

**DESIGN AND DEVELOPMENT OF ONLINE ADMISSION  
SYSTEM FOR ALQUDS OPEN UNIVERSITY IN PALESTINE**

**SAMER A.K MALALHA (808253)**

**UNIVERSITY UTARA MALAYSIA**

**2012**

# **DESIGN AND DEVELOPMENT OF ONLINE ADMISION SYSTEM FOR ALQUDS OPEN UNIVERSITY IN PALESTINE**

A project submitted to the Graduate School in partial  
fulfillment of the requirements for the degree  
Master of Science (Information Technology)  
Universiti Utara Malaysia

**By**  
**Samer A.K Malalha**

© Samer A.K Malalha, June 2012, All Rights Reserved.

## **PERMISSION TO USE**

In presenting this project of the requirements for a Master of Science in Information Technology (MSc. IT) from Universiti Utara Malaysia. I agree that the University library may make it freely available for inspection. I further agree that permission for copying of this project in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor or in their absence, by the Dean of Awang Had Salleh Graduate School. It is understood that any copying or publication or use of this project or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my project.

Request for permission to copy or make other use of materials in this project, in whole or in part, should be addressed to:

Dean of Awang Had Salleh Graduate School  
College of Arts and Sciences  
Universiti Utara Malaysia  
06010 UUM Sintok  
Kedah Darul Aman  
Malaysia

## **ABSTRACT**

Student admissions are playing very important role in major activities of the any university as the basic requirement of the university is students and without students university cannot survive. An inefficient admission application system may reduce the number of admitted student in the esteemed university because if the admission system is slow and having many delays in the process. When considering Palestine students this is unfortunate, but when considering Palestinian international students it can mean the difference between success and failure because of the large sums of money each brings to the university's economy. This project is to design and develop the under-graduate Palestinian international and local admission process at the University of Alquds Open University to develop an easy to use system that will significantly quicken and simplify this process. The interviews were conducted for the data collection, after that the design was made in UML for meeting the requirement of admission system. This admission system was developed by using JSP and MySQL. The system usefulness, quality of information and quality of interface were evaluated by distributing questionnaire to users and analysis on the data collected from questionnaire was analyzed by using SPSS software.

## **ACKNOWLEDGEMENT**

In the name of ALLAH, the Most Gracious and Most Merciful, all praises to ALLAH for the strengths and his blessing to me for the completion of the project. I am very thankful to almighty ALLAH who showers his blessing always on me.

I am deeply grateful to my supervisor Mr Abdul Razak bin Rahmat who was all the time helpful and supportive to me for the completion of this project. Being truly without his guidance, support, suggestions and encouragement I would not have been to complete this study. He was my source of motivation and guidance for the completion of this project. I am thankful for his cooperation and guidance which was continuous throughout the semester all the way.

Also I would like to thank Ms. Nor Farzana Binti Abd Ghani for giving her valuable comments regarding to achieve the best quality of this work. My deeply thanks to my father, my mother and all my family who they been patient and being supportive for pursuing my higher studies.

I would like to thank all those who supported me and giving me encouragement for the process of completion of this project.

Thanks to all UUM officials, my friends and my colleagues who they supported and encouraged me at the various situation in the completion and successful achievement of this project.

*Samer A.K Malalha*

*2012*

## TABLE OF CONTENT

PERMISSION TO USE.....	III
ABSTRACT.....	IV
ACKNOWLEDGEMENT .....	V
TABLE OF CONTENT.....	VI
LIST OF ABBREVIATIONS .....	X
LIST OF TABLES .....	XI
LIST OF FIGURES .....	XII
1. CHAPTER 1 .....	1
INTRODUCTION.....	1
1.1 BACKGROUND .....	1
1.2 PROBLEM STATEMENT .....	2
1.3 RESEARCH QUESTIONS.....	4
1.4 RESEARCH OBJECTIVES.....	4
1.5 SCOPE OF THE STUDY .....	5
1.6 SIGNIFICANCE OF THE STUDY.....	5
1.7 PROJECT ORGANIZATION.....	6
2. CHAPTER 2.....	7
LITERATURE REVIEW .....	7
2.1 AL-QUDS OPEN UNIVERSITY (QOU).....	7
2.1.1 History of QOU .....	7
2.1.2 Instructional Technology Used at QOU .....	8
2.2 THE IMPORTANCE OF THE ADMISSION SYSTEM .....	8
2.2.1 The Problems and Issues in Admissions .....	9
2.2.2 Suggestions for Fair and Transparent Admission System.....	10
2.3 THE FUNCTIONS OF DOCUMENTS IN ORGANIZATIONS .....	11
2.3.1 Concepts and Definition .....	11
2.3.2 Types Of Documents .....	12
2.3.3 Functions of Documents.....	13

2.3.4 Document Processing .....	14
2.3.5 Electronic Documentation (Paperless Organizations).....	14
2.3.6 Advantages or Endeavors of Paperless Office Operation .....	16
2.4 WEB AND INTERNET .....	17
2.4.1 Web-Based System.....	18
2.4.2 Web Based Communications.....	19
2.4.3 Advantages of Web Based Applications .....	19
2.4.4 Web Application Architecture .....	20
2.5 JAVA PROGRAMMING LANGUAGE .....	21
2.5.1 Why Java Is Important To Internet .....	22
2.5.2 Java Features .....	22
2.5.3 Java Server Pages .....	23
2.5.4 What Is JavaServer Pages? .....	23
2.5.5 Why to Use JSP?.....	25
2.5.6 The JSP Advantages .....	26
2.5.7 JSP Processing .....	27
2.5.8 Java Database Connectivity (Jdbc) .....	29
3. CHAPTER 3.....	34
METHODOLOGY .....	34
3.1 INTRODUCTION .....	34
3.2 AWARENESS OF PROBLEM.....	35
3.3 REQUIREMENT ANALYSIS.....	35
3.3.1 Data Collection .....	36
3.3.2 Suggestion.....	36
3.4 DESIGN REQUIREMENT MODEL .....	37
3.5 DEVELOPMENT .....	37
3.6 EVALUATION & TESTING .....	38
3.7 DOCUMENTATION.....	39
4. CHAPTER 4.....	40
SYSTEM DESIGN.....	40
4.1 REQUIREMENTS ANALYSIS.....	40

4.2	USE CASE DIAGRAM .....	42
4.3	USE CASE SPECIFICATION .....	44
4.3.1	Use Case Specification Sign up [OAS_01] .....	45
4.3.2	Use Case Specification Login [OAS_02] .....	46
4.3.3	Use Case Specification Forget Secret Password [OAS_03] .....	48
4.3.4	Use Case Specification Create Application [OAS_04] .....	49
4.3.5	Use Case Specification Pay The Payments [OAS_05] .....	50
4.3.6	Use Case Specification View Application Status [OAS_06] .....	52
4.3.7	Use Case Specification Update Application Status [Oas_07] .....	53
4.3.8	Use Case Specification View Profile [Oas_08] .....	54
4.3.9	Use Case Specification Update Profile [Oas_09] .....	56
4.3.10	Use Case Specification Manage User Account [Oas_010] .....	57
4.4	SEQUENCE DIAGRAM .....	59
4.4.1	Sign Up [OAS_UCD001] .....	59
4.4.2	Log_In [OAS_UCD002] .....	60
4.4.3	Forget Password [OAS_UCD003] .....	61
4.4.4	Create Application [OAS_UCD004] .....	62
4.4.5	Payments of Application [OAS_UCD005] .....	63
4.4.6	View Application Status [OAS_UCD006] .....	64
4.4.7	Update Application Status [OAS_UCD007] .....	65
4.4.8	View User Profile [OAS_UCD008] .....	66
4.4.9	Update User Profile [OAS_UCD009] .....	67
4.4.10	Add User Account [OAS_UCD010] .....	68
4.4.11	Update User Account [OAS_UCD011] .....	69
4.4.12	Delete User Account [OAS_UCD012] .....	70
4.5	Class Diagram .....	71
4.6	DEVELOPED PROTOTYPE INTERFACE .....	72
4.6.1	Main Page Interface .....	72
4.6.2	Registration Page Interface .....	72
4.6.3	Login Page Interface .....	73
4.6.4	Apply application education details Page Interface .....	74



4.6.5 Apply application program selection and file upload Page Interface .....	74
4.6.6 Payment Selection Page Interface .....	75
4.6.7 Online Payment Page Interface .....	76
4.6.8 Application Status Page Interface .....	77
4.6.9 Admin Login Page Interface .....	78
4.6.10 Admin main Page Interface .....	79
4.6.11 Manage Applications Page Interface .....	80
5. CHAPTER FIVE .....	81
RESULTS AND FINDINGS .....	81
5.1 DESCRIPTIVE STATISTICS OF USER INTERFACE SATISFICATION .....	81
5.2 THE COMPUTER SYSTEM USABILITY QUESTIONNAIRE (CSUQ) .....	82
5.3 DESCRIPTIVE STATISTICS OF DEMOGRAPHIC INFORMATION .....	83
5.4 RESULT OF SYSTEM SATISFACTION EVALUATION .....	86
5.5 RELIABILITY TEST RESULTS .....	89
6. CHAPTER 6 .....	92
DISCUSSION AND CONCLUSION .....	92
6.1 INTRODUCTION .....	92
6.2 LIMITATIONS .....	93
6.3 RECOMMENDATION .....	94
6.4 STUDY CONTRIBUTION .....	94
6.6 CONCLUSION .....	95
REFERENCES .....	96
APPENDIX – A .....	101
APPENDIX – B .....	104

## **LIST OF ABBREVIATIONS**

QOU	:	Alquds Open University
UUM	:	Universiti Utara Malaysia
OCR	:	Optical Character Recognition
WWW	:	World Wide Web
JSP	:	Java Server Pages
JSTL	:	JSP special standard tag library
CGI	:	Common Gateway Interface
JDBC	:	Java Database Connectivity
APIs	:	Application Programming Interfaces
JDK	:	Java Developer Kit
SQL	:	Structured Query Language
ODBC	:	Open Database Connectivity
UML	:	Unified Modeling Language
OAS	:	Online Admission System
CSUQ	:	Computer System Usability Questionnaire
SPSS	:	Statistical Package for the Social Sciences
IBM	:	International Business Machines
CAPTCHA	:	Completely Automated Public Turing test to tell Computers and Humans Apart

## LIST OF TABLES

TABLE 4.1: FUNCTIONAL REQUIREMENTS .....	41
TABLE 4.2: USE CASE LOOK-UP TABLE .....	42
TABLE 5.1: CSUQ FACTORS AND ITS ITEMS .....	83
TABLE 5.2: GENDER INFORMATION.....	83
TABLE 5.3: AGE INFORMATION.....	84
TABLE 5.4: EXPERIENCE OF COMPUTER INFORMATION.....	85
TABLE 5.5: SYSTEM USEFULNESS .....	87
TABLE 5.6: QUALITY OF INFORMATION.....	87
TABLE 5.7: INTERFACE QUALITY .....	88
TABLE 5.8: OVERALL .....	89
TABLE 5.9: THE TEST RELIABILITY (CRONBACH'S ALPHA).....	90

## LIST OF FIGURES

FIGURE 2.1: WEB APPLICATION ARCHITECTURE .....	21
FIGURE 2.2: GENERATING DYNAMIC CONTENT WITH JSP ELEMENTS .....	25
FIGURE 2.3: JSP PAGE TRANSLATION AND PROCESSING PHASES .....	28
FIGURE 2.4: THE ARCHITECTURE OF JDBC .....	32
FIGURE 3.1: OBJECT ORIENTED METHODOLOGY .....	35
FIGURE 4.1: USE CASE DIAGRAM .....	43
FIGURE 4.2: USE CASE SPECIFICATION SIGN UP .....	45
FIGURE 4.3: USE CASE SPECIFICATION LOGIN .....	46
FIGURE 4.4: USE CASE SPECIFICATION FORGET PASSWORD .....	48
FIGURE 4.5: USE CASE SPECIFICATION CREATE APPLICATION .....	49
FIGURE 4.6: USE CASE SPECIFICATION PAYMENT .....	50
FIGURE 4.7: USE CASE SPECIFICATION APPLICATION STATUS .....	52
FIGURE 4.8: USE CASE SPECIFICATION UPDATE APPLICATION STATUS .....	53
FIGURE 4.9: USE CASE SPECIFICATION VIEW PROFILE .....	54
FIGURE 4.10: USE CASE SPECIFICATION UPDATE PROFILE .....	56
FIGURE 4.11: USE CASE SPECIFICATION MANAGE USER ACCOUNT .....	57
FIGURE 4.12: SEQUENCE DIAGRAM FOR SIGN UP .....	59
FIGURE 4.13: SEQUENCE DIAGRAM FOR LOGIN .....	60
FIGURE 4.14: SEQUENCE DIAGRAM FOR FORGET PASSWORD .....	61
FIGURE 4.15: SEQUENCE DIAGRAM FOR CREATE APPLICATION .....	62
FIGURE 4.16: SEQUENCE DIAGRAM FOR DOING THE PAYMENTS .....	63
FIGURE 4.17: : SEQUENCE DIAGRAM FOR VIEW APPLICATION STATUS .....	64
FIGURE 4.18: SEQUENCE DIAGRAM FOR VIEW APPLICATION STATUS. ....	65
FIGURE 4.19: SEQUENCE DIAGRAM FOR VIEW USER PROFILE .....	66
FIGURE 4.20: SEQUENCE DIAGRAM FOR UPDATE USER PROFILE .....	67
FIGURE 4.21: SEQUENCE DIAGRAM FOR ADD USER ACCOUNT .....	68
FIGURE 4.22: SEQUENCE DIAGRAM FOR UPDATE USER ACCOUNT .....	69
FIGURE 4.23: SEQUENCE DIAGRAM FOR DELETE USER ACCOUNT .....	70
FIGURE 4.24: CLASS DIAGRAM .....	71
FIGURE 4.25: SCREENSHOT OF MAIN PAGE .....	72
FIGURE 4.26: SCREENSHOT OF USER REGISTRATION PAGE .....	73
FIGURE 4.27: SCREENSHOT OF LOGIN PAGE .....	73
FIGURE 4.28: SCREENSHOT OF APPLY APPLICATION EDUCATION DETAILS PAGE .....	74
FIGURE 4.29: SCREENSHOT OF APPLY APPLICATION PROGRAM AND FILE UPLOAD PAGE .....	75
FIGURE 4.30: SCREENSHOT OF PAYMENT SELECTION PAGE .....	76
FIGURE 4.31: SCREENSHOT OF ONLINE PAYMENT PAGE .....	77
FIGURE 4.32: SCREENSHOT OF APPLICATION STATUS PAGE .....	78
FIGURE 4.33: SCREENSHOT OF ADMIN LOGIN PAGE .....	78

FIGURE 4.34: SCREENSHOT OF ADMIN MAIN PAGE.....	79
FIGURE 4.35: SCREENSHOT OF MANAGE APPLICATION PAGE.....	80
FIGURE 5.1: GENDER ANALYSIS .....	84
FIGURE 5.2: AGE ANALYSIS .....	85
FIGURE 5.3: EXPERIENCE IN COMPUTER ANALYSIS .....	86

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 BACKGROUND**

Student Admissions is the process in which all applicants to The University of ALQUDS OPEN UNIVERSITY they apply for admission. Like the manual admission applications, where the procedure of admission application starts with the completion of student admission form by the perspective student through the manual university admission department (Admission procedure & policy, 2012), the student may print and download the form and also come directly from the university.

The second stage will be the University Admission Department will review and consider the application for admission and it will check that all the pre-requisite and required information which is mandatory is provided or not, also the documentation required with the form just like degree and certificates required are attached with the form or not. If anything is missing information or the required documents the Admission Department will send to the application from where it was initiated or routed to rearrange and provide the missing documents or mandatory information required (Admission procedure & policy, 2012).

The whole entire application will be forwarded, along with the required documents to the section of the admission department for the evaluation, the teachers and staff committee will have right to decide that which application will be accepted or rejected. The committee will review the

The contents of  
the thesis is for  
internal user  
only

## **6.5 FUTURE WORK**

The online admission system prototype which was developed is effective in a way that it will automate and make online admission instead of manual. Yet some areas in this study not explored in detail due to time constraint. Some of them are given below in future the possibilities of work to be carried out in this system

1. The payment system can be increased by using the original merchant account for credit card holders.
2. The admission offer letter can be sent online when student is admitted to the university.
3. Student can be assigned academic coordinator to advice them after admission to avoid problems of students facing for coming university and choosing subjects.
4. The admission system security in login can be increased by using CAPTCHA.
5. The System can send the confirmation or information by SMS to cell phone of candidates.

## **6.6 CONCLUSION**

This chapter discussed on user acceptance, usability results and system limitations. At the end of the chapter some recommendations are proposed. The overall findings found during the development of this prototype and testing were positive and goal oriented.

As it was already explained in Chapter one that the major objective of this study is to design and develop an Online Admission System for QOU. The prototype which was developed that is very helpful to the admission department as well as the perspective students. This Online Admission System will bring the enhanced interaction between them.



## REFERENCES

- Admission procedure & policy (2012). Retrieved January 28, 2012, From <http://www.qou.edu/english/index.jsp?pageId=25>.
- Alexander, S. et al., (2003), Case Studies in Admissions to and Early Performance in Computer Science Degrees, ITiCSE-WGR '03 Working group reports from ITiCSE on Innovation and technology in computer science education, ACM New York, NY, USA
- Alsunbul, A. (2002). Issues relating to distance education in the Arab world. *Convergence*, 35(1), 59- 81. ERIC Database.
- Bergsten, H. (2002). *JavaServer Pages 2<sup>nd</sup> Edition*, Publisher O'Reilly. ISBN 059600317X.
- Barnum, C. M. (2002). *Usability Testing and Research*, New York Longman. Needham Heights, MA. Allyn & Bacon, Inc.
- Boyer, J. M. (2008). Interactive Office Documents A New Face for Web 2.0 Applications, *Proceedings of the 2008 ACM Symposium on Document Engineering*.
- Caulton, D. A. (2001). Relaxing the homogeneity assumption in usability testing. *Behaviour & Information Technology*, 20 1–7.
- Cavana, R., Delahaye, B., & Sekaran, U. (2001). *Applied Business Research Qualitative and Quantitative Methods*, John Wiley & Sons, Milton, Queensland.
- Chen, M. Y., Kıcıman E., & Brewer E. (2003). An Online Evolutionary Approach to Developing Internet Services, *HOTOS'03 Proceedings of the 9th conference on Topics in Operating Systems*, Vol 9.
- Clark, M.C & Boyle R. D., (2003), Discipline specific preparation for university study. *Teaching in Higher Education*,. In preparation.
- Cooper, J. W. (2000). *Java™ Design Patterns A Tutorial*, Addison-Wesley Professional.
- Fielding, R. T., & Taylor, R. N. (2002). Principled design of the modern Web architecture, *ACM Transactions on Internet Technology (TOIT)*, v.2 n.2, p.115-150.
- Fan, K., Li N., Wu, Q., & Liu, X. (2010). A framework of on-line office document processing tool based on Xforms, Published in *IEEE International Conference on Software Engineering and Service Sciences (ICSESS)*.

- Fuggetta, F., Picco, G. P., & Vigna, G. (1998). Understanding Code Mobility, *IEEE Transactions on Software Engineering*, v.24 n.5, p.342-361.
- Gaedke, M., & Graef, G. (2000). Development and Evolution of Web- Applications using the Web Composition Process Model. In *International Workshop on Web Engineering at the 9th International WWW Conference*.
- Galbraith, J. R. (1979). Organization Design An Information Processing View. In R. C. Huseman (Eds.), *Readings in Interpersonal and Organizational Communication* Boston, MA Allyn and Bacon.
- Ghanem, F., & Hamayil, M. (2011). Management Role of Al-Quds Open University in Leading Effective Distance Learning Programs An Evaluation of QOU Experience in Blended Learning, *Contemporary educational technology*, 2(1), 55-76.
- Jusuf, S., Nevenka, T., & Miroslav, Z. (2003). University Without Paper”, 25th Int. Conf. IT Interfaces ITI, Cavtat, Croatia.
- Konishi, K., Furukawa, N., & Ikeda, H. (2007). Data Model and Architecture of a Paper-Digital Document Management System, *DocEng'07*, August 28- 31, Winnipeg, Manitoba, Canada, ACM.
- Lewis, J. (1995). IBM computer usability satisfaction questionnaires psychometric evaluation and instructions for use. *International Journal of Human-Computer Interaction*, 7(1), 57-78.
- Liao, C., Guimbretiere, F., & Hinckley, K. (2005). PapierCraft A Command System for Interactive paper, *Proceedings of the 18th Annual ACM Symposium on user interface software and technology*.
- Maciaszek, L. (2007). *Requirement Analysis and System Design*, Addison Wesley, 3rd edition.
- Macrae, S. & Maguire M., (2002), Getting in and getting on: choosing the ‘best’. In A. Hayton and A. Pacazuska, editors, *Access, Participation and Higher Education: policy and practice*.
- Meier, J., & Sprague, R. (1996). Towards a Better Understanding of Electronic Document Management, *Proceedings of the 29th Hawaii International Conference on System Sciences*, Digital Documents mini-track, pp. 53–61.

- Microsoft Corporation. (2012). Chapter 20 Choosing an Application Type. Retrieved, Feb 01, 2012 from <http://msdn.microsoft.com/en-us/library/ee658104.aspx#WebApplicationArchetype>
- Miller, J. A., Palaniswami, D., Sheth, A. P., Kochut, K. J., & Singh, H. (1998). WebWork METEOR 2's web-based workflow management system. *Journal of Intelligent Information Systems*, 10(2), 185-215.
- Norrie, M. C., Signer, B., & Weibel, N. (2006). Print-n-Link Weaving the Paper Web, in *Proceedings of DocEng*.
- Patel, P., & Moss, K. (1997). *Java Database Programming with JDBC*, 2nd Edition, Coriolis Group Books, NY.
- Plimmer B., & Apperley, M., (2007), Making Paperless Work, ACM International Conference Proceeding Series; Vol. 254, Proceedings of the 7th ACM SIGCHI New Zealand chapter's international conference on Computer-human interaction design centered HCI (2007) Pages1-8.
- Plimmer B., & Mason, P. (2006). A Pen-based Paperless Environment for Annotating and Marking Student Assignments, Seventh Australasian User Interface Conference (AUI2006) Vol. 50.
- Rajasekar, S., & Philominathan, P. (2000). Research Methodology [Electronic Version], Retrieved January 25, 2012, from <http://www.scribd.com/doc/6949151/Research-Methodology>.
- Russell, B. C., Torralba, A., Murphy, K. P., & Freeman, W. T. (2008). LabelMe a database and web-based tool for image annotation. *International journal of computer vision*, 77(1), 157-173.
- SangYeob, N., & SeungDae, L, (2008). Design of Security Mechanism for Electronic Document Repository System, (2008), *Convergence and Hybrid Information Technology*. ICHIT '08.
- Schildt, H. (2002). *The Complete Reference – JAVA 2*, Fifth Edition, McGraw-Hill Osborne Media, 2002.

- Schwartz, S., (2004), Fair admissions to higher education: recommendations for good practice, Admissions to Higher Education Steering Group.
- Sellen, A. J., & Harper, R. H., (2001). The Myth of the Paperless Office, 1st Ed., MIT Press.
- Skapinker, M. (1991), Warm for Forms. BYTE, Pages 166-181.
- Smart, K. L. (1995). The paperless office Facts and Fictions”, Brigham Young University, Department of Management Communication.
- Sommerville, I. (2007). “Software Engineering”. 8th Edition, New York, Harlow Addison Wesley.
- Sprenger, T., Gross, M., Eggenberger, A., & Kaufmann, M. (1997). A framework for physically-based information visualization. Paper presented at the Proceedings of Eurographics Workshop on Visualization.
- Sprague, R. H. (1995). Electronic Document Management; Challenges and Opportunities for Information Systems Managers, MIS Quarterly, 19,2, (March 1995), pp. 29-49.
- Sridaran, R., Padmavathi G., and Iyakutti R. (2009). A Survey of Design Pattern Based Web Applications. *JOURNAL OF OBJECT TECHNOLOGY*, 8(2).
- Tauber, E.M. (1972). Marketing Notes and communications why do people shop? Journal of Marketing, Vol. 36, October, pp46-59.
- Valacich, J., George J., & Hoffer J. (2004). Essentials of Systems Analysis and Design 2<sup>nd</sup> edition Pearson/Prentice Hall.
- Wang, X. (2006). A practical way to teach web programming in computer science, Journal of Computing Sciences in Colleges, v.22 n.1, p.211-220.
- Xie, Q., (2004).Web-based Management System of Documents, Published in Microcomputer Development, 8th Conference.
- Yaffee, R. A. (1998). Enhancement of reliability analysis application of intraclass correlations with SPSS/Windows v. 8. New York Statistics and Social Science Group.
- Yang, J., & Zhao, Q. (2007). E-Business in Service Recent Trend and Development in Online College Textbook Sales. 7( 2).

Yusoff, A.M., & Sidhu, M. S. (2001), Paperless in the Electronic Era Millennium Dream and Reality, in Proc. CSCWD, pp.536-541.

Zdybel, J. F., Sang, J. H., Pedersen, J. O., Smith Z., Henderson D., Hecht D. L., et al. (1996). Hardcopy lossless data storage and communications for electronic document processing systems.