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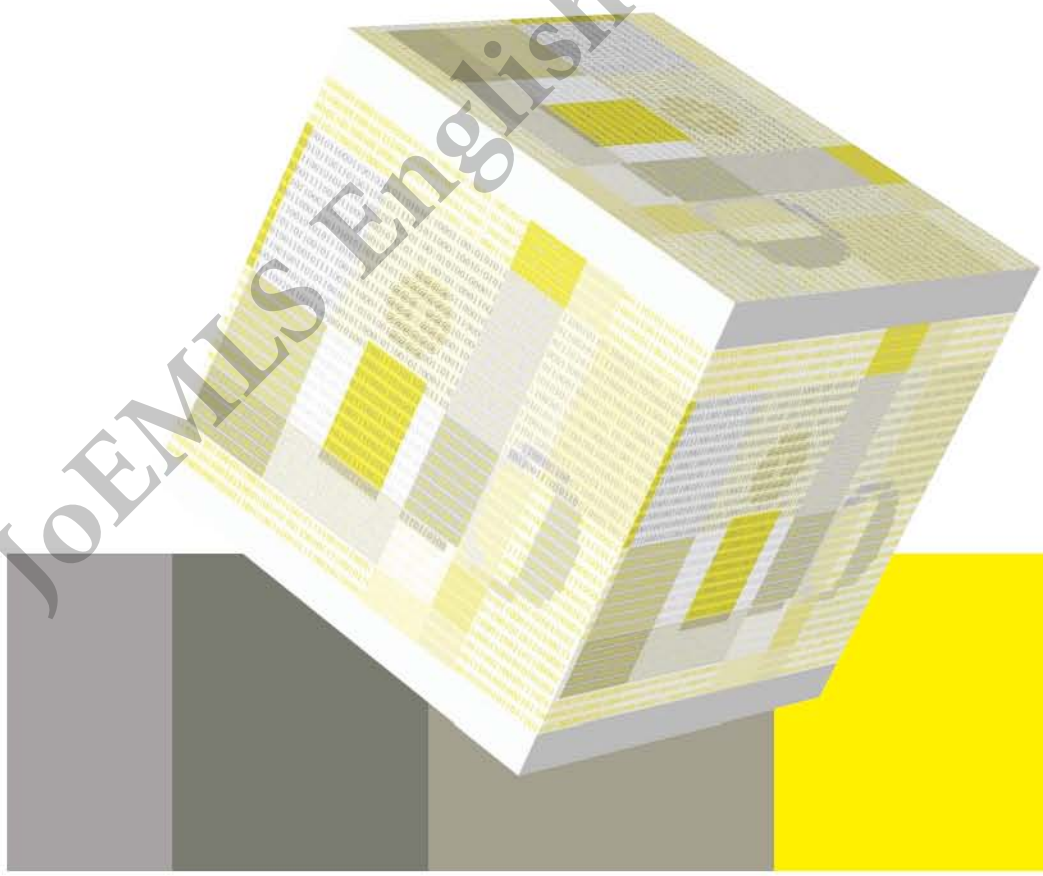

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教育資料與圖書館學 JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES Vol. 50, No. 2, Winter 2012

教育資料與圖書館學，始於1970年3月創刊之**教育資料科學月刊**，其間於1980年9月更名為**教育資料科學**，改以季刊發行。自1982年9月起易今名，而仍為季刊，每年秋(10月)、冬(翌年1月)、春(4月)與夏季(7月)各出刊一期，合為一卷。現由淡江大學出版中心出版，淡江大學資訊與圖書館學系和覺生紀念圖書館合作策劃編輯。本刊為國際學術期刊，2008年獲國科會學術期刊評比為第一級，並廣為海內外知名資料庫所收錄(如下英文所列)。

The JOURNAL OF EDUCATIONAL MEDIA & LIBRARY SCIENCES *(JoEMLS)*, published by the Tamkang University Press and co-published with the Department of Information & Library Science (DILS) and Chueh Sheng Memorial Library, was formerly the ***Bulletin of Educational Media Science*** (March 1970 – June 1980) and the ***Journal of Educational Media Science*** (September 1980 – June 1982). The *JoEMLS* has been a quarterly as well as a new title since September 1982, appearing in Fall, Winter, Spring and Summer issues. The *JoEMLS* is indexed or abstracted in *Index to Chinese Periodicals, Chinese Electronic Periodicals Service (CEPS), Ulrich's Periodicals Directory, Public Affairs Information Services (PAIS), Library & Information Sciences Abstracts (LISA), Library Literature & Information Science (LLIS), H.W. Wilson Database, Directory of Open Access Journal (DOAJ), Library, Information Science & Technology Abstract (LISTA), Scopus,* and *Taiwan Social Sciences Citation Index (TSSCI).*

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

JoEMLS 編輯政策

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

Open Access 典藏政策

*JoEMLS*向來以「綠色期刊出版者」（Green Publisher / Journal）自居，同意且鼓勵作者將自己投稿至*JoEMLS*之稿件，不論同儕評閱修訂稿與否，都能自行善加利用處理，但希望有若干限制：

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JoEMLS Editorial Policy

The *JoEMLS* is an Open Access (OA) Dual, double-blind reviewed and international scholarly journal dedicated to making accessible the results of research across a wide range of Information & Library-related disciplines. The *JoEMLS* invites manuscripts for a professional information & library audience that report empirical, historical, and philosophical research with implications for librarianship or that explore theoretical and practical aspects of the field. Peer-reviewed articles are devoted to studies regarding the field of library science, information science and IT, the book trade and publishing. Subjects on instructional technology and information communication, pertaining to librarianship are also appreciated. The *JoEMLS* encourages interdisciplinary authorship because, although library science is a distinct discipline, it is in the mainstream of information science leading to the future of **InfoLibrary**.

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(1) authors can archive both preprint and postprint version, the latter must be on a non-commercial base;
(2) publisher's PDF version is the most recommend if self-archiving for postprint is applicable; and
(3) published source must be acknowledged with citation.

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EDITORIAL

In and Beyond This Issue

The rejection rate for this issue (Vol. 50, no. 2) was considerably increased. Thirteen manuscripts were received and reviewed and nine were rejected, which means we only accepted 4 articles for this issue with a rejection rate of 69.23%. We hope to adjust or control the growth of the rejection rate because the well-being of an academic journal can't be established only through the rejection rate; the acceptability and legitimacy of the submission and review process in our own professional domain have to be taken into account equally as well. It is also essential that the open information about the process to be more transparent and effective. In addition, how to adequately review the growing number of interdisciplinary research papers (e.g. Library & Information Science and its educational technology related sub-fields)? These are the issues that we target and continue to work on.

We are also concerned about the fact that, even with limited resource support for research and scholarship, there are more commercial databases of scholarly journals that continue to expend and penetrate the market. That drives up the competition among commercial databases and libraries will discover more duplicated content in these databases. If the situation of scholarly journal publishing industry in Taiwan worsens, it will create a disadvantage for the industry in Taiwan in the future Cross-Strait competition among scholarly resources. In the recent years, Open Access has been a wildly discussed issue. The Taiwan Government has issued and recommended some copyright agreement sample documents to inform journal publishers not to give away "exclusive rights" to database vendors. It does seem like the idea of "products of scholarly research are part of public domain" has been reinforced. The *Journal of Educational Media and Library Sciences* has been a supporter for Open Access and opposes to monopoly practices. With that devotion we have made many efforts in promoting Open Access policies and practices, which is evident to the public. Nevertheless, we remain highly critical and cautious when it comes to the development of "publicly-owned scholarly information" for we do not want to act blindly following a trend before the scholarly publishing in Taiwan matures. Putting scholarly information into the public domain without a well-developed system will jeopardize the current establishments of scholarly publishing. Developing "public-owned scholarly information" requires commitment from the Government to create and execute sustainable management and government

funding policies. However, are we ready? Does the Government have a well-built roadmap to guide us? Not to mention that we are constantly under the pressure of competing and cooperating within the Chinese scholarly publishing industries with China and Hong Kong.

Finally let's shift the focus to our *Journal*. This issue includes 4 research papers: Ti Yu (于第) and Chao-Chen Chen (陳昭珍) focused on "A Study on the Relationship between Organizational Learning Culture and Organizational Performance in Taiwan's University and College Libraries"; Yu-Wei Chang (張郁蔚) presented "The Influence of Book References on Characteristics of Interdisciplinarity in the Fields of Humanities and Social Sciences", Hai-Hon Chen (陳海泓) presented "How to Use Readability Formulas to Access and Select English Reading Materials"; and Jiann-Cherng Shieh (謝建成) and Huang-Wei Lin (林黃瑋) published "The Study of Web Findability Based on Its Breadth and Depth". We greatly appreciate the submission from the authors and other researchers, which gives us an opportunity to continuously grow and evolve.

Jeong-Yeou Chiu
JoEMLS Chief Editor

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Research Article

A Study on the Relationship between Organizational Learning Culture and Organizational Performance in Taiwan's University and College Libraries

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Abstract

Most of the college and university libraries in Taiwan always pay much attention on their staff training and give highly support on their staff learning through various workshops or conferences. However, can these learning activities bring positive influence to performance and effectiveness in a library organization? And, whether library staff members recognize the importance of organizational learning culture in Taiwan's colleges and universities? Based on above mentioned questions, this study designed a survey questionnaire mainly according to the constructs of DLOQ. The population for this study includes all university and college libraries in Taiwan, a total of 162. 810 questionnaires were sent out in total for this study. Finally, a total of 478 library employees responded resulting in an overall response rate of 59%. The main findings of this study including: 1. Regarding the perceived value of organizational learning culture among college and university library staff in Taiwan, the dimension of "promoting inquiry and dialogue" is in the lead, followed by the dimensions of "providing strategic leadership for learning", "connecting the organization to its environment", "encouraging collaboration and team learning", "empowering people toward a collective vision", "creating system to capture and share learning", and "creating continuous learning opportunity". 2. Most library staff showed quiet good command on the improvement of organizational performance. 3. Different characteristics of library staff did vary in different perceived levels to organizational culture, such as attribute of library, position of job, and years of service. 4. The three organizational cultural dimensions of "creating continuous learning opportunity", "creating system to capture and share learning", and "providing strategic leadership for learning" have a significantly positive effect on organizational knowledge performance. 5. The three dimensions of "creating continuous learning opportunity", "create system to capture and share learning", and "providing strategic leadership for learning" have a significantly positive effect on organizational extrinsic performance.

Keywords: *Organizational learning culture; Learning organization; Organizational performance; Library; University and college*

SUMMARY

It is a changing era in the 21st century with various challenges and changes. Both profit and non-profit organizations recognize the importance of organizational learning and commit to build a learning organization to cope with these challenges and changes. Since an effective learning organization relies on a positive learning culture in the organization, a library with a stronger climate of learning culture can probably help its staff members to obtain more professional development and bring better performance.

Most of the college and university libraries in Taiwan always pay much attention to their staff training and give highly support to their staff learning through various workshops and seminars. However, can these learning activities bring influence to performance and effectiveness of the organization in a library? And, whether do library staffs recognize the importance of organizational learning culture in Taiwan's colleges and universities?

According to the results of some previous empirical studies, it is concluded that a learning organization do have impact to the organizational performance in a range of industries and businesses. In addition, it is proved that the DLOQ (Dimensions of the Learning Organization Questionnaire) which was developed by Marsick and Watkins (2003) can be used as a diagnostic instrument to explore the links between organizational learning and performance of the organization.

Since there is a lack of empirical studies on the topic of organizational learning and organizational performance in the field of librarianship in Taiwan, some research questions are proposed in this study as follows:

(1) What are the perceptions of library staffs to their organizational learning culture in colleges and universities?

(2) Whether do different characteristics of library staffs have different perceptions to the organizational learning culture?

(3) What are the perceptions of library staffs to their organizational performance in colleges and universities?

(4) Whether do different characteristics of library staffs have different perceptions to the organizational performance?

(5) Can organizational learning culture have a positive impact to organizational performance?

Further, based on the research questions, seven hypotheses are outlined as follows:

H1: Continuous learning has a positive impact on organizational performance.

H2: Inquiry and dialogue has a positive impact on organizational performance.

H3: Team learning has a positive impact on organizational performance.

H4: Embedded systems have a positive impact on organizational performance.

H5: Empowerment has a positive impact on organizational performance.

H6: Systems connection has a positive impact on organizational performance.

H7: Leadership has a positive impact on organizational performance.

For this study, a survey questionnaire is designed based on the constructs of DLOQ and literature reviews. The questionnaire consists of three parts. The first part consists of five items of demographic information, including category of library, staff size of library, job position, job duty, and years of service in a library. The second part consists of 43 statements which were used to measure the perceptions of the respondents on the seven dimensions of the organizational learning. The seven dimensions are:

(1) Continuous learning (questions 1-7),

(2) Inquiry and dialogue (questions 8-13),

(3) Team learning (questions 14-19),

(4) Embedded systems (questions 20-25),

(5) Empowerment (questions 26-31),

(6) Systems connection (questions 32-37), and

(7) Leadership (questions 38-43).

Finally, a set of nine questions was adopted to measure the perceptions of the respondents on the changes of organizational performance in the third part. Questions 1 to 6 were used to measure the knowledge performance in an organization which were designed based on the DLOQ. Questions 7 to 9 were edited by this study for measuring the extrinsic performance in an organization regarding the satisfaction of school authority to the library, reputation of the library, and overall progress of the library. A six-point Likert-type scale was used with 6=always, 5=almost always, 4=often, 3=sometimes, 2=hardly ever, 1=never for both part two and part three; in addition, 6=strongly agree, 5=agree, 4=slightly agree, 3=slightly disagree, 2=disagree, 1=strongly disagree for the part third.

The population for this study includes all college and university libraries in Taiwan, a total of 162. 810 questionnaires were sent out in total for this study. Finally, a total of 478 library employees responded resulting in an overall response rate of 59 %. The quantitative analysis of the questionnaire was conducted using the SPSS by means of some statistical analysis methods, such as descriptive analysis, T-test, ANOVA, and regression analysis, etc.

The main findings of this study include: (1) Regarding the perceived value of organizational learning culture among college and university library staffs in Taiwan, the dimension of “inquiry and dialogue” is in the lead, followed by the dimensions of “leadership”, “systems connection”, “team learning”, “empowerment”, “embedded system”, and “continuous learning”. (2) Most

library staffs showed quiet good comments on the improvement of organizational performance. (3) Different characteristics of library staffs did vary in different perceived levels to organizational culture, such as category of library, job position, and years of service. (4) H1, H4, and H7 are accepted. H2, H3, H5, and H6 are rejected. It means that the three dimensions of organizational culture "continuous learning", "embedded", and "leadership" have a significantly positive impact on organizational knowledge performance. In addition, both "continuous learning" and "leadership" have a significantly positive impact on organizational extrinsic performance.

Finally, some suggestions for library leaders are proposed in this study according to the findings. They are:

(1) Leaders should play a significant role to promote learning culture and build a learning system that can push and encourage library staffs to learning continuously in their organizations. In addition, essential rewards and funding support for staffs' learning are probably necessary.

(2) Leaders can organize a variety of formal or informal, regular or irregular on-the-job learning activities for cultivating staffs' learning interests and habits.

(3) Leaders need to provide some formal or informal sharing channels and platforms for staffs easier to exchange their learning experiences and establish a linkage between individual learning outcome and performance evaluation for enhancing staffs' achievements.

(4) ICT skills are really important to every library staff in the changing era of 21st century. Therefore, leaders should help their staffs to build confidence to learn new ICT skills continuously. On the other hand, leaders may consider to hiring some staffs with strong ICT background for influencing those who are conservative-oriented staffs.

(5) Staffs with non-managerial position and 11-15 years of service experience in the library showed the lowest level of perceptions to the organizational learning culture according to the findings of this study. Therefore, leaders probably should pay more attention to these staffs and organize some suitable learning workshops or activities for the group of staffs.

ROMANIZED & TRANSLATED REFERENCE FOR ORIGINAL TEXT

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Research Article

The Influence of Book References on Characteristics of Interdisciplinarity in the Fields of Humanities and Social Sciences: The Case of the Discipline of Library and Information Science

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Abstract

This study used citation analysis to analyze and compare the interdisciplinary characteristics and trends of book references and journal references of artilces published in journals of library and information science (LIS) from 1982 to 2011. The results show that an increasing trend in degree of interdisciplinarity was identified based on book references and journal references, respectively. Although both book references and journal references represented across 30 disciplines, the propotion of LIS books is much higher than that of LIS journals. In addition, the main disciplines have a great contribution to book references are different from those to journal references. Because both books and journals are two types of sources cited most frequently for LIS researchers and interdisciplinary characteristics differ in book references and journal references. This study suggests that book references have to be included in sample data for studies of interdisciplinarity in humanities and social sciences using citation analysis.

Keywords: *Library and information science; Books; Journals; References; Interdisciplinarity*

SUMMARY

Introduction

Citing literature is a common behavior for academic authors because present research builds on the foundation of prior studies. It is evident that the development of each discipline relies in part on knowledge originating from other disciplines. Therefore, all disciplines are interdisciplinary. According to prior studies, natural science (NS) researchers cite mainly journal articles, while social science and humanities (SSH) researchers cite both journal articles and books. Although some social science researchers cite more journal articles than books,

NS researchers cite a higher percentage of journal articles than those in the SSH.

Because books are the main cited sources for SSH researchers, book references should be included in research on the disciplinary sources supporting the development of SSH. However, most previous studies have only analyzed references from a few journals without presenting the trends in interdisciplinarity, and did not describe the types of cited sources that were included in their sample. This leads to problems in interpreting the results.

This study aims to explore the influence of book references on measuring the degree of interdisciplinarity in a specific discipline belonging to SSH. The differences in the degree of interdisciplinarity between book references and journal references are presented. The discipline of library and information science (LIS) was chosen as the subject because more studies have been conducted on LIS publications and their results can be compared to the results of this study. The research questions in this study are as follows:

1. What is the disciplinary distribution of references from the LIS articles? How are the references distributed, by discipline?

2. What are the differences in disciplinary distribution and rankings between book references and journal references?

3. In LIS, is the degree of interdisciplinarity for book references different from that based on journal references? Are the degrees of interdisciplinarity for book references and journal references, respectively, rising?

Methodology

This study used direct citation analysis to explore the interdisciplinary characteristics and changes in LIS across a 30-year period (1982 to 2011) by analyzing the disciplinary attributes of references from LIS journals. To examine the interdisciplinary characteristics of book references compared to journal references, ten LIS journals were selected from the category of "Information Science & Library Science" as classified by Journal Citation Reports in 2006. The references in this study were collected from research articles in the ten selected journals. As LIS journals include the subject of computer science, articles focusing on computer science were excluded by reviewing the title, abstract, and even full text. Systematic sampling was used to select a representative sample.

The scope of references analyzed in this study was limited to books and journals. All selected references were marked by discipline based on their Library of Congress classification (LCC) number. The LCC system was used to divide all the sample data into 30 disciplines. After excluding references for which classification numbers could not be found, a total of 38,027 references, consisting of 11,449 book references and 26,578 journal references, were analyzed for this

study. In addition, the Shannon-Wiener Diversity Index was used to measure the degree of interdisciplinarity. The larger the value, the higher the degree of interdisciplinarity.

Results

LIS articles cited books and journals across the natural sciences, social sciences and humanities. Of the references cited, LIS literature dominated (54.18%), followed by general science (6.86%), management (5.21%), computer science (4.06%), and sociology (3.71%) references. Changes over time in the top five cited disciplines showed a decrease in LIS and general science references and an increase in computer science references.

For both book and journal references, LIS was the most cited discipline, followed by general science. However, the proportion of book references from LIS was much lower (37.75%) than the proportion of journal references from LIS (61.25%). There was a large difference in the share of references between the top two cited disciplines. The top three to fifth-cited disciplines for book references were computer science, sociology, and management. For journal references, the top three to fifth cited disciplines included management, medicine, and technology. In addition, half of the disciplines had citations fewer than 1% of the total, indicating that many disciplines have little influence on LIS.

The number of disciplines cited was found to be increasing for both book references and journal references. This indicates that LIS researchers are citing more books and journals from disciplines outside LIS.

The degree of interdisciplinarity based on book references in LIS articles was higher than that based on journal references, 2.39 versus 1.72, respectively. From both book and journal references, the degree of interdisciplinarity in LIS is increasing. In particular, there was a greater range in the interdisciplinary values for book references than for journal references. Citations from books contributed more to the rising degree of interdisciplinarity in LIS than citations from journals. If book citations were not included in the sample data for analysis, the interdisciplinary value for LIS would be lower.

Discussion and conclusion

This study demonstrated the different levels of interdisciplinarity among book references and journal references in LIS. Of the references analyzed in this study, about one-third of them were from books. This shows that books are important cited sources for LIS researchers. Moreover, differences in the characteristics and trends of interdisciplinarity were identified between book references and journal references. In particular, the degree of interdisciplinarity

for book references was much higher than that for journal references. This suggests that research on interdisciplinarity in LIS should be conducted according to the cited sources. One possible reason for explaining the higher degree of interdisciplinarity for book references is that journal topics tend to be more specific. Many books cover various topics across disciplines, therefore a book containing a topic related to LIS may be classified with a LCC number for a non-LIS discipline.

In sum, using empirical data, this study confirms that differences exist in the characteristics of interdisciplinarity between book references and journal references. Books and journals are main cited sources for LIS researchers. The results suggest that references to books cannot be excluded from sample data when exploring interdisciplinary research in SSH using citation analysis.

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How to Use Readability Formulas to Access and Select English Reading Materials

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Research Article

Abstract

The purpose of this study was to describe the most common readability formulas. Three children's books, ***The empty pot*** *(670 words),* ***Smoky night*** *(1,267 words), and* ***Sarah, plain and tall*** *(3,158 words) were used as the subjects to calculate the numerical or grade-level score. The study also focused on comparing readability formulas that were calculated using different methods: with a tool embedded in a Microsoft Word processing program, with Free Text Readability Consensus Calculator tools found on the web, and by hand. Results were presented as follows: 1.* ***The empty pot*** *that was the least words got a fifth-grade level,* ***Sarah, plain and tall*** *that was the most words got a third-fourth grade level,* ***Smoky night*** *a third grade level. 2. Readability formula embedded in a Microsoft Word processing program was the easiest way to obtain the most accurate readability scores by typing the entire book into a word document. 3. Readability scores differed slightly depending on the readability tool that was used. However, the rank of the three books was the same among the different tools. 4. The readability levels obtained from Fry by hand were the same as results of the Flesch-Kincaid from Microsoft Word and from free web-based calculators. Owing to these two formulas were used the same variables, sentence length and number of syllables per word to calculate the readability levels.*

Keywords: *Readability formula; Microsoft word processing program; Free web-based calculators; Grade-level score*

SUMMARY

Introduction

Reading is the best way to learn new knowledge. Students learn how to read through the practice of reading. Selecting readings that are appropriate for students' levels allows students to experience the joy of reading and develops motivation and confidence in reading thus fosters spontaneous reading. When students are not frustrated with reading materials, that's when they can easily connect with the materials to learn, grow, think as well as internalize and absorb what they've read into part their own knowledge. Therefore, finding appropriate reading materials for students' reading levels has become an important factor for sparking students' interest in reading.

However, as many publishers print suggested grade levels, these levels are not always accurate (Burke, & Greenberg, 2010). Some other researchers pointed out that personal judgments about the difficulty of a text are often subjective and therefore not good indicators of reading level (Burke, & Greenberg, 2010; Hamilton, & Shinn, 2003; Johnson, 1998; Klare, 1976). Due to the fact that the publishers' or personal judgments are both unreliable, after years of research readability formulas were developed by researchers to evaluate difficulty of texts. In the United States the readability formulas assist teachers, teacher librarians and librarians to identify appropriate reading materials by grade level or age level and to help students select reading materials with moderate difficulty yet most effective for reading and learning.

With the rapid development of information technology, the far-reaching Internet and the knowledge-sharing practice among reading education researchers, many readability formulas with powerful capabilities are accessible freely on the web. Therefore, this study aimed to introduce the most commonly used readability formulas. The study focused on three English reading materials and compared readability formulas calculated with Microsoft Word processing program, with a free readability formula software, and by hand. Second, the study compared readability of the same readings by different methods and see if the results were the same. The study further discussed how to correctly apply readability formulas and recommendations on how teachers, teacher librarians and librarians in Taiwan should adopt readability formulas in order to select English reading materials that are at levels of their students.

Research Design and Implementation

This study selected three English reading materials to be used as research subjects. Two were picture books: *The Empty Pot* (670 words) and *Smoky Night* (1,267 words). The other one was a fiction, *Sarah, Plain and Tall* (3,158 words). First the texts of the three books were typed into Word files and then the readability and grade levels were calculated using the readability formulas. The study utilized tools included: 1. Flesch Reading Ease and Flesch-Kincaid formulas available in Microsoft Word; 2. Free Text Readability Consensus Calculator (http://www.readabilityformulas.com/free-readability-formula-tests.php), a free tool on the web that calculates scores (readability) or grade levels based on the Flesch Reading Ease formula, the Flesch-Kincaid Grade Level, the Fog Scale (Gunning Fog Index), the Smog Index, the Coleman- Liau Index, the Automated Readability Index and the Linsear Write Formula and the average the seven commonly used formulas; 3. Manually calculated Fry Graph and the Rate Index (RIX) score.

Results

i. The three reading materials' readability scores or grade levels calculated by Microsoft Word, Free Text Readability Consensus Calculator and by hand were slightly different due to the elements used for analysis and comparison. However the order was the same if we ranked the reading materials by the difficulty of each text, which indicated the order was also the same if we ranked by grade levels.

ii. Same readability formula elements resulted in same grade levels. For example, the readability results from Fry (by hand), Flesch-Kincaid (Microsoft Word) and Flesch-Kincaid (Free Text Readability Consensus Calculator) were the same.

iii. Errors in sampling affected the readability score and grade level of a text. For example, slightly different grade levels were found using the Free Text Readability Consensus Calculator to calculate the first 600 words and the 600 words from the beginning, the middle or the end of the same text. That was because different reading levels existed in the text and its chapters and that contributed to the errors when sampling texts.

iv. Among the three reading materials, *The Empty Pot* (picture book with 670 words) had the least words but highest grade level (US grade 5). *Sarah, Plain and Tall* (fiction with 3,158 words) had the most words and a readability of US grades 3-4 reading level. *Smoky Night* (picture book with 1,267 words) was appropriate for US grade 3 reading level. In terms of readability formulas, the results explained that the average length of sentences along with average word counts and the number of syllables affected readability grade level more than the length of texts did.

Recommendations and Implications

This study recommended the correct ways of using the readability formulas: 1. Use full texts to reduce sampling errors; 2. Accurately select sampling text. For example, the SMOG formula samples a selection of 10 consecutive sentences from the beginning, the middle and the end of a text and then calculates the average, which doesn't mean using three samples with 100 words each; and 3. When typing up a text in Word, make sure to have correct spelling and maintain the same punctuation as it appears in the original text. In addition, there are recommendations for teacher, teacher librarians and librarians in Taiwan on how to select and recommend English reading materials for Non-native English speaking students.

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Research Article

The Study of Web Findability Based on Its Breadth and Depth

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Abstract

Interior findability of a web site is the ability to allow users to find the exact needs of the information where exists in the site. Studies have shown that the effective information architecture can be used to enhance its interior findability and usability. However, the user can tolerate how many times the mouse clicks to find the information they need (site depth)? Users' eyes can glance over how many items on a web page (site breadth)? The issues have been discussed and researched by web site designers and usability experts over the years. In 2000, Zaphiris found that the site depth and breadth have the impact on user preferences of the site. Based on user-centered design concept, the card sorting method is an economical and effective tool can be used to construct websites with better findability. Card Sorting Implementation is primarily to acquire users' awareness about the classification of information content on a web site. After collecting the classifications from different users, and further through cluster analysis, factor analysis and other data analysis methods to identify the common perception of classifications from different users', we can create a web structure with enhanced findability and usability. Card sorting method is applied to construct the shape of the site focused on user shared cognition, but the site depth and breadth may cause the effects on its findability and usability have not be explored. This study attempts to apply the card sorting method to construct the web site architecture in considering the factors of site depth and breadth, thus to propose a new method of website construction. We then use the evaluation of findability of web site to verify its effectiveness.

Keywords: *Information architecture; Findability; Site breadth; Site depth*

SUMMARY

Interior findability is the ability of web sites to enable users to find the information that they need. Studies have shown that the effective information architecture can be used to enhance its interior findability and usability. However, how many mouse-clicks would the users tolerate before they find what they

need (site depth)? What is the number of items on web pages that users would browse through (site breadth)? These are the issues that web designers and usability experts have discussed and investigated for years. "Site depth" refers to the number of levels in a hierarchical system. If the hierarchical structure is too narrow and too deep, users have to click through too many sublevels to find what they need. "Site breadth" refers to the number of options on every level. If a level is too broad, which means users will face a problem of having too many options on menus. In 2000, Zaphiris found that the site depth and breadth have the impact on user preferences of the site. Therefore, the balance between the depth and the breadth of web site architectures is very important for web designers and users. Many studies suggest that the "breadth" factor of menu structures is more important than the "depth" factor and users often have difficulties when navigating through deep menu structures (Seppala, & Salvendy, 1985; Norman, & Chin, 1988; Brinck, Gergle, & Wood, 2002; Matsui, & Yamada, 2008). The card sorting method has always been an economical and effective tool for building web sites with better findability and usability. It is mainly due to the fact that in order to capture users' perceptions of categorization of information on the Web, the card sorting method collects data on how different users categorize information. Next the data is analyzed using techniques such as cluster analysis, which discovers the users' common perceptions of categorization models, and the finding is applied to develop web structure that promote findability and usability. In the past, web sites developed by implementing the card sorting method only focused on creating users' common perceptions. The issue of how site depth and site breadth might affect findability and usability was not investigated. This study used the National Taiwan Normal University Library web site as the research subject and investigated the issues of considering the website depth and breadth and cards taxonomy for the effectiveness of web site construction. We proposed a new approach for developing academic library web sites: Develop web sites using the card sorting method with the consideration of the restrictions of depth and breadth. We also proved its effectiveness by examining web site findability.

From literature reviews (Miller, 1981; Kiger, 1984; Jacko, & Salvendy, 1996; Zaphiris, & Mtei, 1997; Larson, & Czerwinski, 1998; Zaphiris, 2000; Bernard, 2002; Arjan, Sefelin, & Tscheligi, 2006; Zaphiris, & Savitch, 2008), they showed that users spent least amount of time on navigating web sites constructed with a 8 × 2 (breadth = 8, depth = 2) structure. However, users preferred a structure of 16^1 + 4^1 structure most. Additionally, according to Brinck, Gergle, & Wood (2002), breadth of web sites should not exceed 16 (links) and depth should not be deeper than 3 (levels).

This study conducted cluster analysis on the data collected from the card

sorting method in order to understand how participants categorize the content on the library web site. The researchers conducted cluster analysis using the EZCalc software. Four possible information architectures with depth less and equal to 3 and breadth less than 16 are generated:

1. Breadth = 9, unlimited depth (Architecture A)
2. Breadth = 9, depth <= 3 (Architecture B)
3. Breadth = 8, depth <= 3 (Architecture C)
4. Breadth = 16, depth <=3 (Architecture D)

The findability evaluation was tested by 15 participants (randomly selected). The 15 participants scored the findability for the 4 architectures on 6 selected tasks which are the most often users visited pages counting from the web log data. Participants scored each task by Likert scale 5 to 1 to evaluate whether it is easy to find or not on the specific architecture. The score is higher the better. Their total scores, means and standard deviations of four architectures were calculated respectively. Results were rounded to the nearest hundredth. Based on the means, Architecture D (breadth = 16, depth <= 3) scored the highest with a mean of 25.27. The second is Architecture B (breadth = 9, depth <= 3) with a mean of 24.87 followed by Architecture C (breadth = 8, depth <= 3) with a mean of 23.47. Finally the mean for Architecture A (breadth = 9, unlimited depth) was 12.4. The range of standard deviation was 1-2.

Then SPSS was used to conduct one-way ANOVA analysis to investigate whether there was a significant difference among the findability of 4 architectures. The results is displayed in the figure below: Architecture D scored significantly better than Architecture A, B and C. Therefore, this study found that in terms of breadth and depth, an information architecture of breadth =16 and depth < = 3 (Architecture D) was most effective.

Figure Web Findability Post Comparisons

(I) Factor	(J) Factor	Mean difference (I-J)	Standard deviations	Significance α	95% Confidence interval Lower bound	Upper bound
	B	–12.467*	.646	.000	–13.853	–11.080
A	C	–11.067*	.765	.000	–12.708	–9.426
	D	–12.867*	.646	.000	–14.253	–11.480
	A	12.467*	.646	.000	11.080	13.853
B	C	1.400	.722	.073	–.149	2.949
	D	–.400	.434	.373	–1.331	.531
	A	11.067*	.765	.000	9.426	12.708
C	B	–1.400	.722	.073	–2.949	.149
	D	–1.800*	.770	.035	–3.451	–.149
	A	12.867*	.646	.000	11.480	14.253
D	B	.400	.434	.373	–.531	1.331
	C	1.800*	.770	.035	.149	3.451

Through a findability tasks survey and statistical analysis, it was proven

that the web site architecture developed with consideration of the site breadth and site depth discovered by this study did perform better than the original library web site structure in terms of findability. Therefore, when designing and planning for a library web site, one needs to consider the design of information architecture in order to meet users' needs, and the information architecture of breadth = 16, depth = 3 can be used as a guiding design principle.

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