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JoEMLS English Summary



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)

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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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- (3) 任何稿件之典藏版本皆須註明其與 *JoEMLS* 之關係或出版後之卷期出處。

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**.

Open Access Archiving

The *JoEMLS*, as a role of “OA green publisher/journal”, provides free access online to all articles and utilizes a form of licensing, similar to Creative Commons Attribution license, that puts minimal restrictions on the use of *JoEMLS*'s articles. The minimal restrictions here in the *JoEMLS* are:

- (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

Starting from this issue (Vol. 50, no. 1) *JoEMLS* has a brand new cover. The previous one-dimensional “LIB” graphic was transformed to a three-dimensional cube model. The new cover design demonstrates *JoEMLS*'s commitment to forever evolution in order to achieve high quality in scholarship and editorial works in the 21st century. The new cover design also marks a new milestone.

We achieved the new milestone by establishing three new benchmarks: DOI, QR Code, and the mobile reading service. To continue promoting the globalization and digitalization of the Journal and to increase visibility and usage, *JoEMLS* provides its own DOI (Digital Object Identifier) on the cover as well as on the first page of each journal article. The preprint (Fore Sight) of this issue already adopted the DOI system. Therefore once this issue is published, With the special design of the codes and website locators, the consistent and effective web links can be established once the final version of the journal articles is published. It allows readers to, when viewing the preprint articles online, make references to or cite the preprint content right away. It also allows the readers to add DOI URLs to the references or notes of their own research articles. Thus the articles will be compliant with citation rules required by APA and Chicago/Turabian citation manuals.

The second new benchmark is the implementation of QR Code (Quick Response Code, a type of two-dimensional code). It was established and based upon the DOI system with the popularity of mobile reading services. The QR Codes enable readers to use mobile devices to access fulltext online from the information they have in print. The third benchmark is also on target to meet the demand for mobile reading—*JoEMLS* has published an electronic version for iPad. We hope the new version can better serve our users' needs with a variety of options for reading.

This issue we received fourteen manuscripts including five articles accepted and nine rejected. The rejection rate for this issue is 64.3%. In fact, for scholarly journals, it is appropriate to stably maintain a rejection rate that is about 65% and below 70%. Although the rejection rate changes often, it doesn't affect our attitude and approach. As always, we follow strict guidelines in order to carry out the best editing service.

Without a doubt, we have heartfelt gratitude for researchers who submitted articles. Special thanks to the authors who contributed the articles published in

this issue: Chen Su-May Sheih (陳書梅), author of “A Survey of Circulation Librarians’ Emotional Labor and Emotional Exhaustion”; Fang-Ling Lin (林芳伶) and Hao-Ren Ke (柯皓仁), authors of “A Study on the Development of Digital Archives for Performing Arts Groups; Hsiao-Shen Wang (王曉璿) et. al., authors of “A Study of Using Tangible Augmented Reality System to Enhance the Learning Effects on Museum Artifacts”; Lin Ching Chen (林菁) and Mei-Shwu Kuo (郭玫叔), authors of “Effectiveness of First-Grade Information Literacy Instruction”; and Chi-Cheng Chang (張基成) and Cheng-Wei Tsai (蔡政緯), authors of “Developing a Knowledge Management Behavior Scale of e-Portfolio Based on Approaches of Web Fuzzy Delphi and Fuzzy AHP”. Each article highlights a unique field with rigorous research and discussion for readers to peruse.

Jeong-Yeou Chiu
JoEMLS Chief Editor

JOEMLS English Summary



A Survey of Circulation Librarians' Emotional Labor and Emotional Exhaustion: The Case of Difficult Patron Service in University Libraries

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Abstract

At the front line of library service, circulation librarians devote considerable efforts to performing "emotional labor", i.e., maintaining a pleasant manner while dealing with difficult patrons. Using questionnaires, this study examines frequency of encountering difficult patrons, emotional labor, and degree of emotional exhaustion among university circulation librarians in Taiwan. Meanwhile, the current study also analyzes effects of circulation librarians' personal background factors on these three variables, and the correlation between them. The results suggested that university circulation librarians "scarcely" or "occasionally" encountered difficult patrons, among whom the most frequently encountered types were the "externally attributive" and "critical" ones. Nevertheless, circulation librarians were found high emotional labor workers who mostly performed emotional labor along the dimensions of "dealing with others' negative emotions" and "expressing one's positive emotions". Besides, circulation librarians "scarcely" or "occasionally" felt emotionally exhausted. In general, a positive correlation was found between librarians' frequency of encountering difficult patrons and degree of emotional exhaustion, while a negative correlation was found between librarians' emotional labor and degree of emotional exhaustion.

Keywords: Emotional labor; Emotional exhaustion; Difficult patron; Circulation librarian; University library

SUMMARY

In contemporary society, front-line employees' etiquettes, smiles and other explicit service manners are part of any product. Good service manners require individuals to exercise them with dedication so the best results can be achieved. And that is the so called "emotional labor." Because of its commitment to quality service, library business is considered to be a service industry. To maintain or improve service quality, librarians have to conceal their emotions in most situations to look amiable to patrons. As a result, librarians are part of the workforce that demands high emotional labor, in particular, when encountering

“difficult patrons”. Furthermore, the front-line circulation librarians who provide customer service and deal with diverse user groups demand more of suppressing personal feelings and maintaining a good service attitude in order to meet the needs of their job responsibilities.

After searching through library and information science literature, it was evident that currently there are few studies that discuss how difficult patrons impact circulation librarians’ emotional labor. Therefore, this study employed questionnaire to investigate how often university circulation librarians in Taiwan encounter difficult patron and the circulation librarians’ emotional labor and degree of emotional exhaustion. In addition, this study analyzed the circulation librarians’ personal background and how that relates to the frequency of encountering difficult patrons, emotional labor and the degree of emotional exhaustion. The correlation among the frequency of encountering difficult patrons, emotional labor and the degree of emotional exhaustion was also analyzed. Hopefully the results of this study can prompt circulation librarians to concern about their own emotional labor issues. Furthermore, administration at university libraries can be informed with the situation of emotional labor among circulation librarians and develop training in order to enhance the quality of patron services.

In this study, a questionnaire was employed and three emotional labor scales were implemented by the researcher. In addition to the questions on personal background, the three scales of the questionnaire were “Circulation Librarians Encountering Difficult Patrons Frequency Scale”, “University Circulation Librarians’ Emotional Labor Scale” and “University Circulation Librarian’s Emotional Exhaustion Scale”. The first scale was used to measure how often circulation librarians encounter difficult patrons. The second scale was deployed to measure the three dimensions of “dealing with others’ negative emotions,” “displaying positive personal emotions” and “dealing with negative personal emotions”; while the third scale was used to investigate the degree of emotional exhaustion in the perception of the participants. Initially 425 copies of the questionnaire were mailed to circulation librarians in 141 university libraries during late June to mid July, 2009. By early September, 394 replies were received, and 388 were deemed effective, for an return rate of 92.7%; and a valid return rate of 91.3%.

In the section below, significant findings of this study will be described in detail.

1. The relationship between the “frequency of encountering difficult patrons” and participants’ personal backgrounds

The result showed that the average frequency among the participants was 2.68 (SD=0.49). The figure indicated that the frequency of participants encountering

difficult patrons ranged from “scarcely” to “occasionally”. In particular, the frequency of participants encountering difficult patrons differs based on the participants’ gender and age. The results showed statistical significance ($p=.002$; $p=.003$). “Age” clearly affects the circulation librarians’ perception of the frequency of difficult patron encounters. However, except for gender and age, circulation librarians’ educational background, LIS-related professional background, marital status, library seniority, circulation department seniority, and whether they had supervisor experience did not generate significant influence on the frequency of encountering difficult patrons.

2. The relationship between emotional labor and personal background

The overall emotional labor was high among the participants with the average of 4.12 (SD=0.43). “Dealing with others’ negative emotions” and “displaying positive personal emotions” had higher averages than “dealing with negative personal emotions” ($p<.001$). The average for the “dealing with others’ negative emotions” dimension was 4.18 (SD=0.49), which showed that the librarians often dealt with other people’s negative emotions. The average for the “displaying positive personal emotions” dimension was 4.17 (SD=0.46), which showed that the circulation librarians needed to display positive personal emotions. The average for the “dealing with negative personal emotions” dimension was 4.03 (SD=0.48), which showed the librarians were often required to control personal negative emotions. As for the circulation librarians’ emotional labor, regardless of looking at the overall results or by dimensions, was influenced by the librarians’ age, marital status, library seniority, circulation department seniority and whether they had supervisor experience. On the other hand, a circulation librarian’s educational background had significant influence on his or her emotional labor only in the dimension of “displaying positive personal emotions.”

3. The relationship between personal background and the degree of emotional exhaustion

The average was 2.45 (SD=0.63) based on the “University Circulation Librarian’s Emotional Exhaustion Scale”, and this indicated that the librarians “scarcely” or “occasionally” experienced emotional exhaustion. The circulation librarians’ gender, LIS-related professional background and age all had significant impact on their perceptions of emotional exhaustion. In particular, female and library and information science graduates had significantly higher degree of emotional exhaustion. On the other hand, educational background, marital status, library seniority, circulation department seniority and whether they had supervisor experience did not show statistically significant influence on the degree of circulation librarians’ emotional exhaustion.

4. The relationship among the “frequency of encountering difficult patrons”, emotional labor and emotional exhaustion

There was a positive correlation between how often the participants encountered difficult patrons and the participants’ degree of emotional exhaustion ($r=.47, p<.001$). There was a negative correlation between the emotional labor and the degree of emotional exhaustion ($r=-.22, p<.001$). In addition, the frequency of difficult patron encounters had a significant negative correlation with “dealing with others’ negative emotions” and “displaying positive personal emotions” dimensions ($r=-0.11, p<.05$; $r=-0.14, p<.01$). However, the research findings showed no significantly positive or negative correlation with the frequency encountering difficult patrons and emotional labor in the dimension of “dealing with negative personal emotions”.

5. Conclusion

- (1) The participants “scarcely” or “occasionally” encountered difficult patrons
 - a. The difficult patrons are more likely to be “external attributers” and “criticizers”.
 - b. Female or librarians between the ages of 25 to 29 are more likely to encounter difficult patrons.
- (2) University Circulation librarians are high emotional labor workers
 - a. The participants’ emotional labor laid on “dealing with others’ negative emotions” and “displaying positive personal emotions”.
 - b. The participants’ emotional labor was influenced by personal background, including age, marital status, educational background, library seniority, circulation department seniority and whether they had supervisor experience.
 - c. The frequency in which participants encountering difficult patrons affected the ways they “displayed positive personal emotions” and “dealing with others’ negative emotions”.
- (3) The participants “scarcely” or “occasionally” felt emotionally exhausted
 - a. Gender, LIS-related professional background and age had influence on emotional exhaustion.
 - b. The participants’ degree of emotional exhaustion had a positive correlation with how frequently they encounter difficult patrons as well as a negative correlation with the participants’ emotional labor.

ROMANIZED & TRANSLATED REFERENCES FOR ORIGINAL TEXT

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JOEMLS English Summary

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Effectiveness of First-Grade Information Literacy Instruction

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Abstract

The purpose of this study was to investigate the effectiveness of first-grade information literacy instruction and students', teacher's as well as parents' opinions towards the curriculum. The fields of library literacy and media literacy of this curriculum were the focuses of this study, which lasted for a year. The data were gathered through participant observations, interviews, tests and surveys. The results showed that students' library and media literacy were improved; they did not like the units involving reading and writing, though their performance on them was fine. Both teachers and parents thought information literacy instruction would help other subjects learning and should be taught systematically.

Keywords: Information literacy; Library literacy; Media literacy

SUMMARY

Introduction

In the 21st century what we concern about is not the lack of information, but information overload. Therefore, how to effectively extract information needed, solve problems and make informed decisions has been the most important issue today. This is the essence of information literacy (Bruce, 2008; Riedling, 2007).

Information Literacy is not just about operating computers. It contains two aspects: Inquiry Process and Scopes (Figure 1). The Inquiry Process aspect includes the abilities and attitudes to recognize, locate, organize, evaluate, use and effectively create the needed information (AASL & AECT, 1998; ACRL, 2000). From the aspect of Scopes, information literacy refers to multiple literacies, such as library, media and computer literacies (Farmer, 2007; Eisenberg, Lowe, & Spitzer, 2004).

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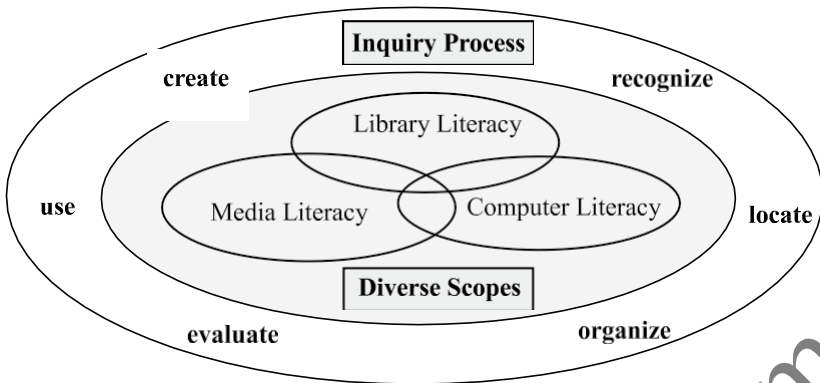


Figure 1 Essence of Information Literacy

Many researchers advocate that schools should highlight the information literacy instruction, so that students can become life-long learners who can solve problems effectively during the inquiry process (Chen, 2008; Wu, 1996; AASL, 2007, 2009; Andretta, 2005; Eisenberg, Lowe, & Spitzer, 2004). However, most information literacy instruction in Taiwan has been implemented in disconnected grade levels or subject areas instead of in a method of systematic and organized curriculum design and development. There is a large body of studies finding that students' information literacy levels would not improve automatically as they grow up (Chen, 2008; AASL, 2009; Curzon, & Lampert, 2007; Eisenberg, Lowe, & Spitzer, 2004; Harada, & Yoshina, 2004). Only through the systematic integrated information literacy instruction from elementary level through high schools or even higher education, students' information literacy can be developed. Therefore, it is evident that designing a series of information literacy instruction from first grade through sixth grade is necessary and urgent.

The purpose of this study was to investigate the effectiveness of first-grade information literacy instruction developed by the researcher and the collaborative teachers. Furthermore, students', teachers' as well as parents' opinions towards the instruction were also the focus of this study.

Methods

The case-study method was used as a framework in this study. This study was conducted in an elementary school located in southern Taiwan. With the support from the principal, the information literacy instruction was taught by a media specialist and five other teachers one class period per week from first grade through sixth grade. However, when the inquiry learning project was implemented, the media specialist would collaborate with the head classroom teachers to integrate information literacy into selected curriculum unit based on

the inquiry learning process. Through working on the inquiry project, students would apply knowledge, skills and attitudes within the scopes of library and media literacy they learned in the regular information literacy instruction.

The main research site was in a first-grade classroom which had a total of 25 students (14 boys and 11 girls). Ms. Shen, the main collaborated teacher in this study, was responsible for teaching the first-grade information literacy instruction. She has taught elementary school for 20 years and was interested in integrating information literacy into different subject areas. Ms. Chuang was another collaborated teacher in this study. She was the first-grade head classroom teacher and has experiences in promoting reading activities in another school where she taught previously.

The instructional content was based on a standard of information literacy instruction developed by the researcher and collaborated teachers. This standard was designed based on grade level, from first grade through sixth grade, and contained both of the inquiry process and diverse scopes of information literacy. Since the computer literacy was taught from third grade, the instructional content in this study focused on the scopes of library and media literacy only. The instructional units in the library literacy included learning about the school library environment and facilities, and using simple reading strategies to find key points in books, as well as loving to read. For media literacy, the teacher introduced the concepts of television rating system and public service broadcasting to students through interesting activities to cultivate students' good viewing habits in order to become wise audiences. For the inquiry process, the instructional content was a unit called *Investigation of Life on Campus*, based on the first-grade science textbook. The information literacy instruction lasted two semesters, one class period per week. Each period was 40 minutes.

There were three instruments used in this study. The Information Literacy Test for First Graders was designed for measuring student achievement in information literacy. The survey for students was designed for collecting data about their levels of liking towards the instructional units and self-evaluation of their information literacy ability. The survey for parents contained five open questions, such as have you noticed your children's changes on using libraries, reading books, selecting television programs, and solving problems? Do you think the information literacy instruction should go on, why? What are your suggestions toward the information literacy instruction?

Research data collected included interviews, tests, surveys, participant observations, and documents. All data were organized, coded, read and analyzed repeatedly. As for the test data, it was analyzed using a *t* test.

Results

Since the results of the inquiry process about the Investigation of Life on Campus was published (Chen, 2011), this study discussed only students' performance on library literacy and media literacy. Students' information literacy was improved during the study, as shown by statistically significant *t* values ($t=7.910$, $p<0.05$; $t=4.698$, $p<0.05$; $t=4.648$, $p<0.05$). It meant that after a year-long instruction, first-graders understood the knowledge and the concepts of information literacy as well as reached the level of basic application. As for the scope of library literacy in detail, most students could easily identify the key points of an article. However, their oral skills (e.g. retelling a story, fluently sharing their findings) needed to be enhanced. As for media literacy, most students knew the television rating system and would watch the programs which were suitable for them. However, first-graders did not quite understand the characteristics of different types of television programs. Therefore, they could not distinguish programs that belonged to the right types.

As for the levels of liking towards the instructional units, first-graders liked the ones which they could practice actually, such as taking good care of books and reading aloud. Students did not like the unit involved a lot of reading and writing activities, though their performance on these activities was fine.

According to the parent survey, the parents found their children more likely to use libraries and would choose appropriate television programs for themselves. Ms. Shen and Ms. Chuang as well as the parents thought information literacy instruction would help students learn other subject matters and it should be taught systematically and regularly.

Conclusion

From this study, three conclusions and recommendations are proposed for researcher and educators to consider:

1. Information literacy instruction can be taught systematically from first grade. The instructional contents should include library literacy and media literacy.
2. Though some students do not like the unit of reading strategies, teachers should gradually introduce them strategies of retelling, prediction, and finding key points, to build the base of information literacy.
3. Future studies are needed to investigate creative instructional methods on reading and writing in order to reduce students' resistance to reading and writing.

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A Study on the Development of Digital Archives for Performing Arts Groups

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Abstract

Performing arts cultivates rich cultural assets. Performing arts groups utilize limited resources to reserve their works. If they can establish digital archives, rich cultural assets can be reserved for a long term. This study adopted the qualitative research approach and conducted semi-structured in-depth interviews to collect data. Ten interviewees, including seven performing arts groups, two academic departments and one cultural institution, were contacted. Through the interviews, this study attempts to investigate the experiences of performing arts groups which have created digital archives, including motivations, processes, organization change, difficulties, benefits, and value-added applications. For those which have not yet created digital archives, this study attempts to understand their reasons and thoughts. In addition, for academic and cultural institutions which have the experiences of cooperating with performing arts groups to establish digital archives, this article tries to understand the cooperation models.

Keywords: *Performing arts groups; Digital archives; Standard operation procedure; Value-added applications; Art education*

SUMMARY

Performing Arts produce works that combine music, costume, props, stage design and many components that are extremely difficult to preserve. Once a performance ends and the curtain goes down, there is no way to preserve that performance. Often performing arts works just disappear. That is why performing arts works are considered to be one of the most difficult art form to be preserved. In early 2008 a fire broke out at the Cloud Gate Dance Theatre of Taiwan and many priceless documents about their performances were destroyed. The incident also reminded many performing arts groups to focus on preserving data about

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performing arts works. As digital technologies developed and matured, archiving performing arts related data digitally can be considered as a viable approach.

To understand currently how performing arts groups utilize the web to communicate and create digital archives, the researchers had analyzed 36 performing arts groups' official web sites from Taiwan and other countries. It was found that performing arts groups had already used the web to distribute news and information about their works. When it came to using the web to enhance members' loyalty or as a way to provide two-way interaction, these components were rarely seen on the performing arts groups' web sites. Moreover, very little performing arts groups have created digital archives. Most web sites only provide simple introduction to their works, photographs, videos etc. for browsing or download.

This study adopted the qualitative research approach and conducted semi-structured in-depth interviews to collect data. There were 3 groups of interviewees and questions: (1) For the performing arts groups that had created digital archival systems: perceptions and focus of digital archives, the status and related workflow of developing digital archives, and the maintenance and impacts after establishing the digital archives; (2) For the performing arts groups that hadn't created any digital archival systems: the current status of data storage and management and the reasons why they did not developing digital archives; (3) For the cultural organizations or academic institutions that partnered with performing arts groups on digital archives: how to approach the performing arts groups? How to work and communicate with the performing arts groups? The interviewees were selected from group (1) and (2), who were in charge of data management and/or digital archives, plus from group (3) who had experience working with performing arts group on digital archival projects. There were 10 interviewee total including 4 from dance groups, 2 from theater groups, 1 from traditional opera groups; 2 from academic institutions that worked with dance and traditional opera performing arts groups on digital archival projects. The last interviewee was from a cultural organization that worked with music performing arts groups on digital archival projects.

The key findings from this study are presented as follows:

1. Performing arts groups' motivation of developing digital archives could come from internal or external factors and establishing digital archive systems could add value to the contents. One internal factor was to preserve the groups' valuable assets. One most important external factor was the support coming from the environment such as "Taiwan e-Learning and Digital Archives Program", in which some performing arts groups were selected through an open "call for project proposals" process and developing their digital archives.

2. Standardizing the digital archives related specifications helped guide the performing arts groups to follow archival rules and specifications including file naming conventions, digitization specifications and metadata so the archives could be maintained and managed.

3. For an organizational point of view, the performing arts groups had no significant organizational changes after they developed digital archives. The groups often selected capable members within the groups and made them responsible for the digital archive project. The selected members' job responsibilities would be adjusted and the projects were often executed by forming task forces.

4. Data digitized by performing arts groups such as stage photographs, scripts, performers and print publications, etc., were all under the question of "Who own the copyright?" Digital archives stored all digitized contents and should have technologies in place in to prevent illegal use of the contents. In order to promote the "Taiwan e-Learning and Digital Archives Program" and the wealth of information it preserved among industries, education, research and culture, the national program had established plans for examining digital archive copyrights and legal consultation teams. Aimed for the digital collections that the program had established to date, the plans were intended to develop a feasible workflow which facilitates a comprehensive, clear and accurate examination of digital archive rights. Additionally, the participating performing arts groups received consultation during the process of import data into the digital archives, which resolved some copyright-related issues.

5. Digital archives could help the performing arts groups increase exposure. However more assessment was needed to measure the benefits of the digital archives in value-added applications for revenue generation. Revenue generation was an unfamiliar territory for the performing arts groups. For the performing arts groups that already established digital archives, it was a labor-intensive process to develop retail merchandise. It also required marketing strategies to promote the merchandise. The performing arts groups often hesitate to utilize the digital archives for merchandising because it was hard to predict outcomes. As for the performing arts groups that didn't establish digital archives—the groups usually were devoted to developing new performances and productions. Limited by budget and human resources, they haven't even started digital archives, not to mention utilizing digital archives in order to generate revenue.

6. For performing arts groups to create digital archives on their own were truly difficult due to the lack of budget, human resources, technical expertise, and so on. Therefore it was a viable approach for the groups to partner with academic institutions to establish digital archives. The academic institutions were

more experienced with digital archival projects. Through the partnership and building relationship and trust, the performing arts group would be more willing to cooperate on digital archival projects.

This study found that the performing arts groups spent a lot of time on managing their data. However, due to lack of experience in digital file naming conventions, metadata and digitization specifications, the data management work often lack standardization. Therefore, the performing arts groups should implement data management and be familiar with related specifications and workflows, even the groups could not establish digital archives due to the lack of funding or other constrains. It was not an easy task to manage data for long-term preservation. However, implementing data management would contribute to the establishment of digital archives in the future.

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Developing a Knowledge Management Behavior Scale of e-Portfolio Based on Approaches of Web Fuzzy Delphi and Fuzzy AHP

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Abstract

This study developed a knowledge management behavior scale of e-portfolio for university students based on the approaches of Web-based fuzzy Delphi and fuzzy AHP. According to the experts' opinions, the constructs of the scale included knowledge sharing, innovation, acquisition, application, and accumulation. The items in each construct consisted of the activities of e-portfolio implementation, which were reflection, assignment improvement, self-evaluation, organization of learning contents, teacher feedback, review and learning, and communication and discussion. All the constructs and items had weights and ranks and were by acceptable reliability and validity. Among all the items, the overall weight of reflection was highest, while following was assignment improvement. It applied that reflection had a highest effect on knowledge management. Therefore, the scale can be used as a knowledge management performance measurement tool for e-portfolio implementation.

Keywords: Web-based fuzzy Delphi; Fuzzy Analytic Hierarchy Process (FAHP); E-portfolio; Knowledge management

SUMMARY

Introduction

Activities for developing an e-portfolio include Goal Setting, Reflection, Presentation, Self Assessment, Modeling, Peer Assessment, and Feedback. Among these activities, "reflection" facilitates knowledge innovation by helping students develop their own thinking models and apply them to their works. "Presentation" and "sharing" provide a chance for students to share learning experiences with peers and to acquire related knowledge from peers. In short, the development of e-portfolios is a process that allows students to collect, apply,

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share, acquire, innovate, and accumulate knowledge.

The abovementioned knowledge sharing, innovation, acquisition, and accumulation are the important concepts for knowledge management and are closely related to e-portfolios. Although there are already scales for measuring knowledge management, they are not developed for e-portfolios. Hence, the knowledge management scale for e-portfolios with five constructs, which are knowledge sharing, innovation, acquisition, application, and accumulation, in this study was developed based on the development of e-portfolios and the main concepts of knowledge management.

The purpose of this study was to develop a knowledge management scale of e-portfolios for university students based on Fuzzy Delphi Method (FDM) and Fuzzy Analytic Hierarchy Process (FAHP). The research questions are listed as the following: 1) What are the constructs in the knowledge management scale of e-portfolios? What is the weight value for each construct? Which construct has the highest weight value? 2) What are the indicators in the knowledge management scale of e-portfolios? What is the weight value for each indicator? 3) Among all indicators, which indicator has the highest weight value? Among all constructs, which construct has the highest index weight value?

Method

Participant

Fifteen experts were invited to evaluate the scale in this study. The experts were professors in the field of educational technology or knowledge management. Five of them were specialists in the e-portfolio, five were specialists in knowledge management, and five were specialists in both e-portfolio and knowledge management. Most experts possessed knowledge of both e-portfolios and knowledge management and were experienced in teaching. The definitions of knowledge management and e-portfolios and the comparison of the relationship between knowledge management and e-portfolios were provided in an appendix attached to the scale. Therefore the scopes knowledge management and e-portfolios could be understood further by the experts and the interference on the reliability and validity of the scale could be reduced.

Procedure

First of all, the scale was developed based on literature in the field and was reviewed by the researchers to ensure the appropriateness and readability of the items. After the experts of FDM were identified, the researchers worked with them to revise the items in order to ensure the specialization and accuracy of the items and to establish validity. After the revision, the first round FDM survey was conducted by asking experts to specify the degree of importance for each

item, and then defuzzified values of each construct and item were calculated for a consistency test. The scale was revised based on the test results. Finally, the FAHP survey was performed based on the results of the FDM survey to calculate relative weights of each construct and each item by asking experts to complete a paired comparison on the importance between each paired item. The reliability and validity of the scale were examined afterwards. The scale was therefore completed.

Scale Development

The constructs and items of the e-portfolio and knowledge management in the study were determined based on literature review. Five constructs of the knowledge management scale with FDM of e-portfolio are knowledge sharing, knowledge innovation, knowledge acquisition, knowledge application, and knowledge accumulation. These five constructs are the important concepts of knowledge management.

The items of the scale were developed based on activities involved in the development of e-portfolios, including reflection, work revision, self assessment on work, arrangement of learning content, peer and teacher feedback toward work, modeling, and communication and discussion. After much deliberation, the researchers deleted the items that did not work with e-portfolios and knowledge management. To make the scale more readable and easier to respond, each item was phrased using the same sentence pattern.

There were 40 items in the scale, with eight items for each construct. Each construct is explained as follows: 1) Knowledge sharing is to measure a situation of knowledge sharing between a student and peers; 2) Knowledge innovation is to measure a shift that a student reintegrates the existing knowledge and creates the new knowledge and thinking model; 3) Knowledge acquisition is to measure a student's situation on acquiring knowledge in a learning process; 4) Knowledge application is to measure a student's situation on applications in his or her work or learning; 5) Knowledge accumulation is to measure a student's situation on storage and accumulation of learning content or work.

Data Collection and Analysis

The procedure for FDM

- 1) Collecting opinions of decision group;
- 2) Setting triangular fuzzy number;
- 3) Screening evaluation indexes.

The procedure for FAHP

- 1) Establishing hierarchy architecture;
- 2) Designing the scale;
- 3) Establishing a fuzzy positive reciprocal matrix;
- 4) Consistency Test;
- 5) Calculating fuzzy weight value;
- 6) Defuzzification;
- 7) Sequencing.

Reliability and validity

The threshold (Cronbach's $\alpha=0.7$) was employed in the present study to examine the consistency of the result of FDM scale. Reliability must be greater than 0.7 in order to meet a certain level of reliability. If Cronbach's α of a FDM scale in the first round is greater than 0.7, then the scale possesses a certain level of reliability. Hwang, Huang, and Tseng (2004), Lin (2009), and Zha (2006) adopted the consistency index proposed by Satty by using Power Choice software to calculate CI. When the CI meets the requirement of the consistency test ($CI < 1$), the FAHP scale possesses a consistency. If a FAHP scale passes the consistency test, its rationality and objectivity can be established.

Two scales in the present study included FDM and FAHP, and the face validity was completed with reviews by the researchers. Based on literature review and suggestions from experts, the scale was revised and examined in order to understand how each item actually measured for the research questions and to achieve validity.

Results

Result for the Analysis of FDM Scale

There were 40 items of the FDM scale in the first round, including five constructs, which were knowledge sharing, knowledge innovation, knowledge acquisition, knowledge application, and knowledge accumulation. The evaluation indexes were screened based on the threshold $\alpha=0.7$. The indexes that were greater than 0.7 were retained, whereas the indexes that were smaller than 0.7 were deleted.

It was found that the defuzzified values for the items in the construct of peer feedback toward work were smaller than 0.7, which were 0.67, 0.69, 0.67, 0.67, and 0.66. The five items did not reach the threshold, so they were deleted. This revealed that experts believed that the effect of peer feedback toward work on knowledge management was unlikely to exist during the development of portfolios. Other items were retained because their defuzzified values were greater than 0.7.

Result for the Analysis of FAHP Scale

Based on the result and the analysis of the first round, the scale for the second round was developed. Super Decision, which is software of FAHP, was employed in the present study to calculate each index's weight value and consistency. The consistency existed when CI was smaller than 0.1. CI among constructs and CI among items in a construct were less than 0.1, implying that consistency existed among constructs and among items in each construct.

The sequence for the five constructs was knowledge application, knowledge sharing, knowledge innovation, knowledge acquisition, and knowledge accumulation, based on the weight values, from high to low. Knowledge application possessed the highest weight (0.232), which implied that the e-portfolio had the highest effect on knowledge application.

Conclusion and Implication

Compared with existing knowledge management scales, features of the scale in the study included: 1) the participants were students; 2) e-portfolios; 3) the items in each construct were developed based on the common activities of e-portfolios, including reflection, revision on works, self assessment on works, arrangement of learning content, teacher feedback, modeling, and communication and discussion; and 4) the items in five constructs were corresponding to one another. Most existing knowledge scales were not designed for students and e-portfolios, so items in different constructs were not corresponding to one another.

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JOEMLS English Summary



A Study of Using Tangible Augmented Reality System to Enhance the Learning Effects on Museum Artifacts

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Abstract

The purpose of this study was based on our WiiRemote system study results to improve the human-machine interface and to develop the tangible augmented reality system for the learning effects on museum artifacts. The system prototype of tangible augmented reality system for butterfly's specimens was examined in National Museum of Natural Science. Through the research method of questionnaire, interview and observation, we gathered the different aspects of the data and the information from visitors of National Museum of Natural Science. Based on the analysis of research data, the important conclusions are as follows: 1. All visitors highly satisfied with the tangible augmented reality system and met their needs of use: high interaction, easy to use and enjoyment; 2. The system usability impacted the system utility. Furthermore both of system usability and system utility affected the users' attention in tangible augmented reality system.

Keywords: Museum guide system; User interface; Tangible augmented reality

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SUMMARY

Introduction

Delivering museum guides digitally is currently an important method for museum education. In particular, interactive museum guides can intensify visitors' enthusiasm and interest. Therefore, this study intends to incorporate information technology into museum guides, specifically Tangible Augmented Reality technology, in order to investigate the benefits of applying these technologies to designing guides for museum artifacts.

Literature Review

Main functions of museums are to provide educational and recreational experiences so that visitors can learn and have fun at the same time. However literature review shows that visitors don't stay very long for artifacts on exhibit. How to effectively design and attract visitors' attention so that they can be cultivated by the exhibit? An important issue here is to improve delivering methods for museum guides.

Interactive exhibits can provide enhanced entertainment and make a deep impression on the visitors through a direct and intuitive way of presenting the artifacts. In addition, interactive exhibits apply a refreshing and enjoyable ICT approach so that visitors become interested in learning and are willing to go through the exhibits repeatedly. Museum guides are not to replace existing museum tour guides but to provide enhanced features for the guides. Also there are some dimensional or abstract concepts that are beyond describable. In this case interactive museum guides can help rendering a more tangible presentation about the artifacts. In addition, when museum tour guides are not available, the guides allow visitors to freely explore, learn and research in the museums. Therefore the human-machine interface for the museum guides is very important.

Research also shows that museum guides developed using Tangible Augmented Reality technology often increase visitors' curiosity and interests as well as higher interactivity with the guides. As such, if we provide more interactive, attractive and stimulating Tangible Augmented Reality guide systems, not only the visitors can be assured with consistent sense of space and learning environment, but also the cost for creating such environment can be reduced. Hence the education function of museums can be enhanced in the future. Therefore, for this study the researchers focused on developing applications that had the capabilities of rotating and zooming on museum specimens as well as examining specimens' detail textures. In view of the future needs of the research, "Altas moth" specimens was selected as the representing artifacts. In the past

butterfly products, such as Altas moth samples, was once major exporting goods from Taiwan.

Research Methods

Phase I

There were two phases of the research. Phase I focused on conducting an initial investigation on the design of interactive Tangible Augmented Reality systems (Wang et. al., 2010) and used WiiRemote. For the WiiRemote had a low learning curve and was popular at that time. The results showed that the museum visitors liked the system however it had a high error rate which caused “break downs” during operation and could affected cognitive processes.

Phase II

During Phase II we designed a Tangible Augmented Reality museum guide system with the goal to improve the errors and intuitiveness identified during Phase I. The system design of the second phase of the experiment consists of three main parts, namely makers, 3D objects, and the TAR system. EZFLAR package was used as the source function library and three Tangible Augmented Reality system interface prototypes were designed: “single press triggers single motion”, “single trigger for continuous motion” and “single press triggers continuous motion”. The prototypes were evaluated by the museum visitors. The “single press triggers continuous motion” prototype was selected as the system interface and was tested by conducting surveys, interviews and observations in order to explore the users’ cognitive understanding of the use of this system, the ease of use of the system, the authenticity of the system object, the willingness to use of the system, and the feasibility of the Tangible Augmented Reality application.

Results and Discussion

1. The visitors liked both operating interfaces used in Phase I and Phase II.
2. When designing Tangible Augmented Reality museum guide systems, elements of gaming can be incorporated in order to attract visitors.
3. Visitors’ sex, age or level of experience with gaming consoles had no clear effect on whether they found the Tangible Augmented Reality interface user-friendly.
4. The “reality” factor had no clear impact on willingness to use the system. For visitors the most attractive factors were interactivity, user-friendliness and enjoyment.
5. The error rate varied based on the visitors’ age. However they still had high degree of focus because the system was user-friendly.

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