

IT 01/110

LB/DON/39/2015

A  
**PROJECT REPORT** ?  
 ON  
**ONLINE EXAMINATION SYSTEM**

Submitted To  
**UNIVERSITY OF MORATUWA**

In Partial Fulfillment of the Requirement of  
 DEGREE OF MSC IN INFORMATION TECHNOLOGY

By

C.R. Weeramuni



University of Moratuwa, Sri Lanka.  
 (MSc/IT/08/10015)  
 Electronic Theses & Dissertations

www.lib.mrt.ac.lk  
 Under The Guidance Of

**LIBRARY**  
**UNIVERSITY OF MORATUWA, SRI LANKA**  
**MORATUWA**

Supervisor

Mr. Saminda Premaratne

University of Moratuwa



108936

004 "13"  
 004 (043)

Dept. of Information Technology ?

Faculty of Information Technology

108936

University of Moratuwa

May 2013

108936

## Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

C.R. Weeraman

Name of Student

Ruwankumari

Signature of Student

Date: 12/01/2015



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

Supervised by

S.C. Premaratne

Name of Supervisor(s)

S.C. Premaratne

Signature of Supervisor(s)

Date: 12/01/2015

## Dedication

This work is dedicated to my husband without whose caring support it would not have been possible; and to my parents who inspire in me a respect for human and ethical values and education.



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

## Acknowledgement

It is not a trivial task to complete a project of this magnitude, especially having to meet the dateline of the project. Most of the acknowledgements I must give here must go to my Supervisor Mr. Saminda Premaratne. Throughout the project, he has provided me with much helpful guidance and moral support towards the end when I needed it most! His guidance on Online Examination Systems concept and explanations on the inner working of examination were crucial to the understanding of how a project of this nature should be developed. His guidance, insight, and confidence have inspired me to complete this project within the time schedule.

The senior lecturer Dr. Prasad Wimalaratne has been a source of motivation for me throughout this project process offering his unique and direct assistance or advice where needed.

This project would not have been possible without the support provided by the Principal of Sri Rahula Balika Maha Vidyalaya, Mrs. W.A.S.P. Jayarathna. She was able to provide support while this project was being completed.



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
www.lib.mru.ac.lk

Finally, I wish to thank my husband, Roshan, for his continuous support and encouragement. It was his support in minding the “tribe” that enabled me to complete this research. I also acknowledge the support of my family -mother and father who also ‘baby sat’ helping me to complete this project.

There are many people who had contributed to the satisfactory completion of the project. There are also too many people to mention individually by name, who have provided feedback and inspiration in one way or another that contributed to the success of this project.

Last but not least, I would like to express my gratitude to all those helpful people. Thank you very much.

## Abstract

Sri Lankan government schools are increasingly using Information Communication Technologies (ICTs) for student learning and other school functions. Sri Rahula Balika Maha Vidyalaya (RBV) is also incorporating ICT applications to streamline school management practices. This research examines the implementation of an Online Examination System (OES), which will make use of open source technology. Sustainability literature was used to examine the key measures to identify changes in ICT practices at the school by students, teachers and other school staff.

Question bank can be described as the databank that keeps all the examination questions whether pre-existing or created by user. Web-based examination is an online assessment tool used to evaluate students' performance. Examination will incorporate questions with varying complexity from question bank. Students are required to respond to those examination questions. With this, examination serves as the assessment tool to track student understanding of the classroom material.



University of Moratuwa, Sri Lanka.

Electronic Theses & Dissertations

[www.lib.mru.ac.lk](http://www.lib.mru.ac.lk)

The system that had been developed enables a teacher to author and store a bank of web-based questions. Furthermore, this system is able to assemble questions and generate exam based questions on lecturers' specifications.

The examination module allowed user to conduct examination over the Internet and Intranet. Questions from various topics with different levels of complexity can be included and assigned to user as per the levels. Upon completion of examination, the system is able to grade students based on the questions with varying complexity they have answered.

# Contents

	<b>Page</b>
<b>Chapter 1 – Introduction</b>	<b>01</b>
1.1 Overview of the System	01
1.2 Objective	02
1.3 Project Scope	03
1.4 Problem Statement	03
1.5 System Limitation	05
1.6 Expected Outcome	05
1.7 Significance of System	06
1.8 Theses Organization	06
<b>Chapter 2 – Literature Review</b>	<b>07</b>
2.1 Introduction	07
2.2 Analysis Studies	07
2.2.1 Overview of current Examinations Systems	07
2.2.2 Current Process Flow (Manual)	08
2.2.3 Case Study 1: MIND Online Evaluation System (MOES)	08
2.2.4 Case Study 2: Exam Manager	11
2.2.5 Case Study 3: SIETTE	13
2.2.6 Relationship to existing work	15
2.2.7 OES Approach	17
2.2.7.1 Question difficulty assessment algorithm	17
2.2.7.2 Automatic question generator	18
2.2.7.3 Intelligent questioning system	19
2.3 e-Assessment Systems and Tools	22
2.3.1 e-Learning Systems	22
<b>Chapter 3 – Methodology</b>	<b>25</b>
3.1 Introduction	25
3.2 Software Methodology	26
3.2.1 Techniques Used to Define Requirements	27
3.2.1.1 Analysis of existing systems	27
3.2.1.2 Feedback from users of existing systems	27
3.2.1.3 Review of new technologies	29
3.2.1.4 Library Research	29
3.2.1.5 Internet Browsing	29
3.2.1.6 e-Books, that is, electronic books	30
3.2.2 Software Process Model	30
3.2.3 Choice of Incremental Development Model as Methodology	30





9.5 System Constraints and Future Enhancement	116
9.5.1 Future Enhancement	116
9.5.1.1 Integration with the other existing system	116
9.5.1.2 Support multiple databases	116
9.5.1.3 Support multiple web browsers	116
9.5.1.4 Support multiple devices	116
9.6 Conclusion	116
Appendix A - References	117
Appendix B - Moodle	119
Appendix C - Major Codes of the Development	124
Appendix D - Questionnaire	131
Appendix E - OES Screen Shots	133
Appendix F - WP/JAYA/Sri Rahula Balika Maha Vidyalaya	139
Appendix G - Test Plan	140
Appendix H - Table	143



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

## List of Figures

	Page
Figure 2.1 – Four stages in the Examination System	07
Figure 2.2 – Classic Examination System	08
Figure 2.3 – Semi-Computerized Examinations Marks System	09
Figure 2.4 – Screen shot of questioning process	22
Figure 3.1 – Incremental Development Model	34
Figure 4.1 – Relationship learning modules and assessment activities	40
Figure 5.1 – Proposed online examination system	51
Figure 5.2 – The relationship between assessment and effective	51
Figure 5.3 – Proposed model for examination process	52
Figure 5.4 – Structure of the OES System	57
Figure 5.5 – Interaction flow diagram Students' interactions-OES system	58
Figure 5.6 – Interaction flow diagram - Teachers' interactions-OES system	59
Figure 5.7 – Use case diagram for the OES system	62
Figure 5.8 – Sequence diagram for the OES system	64
Figure 5.9 – Architecture main components of the OES system	65
Figure 6.1 – Architecture of the system-main modules of the OES system	73
Figure 6.2 – Communication between Basic OES system and “ITS URL”	75
Figure 6.3 – Progress Bar	78
Figure 6.4 – Overview of Competencies Module	78
Figure 6.5 – The qualifications achieved by students for a particular test	80
Figure 7.1 – Testing Process	85
Figure 8.1 – Comparison of OES and Traditional Examinations	111



## List of Tables

	Page
Table 8.1 – Results of tallying the Questionnaire Responses	95
Table 8.2 – Job Title	96
Table 8.3 – Gender	96
Table 8.4 – Age Group of Respondents	97
Table 8.5 – Summary of Section B – Questions 1 – 3	97
Table 8.6 – Summary of Section B – Questions 4 – 6	97
Table 8.7 – Summary of Section B – Questions 7 – 17	98
Table 8.8 – Section C – User Interface Colour Scheme	98
Table 8.9 – Section C – User Interface Logout	99
Table 8.10 – Section C – User Interface Buttons	99
Table 8.11 – Section C – User Interface Menus	100
Table 8.12 – Section D – Question 1	100
Table 8.13 – Section D – Question 2	101
Table 8.14 – Section D – Question 3	101
Table 8.15 – Enjoyability of OES Exam Process	104
Table 8.16 – Perceived Learning in OES Exam Process	105
Table 8.17 – Perceived Fairness in Grading in OES Exam Process	105
Table 8.18 – Overall Satisfaction with the OES Exam Process	106
Table 8.19 – Overall Recommendation of Using the OES Exam Process	106
Table 8.20 – Comparison between Traditional Exam and OES Exam	108
Table 8.21 – Reliabilities Summary	110



## List of Acronyms

ADL	Advanced Distributed Learning
API	Application Programming Interfaces
AT	Assessment Test
Basic LTI	Basic Learning Tools Interoperability
CA	Continuous Assessment
CAT	Continuous Assessment Tests
DAG	Directed Acyclic Graph
EMQ	Extended Matching Questions
FAQ	Frequently Asked Questions
FIB	Fill in the Blanks
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IMS	Instructional Management System
IMS GLC	Instructional Management System Global Learning Consortium
ISO	International Organization for Standardization
IT	Information Technology
ITS	Intelligent Tutoring Systems
JISC	Joint Information Systems Committee
LIP	Learner Information Package
LMS	Learning Management Systems
LOM	Learning Object Metadata
LTI	Learning Tools Interoperability
MCQ	Multiple Choice Questions
MRQ	Multiple Response Questions
OES	Online Examination System
OSS	Open Source Software
PT	Practice Test
QAML	Question and Answer Markup Language
QTI	Question and Test Interoperability
RBV	Rahula Balika Maha Vidyalaya
TC	Tool Consumer
TP	Tool Provider

UCD	User-Centered Design
URL	Uniform Resource Locator
VLE	Virtual Learning Environments
XML	Extensible Markup Language



University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)