

TABLE OF CONTENTS

ACKNOWLEDGMENT	III
TABLE OF CONTENTS.....	IV
LIST OF TABLES	IX
LIST OF GRAPHS	X
LIST OF FIGURES	XII
ABSTRACT	XIII

CHAPTER 1 INTRODUCTION 1

1.1 Introduction	1
1.2 Objectives.....	1
1.3 Scope	2
1.4 Problem statement.....	2
1.5 Significance of research	3
1.6 Methodology.....	3
1.7 Report Summary	5

CHAPTER 2 LITERATURE REVIEW 7

2.1 Purpose	7
2.2 Approach	7
2.3 Analysis	7
2.3.1 Pedagogical Issues in Learning.....	7
2.3.1.1 Introduction	7
2.3.1.2 Behaviorist learning theory	8
2.3.1.3 Constructivist learning theory	10
2.3.1.3.1 Characteristics of Constructivist Learning	18
2.3.1.4 Socio-constructivist view of learning	22
2.3.1.4.1 Characteristics of socio-constructivism	23
2.3.1.4.1.1 Multiple Perspectives	23
2.3.1.4.1.2 Goals and Objectives.....	24
2.3.1.4.1.3 Teacher's role	24
2.3.1.4.1.4 Metacognition	25
2.3.1.4.1.5 Learner Control.....	25
2.3.1.4.1.6 Authentic activities and	
contexts/Primary sources of data	26
2.3.1.4.1.7 Knowledge Construction	26
2.3.1.4.1.8 Knowledge Collaboration.....	27
2.3.1.4.1.9 Previous knowledge construction	28
2.3.1.4.1.10 Problem solving	28
2.3.1.4.1.11 Consideration of errors	28
2.3.1.4.1.12 Exploration	29
2.3.1.4.1.13 Apprenticeship learning.....	29
2.3.1.4.1.14 Authentic Assessment	29
2.3.2 Evaluation Methods In Human Computer Interaction.	30
2.3.2.1 Observing and Monitoring	31
2.3.2.2 Experiments and benchmarks.....	32
2.3.2.3 Interpretive	33

	2.3.2.4 Predictive Evaluation—Software Heuristics	34
	2.3.2.5 Users Opinion	39
2.4	Software heuristics and socio-constructivist view of learning	40
2.5	Learning theory in Malaysian schools	41
2.6	Conclusion	43

CHAPTER 3 DESCRIPTION OF QUESTIONNAIRES: REQUIREMENTS GATHERING FOR DESIGNING

	EDUCATIONAL SYSTEMS.....	49
3.1	Introduction	49
3.2	User Characteristics	51
	3.2.1 User's level of experience.....	51
	3.2.2 Computer skills	51
	3.2.3 Proficiency in English.....	52
3.3	Goal/ Task Characteristics.....	52
3.4	Social Acceptability	53
3.5	Practical Acceptability	53
	3.5.1 Traditional category.....	54
	3.5.1.1 Reliability	54
	3.5.2 Usability category.....	54
	3.5.2.1 Easy to learn	54
	3.5.2.2 Efficient to Use	55
	3.5.2.3 Easy to Remember	56
	3.5.2.4 Few Errors	56
	3.5.2.5 Pleasant to use	57
3.6	Appropriateness	57
3.7	Method of Delivery	58
3.8	Functionality	58
3.9	Communication.....	59
	3.9.1 No onscreen instructions	59
	3.9.2 States that appear impossible to exit	59
	3.9.3 Wrong, misleading, confusing information	60
	3.9.4 Spelling errors	60
	3.9.5 Invalid metaphors	60
	3.9.6 Confusing feature names	60
	3.9.7 Information overload	61
	3.9.8 Help text and error messages	61
3.10	Display Layout.....	62
	3.10.1 Organization of screen	62
	3.10.2 Screen layout.....	62
	3.10.3 Usage of colour	62
	3.10.4 Menu Navigation.....	63
3.11	Program rigidity.....	64
3.12	Navigational issues	64
3.13	Lesson Structure	65
3.14	Conclusion.....	66

CHAPTER 4	STATISTICAL ANALYSIS AND DISCUSSION	
OF RESULTS OF EVALUATION		67
4.1	Introduction	67
4.2	Descriptions of Educational Systems	68
4.2.1	Educational System (1): University Malaya Online	
	Course-C programming	68
4.2.2	Educational System (2): CosToc-Relational Database Courseware	69
4.2.3	Educational System (3): Learning Microsoft Word 2000	69
4.2.4	Educational System (4): Introduction to the Internet	70
4.2.5	Educational System (5): Hardware Systems	70
4.2.6	Educational System (6): Operating Systems Introduction	71
4.3	Evaluation of Computer Systems	71
4.3.1	Evaluation of University Malaya Online Course (C Programming)	71
4.3.2	Evaluation for Costoc Relational Database	71
4.3.3	Evaluation of Learning Microsoft Word 2000	72
4.3.4	Evaluation of Introduction to the Internet	72
4.3.5	Evaluation of Hardware Systems Courseware	73
4.3.6	Evaluation of Operating Systems Introduction Courseware	73
4.4	Statistical Analysis and Discussion of Survey Results	74
4.4.1	User Characteristics	75
4.4.1.1	Results	75
4.4.1.2	Analysis	76
4.4.1.2.1	User's level of experience	76
4.4.1.2.2	User's skill in using computers	77
4.4.1.2.3	User's fluency in English	77
4.4.1.3	Discussion	77
4.4.2	Goal/Task Characteristics	80
4.4.2.1	Results	80
4.4.2.2	Analysis	80
4.4.2.3	Discussion	82
4.4.3	Social Acceptability, Program Rigidity and	
	Appropriateness of Navigation	83
4.4.3.1	Results	83
4.4.3.2	Analysis	83
4.4.3.3	Discussion	85
4.4.4	Practical Acceptability	86
4.4.4.1	Results	86
4.4.4.2	Analysis	87
4.4.4.3	Discussion	91
4.4.5	Appropriateness	97
4.4.5.1	Results	97
4.4.5.2	Analysis	97
4.4.5.3	Discussion	99
4.4.6	Method of Delivery	99
4.4.6.1	Results	99
4.4.6.2	Analysis	100
4.4.6.3	Discussion	102
4.4.7	Functionality	104
4.4.7.1	Results	104
4.4.7.2	Analysis	104

	4.4.7.3 Discussion	105
4.4.8	Communication	106
	4.4.8.1 Results	106
	4.4.8.2 Analysis	106
	4.4.8.3 Discussion	108
4.4.9	Display layout	111
	4.4.9.1 Results	111
	4.4.9.2 Analysis	112
	4.4.9.3 Discussion	114
4.4.10	Lesson structure.....	115
	4.4.10.1 Results	115
	4.4.10.2 Analysis	116
	4.4.10.3 Discussion.....	118
4.5	Critical Analysis of Survey Results	119
	4.5.1 Relationship of social acceptability with user characteristics, goal & task characteristics, appropriateness of educational systems, rigidity of educational systems and method of delivery issues	119
	4.5.2 Relationship of practical acceptability with appropriateness of navigation, functionality, communication, lesson structure and layout issues in educational systems.....	122
	4.5.3 Relationship between lesson structure and method of delivery.....	124
4.6	Conclusion.....	125

CHAPTER 5 PROTOTYPE DESIGN AND DEVELOPMENT .. 128

5.1	Introduction	128
5.2	Development stages	128
	5.2.1 Requirements Specification	129
	5.2.2 System Design.....	130
	5.2.2.1 Conceptual Design.....	130
	5.2.2.2 Physical Design	132
	5.2.2.2.1 System Architecture	132
	5.2.2.3 Hierarchical Representation	133
	5.2.2.4 Screen Sketches	134
	5.2.3 System Development.....	139
5.3	Conclusion.....	159

CHAPTER 6 PROTOTYPE EVALUATION..... 160

6.1	Introduction	160
6.2	Statistical Analysis and Discussion of Evaluation Results	161
	6.2.1 User Characteristics.....	161
	6.2.1.1 Results	161
	6.2.1.2 Analysis	161
	6.2.1.3 Discussion	161
	6.2.2 Goal/Task Characteristics	162
	6.2.2.1 Results.....	162
	6.2.2.2 Analysis.....	162
	6.2.2.3 Discussion	162
	6.2.3 Social Acceptability, Program Rigidity and Appropriateness of Navigation.....	163

6.2.3.1	Results.....	163
6.2.3.2	Analysis.....	163
6.2.3.3	Discussion.....	163
6.2.4	Practical Acceptability.....	164
6.2.4.1	Results.....	164
6.2.4.2	Analysis.....	165
6.2.4.3	Discussion.....	165
6.2.5	Appropriateness and Method of Delivery.....	166
6.2.5.1	Results.....	166
6.2.5.2	Analysis.....	166
6.2.5.3	Discussion.....	167
6.2.6	Functionality.....	168
6.2.6.1	Results.....	168
6.2.6.2	Analysis.....	168
6.2.6.3	Discussion.....	169
6.2.7	Display Layout.....	170
6.2.7.1	Results.....	170
6.2.7.2	Analysis.....	170
6.2.7.3	Discussion.....	170
6.2.8	Lesson Structure.....	171
6.2.8.1	Results.....	171
6.2.8.2	Analysis.....	171
6.2.8.3	Discussion.....	172
6.2.9	Socio-constructivist learning strategy.....	172
6.2.9.1	Results.....	172
6.2.9.2	Analysis.....	172
6.2.9.3	Discussion.....	173
6.2.10	Students Overall Test Results In Windows 2000 Professional Courseware.....	173
6.2.10.1	Results.....	173
6.2.10.2	Analysis.....	174
6.2.10.3	Discussion.....	175
6.3	Conclusion.....	175
CHAPTER 7 CONCLUSION.....		176
7.1	Introduction.....	176
7.2	Critical Analysis.....	176
7.2.1	Comparison of Social Acceptability.....	176
7.2.2	Comparison of Practical Acceptability.....	178
7.2.3	Comparison of Lesson Structure and Method of Delivery.....	179
7.2.4	Comparison of Socio Constructivist Learning Strategy Results and Students' Test Results in Windows 2000 Professional.....	180
7.2.5	Possibilities of why students could not accept socio-constructivism.....	181
7.3	Conclusion.....	182
REFERENCE	183

6.2.3.1	Results	163
6.2.3.2	Analysis	163
6.2.3.3	Discussion	163
6.2.4	Practical Acceptability	164
6.2.4.1	Results	164
6.2.4.2	Analysis	165
6.2.4.3	Discussion	165
6.2.5	Appropriateness and Method of Delivery	166
6.2.5.1	Results	166
6.2.5.2	Analysis	166
6.2.5.3	Discussion	167
6.2.6	Functionality	168
6.2.6.1	Results	168
6.2.6.2	Analysis	168
6.2.6.3	Discussion	169
6.2.7	Display Layout	170
6.2.7.1	Results	170
6.2.7.2	Analysis	170
6.2.7.3	Discussion	170
6.2.8	Lesson Structure	171
6.2.8.1	Results	171
6.2.8.2	Analysis	171
6.2.8.3	Discussion	172
6.2.9	Socio-constructivist learning strategy	172
6.2.9.1	Results	172
6.2.9.2	Analysis	172
6.2.9.3	Discussion	173
6.2.10	Students Overall Test Results In Windows 2000 Professional Courseware	173
6.2.10.1	Results	173
6.2.10.2	Analysis	174
6.2.10.3	Discussion	175
6.3	Conclusion	175
CHAPTER 7 CONCLUSION		176
7.1	Introduction	176
7.2	Critical Analysis	176
7.2.1	Comparison of Social Acceptability	176
7.2.2	Comparison of Practical Acceptability	178
7.2.3	Comparison of Lesson Structure and Method of Delivery	179
7.2.4	Comparison of Socio Constructivist Learning Strategy Results and Students' Test Results in Windows 2000 Professional	180
7.3	Conclusion	182
REFERENCE		183

LIST OF TABLES

Table 4.1 - Summarization of Evaluation Results.....	126
Table 6.1 - Questions for evaluation of prototype.....	160
Table 6.2 - Students Test Results	174

LIST OF GRAPHS

Graph 4.1 - Experience level in using educational systems.....	75
Graph 4.2 - Users' Computer Skills	75
Graph 4.3 - Users English Proficiency	76
Graph 4.4 - Goal and Task Characteristics of using Educational Systems.....	80
Graph 4.5 - Social Acceptability, Program Rigidity and Appropriateness of navigation in Educational Systems	83
Graph 4.6 - Easy to learn	86
Graph 4.7 - Learning Speed faster than printed materials	86
Graph 4.8 - Easy to remember	86
Graph 4.9 - Pleasant to use.....	87
Graph 4.10 - Errors in educational systems	87
Graph 4.11 -Ease of error recovery	87
Graph 4.12 - Experiencing system failure	87
Graph 4.13 - Appropriateness of Educational Systems with Curriculum	97
Graph 4.14 - Preference of material in computer form instead of printed form	99
Graph 4.15 - Are the systems teacher-directed?	100
Graph 4.16 - Acceptance of functionality of educational systems.....	104
Graph 4.17 - Communication problems in educational systems.....	106
Graph 4.18 - Appropriateness of Display Layout	111
Graph 4.19 - Lesson structure in educational systems	115
Graph 4.20 - Relationship of social acceptability with user characteristics	119
Graph 4.21 - Relationship of social acceptability with goal/task characteristics, method of delivery, program rigidity and appropriateness of menu navigation.....	120
Graph 4.22 - Relationship between practical acceptability and functional, communication and navigation problems and the appropriateness of display layout in the educational systems.....	122
Graph 4.23 - Relationship between lesson structure and method of delivery of educational systems.....	124
Graph 6.1 - User Characteristics	161
Graph 6.2 - Goal/Task Characteristics	162
Graph 6.3 - Social Acceptability, Program Rigidity and Appropriateness of Navigation.....	163
Graph 6.4a - Practical Acceptability.....	164
Graph 6.4b - Practical Acceptability	165
Graph 6.5 - Appropriateness and Method of Delivery	166
Graph 6.6 - Functionality and Communication Problems	168
Graph 6.7 - Display Layout.....	170
Graph 6.8 - Lesson Structure	171
Graph 6.9 - Acceptance of Socio-constructivist learning strategy	172
Graph 7.1 - Social Acceptability of Windows 2000 Professional compared to other Educational Systems.....	176
Graph 7.2 - Social Acceptability, Goal/Task Characteristics, Method of Delivery, Program Rigidity and Appropriateness of Menu Navigation of Windows 2000 Professional compared to other educational systems	177
Graph 7.3 - Practical acceptability of Windows 2000 Professional compared to other educational systems.....	178

Graph 7.4 - Lesson Structure and the Method of delivery of Windows 2000	
Professional compared to other educational systems	179
Graph 7.5 - Acceptance of Socio-constructivist learning strategy of Windows 2000	
Professional	180

LIST OF FIGURES

Figure 2.1 - Hierarchical Representation of the categories in questionnaires	43
Figure 5.1 – Development Stages.....	128
Figure 5.2 -Data Flow Diagram	131
Figure 5.3 -System Architecture	132
Figure 5.4 - Hierarchical Representation of Screens.....	133
Figure 5.5 - Mainpage.....	134
Figure 5.6 - Notes Mainpage.....	134
Figure 5.7 - Chapter 1	135
Figure 5.8 - Topic 1	135
Figure 5.9 - Test 1	136
Figure 5.10 - Evaluator Login Page	136
Figure 5.11 - Student Evaluation Form	137
Figure 5.12 - Student’s Profile Page.....	137
Figure 5.13 - Student’s Final Results Page.....	138
Figure 5.14 – Mainpage.....	139
Figure 5.15 – Notes	140
Figure 5.16 - Chapter 1	140
Figure 5.17 - Topic 1	141
Figure 5.18 - Topic 2	142
Figure 5.19 - Topic 3	143
Figure 5.20 - Topic 4	144
Figure 5.21 - Exercise.....	145
Figure 5.22 - Exercise 1	146
Figure 5.23 - Exercise 1 Answers	147
Figure 5.24 - Test	148
Figure 5.25 - Test Reply Page.....	149
Figure 5.26 - Evaluator login	149
Figure 5.27 - Test Selection Page.....	150
Figure 5.28 - Evaluate test page	150
Figure 5.29 - Student’s Final Marks.....	151
Figure 5.30 - Student’s Profile	152
Figure 5.31 - Self-Assessment Quiz	153
Figure 5.32 - Self-Assessment Results	154
Figure 5.33 - Student Login Page.....	154
Figure 5.34 - Student’s Final Results	155
Figure 5.35 – Error Page.....	156