieved May 14, 2012, from http://epress.lib.uts.edu.au/dspace/bitstream/handle/2100/16/Performance_Indicators_2004.pdf?sequence=1

Galagedera, D. U. A., Silvapulle, P. (2002). Australian mutual fund performance appraisal using data envelopment analysis. *Managerial Finance, 28*(9), 60-73.

Huang, M. C. (1989). *Piecewise linear tree-structured regression*. Unpublished master's thesis, University of Wisconsin--Madison.

Jaguszewski, J. M., & Probst, L. K. (2000). The impact of electronic resources on serial cancellations and remote storage decisions in academic research libraries. *Library Trends, 48*(4), 799-820.

Kim, J.-T., & H., B.-H. (2008). A study on the relative weights for the development of university library performance indicator model. *Journal of the Korean Library and Information Science, 39*(4), 71-96.

Lee, J. W. & Kim, S. H. (2000). Using analytic network process and goal programming for interdependent information system project selection. *Computers & Operations Research, 27*(4), 367-382.

Noh, Y. (2010). A Study on Developing Evaluation Criteria for Electronic Resources in Evaluation Indicators of Libraries. The *Journal of Academic Librarianship, 36*(1), 41-52.

Noh, Y. (2012). A study measuring the performance of electronic resources in academic libraries. *Aslib Proceedings, 64*(2), 134-153.

Reichmann, G. (2004). Measuring university library efficiency using data envelopment analysis. *Libri. International Journal of Libraries and Information Services, 54*(2), 136-146.

Reichmann, G., & Sommersguter-Reichmann, M. (2010). Efficiency measures and productivity indexes in the context of university library benchmarking. *Applied Economics, 42*(3), 311-323.

Revilla, E., Sarkis, J. & Modrego, A. (2003). Evaluating performance of public–private research collaborations: A DEA analysis. *Journal of the Operational Research Society, 54*(2), 165-174.

Russell, R. R. (1985). Measures of technical efficiency. *Journal of Economic Theory, 35*(1), 109-126.

Saaty, T. L. (1980). *The analytical hierarchy process: Planning, priority setting, resource allocation*. New York, NY: McGraw-Hill.

Tone, K. (2001). A slacks-based measure of efficiency in data envelopment analysis. *European Journal of Operational Research, 130*(3), 498-509.

Tzeng, G.-H., & Teng, J.-Y. (1993). Transportation investment project selection with fuzzy multiobjectives. *Transportation Planning and Technology, 17*(2), 91-112.

van Laarhoven, P. J. M., & Pedrycz, W. (1983). A fuzzy extension of Saaty's priority theory. *Fuzzy sets and systems, 11*(1/2/3), 199-227.

Yoon, H.-Y. (2001a). Multiplicity of meaning and directivity of evaluation indicators for the academic libraries. *Journal of the Korean Library and Information Science, 32*(3), 91-115.

Yoon, H.-Y. (2001b). A study on the development of comprehensive evaluation model for Korean university libraries. *Journal of the Korean Library and Information Science, 32*(4), 45-75.

Zadeh, L. A. (1965). Fuzzy sets. *Information and Control, 8*(3), 338-353.

A Study of Research Topic Visualization Using Network Structure Analysis

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Abstract

The Pathfinder network (PFNet) method and the community detection algorithms both are methods which have been widely applied to visual presentation and analysis of research topics. The PFNet method can delete a large amount of insignificant links in networks but also retains the structural characteristics of the original networks, while the community detection algorithms are able to partition networks into a set of cohesive subgroups. However, each of the methods has its deficiencies. The PFNet method cannot automatically find out critical subgroups in input networks and the community detection algorithms do not guarantee nodes in the same subgroup able to be mapped in neighboring area. The integration of these two methods provides a way to alleviate the above problems: The output network from the PFNet method is partitioned using community detection algorithm. In addition, this study also suggests that the use of high frequency terms within papers in subgroups as the labels of research topics to make the analysis and interpretation of results easier. This study takes the field of Information Communication as an analytic case to study the application of the integrated methods, and the data of master theses of the related graduated schools are collected to be used for the analysis. The results show that it is effective to integrate the PFNet method and the community detection algorithms to discover subgroups representing important research topics from the network which is constructed upon the relations between papers in the examined field. The terms with high occurring frequency in subgroups are very relevant to the problems, method, theorems and technologies in the field of Information Communications and its fundamental disciplines, and therefore, they are suitable as the representatives of research topics.

Keywords: *Analysis of research topics; Information visualization; Path-finder Networks; Community detection algorithms*

SUMMARY

Introduction

Pathfinder network (PFNet) scaling and community detection algorithms are both techniques that have been widely applied to the analysis and visual presentation of research topics (Lin, 1997; Chen, 1998; Zhao, & Lin, 2010). To

visualize important research topics in an academic field, representative documents in the examined field are collected and analyzed to establish a network, in which nodes correspond to the documents and edges between nodes are determined by the relevance scores between the documents. PFNet scaling is able to delete a large amount of the insignificant links, while retaining the structural characteristics of the original network. Community detection algorithms are able to partition the network into a set of cohesive subgroups. However, each technique also has its deficiencies. PFNet scaling cannot automatically determine the critical subgroups in input networks and community detection algorithms do not guarantee that nodes in the same subgroup can be mapped in neighboring areas. Groh and Fuchs (2011) proposed a method to combine these two network visualization techniques by performing them separately, but this method did not alleviate the above problems. Instead of using the two techniques independently, this study proposed integration of the two: The output network from PFNet scaling is used as the input for the community detection algorithm to partition nodes in the network into subgroups. Thus, subgroups of nodes in the resulting network represent important research topics in the examined field and the structure of the network is able to express relationships between the research topics. Furthermore, this study also suggests using high frequency terms within papers in subgroups as the labels of research topics, to make the analysis and interpretation of results easier.

Methods

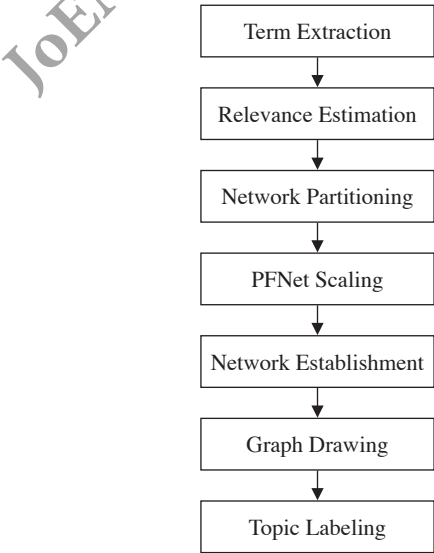Figure 1 shows the process proposed in this study and the techniques used in each step.

Fig. 1   The Proposed Process for Research topic Visualization

1. Term Extraction: Terms are first extracted from the titles and abstracts of examined documents as features to represent the documents. The method of term extraction used in the study is that used by Lin (2012).

2. Relevance Estimation: A feature vector is assigned to each of the examined documents, and the values of elements in such a feature vector are calculated based on the frequency counts of terms appearing in the corresponding document and the inverse document frequencies (idf) of those terms. The relevance score between two documents is defined as the value: 1 minus the Euclidean distance between their corresponding feature vectors.

3. Network Establishment: This step establishes a network for following processing steps. Each of the documents corresponds to a node in the network. The edge between a pair of nodes is determined by the relevance score of their corresponding documents. It is beneficial to delete edges with very small relevance scores to reduce computational resources needed in the next steps.

4. PFNet Scaling: The method of PFNet scaling used in this step to further delete insignificant edges in the network is the function of "Pathfinder Network Scaling", provided by the network analysis software, NWB Tool (NWB Team, 2006). To delete as many edges as possible, the parameter *r* in the algorithm is set to infinite (∞).

5. Network Partitioning: We use the Girvan-Newman method (Girvan, & Newman, 2002), provided by the network analysis software NodeXL (Hansen, Shneiderman, & Smith, 2010), to partition the resulting network of the PFNet scaling into a set of subgroups of nodes. Every subgroup in the output of the algorithm is considered to be an important research topic in the examined field.

6. Graph Drawing: In this study, another network analysis software Pajek (De Nooy, Mrvar, & Batagelj, 2005), is used to visualize the results of PFNet scaling and network partitioning. The visualization method is the Kamada-Kawai algorithm and is very suitable for visualizing the resulting networks generated by PFNet scaling.

7. Topic Labeling: As mentioned above, the subgroups of nodes produced by the Girvan-Newman algorithm are considered to be important research topics in the examined field. To give labels to these topics, we selected the terms with the five highest frequency counts occurring in the documents to correspond to nodes of these subgroups.

Results

The data used in this study

The data used in this study were Masters theses published by graduate

schools related to the field of information communication, retrieved from the database of the National Digital Library of Theses and Dissertations in Taiwan (http://ndltd.ncl.edu.tw/). In total, 778 theses were examined in this study. 293 different kinds of terms were extracted from the titles and abstracts of these theses. Feature vectors were generated based on the occurrences of the extracted terms to represent 777 theses, excluding one that was without any extracted term appearing in it, and relevance scores between the theses were estimated to establish a network. The resulting network had 777 nodes and 7168 edges with a density of 2.37×10^{-2}, and there was only one component in the network; in other words, the network was connected.

The results of PFNet scaling

PFNet scaling deleted most edges and the new network had 786 edges (only about 10.97% compared with the original network) with a density 2.61×10^{-3}.

The results of network partitioning and topic labeling

The Girvan-Newman algorithm partitioned the nodes in the new network into 30 subgroups with the condition of maximal modularity. Figure 2 shows the distribution of subgroups in the network. Nodes with the same color indicate that they are in the same subgroup. We assign every subgroup with a code and the term with the highest frequency count in the corresponding theses for convenience of identification. Table 1 shows the number of corresponding theses and the terms with the five highest frequency counts of all subgroups. The largest subgroup is C27 and the smallest subgroup is C15, with 36 and 15 theses, respectively. In Table 1, the terms are almost highly relevant to the field of information and communications or its fundamental disciplines, such as information and communication technology, communication science, and art and design. In addition, terms in each subgroup are also related to each other. Thus, the resulting graph and table can be used as information resources to determine the important research topics and explore how they are related, in the examined field.

Discussion

The resulting graph shows the scope and content of research topics in the field of information communication. Using the graph, we can clearly see that some of the research topics in this field originally came from several fundamental disciplines, which are communication science, library and information science, information communication technology, and art and design. Innovations and impacts from the application of information communication technology on business management, content creation, application services, and user experiences are also important research topics in the field. The above observations confirm Liang's (2011) points. In addition, "e learning" and "digital content", both located
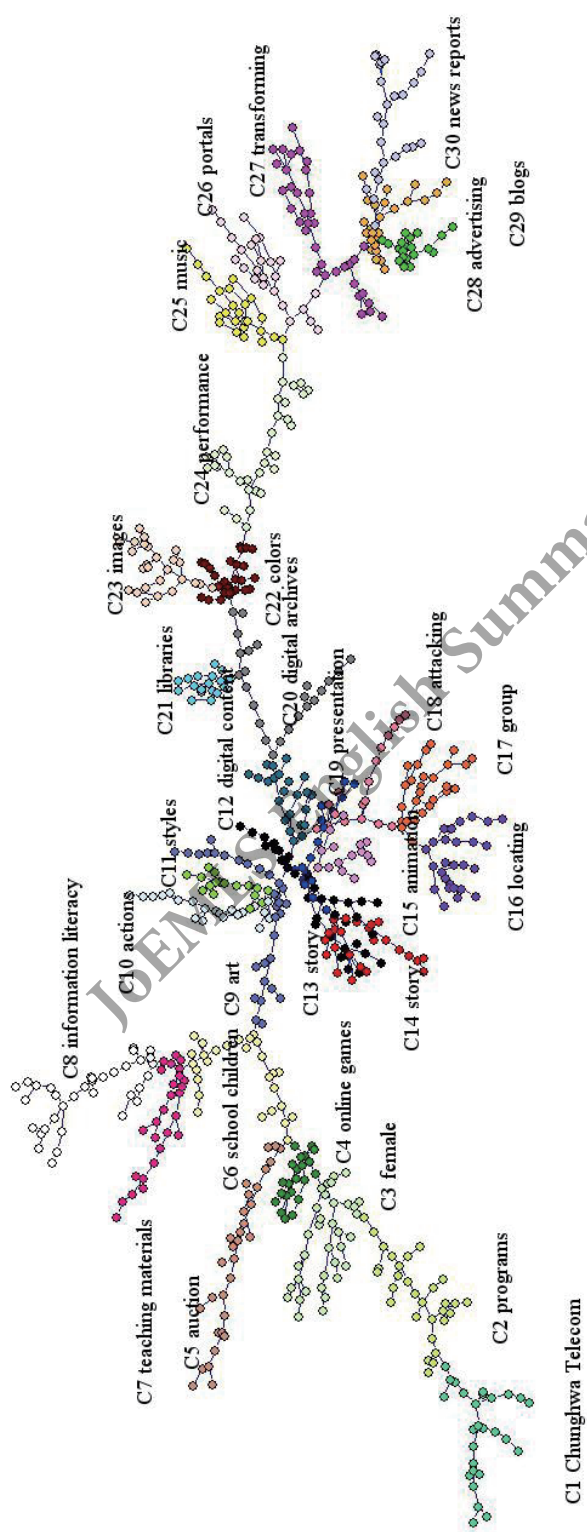
Fig. 2 The Results of Network Partitioning and Topic Labeling

**Table 1   The Terms with the Five Highest
Frequency Counts in Each Subgroup**

Sub-group	number of theses	Terms with highest frequency count				
C1	27	Chunghwa Telecom	integrated marketing	digital television	magazines	telecommunications
C2	30	programs	video	broadcasting	movies	television stations
C3	35	female	experiences	consumption	Web pages	male
C4	22	online games	players	online game (in English)	forum	female
C5	31	auction	network	transaction	trust	players
C6	28	school children	teaching materials	elementary school	players	grade
C7	27	teaching materials	e-learning (in English)	e learning	web 2 (in English)	e-commerce
C8	35	information literacy	e learning (in English)	e learning	skills	employees
C9	31	art	members	research and development	elementary school	creation
C10	21	actions	features	Chinese	usability	documents
C11	17	styles	graph	shape	art	flat
C12	36	digital content	creative	learner	evaluation	creation
C13	17	story	children	reality	reading	experiences
C14	24	reading	publishing	movies	readers	e-book
C15	15	animation	talents	game industry	colleges	creative
C16	27	locating	signals	dynamic	wireless LAN	tracking
C17	27	group	family	telephone	stress	health
C18	18	attacking	communications	group	protocol	exchange
C19	23	presentation	digital media	projects	digital media (in English)	departments
C20	24	digital archives	navigation	digital archives (in English)	museums	archiving
C21	19	libraries	librarians	library collection	community	readers
C22	27	colors	printing	chromatic aberration	memory	detecting
C23	26	images	retrieval	noise	copying	image quality
C24	34	performance	knowledge management	channels	customers	knowledge management (in Eng.)
C25	25	music	perception	independent	industry	marketing strategies
C26	25	portals	cellular phones	electronic	loyalty	involvement
C27	36	transforming	tags	visualization	algorithms	investment
C28	20	advertising	make-up	blogs	strength	placement
C29	25	blogs	search	people	reliability	search engines
C30	25	news reports	frame	image	China	encoding

in the central region of the graph, were the major research topics of Masters theses in the examined field. "E learning" and "digital content" integrate multiple fundamental disciplines of information communication.

The resulting graph is compared with the self-organizing map generated by Lin (2012) to reveal features of the two methods. Self-organizing maps are good at showing the overall structure of the field. However, the network graph in this study can display the local linking structures of the field, demonstrating the membership among theses and their related topics.

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

李敦仁[Lee, Duen R.]、余民寧[Yu, Min-Ning]（2007）。學習表現的知識結構評量研究：以「教育統計學」學科知識為例[The assessment of knowledge structures of learning performance in educational statistics]。教育研究與發展期刊[*Journal of Educational Research and Development*]，*3*（4），113-148。

林頌堅[Lin, Sung-Chien]（2012）。資訊傳播學領域的研究主題發展分析[An analysis of the development of research topics in the field of information communication]。資訊傳播研究[*Journal of Information Communication*]，*2*(2)，1-19。

梁朝雲[Liang, Chao-Yun]（2011，3月）[2011 March]。尋找「資訊傳播」定義、發現「資訊傳播」研究[In search of the consensus definition and its research agenda of "Information Communication"]。在[In]淡江大學資訊與圖書館學系主辦[Department of Information and Library Science, Tamkang University]《教育資料與圖書館學》40週年國際學術研討會[*The International Conference of the 40th Anniversary of Journal of Educational Media & Library Sciences*]，新北市[New Taipei City]。

Blondel, V. D., Guillaume, J.-L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment, 2008*(10), P10008.

Börner, K., Chen, C., & Boyack, K. W. (2003). Visualizing knowledge domains. *Annual Review of Information Science and Technology, 37*(1), 179-255.

Börner, K., Sanyal, S., & Vespignani, A. (2007). Network science. *Annual Review of Information Science and Technology, 41*(1), 537-607.

Chen, C. (1998). Bridging the gap: The use of Pathfinder networks in visual navigation. *Journal of Visual Languages and Computing, 9*(3), 267-286.

Chen, C. (2003). *Mapping scientific frontiers: The quest for knowledge visualization*. London, UK: Springer-Verlag.

Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *Journal of American Society for Information Science and Technology, 57*(3), 359-377.

Chen, C., & Carr, L. (1999). Trailblazing the literature of hypertext: Author co-citation analysis (1989-1998). In J. Westbomke, U. K. Wiil, J. J. Leggett, K. Tochtermann, & J. M. Haake, (Eds.), *Proceedings of the tenth ACM Conference on Hypertext and hypermedia: Returning to our diverse roots: Returning to our diverse roots(HYPERTEXT '99)* (pp.

51-60). New York, NY: ACM.

Chen, C., & Morris, S. (2003). Visualizing evolving networks: Minimum spanning trees versus pathfinder networks. In *Information Visualization, 2003. INFOVIS 2003. IEEE Symposium on* (pp. 67-74). Seattle, WA: IEEE.

Chen, C., & Paul, R. J. (2001). Visualizing a knowledge domain's intellectual structure. *Computer, 34*, 65-71.

Chen, P., & Redner, S. (2010). Community structure of the physical review citation network. *Journal of Informetrics, 4*(3), 278-290.

Clauset, A., Newman, M. E., & Moore, C. (2004). Finding community structure in very large networks. *Physical review E, 70*(6), 066111.

Colliander, C., & Ahlgren, P. (2012). Experimental comparison of first and second-order similarities in a scientometric context. *Scientometrics, 90*(2), 675-685.

de Nooy, W., Mrvar, A., & Batagelj, V. (2005). *Exploratory social network analysis with Pajek* (Structural Analysis in the Social Sciences, vol. 27). New York, NY: Cambridge University Press.

Girvan, M., & Newman, M. E. J. (2002). Community structure in social and biological networks. *Proceedings of the National Academy of Sciences of the United States of America, 99*(12), 7821-7826.

Groh, G., & Fuchs, C. (2011). Multi-modal social networks for modeling scientific fields. *Scientometrics, 89*(2), 569-590.

Hansen, D., Shneiderman, B., & Smith, M. A. (2010). *Analyzing social media networks with NodeXL: Insights from a connected world*. Amsterdam, Netherlands: Morgan Kaufmann.

Kamada, T., & Kawai, S. (1989). An algorithm for drawing general undirected graphs. *Information processing letters, 31*(1), 7-15.

Lin, X. (1997). Map displays for information retrieval. *Journal of the American Society for Information Science, 48*, 40-54.

Morris, S. A. & Van der Veer Martens, B. (2008). Mapping research specialties. *Annual Review of Information Science and Technology, 42*(1)*, 213-295.

Newman, M. E. (2006). Modularity and community structure in networks. *Proceedings of the National Academy of Sciences of the United States of America, 103*(23), 8577-8582.

Newman, M. E., & Girvan, M. (2004). Finding and evaluating community structure in networks. *Physical review E, 69*(2), 026113.

NWB Team. (2006). *Network Workbench Tool*. Indiana University, Northeastern University, and University of Michigan, Retrieved November 20, 2012, from http://nwb.slis.indiana.edu.

Schubert, A., & Soós, S. (2010). Mapping of science journals based on h-similarity. *Scientometrics, 83*(2), 589-600.

Small, H. (2006). Tracking and predicting growth areas in science. *Scientometrics, 68*(3), 595-610.

Takeda, Y., & Kajikawa, Y. (2009). Optics: A bibliometric approach to detect emerging research domains and intellectual bases. *Scientometrics, 78*(3), 543-558.

van Eck, N. J., Waltman, L., Noyons, Ed C. M., & Buter, R. K. (2010). Automatic term

identification for bibliometric mapping. *Scientometrics, 82*(3), 581-596.

Wallace, M. L., Gingras, Y., & Duhon, R. (2009). A new approach for detecting scientific specialties from raw cocitation networks. *Journal of the American Society for Information Science and Technology, 60*(2), 240-246.

Waltman, L., van Eck, N. J., & Noyons, Ed C. M. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics, 4*(4), 629-635.

White, H. D. (2003). Pathfinder networks and author cocitation analysis: A remapping of paradigmatic information scientists. *Journal of American Society for Information Science and Technology, 54*(3), 423-434.

Yan, E., Ding, Y., Milojević, S., & Sugimoto, C. R. (2012). Topics in dynamic research communities: An exploratory study for the field of information retrieval. *Journal of Informetrics, 6*(1), 140-153.

Zhang, L., Liu, X., Janssens, F., Liang, L., & Glänzel, W. (2010). Subject clustering analysis based on ISI category classification. *Journal of Informetrics, 4*(2), 185-193.

Zhao, H., & Lin, X. (2010). A comparison of mapping algorithms for author co-citation data analysis. *Proceedings of American Society for Information Science and Technology, 47*(1), 1-3.

The Study of Applying Pathfinder Analysis to University Library Websites Construction

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Abstract

Card sorting and cluster analysis are the methods applied most frequently in information architecture studies. However, the similarity rating and pathfinder analysis have been widely adapted to structural knowledge elicitation and presentation in educational psychology studies. This study investigated how similarity rating and pathfinder analysis are used to construct library websites and what are their effects. We took the National Taiwan Normal University Library website as our study case. Randomly 30 students were selected as the subjects to conduct card sorting or similarity rating on the picked out site labels. Next we applied cluster analysis and pathfinder analysis to the above results to generate four websites. Finally, we again randomly selected 120 students into four groups to conduct findability tests on four websites respectively. By the statistical analysis, we concluded that there is no significant difference between card sorting and similarity rating on findability; however, if card sorting is applied to structural knowledge elicitation, there will be significant difference between cluster analysis and pathfinder analysis on findability.

Keywords: *Card sorting; Similarity rating; Cluster analysis; Pathfinder analysis; Findability*

SUMMARY

Most of recent studies on information architecture are based on the "user-centered design" concept, using user-oriented evaluation methods to understand users' thoughts and opinions, for helping build websites to better meet users' needs. Card-sorting is a common approach used to understand users' model of cognition when reviewing website content, to help design websites to better meet users' needs (Hawley, 2008). Morville & Rosenfeld (2006) recognized that card sorting, with its advantages of being low-tech and effective in understanding

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users' behaviors and cognition models, is a powerful research tool for information architecture studies. Although card sorting is a cost-effective and useful tool for collecting cognitive information, it is mostly questioned that whether participants truly understand the meanings about their own sorting results, which would greatly affect the objectivity of experiment outcomes.

Educational psychologists have used knowledge structure assessment tools to understand learners/users' cognitive modes. Among knowledge structure assessment tools, the most commonly used are "similarity ratings" and "pathfinder analysis". Similarity ratings approach is for users to compare and evaluate among categories, and similarity matrix is generated and then analyzed by pathfinder analysis. Pathfinder improved the past disadvantages of non-objective representations of network relationships on concepts. It is a more objective assessment method and can represent relationships of knowledge concepts with network graphics. This study tries to investigate how to apply similarity ratings to collect users' cognitive information about website labels, and then to apply pathfinder approach to build website structures. Card sorting and similarity ratings derived from knowledge structure approaches are used in this study to understand how users organize library website contents, and then cluster analysis and pathfinder methods are applied to analyze the previous findings to construct various websites. Four different website structures are generated from the analysis. Furthermore, in order to analyze advantages and disadvantages of different website structures, the researchers conduct web findability tests to compare the differences. In this research, KNOT (Interlink, 2004) software is used to do pathfinder analysis and generate corresponding networked structures. For each networked structure, we divide the nodes that get most linkages into different groups. After each division, we do the same operations on the new generated groups, until there are no nodes with more than two linkages of phrases. Four website structures generated from this study are explained below:

1. When card sorting approach is used to elicit knowledge structures and cluster analysis is used to represent knowledge structures, we call the website structure CC. The CC website structure can be generated by MATLAB (MathWorks, 1994) software when the threshold value is set as 0.73. Its breadth of website is 12.

2. When similarity rating approach is used to elicit knowledge structures and cluster analysis is used to represent knowledge structures, we call the website SC. The SC website structure can be generated by MATLAB software when the threshold value is set as 1.8. Its breadth of website is 11.

3. When card sorting approach is used to elicit knowledge structures and pathfinder analysis is used to represent knowledge structures, we call the website

CP. The CP website generated from MATLAB is with the breadth of 3 and the depth of 4.

4. When similarity ratings approach is used to elicit knowledge structures and pathfinder analysis is used to represent knowledge structures, a website generated is called SP. The SP website is with the breadth of 5 and the depth of 3.

To further understand whether users are able to easily find needed information in these website structures, the researchers conduct web findability experiment to evaluate the structures. The survey method is used to evaluate the web findability by asking participants to rate the fit of locations of assigned items in web structures. Paul (2007) chose seven website users as participants of web findability tests for them to answer the web content labels of ten assigned items. The goal of findability tests is to understand whether the categories of web structures matches how users conceive in mind. Shieh and Wu (2010) used the survey method to evaluate findability of university library websites using the Likert's five-point scale; twenty participants were asked to evaluate the fit of locations of six webpage labels in different website structures. Shieh et al. (2011) also used the survey method to evaluate the findability of website structures; fifteen participants were asked to evaluate the findability of three web structures generated from studies and rate the fit of locations of eight webpage labels in these three web structures on the Likert's five-point scale, which defines that the higher scores of the fit, the higher level of web content findability.

In this study, fifteen enrolled students are randomly chosen for the tests to evaluate findability of each website structure. Participants are asked to imagine the computer file structures as the library website structures, and find the locations of five assigned items in computer files. Then the fit of labels locations are rated with Likert's five-point scale.

In terms of the breadth and depth of websites, the breadth of the CP and SP structures generated from pathfinder analysis is less than the CC and SC structures generated from cluster analysis, it means that the number of categories of CP and SP is smaller; as to the depth of websutes, there is no significant difference. In terms of the comparison of card-sorting and similarity ratings elicited by knowledge structure approach, there is no significant difference.

As to the website findability, results of analysis reveal that there is no significant difference between the two approaches of knowledge structure elicitation (card sorting and similarity ratings); however there is a significant difference between the two approaches of knowledge structure representation (cluster analysis and pathfinder analysis). The cross-analysis of knowledge structure elicitation and knowledge structure representation approaches indicates that there is no direct influence between knowledge structure elicitation and

knowledge structure representation approaches. Next, we apply One-Way ANOVA to investigate whether there is a significant difference between different knowledge structure representation approaches when used the same approach of knowledge structure elicitation. The results show that when used the same approach of card sorting, pathfinder analysis is more effective than cluster analysis in terms of web findability, and when used the same approach of similarity ratings, there is no significant difference between pathfinder analysis and cluster analysis in terms of web findability.

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

邱亦秀[Chiou, Yi-Shiou]（2010）。受試者特性對修正型德菲式卡片分類法成效影響之研究 [*A study on participants' character to the effect of Modified-Delphi card sorting*]。未出版之碩士論文[Unpublished master's thesis]，國立臺灣師範大學圖書資訊學研究所[Graduate Institute of Library and Information Studies, National Taiwan Normal University]，台北市[Taipei]。

蔡維君[Tsai, Wei-Chun]（2004）。大學圖書館網站好用性評估：以臺灣大學圖書館網站為例[Usability test of university library websites: A case study of National Taiwan University Library website]。未出版之碩士論文[Unpublished master's thesis]，國立臺灣師範大學圖書資訊學研究所[Graduate Institute of Library and Information Studies, National Taiwan Normal University]，台北市[Taipei]。

謝建成[Shieh, Jiann-Cherng]、丁依玲[Ding, Yi-Ling]、陳慧倫[Chen, Hui-Lun]（2011）。大學圖書館網站資訊尋獲度之研究[Information findability study of university library web sites]。資訊管理學報[*Journal of Information Management*]，*18*（3），26-50。

謝建成[Shieh, Jiann-Cherng]、吳怡青[Wu, Yi-Ching]（2010）。改進修正型德菲式卡片分類法探討大學圖書館網站尋獲度之研究[Using refined Modified-Delphi card sorting to analyze the findability of university library websites]。教育資料與圖書館學[*Journal of Educational Media & Library Sciences*]，*47*（3），245-282。

Ahlstrom, V., & Allendoerfer, K. (2004). *Information organization for a portal using a card-sorting technique*. Atlantic City International Airport, NJ: Federal Aviation Administration William J. Hughes Technical Center. (DOT/FAA/CT-TN04/31) Retrieved May 14, 2012, from http://hf.tc.faa.gov/technotes/dot-faa-ct-tn04-31.pdf

Boulton, M. (2007). *Card sorting*. Retrieved May 22, 2012, from http://v3.markboulton.co.uk/articles/detail/card_sorting_part_1/

Cooke, N. M., & McDonald, J. E. (1987). The application of psychological scaling techniques to knowledge elicitation for knowledge-based systems. *International Journal of Man-Machine Studies, 26*(4), 533-550.

Courage, C., & Baxter, K. (2004). *Understanding your users: A practical guide to user requirements methods, tools, and techniques*. San Fransisco, CA: Morgan Kaufmann.

Coxon, A. P. M. (1999). *Sorting data: collection and analysis*. Thousand Oaks: Sage.

Dearholt, D. W., & Schvaneveldt, R. W. (1990). Properies of pathfinder networks. In *Pathfinder associative networks: Studies in knowledge organization* (R. W. Schvaneveldt,

Ed., pp. 1-30). (Ablex series in computational science). Norwood, NJ : Ablex.

Deaton, M. (2002). *Sorting techniques for user-centered information design*. Retrieved May 21, 2012, from http://www.mmdeaton.com/SortingTechniquesforInformationDesign.pdf

Durso, F. T., & Coggins, K. A. (1990). Graphs in the social and psychological sciences: Empirical contributions of pathfinder. In *Pathfinder associative networks: Studies in knowledge organization* (R. W. Schvaneveldt, Ed., pp. 31-51). (Ablex series in computational science). Norwood, NJ : Ablex.

Fincher, S., & Tenenberg, J. (2005). Making sense of card sorting data. *Expert Systems, 22*(3), 89-93.

Fuccella, J., & Pizzolato, J. (1998, June 1). *Creating web site designs based on user expectations and feedback*. Retrieved May 24, 2012, from http://internettg.org/newsletter/june98/web_design.html

Goldsmith, T. E., Johnson, P. J., & Acton, W. H. (1991). Assessing structural knowledge. *Journal of Educational Psychology, 83*(1), 88-96.

Hahsler, M., & Simon, B. (2001). User-centered navigation re-design for web-based information systems. In H. M. Chung (Ed.), *Proceedings of the Americas conference on information systems, AMCIS 2000* (pp. 192-198). Long Beach, CA: Association for Information Systems. Retrieved May 24, 2012, from http://michael.hahsler.net/research/webdesign_amcis2000/TT04-11_final.pdf

Hawley, M. (2008, October 6). *Extending card-sorting techniques to inform the design of web site hierarchies*. Retrieved May 21, 2012, from http://www.uxmatters.com/MT/archives/000332.php

Hinkle, V. (2008). *Card-sorting: What you need to know about analyzing and interpreting card sorting results*. Retrieved May 22, 2012, from http://www.surl.org/usabilitynews/102/cardsort.asp

Hudson, W. (2005). Playing your cards right: Getting the most from card sorting for navigation design. *Interactions, 12*(5), 56-58.

Interlink (2004). *The knowledge network organizing tool* (KNOT) software. Retrieved July 1, 2013, from http://interlinkinc.net/KNOT.html.

Kaufman, J. (2006, November). Card sorting: An inexpensive and practical usability technique. *Intercom, 2006*(Nov.), 17-19. Retrieved May 23, 2012, from http://unraveled.com/publications/assets/card_sorting/Card_Sorting-Kaufman.pdf

Maiden, N. A. M., & Hare, M. (1998). Problem domain categories in requirements engineering. *International Journal of Human-Computer Studies, 49*(3), 281-304.

Martin, S., & Kidwell, D. K. (2001). A case study in cluster analysis for intranet organization. In A. Ambler, K. Graham, & P. Jensen (Eds.), *Engineering management for appied technology (EMAT 2001): 2nd International Workshop on Engineering Management for Applied Technology* (pp. 57-64). Los Alamitos, CA: IEEE.

MathWorks. (1994). *MATLAB: The language of technical computing*. Retrieved July 1, 2013, from http://www.mathworks.com/products/matlab/

McGriff, S. J., & Van Meter, D. P. (2001). *Measuring cognitive structure: An overview of pathfinder networks and semantic networks*. Unpublished manuscript, Pennsylvania State

University at Pennsylvania.

McNamara, D. S., & O'Reilly , T. (2004). Learning: Knowledge representation, organization, and acquisition. Unpublished manuscript, Old Dominion University at Virginia.

Mitchell, A. A., & Chi, M.T. (1984). Measuring knowledge within a domain. In P. Nagy (Ed.), *The representation of cognitive structure* (pp. 85-109). Toronto, Canada: ISE.

Morville, P. (2005). *Ambient Findability: What we find changes who we become*. Sebastopol, CA: O'Reilly Media.

Morville, P., & Rosenfeld, L. (2006). *Information Architecture for the World Wide Web: Designing large-scale web sites* (3 rd.). Sebastopol, CA: O'Reilly Media.

Nielsen, J. (2004, July 19). *Card sorting: How many users to test*. Retrieved May 24, 2012, from http://www.useit.com/alertbox/20040719.html

Optimal Workshop (2007). *Online card sorting software*. Retrieved July 1, 2013, from http://www.optimalworkshop.com/optimalsort.htm

Paul, C. L. (2007). A modified delphi approach to a new card sorting methodology. *Journal of Usability Studies, 4*(1), 7-30.

Robertson, J. (2001, February 19). *Information design using card sorting*. Retrieved May 24, 2012, from http://www.steptwo.com.au/papers/cardsorting/index.html

Schvaneveldt, R. W. (1990). *Pathfinder associative networks: Studies in knowledge organization* (Ablex series in computational sciences). Norwood, NJ: Ablex.

Spencer, D., & Warfel, T. (2004). *Card sorting: A definitive guide*. Retrieved May 24, 2012, from http://www.boxesandarrows.com/view/card_sorting_a_definitive_guide

Tullis, T., & Wood, L. (2004). How many users are enough for a card-sorting study? Poster presented at the Annual Meeting of the Usability Professionals Association, June 10-12, Minneapolis, MN. Retrieved May 25, 2012, from http://home.comcast.net/~tomtullis/publications/UPA2004CardSorting.pdf

Upchurch, L., Rugg, G., & Kitchenham, B. (2001). Using card sorts to elicit web page quality attributes. *IEEE Software, 18*(4), 84-89.

Wang, P., Hawk, W. B., & Tenopir, C. (2000). User's interaction with world wide web resource: An exploratory study using a holistic approach. *Information Processing & Management, 36*(2), 232-236.

White, B. (2003). Web accessibility, mobility, and findability. In *Web congress, 2003. Proceedings. First Latin American* (pp. 239-240). Los Alamitos, CA: IEEE Computer Society.

Zimmerman, D. E., & Akerelrea, C.(2002). A group card sorting methodology for developing informational web sites. In *Professional communication conference, 2002*. IPCC 2002. Proceedings. IEEE international (pp. 437-445). Piscataway, NJ: IEEE. Retrieved May 24, 2012, from http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=01049127

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Ver 1.3 (May 24, 2010)

************** ********** ****************

1. 圖書（Books）
   (1)作者為一人

   John Hope Franklin, *George Washington Williams: A Biography* (Chicago: University of Chicago Press, 1985), 54.

   丁學東，文獻計量學基礎（北京市：北京大學出版社，1993），206。

   (2)作者為二人

   Robert Lynd and Helen Lynd, *Middletown: A Study in American Culture* (New York: Harcourt, Brace and World, 1929), 67.

   胡述兆、吳祖善，圖書館學導論（台北市：漢美，1989），28。

   (3)作者為三人

   Max Komatose, Ira Sneed, and Sarah Swidher, eds., *Ensemble Acting in the Off-Loop Theaters of Chicago* (Toledo: Wright-Smart Press, 1995), 193.

   黃世雄、黃鴻珠、宋雪芳，圖書館與網路資源應用（台北縣蘆洲市：國立空中大學，2000），70。

   (4)作者為四人以上

   Martin Greenberger et al., eds., *Networks for Research and Education: Sharing of Computer Information Resources Nationwide* (Cambridge: MIT Press, 1974), 54.

   翁明賢等著，國際組織新論 (台北市：五南，1995)，25。

   (5)作者為團體

   American Library Association, Young Adult Services Division, Services Statement Development Committee, *Directions for Library Service to Young Adults* (Chicago: American Library Association, 1978), 25.

   經濟部數位內容產業推動辦公室，*2004年台灣數位內容產業白皮書*（台北市：經濟部工業局，2004），1-23。

   (6)編輯著作

   Robert Von Hallberg, ed., *Canons* (Chicago: University of Chicago Press, 1984), 225.

   楊國樞等編，社會及行為科學研究法（台北市：東華，1981），25。

   (7)引用書中之前言、序等部分

   James Rieger, introduction to *Frankenstein; or, The Modern Prometheus*, by Mary Wollstonecraft Shelley (Chicago: University of Chicago Press, 1982), xx–xxi.

---

(8)翻譯作品

Jean Anouilh, *The Lark*, trans. Christopher Fry (London: Methuen, 1955), 86.

Datus C. Smith, Jr., *A Guide to Book Publishing*, 彭松建、趙學范譯，圖書出版的藝術與實務（台北市：周知文化，1995），42-45。

(9)叢書中之單本著作

Gordon N. Ray, ed., An Introduction to Literature, vol. 2, *The Nature of Drama*, by Hubert Hefner (Boston: Houghton Mifflin, 1959), 47-49.

張苙雲主編，台灣產業研究，第3冊，文化產業：文化生產的結構分析（台北市：遠流，2000），24。

(10) 編輯著作或論文集中之單篇論文

Kahin Brian, "Scholarly Communication in the Networked Environment: Issues of Principle, Policy and Practice," in *Scholarly Publishing: The Electronic Frontier*, ed. Robin P. Peek and Gregory B. Newby. (Cambridge: MIT Press, 1996), 280.

朱元鴻，「文化工業：因繁榮而即將作廢的類概念」，在 文化產業：文化生產的結構文析。張苙雲主編。（台北市：遠流，2000），11-45。

(11) 以電子形式出版的書籍

Philip B. Kurland and Ralph Lerner, eds., *The Founders' Constitution* (Chicago: University of Chicago Press, 1987), http://press-pubs.uchicago.edu/founders/ (accessed June 27, 2006).

(12) 書評

Paula Frosch, "Cataloging Our Culture," review of *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images*, by Murtha Baca et al., *Library Journal Book Review*, February 15, 2007, 152.

2. **期刊論文**（Journals）

(1)連續編碼之期刊文章

W. Edmund Farrar, "Antibiotic Resistance in Developing Countries," *Journal of Infectious Diseases* 152 (December 1985): 1103-1109.

陳昭珍，「從實體到虛擬：談資訊組織發展現況與展望」，中國圖書館學會會報 68 期（2002年6月）：26-36。

(2)各期單獨編碼之期刊文章

Alma Swan and Sheridan Brown, "Author and Open Access Publishing," *Learned Publishing* 17, no. 3 (July 2004): 220.

邱炯友，「公共出借權計畫之本質與價值」，教育資料與圖書館學 38卷，3期（2001）：273-276。

(3)期刊中之特刊

Matthew L. Jones, "Descartes's Geometry as a Spiritual Exercise," in "Things," ed. Bill Brown, special issue, *Critical Inquiry* 28, no. 1 (Autumn 2001): 43-44.

3. **雜誌中的文章**（Magazines）

Anne B. Fisher, "Ford Is Back on the Track," *Fortune*, 23 December 1985, 18.

楊淑娟、孫曉萍，「資深員工請留下」，天下雜誌，2005年4月15日，134-137。

4. **報紙報導**（Newspapers）

Tyler Marshall, "200th Birthday of Grimms Celebrated," *Los Angeles Times*, 15 March

1985, sec. 1A, p. 3.

孟祥傑，「論文篇數，台大最多，長庚第五，政大排48」，聯合報，2003年10月21日，第A6版。

5. **百科全書或字典**（Articles in Encyclopedias and Dictionaries）

Encyclopadia Britannica, 11th ed., s.v. "Blake, William," by J. W. Cosyns-Carr.

Webster's New Geographical Dictionary (1984), s.v. "Dominican Republic."

6. **會議或研討會論文**（Published Reports and Proceedings）

(1)正式出版之會議或研討會論文集

S. Akazawa, "The Scope of the Japanese Information Industry in the 1980s," in *The Challenge of Information Technology: Proceedings of the Forty-first FID (Federation Internationale de Documentation) Congress Held in Hong Kong 13-16 September 1982*, ed. K. R. Brown (Amsterdam, New York, and Oxford: Northholland, 1983), 20.

黃慕萱，「引用文獻初探」，於當代圖書館事業論集，王振鵠教授七秩榮慶祝壽論文集編輯小組編（台北市：正中，1994），807-816。

(2)會議或研討會中發表之論文（未出版）

George Psacharopoulos and Keith Hincliffe, "Tracer Study Guidelines" (Washington, D. C.: World Bank, Education Department, 1983, photocopied), 5.

7. **博碩士論文**（Thesis or Dissertation）

Karen Leigh Culcasi, "Cartographic Representations of Kurdistan in the Print Media" (master's thesis, Syracuse University, 2003), 15.

Gilberto Artioli, "Structural Studies of the Water Molecules and Hydrogen Bonding in Zeolites" (Ph. D. diss., University of Chicago, 1985), 10.

鄭麗敏，「近二十年來台灣地區圖書館學與資訊科學期刊論文引用參考文獻特性分析」（碩士論文，淡江大學，1994），76-80。

8. **電子資源**（Electronic Documents）

(1)由資料庫取得的電子全文

Rosabel Flax, Guidelines for Teaching Mathematics K-12 (Topeka: Kansas State Department of Education, 1979) [database online], available from Dialog, ERIC, ED 178312.

(2)由Internet取得的期刊文章

若欲加上檢索日期，應於網址後以括弧方式將日期標出。

Albanese, Andrew, "BioMed Central Changes Tack," *Library Journal* 129, no.5 (15 March 2004), http://www.libraryjournal.com/article/CA386750.html (accessed May 26, 2005).

Bo-Christer Björk, "Open Access to Scientific Publications: An Analysis of the Barriers to Change?" *Information Research* 9, no.2 (January 2004), http://informationr.net/ir/9-2/paper170.html (accessed December 26, 2005).

(3)一般網站或網頁

網站或網頁文獻在引註時應包括四部分，作者、網頁標題、網站擁有者(Owner of the site)，以及網址。

University of Washington-Information School, "Mission and Vision," http://www.ischool.

washington.edu/mission.aspx (accessed July 30, 2006).

楊昌勇，「學術論著注釋和索引的規範與功能」，學術批評網，http://www.
acriticism.com/article.asp?Newsid=2044&type=1000 (檢索於2005年3月21日)。

若網頁文獻無法得知作者時，應以「網站擁有者」為作者，這時上述之第三部分可
省略。

財團法人國家實驗研究院科技政策研究與資訊中心，「美國科學資訊所(ISI)引用文
獻索引(Citation Index)簡介」，http://www.stic.gov.tw/stic/1/nscjaw/isiintro.htm
(檢索於2005年3月21日)。

(4)部落格的文章或回覆

Peter Pearson, comment on "The New American Dilemma: Illegal Immigration," The
Becker-Posner Blog, comment posted March 6, 2006, http://www.becker-posner-
blog.com/archives/2006/03/the_new_america.html#c080052 (accessed March 28,
2006).

9. **同一註釋有多筆引用文獻，以分號【；】為區隔**（Multiple References within a Single Note）

Eduard Hanslick, *The Beautiful in Music*, Trans. G. Cohen (New York: Novello, Ewer,
1891); Heinrich Schenker, Der freie Satz, Trans. and ed. T. H. Kreuger (Ann Arbor:
University Microfilms, 1960), pub. No. 60-1558; Suzanne Langer, *Philosophy in a
New Key* (New York: Mentor, 1959); Leonard B. Meyer, *Emotion and Meaning in
Music* (Chicago: University of Chicago Press, 1956), and idem, *Music, the Arts, and
Ideas* (Chicago: University of Chicago Press, 1967).

施孟雅，「從專業期刊文獻分析我國臺灣地區的圖書館學研究」(碩士論文，臺灣
大學，1992)；林巧敏，「圖書館學研究方法及研究主題述評」，國立中央圖
書館臺灣分館館刊1卷，2期(1994)：45-53；王梅玲，「臺灣圖書資訊學系所
教師專長調查報告」，中華圖書資訊學教育學會會訊25期(2005)：27-71。

10. **二次引用**（Citations Taken from Secondary Sources）

(1)強調原始作品

Louis Zukofsky, "Sincerity and Objectification," *Poetry* 37 (February 1931): 269, cited
in Bonnie Costello, Marianne Moore: Imaginary Possessions (Cambridge: Harvard
University Press, 1981), 78.

Chares G. Roland, "Thoughts About Medical Writing: XXXII Verify Your Reference,"
Anesthesia and Analgesia 55, no. 5 (1976): 717. 被引於李碧鳳，臺灣地區圖書
館學與資訊科學期刊論文引用文獻錯誤之研究(台北市：文華，1997)，12。

(2)強調二次作品

Bonnie Costello, Marianne Moore: Imaginary Possessions (Cambridge: Harvard
University Press, 1981), 78, citing Louis Zukofsky, "Sincerity and Objectification,"
Poetry 37 (February 1931): 269.

李碧鳳，臺灣地區圖書館學與資訊科學期刊論文引用文獻錯誤之研究(台北市：
文華，1997)，12。引自Chares G. Roland, "Thoughts About Medical Writing:
XXXII Verify Your Reference," *Anesthesia and Analgesia* 55, no. 5 (1976): 717.

11. **同一註釋重複出現**（Ibid.）

同一註釋連續出現時，以「同上註」呈現；非連續出現時，以簡寫呈現。

¹ W. Edmund Farrar, "Antibiotic Resistance in Developing Countries," *Journal of*

Infectious Diseases 152 (December 1985): 1103-1109.

2　Ibid., 1105.

3　Anne B. Fisher, "Ford Is Back on the Track," *Fortune,* 23 December 1985, 18.

4　W. Edmund Farrar, "Antibiotic Resistance in Developing Countries," 1108.

1　吳美美，「Ｅ世代國家現代化指標：資訊素養與資訊政策」，圖書與資訊學刊 40 期（2002）：1-9。

2　同上註，7。

3　胡述兆、吳祖善，圖書館學導論（台北市：漢美，1989），28。

4　吳美美，「Ｅ世代國家現代化指標」，8-9。

教育資料與圖書館學
APA格式範例*

Ver 1.3 (May 24, 2010)

**************** *********** ****************

1. 圖書（Books）

(1)作者為一人

Brown, S. A. (1995). *What customers value most: How to improve the processes that touch your customers*. New York: John Wiley & Sons.

謝寶煖（2000）。網站搜尋 *e* 網打進：當滑鼠遇上知更鳥。台北縣中和市：華文網。

(2)作者為二人

Rosenfeld, L., & Morville, P. (2002). *Information architecture for the World Wide Web* (2nd ed.). Cambridge, MA: O'Reilly.

胡述兆、吳祖善（1989）。圖書館學導論。台北市：漢美。

(3)作者為三至六人

Payne, A., Christopher, M., Clark, M., & Peck, H. (1995). *Relationship marketing for competitive advantage: Winning and keeping customers*. Oxford: Butterworth-Heineman.

翁明賢、林德澔、陳聰銘、黃淑玲（1995）。國際組織新論。台北市：五南。

(4)作者為七人或七人以上

呂亞力、李瑞麟、林水波、林嘉誠、段重祺、段家鋒等（1992）。論文寫作研究（增訂初版）。台北市：三民。

(5)作者為團體

American Psychological Association. (1994). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: Author.

中華民國自然步道協會編著（2000）。台大校園自然步道。台北市：城邦。

(6)多冊著作

Katz, W. A. (1997). *Introduction to reference work* (7th ed., Vols. 1-2). New York: McGraw-Hill.

黃文儀（2000）。專利實務（二版，1-2冊）。台北市：三民。

(7)編輯著作

Bailey, W. G. (Comp.). (1990). *Guide to popular U.S. government publications* (2nd ed.). Englewood, CO: Libraries Unlimited.

楊國樞、文崇一、吳聰賢、李亦園編（1981）。社會及行為科學研究法。台北市：東華。

(8)翻譯作品

Freud, S. (1970). *An outline of psychoanalysis* (J. Strachey, Trans.). New York: Norton. (Original work published 1940).

Haybron, D. M. (2008). Philosopy and the science of subjective well-being. In M. Eid & R. J. Larsen (Eds.), *The science of subjective well-being* (pp. 17-43). New York, NY: Guilford Press.

佛斯（Vos, J.）、戴頓（Dryden, G.）（1997）。學習革命（*The learning revolution*）（林麗寬譯）。台北縣汐止鎮：中國生產力中心。（原作1994年出版）

Sterne, J. （1998）。網際網路客戶服務。（資策會產品處中文化部門譯）。台北市：翔威。（原作1994年出版）

(9)叢書中之單本著作

Scheuing, E. E. (1994). *The power of strategic partnering* (Management Master Series, Vol. 3). Portland, OR: Productivity Press.

張苙雲主編（2000）。文化產業：文化生產的結構分析（台灣產業研究，3）。台北市：遠流。

(10) 叢書之單本著作中之單篇文章

Berry, L. (1986). Big ideas in service marketing. In *Creativity in service marketing: What's new, what works, what's developing* (M. Venkatesan, D. M. Schmalensee, & C. Marshall, Eds., pp. 6-8). (American Marketing Association proceedings series). San Francisco: American Marketing Association.

朱元鴻（2000）。文化工業：因繁榮而即將作廢的類概念。在文化產業：文化生產的結構分析（張苙雲主編，頁11-45）（台灣產業研究，3）。台北市：遠流。

(11) 個人論文集中之單篇文章

王振鵠（1984）。圖書館與圖書館學。在圖書館學論叢（頁3-48）。台北市：台灣學生。

(12) 編輯著作或論文集中之單篇文章

James, N. E. (1988). Two sides of paradise: The Eden myth according to Kirk and Spock. In D. Palumbo (Ed.), *Spectrum of the fantastic* (pp. 219-223). Westport, CT: Greenwood.

王珮玲（2000）。PUSH科技及其在圖書館之應用。在李德竹編著，資訊科學與圖書館學專題論輯（頁243-291）。台北市：文華。

(13) 書中之章節

Mazzie, M. (2000). Key challenges facing the evolution of knowledge management. In T. K. Srikantaiah, & M. E. D. Koenig (Eds.), *Knowledge management for information professional* (chap. 7, pp. 99-114). Medford, NJ: Information Today.

黃光國（1995）。主觀研究與客觀研究：多重典範的研究取向。在知識與行動：中華文化傳統的社會心理詮釋（第三章，頁91-103）。台北市：心理出版社。

2. **期刊論文**（Journals）

(1)連續編碼之期刊文章

Burt, R. S. (1997, June). The contingent value of social capital. *Administrative Science Quarterly, 42*, 339-365.

劉仁傑（2000，12月）。台灣日系企業的發展與轉型之探討。管理學報，*17*，695-712。

(2)各期單獨編碼之期刊文章

Brady, M. K., & Cronin, J. J., Jr. (2001). Customer orientation: Effects on customer service perceptions and outcome behaviors. *Journal of Service Research, 3*(3), 241-251.

謝寶煖（1997）。從服務接觸談圖書館之服務環境管理。大學圖書館，*1*(4)，31-51。

莊道明（2000，12月）。新世紀圖書館社會影響力與價值的重視。國家圖書館館刊，*2*，109-121。

(3)尚未出版之期刊文章

Zuckerman, M., & Kieffer, S. C. (in press). Race differences in faceism: Does facial prominence imply dominance? *Journal of Personality and Social Psychology*.

謝寶煖（出版中）。歷史研究法及其在圖書資訊學之應用。中國圖書館學會會報。

(4)引用期刊之特刊（Special issue）或特定主題（Special section）

Haney, C., & Wiener, R. L. (Eds.). (2004). Capital punishment in the United States [Special issue]. *Psychology, Public Policy, and Law*, *10*(4).

Greenfield, P., & Yan, Z. (Eds.). (2006). Children, adolescents, and the Internet [Special section]. *Development Psychology, 42*, 391-458.

3. 雜誌中的文章（Magazines）

Posner, M. I. (1993, October 29). Seeing the mind. *Science, 262*, 673-674.

楊淑娟、孫曉萍（2005，4月15日）。資深員工請留下。天下雜誌，*321*，134-137。

4. 報紙報導（Newspapers）

(1)紙本報紙刊登的文章，有作者

Schwartz, J. (1993, September 30). Obesity affects economics, social status. *The Washington Post*, pp. A1, A4.

余光中（2001，8月11日）。春到齊魯。聯合報，37版。

(2)紙本報紙刊登的文章，無作者

Hoff, P. (1995, November 14). Fat genes may change your life. *Los Angeles Times*, p. A3.

盡力而為：擺蕩在理想與現實間的政策選擇〔社論〕（2001，8月11日）。聯合報，2版。

5. 百科全書或字典（Articles in Encyclopedias and Dictionaries）

(1)整套百科全書或字典

Kent, A. (Ed.). (1968-1998). *Encyclopedia of library and information science* (Vols. 1-63). New York: Marcel Dekker.

胡述兆等編（1995）。圖書館學與資訊科學大辭典（1-3冊）。台北市：漢美。

(2)百科全書中署名之文章

Sturgeon, T. (1995). Science fiction. In *The encyclopedia America* (Vol. 24, pp. 390-392).

Danbury, CT: Grolier.

張保隆（2003）。Service facilities服務設施。在管理辭典（頁358）。台北市：華泰文化。

(3)百科全書中未署名之文章

Value chain. (1997). In *Knowledge exchange business encyclopedia* (pp. 569-571). San Monica, CA: Knowledge exchange.

海峽交流基金會成立（2000）。在台灣全記錄（再版，頁894）。台北市：錦繡。

6. **會議或研討會論文**（Published Reports and Proceedings）

(1)正式出版之會議或研討會論文集

Brogman, C. L. (1988). Human factors in the use of information systems: Research methods and results. In N. Tudor-Silovie, & I. Mihel, (Eds.), *Information research: Research methods in library and information science* (pp. 139-165). London: Taylor Graham.

張保隆、謝寶煖、盧昆宏（1997）。品質管理策略與圖書館業務機能相關性之研究。在銘傳管理學院編，*1997海峽兩岸管理科學學術研討會論文集*（頁190-195）。台北市：編者。

(2)會議或研討會中發表之論文（未出版）

Chang, P. L., & Hsieh, P. N. (1998, June). Managing quality in access services through blueprinting. In C. Tuan (Chair) *International Symposium on Decision Sciences*, Symposium held at the Chinese University of Hong Kong, Hong Kong.

李華偉（2000，12月）。圖書館在知識管理中的角色。在中國圖書館學會、美國國際電腦研究院主辦，*知識管理：方法與系統研討會*，台北市。

Capra, M. G. (2005). *Factor analysis of card sort data: An alternative to hierarchical cluster analysis*. Paper presented at the Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting, Orlando, Florida, USA.

7. **研究報告或技術報告**（Technical Reports）

(1)國科會等研究計畫報告

李德竹主持（1998）。我國大學圖書館館員學習利用網際網路態度之研究（國科會專題研究計畫成果報告，NSC 87-2413-H-002-029）。台北市：台灣大學圖書資訊學系暨研究所。

(2)可由NTIS或ERIC等單位取得之報告

Osgood, D. W., & Wilson, J. K. (1990). *Covariation of adolescent health problems*. Lincoln: University of Nebraska. (NTIS No. PB 91-154 377/AS)

Fuss-Reineck, M. (1993). *Sibling communication in Star Trek: The Next Generation: Conflicts between brothers*. Miami, FL: Annual Meeting of the Speech Communication Association. (ERIC Document Reproduction Service No. ED 364932)

(3)大學或政府機構之研究報告或技術報告

Broadhurst, R. G., & Maller, R. A. (1991). *Sex offending and recidivism* (Tech. Rep. No. 3). Nedlands, Western Australia: University of Western Australia, Crime Research Centre.

8. **博碩士論文**（Thesis or Dissertation）

　(1)未正式出版之博碩士論文

　　A. 美國州立大學

　　Swan, R. M. (1998). *Perceived performance and disconfirmation of expectations as measures of customer satisfaction with information services in the academic library*. Unpublished doctoral dissertation, Florida State University.

　　B. 美國其他大學（註明州別）

　　Wilfley, D. E. (1989). *Interpersonal analysis of bulimia: Normalweight and obese*. Unpublished doctoral dissertation, University of Missouri, Columbia.

　　C. 美國以外國家（註明國別）

　　Gruber, H.-G. (2000). *Does organisational culture affect the sharing of knowledge? The case of a department in a high-technology company*. Unpublished doctoral dissertation, Carleton University, Canada.

　　D. 國內之博碩士論文

　　盧昆宏（1994）。製程能力指標推薦最小值及製程能力判定程序之研究。未出版之博士論文，國立交通大學管理科學研究所，台北市。

　　翁慧娟（1999）。我國大學圖書館網站品質評估之研究。未出版之碩士論文，國立台灣大學圖書資訊學研究所，台北市。

　(2)引用資料庫之博碩士論文摘要或預覽全文

　　Gruber, H. G. (2000). *Does organisational culture affect the sharing of knowledge? The case of a department in a high-technology company* (Master's thesis). Retrieved from ProQuest Digital Dissertation.

　　盧昆宏（1994）。製程能力指標推薦最小值及製程能力判定程序之研究〔摘要〕。未出版之博士論文，國立交通大學管理科學研究所，台北市。檢自全國博碩士論文摘要檢索系統。

9. **電子資源**（Electronic Documents）

　(1)由資料庫中取得的電子全文

　　Borman, W. C., Hanson, M. A., Oppler, S. H., Pulakos, E. D., & White, L. A. (1993). Role of early supervisory experience in supervisor performance. *Journal of Applied Psychology, 78*, 443-449. Retrieved October 23, 2000, from PsycARTICLES database.

　　李新路、馬亞軍（2004）。資訊不對稱、管理者內生偏好與上市公司股權融資偏好。中央財經大學學報，*7*，16-20。上網日期：2005年3月2日，檢自中國期刊網。

　(2)由圖書館網站取得的電子期刊

　　Anthony, K. (2004). Design research in education: Yes, but is it methodological? *Journal of the Learning Sciences, 13*, 115-128. Retrieved February 28, 2005, from Academic Search Premier database.

　　Williams, R. L., Bukowitz, W. R. (2001). The yin and yang of intellectual capital management: The impact of ownership on realizing value from intellectual capital. *Journal of Intellectual Capital, 2*(2), 96-110. Available from Emerald Fulltext (http://www.emerald-library.com/).

(3) 由 Internet 取得的期刊文章

Bell, G. G. (2005, January 31). Clusters, networks, and firm innovativeness. *Strategic Management Journal, 26*(3), 287-295. Retrieved March 2, 2005, from http://www3. interscience.wiley.com/cgi-bin/fulltext/109880271/PDFSTART

(4) 一般網站或網頁

ACRL Consultants for Information Literacy, and Downie, J. (2001, May 29). *Assessing student learning outcomes in information literacy programs: Training academic librarians program information*. Retrieved August 14, 2001, from http://library. csusm.edu/acrl/imls

Encryption export control restrictions. (n.d.). Retrieved August 14, 2001, from http://www.lawnotes.com/encrypt.html

Chrisman, J., Diller, K., & Walbridge, S. (1999). *Usability testing: A case study*. Retrieved January 2, 2010, from http://www.ala.org/ala/mgrps/divs/acrl/publications/crljournal/1999/nov/chisman.pdf

戰略性高科技貨品輸出管制清單。上網日期：2001年8月14日，檢自：http://www.trade.gov.tw/law/export/law_export_15.htm

(5) 修訂版本之文章

Wiggins, B. (2007). Library of Congress Subject Headings: Pre- vs. Post-Coordination and related issues (December 20, 2007 Rev. ed.). Retrieved from http://www.loc.gov/catdir/cpso/pre_vs_post.pdf

(6) 線上論壇、討論社群

Rampersad, T. (2005, June 8). Re: Traditional knowledge and traditional cultural expressions [Online forum comment]. Retrieved from http://www.wipo.int/roller/comments/ipisforum/weblog/theme_eight_how_can_cultural#comments

呂宗熹（2008）。R：發展數位出版的人才是出版人才還是數位人才[線上論壇評論]。上網日期：2008年12月2日，檢自：http://udn.com/NEWS/READING/REA8/4634420.shtml

(7) 大學或政府等大型機構網站中的文章

Chou, L., McClintock, R., Moretti, F., & Nix, D. H. (1993). Technology and education: New wine in new bottles: Choosing pasts and imagining educational futures. Retrieved August 24, 2000, from Columbia University, Institute for Learning Technologies Web Site: http://www.ilt.columbia.edu/publications/papers/newwine1.html

教育部（2003）。教育部教學資源網建置背景與發展歷程。上網日期：2008 年03 月29日，檢自 http://etoe.edu.tw/scripts/learning/Document/sitemap.asp

10. **二次引用（Secondary Source）**

二次引用必須是謹慎的，當原始資料難以取得之情況下允許使用。APA格式對二次引用的規定為：將二次文獻列在參考文獻（Reference List）之中；在正文中，引用二次文獻並標註原始文獻，以 as cited in（英文）或轉引自（中文）表示前後關係，範例如下：

正文內呈現方式：

…Seidenberg and McClelland's study (as cited in Coltheart, Curtis, Atkins, & Haller, 1993).

參考文獻呈現方式：

Coltheart, M., Curtis, B., Atkins, P., & Haller, M. (1993) Models of reading aloud: Dual-route and parallel-distributed-processing approaches. *Psychological Review*, *100*, 589-608.

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Acknowledgement: *JoEMLS* Reviewers for Volume 50

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

Ver1.2 (April 24, 2013)

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 *Nanjing Daxue Xuebao*
   e.g. 中國科學引文資料庫 *Zhongguo Kexue Yinwen Ziliaoku*
   e.g. 玉山國家公園解說志工工作滿足之研究 *Yushan guojia gongyuan 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 *Zhongguo Kexue Yinwen Suoyin*"
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
   林信成 [Sinn -Cheng Lin]、陳瑩潔 [Ying -Chieh Chen]、游忠諺 [Chung -Yen Yu]，「Wiki 協作系統應用於數位典藏之內容加值與知識匯集」[Application of Wiki Collaboration System for Value Adding and Knowledge Aggregation in a Digital Archive Project]，教育資料與圖書館學 43 卷，3 期（2006）[*Journal of Educational Media & Library Sciences* 43, no. 3(2006)]：285 - 307。
   範例 2
   邱均平 [Jun -Ping Qiu]，「網路信息計量學導論」[Wanglu Hsinhsi Chilianghsueh Taolun]，國立成功大學圖書館館刊 16 期（2007 年 6 月）[*National Cheng Kung University Library Journal* 16 (June 2007)]：19。

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