

DEVELOPMENT AND EVALUATION OF COMPUTER AIDED TESTING AND INFORMATION (CATI) FOR THE GUIDANCE OFFICE AT THE ISABELA STATE UNIVERSITY, CABAGAN, ISABELA

Rosalinda B. Guiyab^[1]

^[1]Faculty, Isabela State University, Cabagan, Isabela, Philippines 3328

ABSTRACT

The study aimed to develop and evaluate a Computer Aided Testing and Information (CATI) for the Guidance Office at Isabela State University, Cabagan, Isabela. The development phase of this study included the design of the CATI, used the Waterfall Model, together with Unified Modeling Language. The system made used a Client-Server configuration that allows any connected client to the functions possible from the server interface. The systems administrator can just “watch” what is happening at the server from their connected computers. On the other hand, the evaluation phase utilized two methods: technical evaluation with system testing and humanistic evaluation with acceptability of the system. The data gathered was classified according to the respondents to determine if there is a significant difference between their perceptions towards the CATI system. The study revealed that across all features, the CATI system was consistently adjudged by the students and IT experts as “highly acceptable” in terms of accuracy, efficiency, reliability and security features. The study revealed that evaluations based on requirements are effective as most software organizations used in system testing regardless of their sizes and levels. This information confirmed the need to automate the process used to administer, check and score the university entrance examination as well as keeping the students record thus, the study contributes to the body of literatures on the effectiveness of the use of computerized assessment in higher education.

Keywords: Computer Aided Testing and Information, System Testing, Acceptability

INTRODUCTION

With the current technological advances in the field of information technology, society has to continually adapt the changing demands such advances has brought to it. Communities have become increasingly dependent on computers, systems analysts, programmers, as well as on more reliable and efficient systems. Due to these advancements, productivity demands from employees in any given work setting have dramatically increased to a point that it is intolerable without technological intervention. The Guidance Office of the Isabela State University (ISU) at Cabagan, Isabela is not an exemption.

In order for ISU to cope with these demands, it is necessary that it adapts itself to the use of available technologies to aid its operations—more specifically, the application of CATI in the general management of its admission system, and eventually managing its students’ information.

Currently, the Office of the Guidance Counselor at Isabela State University is using the paper-based

form or the traditional written examination in administering the University Entrance Examination and manually keeping the Students’ Information in the filing cabinet. After the examination, the guidance counselor corrects the examination manually and the result is given to the student which takes up to two (2) weeks after the examination. This kind of set-up is found to be time consuming and inevitably, there are errors in checking the examination. As a consequence, the guidance counselor cannot do other guidance services which may be deemed important to clarify issues and academic concerns about the welfare of the students.

With the cited problems above, the researcher developed the Computer Aided Testing and Information (CATI) for the Guidance Office at the Isabela State University, Cabagan, Isabela. This system aimed to automate the process use to create, administer, check and score the University Entrance Examination as well as keeping the Students’ Information. It is geared towards improvement of the traditional written entrance examination and the manual keeping of student’s personal information. It also aimed to

evaluate the CATI system as to its congruence to its intended use as well as to its acceptability by its intended or potential users with a survey of the perception with regard to the features of the system based on the software criteria used in System Testing that will further validate the effectiveness of the CATI.

Statement of the Problem

Specifically, it sought to answer the following questions:

1. What are the features of the Computer Aided Testing and Information (CATI) in terms of the following software criteria used in System Testing: (a) Accuracy, (b) Efficiency, (c) Reliability and (d) Security;
2. What is the perception of the respondents in the CATI system with respect to the software criteria used in System Testing? And
3. Is there a significant difference in the perception of the IT experts and students on the CATI system with respect to the software criteria used in System Testing?

METHODOLOGY

Research Design

The study used a two-phase process method: The development of a system (First Phase), and its consequent evaluation (Second Phase).
Development Phase

Developmental Model

There are various software development approaches defined and designed which are used during development process of software, these approaches are also referred as “Software development Models”. Each process model follows a particular life cycle in order to ensure success in process of software development.

This study employed the Modified Waterfall Model (Mavaddat, 2008) derived from the Waterfall Model approach which was the first process introduced and followed widely in software engineering to

ensure success of the system to be developed. A number of variants of this model exist, with each one quoting slightly different labels for the various stages however, the model may be considered as having six distinct phases namely 1.) Requirements; 2.) Analysis; 3.) Design; 4.) Implementation; 5.) Post delivery maintenance; 6.) Requirements.

Evaluation Phase

System Testing

The evaluation is focused on the accuracy, efficiency, security and the reliability features of the CATI system. This also involved humanistic evaluation focused on the acceptability of the system with a survey of the perceptions by its intended users and was statistically analyzed using the weighted mean to describe the effectiveness of the CATI system and the t-test to compare the perception of the IT experts and the students on the said system at 0.05 level of significance. The software criteria were emphasized by AXIA consulting agency that helped enterprises specify and select new software systems – by providing business managers with impartial time-saving tools and advice, to enable them to make the optimum decision.

A survey questionnaire was employed which was formulated based from the software criteria used in system testing that includes accuracy, efficiency, reliability and security in which the parameters to measure such criteria were requirements-driven based from the requirements needed in the admission system of the university^[7].

The scale has five (5) point scales which have a corresponding descriptive equivalent as presented below.

Scale	Descriptive Equivalent
5	Strongly Agree
4	Agree
3	Undecided
2	Disagree
1	Strongly Disagree

The weighted mean rating was used to get the respondents general rating on the CATI. To describe the perceived features of the CATI system

in terms of accuracy, efficiency, reliability and security, the following arbitrary intervals and descriptions were used.

Point Range	Descriptive Equivalent
4.21 – 5.00	Highly Acceptable
3.41 – 4.20	Acceptable
2.61 – 3.40	Fair
1.81 – 2.60	Unacceptable
1.00 – 1.80	Highly Unacceptable

Participants

There were two groups of respondents in the study. The first group consisted of students from the ISUC – CDCAS who were enrolled during the second semester of the school year 2009-2010 and the second group was IT experts of the ISUC including the campus guidance counselor. The stratified random sampling was used to determine the student-respondents using the Slovin's Formula and finally applying proportionate allocation while total enumeration was applied for the second group of respondents. Out of one hundred eighty students (180), a stratified random sample of ninety two (92) students and twelve (12) IT experts including the campus guidance counselor served as respondents of the study.

Data Gathering Procedure

Prior to the pilot test of the study, the system was presented for trial - run and demonstration to the campus where the audience consisted of the campus guidance counselor and the IT experts. This included system testing of the integrated system to verify if the system meets the specified requirements. Suggestions like the user's manual and the video on how to take the examination were integrated into the system.

An evaluation was conducted if the system satisfies the requirements outlined and to ensure that they are error-free. The CATI system was pilot tested to the ISUC – CDCAS students and the IT experts including the campus guidance counselor. For the student-respondents, the researcher tried to get a representative from the different departments of ISUC – CDCAS (e.g. Natural Sciences, Information and Communications Technology, Development Communication and Social Sciences) with closed coordination to the different department heads. The

researcher floated the questionnaire after watching the video on how to take the examination with live or actual demonstration and used of the CATI system. The researcher personally collected the questionnaire to ensure a one hundred percent (100%) retrieval.

Data Analysis

All the data gathered were collected, organized, tabulated and analyzed using the weighted mean. For in depth analysis of data, the t-test was also employed to determine if there is a significant difference between the perception of the IT experts and the students.

RESULTS AND DISCUSSION

Development of the CATI System

Description of the CATI System

The use of the developed CATI system will help speed-up the process of generating reports originally prepared by the Guidance Counselor. Before the student takes the examination, the student must have the information on his high school average grade together with the desired course to be taken in the university. This process includes the filling-up of the Personal Data Form which is given by the Guidance Counselor. The filled-up form will be submitted to the Guidance Counselor who will then verify whether all the required information were properly filled-up. The Guidance Counselor will enter into the system all the necessary student information including the student's examinee number. Before the student takes the entrance examination, he will be oriented on how to take the exam by watching the embedded video on the system. After watching the video, the student is now ready to take the examination. After taking the examination, the student will be immediately notified as to his performance in the examination which will be given by the Guidance Counselor. The system will also generate all the necessary entrance examination reports i.e. the student personal information, entrance examination results, list of students who took the exam per course and college, etc.

Client-Server Configuration

The CATI system used a Client-Server configuration that allows any connected client to

the functions possible from the server interface. The systems administrator can just “watch” what is happening at the Server from their connected computers. The Server computer should be secured in an area like in the office of the Guidance Counselor or to the Executive Officer’s office, and can be administered remotely across the network.

The Evaluation of the CATI System

This part presents the evaluation of the CATI system by getting the perception of the ISUC – CDCAS students and the IT experts including the guidance counselor. Their perceptions were elicited through a questionnaire after watching the video on how to take the examination and with the live or actual demonstration and used of the CATI system.

Accuracy of the CATI System

The perception of the ISUC – CDCAS students and IT experts on the accuracy of the CATI system yielded the following results: precise in checking the examination, 4.88 or highly acceptable; provides correct examination score, 4.84 or highly acceptable; generates exact test items, 4.83 or highly acceptable; generates correct student’s personal information, 4.87 or highly acceptable; precise with the time of the examination, 4.88 or highly acceptable. In general, the ISUC – CDCAS students assessed the accuracy of the CATI system at 4.77 and the IT experts at 4.95, which are both described as “highly acceptable”. The combined perception of the two groups of respondents shows that the abovementioned accuracy features of the CATI system are “highly acceptable”.

Efficiency of the CATI System

The perception of the ISUC – CDCAS students and IT experts on the efficiency of the CATI system are as follows: provides automatic checking, 4.87 or highly acceptable; provides automatic scoring, 4.90 or highly acceptable; provides automatic remarks for English, 4.76 or highly acceptable; provides composite scores for the four subtests, 4.77 or highly acceptable; provides update on time, 4.83 or highly acceptable; provides update on course, 4.82 or highly acceptable; provides update on test items, 4.88 or highly acceptable; provides update on student’s information, 4.88 or highly acceptable. In general, the

ISUC – CDCAS students assessed the efficiency of the CATI system at 4.73 and the IT experts at 4.94 which are both described as “highly acceptable”. The combined perception of the two groups of respondents shows that the abovementioned efficiency features of the CATI system are “highly acceptable.”

Reliability of the CATI System

The perception of the ISUC – CDCAS students and IT experts on the reliability of the CATI system are as follows: can be an aid for administering the university examination, 4.76 or highly acceptable; can be used to keep student’s personal record, 4.78 or highly acceptable; runs in a stand-alone environment, 4.77 or highly acceptable; runs in a network environment, 4.80 or highly acceptable; maximum set-up time of administering the examination must be 120 minutes, 4.72 or highly acceptable; loading time is less than 10 seconds, 4.77 or CATI system is highly acceptable. In general, the ISUC – CDCAS students assessed the reliability of the CATI system at 4.69 and the IT experts at 4.85 which are both described as “highly acceptable”. The combined perception of the two groups of respondents shows that the abovementioned reliability features of the CATI system are “highly acceptable.”

Security of the CATI System

The perception of the ISUC – CDCAS students and IT experts on the security of the CATI system as follows: protected with a password, 4.86 or highly acceptable; allows only authorize users to access the system, 4.82 or highly acceptable; allows only authorize student can take the examination, 4.87 or highly acceptable; allows only administrator or authorize representative manages the CATI system, 4.83 or highly acceptable; the examination result cannot be change, 4.85 or highly acceptable.

In general, the ISUC – CDCAS students assessed the security of the CATI system as 4.82 and the IT experts as 4.88 which are both described as “highly acceptable.” The combined perception of the two groups of respondents showed that the abovementioned security features of the CATI system are “highly acceptable.”

CONCLUSIONS

The following conclusions were drawn based on the results of the study:

The participants “highly accepted,” the accuracy, efficiency, reliability and security features of the CATI system. This information is confirmed the need to automate the process used to administer, check and score the university entrance examination as well as keeping the students record.

The implementation of the developed system is more beneficial than maintaining the present system. The developed system possesses the identity of generating information at a favorable speed with accuracy and reliability. It is also secured against unauthorized access hence; the guidance counselor will not only be benefited but also the school administrators and the whole studentry.

Adopting the developed system is designed to cater even to non-computer literate. The students were able to cope with the use of the CATI system after watching the video on how to take the exam.

The high acceptability of the developed system will motivate the school administrators, guidance counselor and other concerned officials to undertake an action to improve the quality of the admission system of the university and eventually, managing its students record.

RECOMMENDATIONS

Premised on the results and conclusions of this study, the following recommendations were drawn.

1. That the developed system will be implemented to minimize the time consumed in the manual manipulation of the voluminous information in the university entrance and eliminates other problem that have been perennially observed which make the existing system left behind in the computer world.
2. That proper information dissemination is conducted to the school administrators, the guidance counselor and other concerned officials.

3. That the students should watch the CATI video prior to taking the entrance exam.
4. That the CATI system be submitted to the Executive Officer of the Campus for an action to improve the quality of the present admission system of the university and eventually, managing its students’ record.
5. That the users of the system be trained on how to install and use the system.
6. That the IT experts should be tapped to assist the guidance counselor in the initial implementation of the entrance examination.
7. That the Guidance Office should be equipped with electronic facilities for the implementation of the CATI system.
8. That the Guidance Counselor continually updates the content of the university entrance examination.
9. That the CATI system will serve as a vehicle for extension project of the department of ICT if ever other ISU campuses wish to adopt the said system.
10. That future researcher should look into the validity of the questionnaire by integrating a cross-checking of item questions.
11. That further studies should be conducted to improve or upgrade the CATI system if ever there are changes in the admission system of the university.

References

- [1] Asuni, Nicola (2008). “TCExam :: Computer-Based Assessment”. Available from <http://www.tcexam.org>. Retrieved on 2009-07-15.
- [2] Axia Consulting Ltd.,(2009). A summary of essential software criteria. Available from http://www.axia-consulting.co.uk/html/software_criteria.html.
- [3] Ayon-Ayon, D. (2005). Computer Aided Examination... Saint Paul University Philippines, Tuguegarao, Cagayan.

- [4] Breecher, J. (2003). Software Engineering. Chapter 16. Clark University. Modified from the notes of Stephen R. Schach.
- [5] Cotugna, N. & Vickery, C. (1999), Perceptions and Evaluation of the Computerized Registration Examination for Dietitians, Journal of the American Dietetic Association, Volume 101, Issue 12, Pages 1453-1455
- [6] Hansen, W.J., Doring, R., Withlock, L.R. (1978). Why an exam was slower online than on paper. Int. Journal of Man Machine Studies, 10-5, 507-519, Available from <http://m0134.fmg.uva.nl/publications/1992/comp.ass.exam.pdf>
- [7] IEEE. 2004. Guide to Software Engineering Book of Knowledge. Book on-line. Available from <http://www.swebok.org>. Retrieved on 11 August 2009.
- [8] ITECC Philippines, 2002. Available from <http://www.itecc.gov.ph/ephilippines.htm>
- [9] Lovenia, S. F. (2005). A Survey of Current Software Testing Practices in Metro Manila". Masters Thesis. Ateneo de Manila University.
- [10] Mavaddat, F. (2008). Software Engineering. CHAPTER 2. SOFTWARE LIFE CYCLE MODELS. CS430 Notes. Page 17. Modified from the notes of Jerry Breecher of Clark University & Stephen R. Schach, Vanderbilt University. Available from <http://www.student.cs.uwaterloo.ca/~cs430/.../Chapter02-Life-Cycle.ppt>
- [11] McKenna, C (2001). Introducing Computers into the Assessment Process: What is the impact upon Academic Practice? Higher Education Close Up Conference, Lancaster University. Available from <http://ahp.cqu.edu.au.index.htm>
- [12] Veenendaal, Erik van. (The Netherlands), Standard glossary of terms used in Software Testing, Version 1.3 (dd. May, 31st 2007). Produced by the 'Glossary Working Party'. International Software Testing Qualifications Board. . Book on-line. Retrieved on Tuesday, August 11, 2009. Available from <http://www.istqb.org/downloads/glossary-current.pdf>