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**CONCEPTUAL DESIGN AND DEVELOPMENT MODEL OF
ASSISTIVE COURSEWARE FOR YOUNG LOW VISION LEARNERS
(AC4LV)**



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Universiti Utara Malaysia

**DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
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Abstrak

Fokus kajian ini adalah berkaitan teknologi (perkakasan dan perisian) yang dibangunkan khusus untuk golongan kelainan upaya (OKU), yang dikenali sebagai Teknologi Asistif (AT). Dapatan sebelum ini mendedahkan kajian yang berkaitan kandungan pendidikan di dalam koswer adalah tersangat kurang, terutamanya kepada pelajar-pelajar berpenglihatan terhad. Juga, kebanyakan model rekabentuk konsep bagi koswer yang sedia ada mempunyai kekurangan dari segi keperluan khas dan bukti empirikal yang dapat memenuhi keperluan pelajar-pelajar berpenglihatan terhad. Kajian-kajian awal membuktikan aplikasi kandungan sedia ada gagal memenuhi keperluan pelajar-pelajar berpenglihatan terhad dari segi keupayaan capaian maklumat, keupayaan navigasi, dan keupayaan menghibur. Oleh itu, kajian ini mengusulkan sebuah model rekabentuk konsep bagi koswer untuk pelajar-pelajar berpenglihatan terhad yang dinamakan sebagai *Assistive Courseware for Low Vision (AC4LV)*. Empat (4) objektif dibentuk. Metodologi Kajian Sains Rekabentuk telah diadaptasi. Lapan (8) komponen Model Rekabentuk Konsep AC4LV telah dibina dan diintegrasikan: struktur, komposisi kandungan, elemen AC4LV, teori pembelajaran, pendekatan pembelajaran, proses pembangunan, model rekabentuk pengajaran, dan teknologi. Model yang diusulkan telah dinilai dan dikomen oleh 12 orang pakar dan disahkan melalui pembangunan prototaip. Hasil penilaian menunjukkan, model yang diusulkan dapat diterima baik oleh pakar tempatan dan antarabangsa. Pembangunan prototaip mengimplikasikan model tersebut adalah berguna untuk dirujuk oleh pembangun baru dan kurang kemahiran teknikal. Selain itu, dapatan daripada pengujian pengalaman pengguna menunjukkan AC4LV dapat memenuhi keperluan pelajar-pelajar berpenglihatan terhad dari segi keupayaan capaian maklumat, keupayaan navigasi, dan keupayaan menghibur. Semua dapatan ini menunjukkan bahawa Model Rekabentuk Konsep AC4LV memperlihatkan pembangunan yang berguna untuk aplikasi kandungan serta memberi sumbangan dari sudut teori dan praktikal. Kajian ini menyediakan garis panduan untuk membangunkan kandungan pendidikan di dalam koswer yang dapat memenuhi keperluan pelajar-pelajar berpenglihatan terhad supaya kumpulan istimewa daripada OKU ini mendapat peluang pembelajaran yang sama rata.

Kata kunci: Teknologi Asistif (AT), Masalah penglihatan, Kandungan kreatif, Model rekabentuk konsep, Koswer.

Abstract

The focus of this study relates to technology (hardware and software) that is purposely designed for people with disabilities (PWDs), which is called Assistive Technology (AT). Previous findings reveal that studies related to educational content in courseware is highly lacking, particularly for low vision learners. Also, many existing conceptual design models of courseware lack of specific requirements and empirical evidences to cater the needs of low vision learners. Preliminary studies have proven that available content applications fail to cater the needs of low vision learners in terms of information accessibility, navigationability, and pleasurability. Hence, this study proposes a conceptual design model of courseware for low vision learners, named as Assistive Courseware for Low Vision (AC4LV). Four (4) specific objectives are formulated. The Design Science Research Methodology has been adopted. Eight (8) components of Conceptual Design Model of AC4LV have been constructed and integrated: structural, content composition, AC4LV element, learning theories, learning approaches, development process, instructional design model, and technology. The proposed model has been reviewed by 12 experts and validated through prototyping. It was found that the proposed model has been well-accepted by local and international experts. Prototyping has implicated that the model is useful to follow by novice and non-technical developers. On top of that, the findings of user experience testing indicate that the AC4LV is able to fulfill the needs of the low vision learners in terms of information accessibility, navigationability, and pleasurability. All these findings demonstrate that the Conceptual Design Model of AC4LV exhibits useful development for content application as well as providing theoretical and practical contributions of the study. This study provides guidelines for developing educational content in courseware that caters the need of low vision learners so that this particular group of PWDs may gain equal opportunities of learning.

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Keywords: Assistive Technology (AT), Creative content, Low vision learners, Conceptual design model, Courseware.

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Table of Contents

Permission to Use	i
Abstrak.....	ii
Abstract.....	iii
Acknowledgement	iv
Table of Contents	v
List of Tables	xv
List of Figures.....	xix
List of Appendices.....	xxv
List of Abbreviations	xxvi
List of Publications and Awards.....	xxix
CHAPTER ONE INTRODUCTION	1
1.1 Overview	1
1.2 Background of Study	1
1.3 Motivation of Study	3
1.3.1 Current State of Disabled People in Malaysia	3
1.3.2 Government Support and Initiatives	5
1.3.3 Advancement of Assistive Technology in Education	7
1.3.4 Summary of Research Motivation	10
1.4 Problem Background.....	11
1.4.1 Preliminary Investigation.....	18
1.4.1.1 Preliminary Study I.....	18

1.4.1.2 Preliminary Study II	22
1.5 Problem Statement	30
1.5.1 Research Gaps.....	31
1.6 Research Question.....	32
1.7 Proposed Solution	32
1.8 Research Objective.....	33
1.9 Scope of the Study	34
1.10 Significance of Study	35
1.11 Theoretical and Research Framework.....	37
1.12 Operational Definitions and Terminologies.....	39
1.12.1 People with Disability (PWD)	39
1.12.2 Assistive Technology (AT).....	39
1.12.3 Assistive Courseware (AC).....	39
1.12.4 Visual Impairment (VI).....	40
1.12.5 Low Vision.....	40
1.12.6 Conceptual Design Model of AC4LV	40
1.13 Thesis Structure.....	41
1.14 Summary	43
CHAPTER TWO REVIEWS ON CONCEPTS AND THEORIES	44
2.1 Overview	44
2.2 Assistive Technology (AT)	44
2.2.1 The Widespread Use of AT	47
2.2.2 The Categories of AT.....	48

2.2.2.1 Computer-based AT	48
2.2.2.2 Augmentative and Alternative Communication (AAC).....	51
2.2.2.3 Environmental Control AT	52
2.2.2.4 Telecommunication AT.....	53
2.2.2.5 Cognition AT.....	54
2.2.2.6 Mobility AT	54
2.3 Inclusive Design.....	55
2.4 Disabilities	58
2.4.1 Types of Disabilities	61
2.4.2 Children with Disabilities	63
2.5 Visual Impairment (VI).....	65
2.5.1 AT Devices for Low Vision Learners.....	73
2.5.2 Challenging Task and Ability of Low Vision Learners.....	74
2.6 Courseware and Component	77
2.7 Assistive Courseware (AC).....	78
2.8 Six Category of Design Guidelines for Children	80
2.9 Information Accessibility.....	81
2.10 Navigationability.....	82
2.11 Pleasurability.....	84
2.12 Conceptual Design Model.....	88
2.12.1 Reviews and Critiques on Existing Conceptual Design Model of Typical Courseware (TC).....	91
2.12.2 Reviews and Critiques on Existing AC Model	108

2.12.3 Implications of Reviews and Critiques on Existing Conceptual Design Model (TC and AC) to the Study.....	121
2.13 Instructional Design Model.....	122
2.13.1 ADDIE Model.....	122
2.13.2 Dick, Carey, and Carey Model	124
2.13.3 ARCS Model of Motivational Design	127
2.13.4 Implications of ID Model to the Study	129
2.14 Learning Theories in AC4LV	129
2.14.1 Constructivism Theory.....	130
2.14.2 Connectivism Theory.....	132
2.14.3 Multimedia Learning Theory	134
2.14.4 Multiple Intelligence (MI) Theory.....	136
2.14.5 Implications of Learning Theories to the Study	138
2.15 Learning Approach in AC4LV.....	138
2.15.1 Mastery Learning Approach	139
2.15.2 Problem-based Learning (PBL)	141
2.15.3 Active Learning Approach.....	143
2.15.4 Self-paced Learning	144
2.15.5 Implications of Learning Approaches to this Study.....	146
2.16 Evaluation on Usefulness of Courseware	146
2.17 Summary	148
CHAPTER THREE RESEARCH METHODOLOGY	150
3.1 Overview	150

3.2 Rational of Using Qualitative Approach.....	150
3.3 Triangulation Methodology	151
3.4 Rational of Using Iterative Triangulation Methodology.....	155
3.5 Phase in Methodology.....	156
3.5.1 Phase 1: Awareness of Problem.....	159
3.5.1.1 Content Analysis I and Communication with Expert and Actual Users	159
3.5.2 Phase 2: Suggestion	160
3.5.2.1 Content Analysis II.....	161
3.5.2.2 Comparative Analysis.....	161
3.5.2.3 Expert and Actual Users Consultation	162
3.5.3 Phase 3: Construction	163
3.5.3.1 Expert Consultation	164
3.5.3.2 Expert Review	164
3.5.4 Phase 4: Evaluation.....	165
3.5.4.1 Sampling and Sample Size	165
3.5.4.2 Prototyping	166
3.5.4.3 Investigating User Experience.....	167
3.5.4.4 Pilot Test.....	168
3.5.4.5 Ensuring Validity.....	168
3.5.4.6 User Experience Testing.....	169
3.5.4.7 Data Collection Method.....	170
3.5.4.8 Analysis on Usefulness of AC4LV	176

3.5.5 Phase 5: Conclusion	180
3.6 Summary	180
CHAPTER FOUR CONSTRUCTION OF CONCEPTUAL DESIGN MODEL OF AC4LV	182
4.1 Overview	182
4.2 Component of the Proposed Model.....	185
4.2.1 Structural Component	192
4.2.2 Content Composition Component.....	197
4.2.2.1 Pedagogical Approach.....	198
4.2.2.2 Human Entities	200
4.2.2.3 Justification on Content Composition Components of AC4LV ..	210
4.2.3 Elements and Design Principles of AC4LV	214
4.2.4 Explanation on Content Composition Component of AC4LV	220
4.2.4.1 Pedagogical approach.....	220
4.2.4.2 Human Entities	224
4.2.5 Learning Theories and Approaches	224
4.2.6 Development Process	225
4.2.7 Instructional Design Model.....	225
4.2.8 Technology	226
4.3 The Proposed Conceptual Design Model of AC4LV	226
4.4 Expert Review	229
4.4.1 Instrument and Procedure	232
4.4.2 Expert Review Findings.....	233

4.4.3 Justification on Experts' Comments	239
4.5 Reviewed Conceptual Design Model of AC4LV	242
4.6 Summary	244
CHAPTER FIVE PROTOTYPING OF AC4LV CONCEPTUAL DESIGN MODEL.....	245
5.1 Overview	245
5.2 The Development of AC4LV	246
5.2.1 Pre-production Phase	247
5.2.2 Production Phase.....	254
5.2.3 Post-Production Phase	257
5.3 Principles of ARCS Model in the Development of AC4LV	258
5.4 The AC4LV.....	259
5.4.1 The Opening Segment.....	263
5.4.2 The Assistive Content Segment	265
5.4.2.1 Pedagogical Approach.....	266
5.4.2.2 Human Entities	282
5.4.3 The Closing Segment	285
5.5 Learning Theories in AC4LV	286
5.6 Learning Approach in AC4LV.....	289
5.7 Summary	292
CHAPTER SIX USER EXPERIENCE ON AC4LV	293
6.1 Overview	293
6.2 Special Testing Requirements.....	293

6.3 Pilot Test with Low Vision Learners	296
6.3.1 Pilot Test I.....	296
6.3.1.1 Procedure	297
6.3.1.2 Findings of the Pilot Test I	298
6.3.2 Pilot Test II	301
6.3.2.1 Procedure	301
6.3.2.2 Findings of the Pilot Test II.....	303
6.3.3 Observation and Interview of Pilot Tests.....	303
6.3.4 Implication of the Pilot Test to the Study	309
6.4 Ensuring Validity and Reliability.....	309
6.4.1 Inter-rater (coder) Reliability	313
6.5 The Semantic Network.....	314
6.6 User Experience I.....	314
6.6.1 The Demographic Background of the Subjects	314
6.6.2 Analysis of Findings on User Experience I	316
6.6.2.1 Observation.....	316
6.6.2.2 Interview	321
6.6.3 Conclusion	326
6.7 User Experience II.....	327
6.7.1 Demographic Background of the Subject	327
6.7.2 The Procedure	329
6.7.3 Analysis of Findings on User Experience II	329
6.7.3.1 Observation.....	330

6.7.3.2 Interview	340
6.7.4 Conclusion	348
6.8 Summary	350
CHAPTER SEVEN CONCLUSION.....	352
7.1 Overview	352
7.2 Research Question 1.....	353
7.3 Research Question 2.....	354
7.4 Research Question 3.....	355
7.5 Aim and Objectives: Revisit	355
7.6 Implications of Study to Theory and Practical.....	356
7.7 Limitations and Recommendations for Future Works.....	358
7.7.1 Conceptual Design Model of AC4LV	358
7.7.2 The AC4LV Prototype.....	359
7.8 Summary	360
REFERENCES.....	362
APPENDIX A	393
APPENDIX B	394
APPENDIX C	395
APPENDIX D	396
APPENDIX E	397
APPENDIX F.....	399
APPENDIX G.....	400

APPENDIX H	425
APPENDIX I	426
APPENDIX J	427
APPENDIX K	429



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List of Tables

Table 1.1: Registered Disabled People According to Types of Disability, 2006-2013	4
Table 1.2: Creative Content Clusters	6
Table 1.3: Example of Commercialized Courseware	9
Table 1.4: Example of AC	10
Table 1.5: Challenging Learning Activities for Children and Young People with Low Vision	14
Table 1.6: Example of Conceptual Design Model of Typical Courseware (TC).....	15
Table 1.7: Example of AC with the Target Learners	16
Table 1.8: List of Interview Question	19
Table 1.9: Respondents' Opinion on the Availability and the Needs of Courseware for Low Vision Learners	20
Table 1.10: Data Gathered Through Observing Subjects' Behavior	25
Table 1.11: Characteristic and Level of Acceptance for Audio.....	27
Table 1.12: Characteristic and Level of Acceptance for Formatting Style and Text.	28
Table 1.13: Characteristic and Level of Acceptance for Graphics and Animation ...	28
Table 1.14: Characteristic and Level of Acceptance for General Interaction.....	29
Table 1.15: Level of Acceptance for Practical Testing.....	29
Table 1.16: Current Problems and Methods of Teaching and Learning for Low Vision Learners	30
Table 2.1: Examples of Microsoft AT Products	50
Table 2.2: Examples of Alternatives Input Devices.....	51
Table 2.3: Universal Design Principles in Public CAL for VI Children	57

Table 2.4: Category of Disabilities	62
Table 2.5: Cause of VI Afterbirth	68
Table 2.6: Category of VI	68
Table 2.7: VI Categories based on Visual Acuity Range.....	69
Table 2.8: Types of Human Ability	75
Table 2.9: Six Categories of Design Guidelines for Children	80
Table 2.10: Accessibility Guidelines	82
Table 2.11: Navigationability Guidelines	83
Table 2.12: Fraction of Pleasurability	85
Table 2.13: Components of Conceptual Design Model.....	88
Table 2.14: Recommended Design of Conceptual Model	90
Table 2.15: Interface Design Guidelines of Math Explorer.....	114
Table 2.16: Principles of Multimedia Learning Theory	134
Table 2.17: MI Theory	137
Table 3.1: Six Key Principles of UCD.....	162
Table 3.2: Usefulness Evaluation Method	170
Table 3.3: Observation Techniques.....	171
Table 3.4: Observation Setting.....	172
Table 3.5: Observation Instrument.....	174
Table 3.6: Types of Interview	175
Table 3.7: Kappa Statistics.....	179
Table 4.1: Criteria and Justification of Participants in UCD Cycles in the Construction of Conceptual Design Model of AC4LV	183

Table 4.2: Justification for Selecting Models	186
Table 4.3: Comparative Analysis of Generic Components for TC.....	187
Table 4.4: Comparative Analysis of Generic Components for AC	188
Table 4.5: Summary of Generic Component of Existing Models.....	188
Table 4.6: Indicator for Categories of Component	188
Table 4.7: Generic Component of Existing Models.....	189
Table 4.8: Proposed Generic Component of AC4LV	191
Table 4.9: Details of Structural Components.....	192
Table 4.10: Structural Component of TC.....	193
Table 4.11: Structural Component of AC	193
Table 4.12: Summary of Structural Component in the Existing Models.....	193
Table 4.13: AC4LV Structural Component based on Analyzed Models.....	194
Table 4.14: Proposed Structural Component of AC4LV	196
Table 4.15: Details on Content Composition Component	202
Table 4.16: Comparative Analysis on Content Composition Component for TC ...	204
Table 4.17: Comparative Analysis on Content Composition Component for AC...	205
Table 4.18: Summary of Content Composition Component from Existing Models	206
Table 4.19: AC4LV Content Composition Component based on Analyzed Models	207
Table 4.20: Proposed Content Composition Components of AC4LV	209
Table 4.21: Proposed Elements and Design Principles of AC4LV	214
Table 4.22: Demographic Profile of the Experts	230
Table 4.23: Frequency of Responses from Expert Review	234

Table 4.24: Further Comments from the Expert	236
Table 5.1: Descriptions of the Prototype.....	260
Table 5.2: Actual Content of AC4LV	260
Table 5.3: Description for Form of Activity in AC4LV	261
Table 5.4: Constructivism and Connectivism Theories Associated with AC4LV...	286
Table 5.5: Multimedia Learning Theory Mapped to AC4LV	287
Table 5.6: MI Theory Connected to AC4LV	288
Table 5.7: Learning Approach in AC4LV	290
Table 6.1: Problems, Causes, and Solutions Detected in the Pilot Test I	300
Table 6.2: Types of Interview Questions	304
Table 6.3: Classification and Rationale of Interview Questions.....	306
Table 6.4: Demographic Background of the Subjects involved in User Experience I	315
Table 6.5: Demographic Background of the Subjects involved in User Experience III	328
Table 6.6: Information Accessibility Codes' and Occurrences of Using the AC4LV	330
Table 6.7: Navigationability Codes' and Occurrences of Using the AC4LV	334
Table 6.8: Pleasurability Codes' and Occurrences on AC4LV.....	337
Table 6.9: Codes and Quotations of AC4LV for Information Accessibility	342
Table 6.10: Codes and Quotations of AC4LV for Navigationability	345
Table 6.11: Codes and Quotations of AC4LV	346
Table 6.12: Summary of Finding	349

List of Figures

Figure 1.1: Activities and Interest between VI including Low Vision Students and Non-disabled Students	13
Figure 1.2: Online Teaching Courseware is played to the Low Vision Learners	22
Figure 1.3: Snapshots of the Low-fidelity Prototype of AC	24
Figure 1.4: Theoretical and Research Framework	38
Figure 2.1: Level of Limited Eyesight	70
Figure 2.2: Normal Vision	71
Figure 2.3: Low Vision	71
Figure 2.4: Central Field Loss.....	71
Figure 2.5: Certain Field Loss.....	71
Figure 2.6: Reduction of Vision Field.....	71
Figure 2.7: CCTV	73
Figure 2.8: Magnifying Glass	73
Figure 2.9: Conceptual Framework of English Language Courseware (Mazyrah et al., 2008).....	93
Figure 2.10: Conceptual Design Model of RLM (Ariffin, 2009)	94
Figure 2.11: ID Model of Multimedia Courseware for Lines and Planes (Syazwan & Wan Fatimah, 2010).....	95
Figure 2.12: Conceptual Model of Small Screen (Churchill, 2011)	97
Figure 2.13: Framework of Virtual World Courseware (Nik Siti Hanifah et al., 2011)	98
Figure 2.14: ID Model of Li2D (Zuraini & Wan Fatimah, 2011).....	100

Figure 2.15: CDM (Efendioğlu, 2012).....	101
Figure 2.16: IPO Framework of Courseware for Teaching History Subject (Rossafri, 2012)	103
Figure 2.17: Architecture of UZWEBMAT (Özyurt et al., 2013)	105
Figure 2.18: Model of Constructivist Computational Platform (Garcia & Pacheco, 2013)	106
Figure 2.19: Snapshots of Auslan Children (Ellis, 2009)	109
Figure 2.20: ID Model of Komputer Saya (Norfarhana et al., 2010).....	110
Figure 2.21: Snapshots of Komputer Saya.....	110
Figure 2.22: Snapshots of Interface for: a) teacher b) student (Morfidi et al., 2010)	111
Figure 2.23: eAcces2LearnFramework (Sampson & Zervas, 2010).....	112
Figure 2.24: HTML Content with eAccess2Learn Style Sheet for Low Vision People	113
Figure 2.25: Snapshots of Math Explorer	115
Figure 2.26: Framework of MudahKiu (Siti Zaharah & Nor Azan, 2011)	116
Figure 2.27: Snapshots of Malay Sign Language Courseware (eBIM)	117
Figure 2.28: Snapshot of AC for VI Learners.....	118
Figure 2.29: Scaffolding Models to Hear and Read Stories (Rahmah & Tengku Nazatul, 2012).....	119
Figure 2.30: Digital Storytelling Framework for Remedial Student (Rahmah et al., 2012)	120
Figure 2.31: ADDIE Model	123

Figure 2.32: Dick, Carey, and Carey Instructional Design Model.....	125
Figure 2.33: ARCS Model of Motivational Design.....	127
Figure 2.34: Overview of Literature Study.....	149
Figure 3.1: Basis of Methodology.....	153
Figure 3.2: Phases in the Research Process.....	158
Figure 3.3: Sample of Expert Validation Form for Validity of Data.....	179
Figure 4.1: Summary of Activities in Constructing the Conceptual Design Model of AC4LV.....	182
Figure 4.2: Summary of the Participants in UCD Cycles in the Construction of the Conceptual Design Model of AC4LV.....	184
Figure 4.3: Conditions for Classification.....	189
Figure 4.4: Proposed Model for Generic Component of AC4LV.....	191
Figure 4.5: UCD Approach (Having Discussion with Teacher).....	195
Figure 4.6: Proposed Model for Structural Components of AC4LV.....	197
Figure 4.7: Proposed Model of Content Composition Component of AC4LV.....	213
Figure 4.8: Proposed Elements of AC4LV with Design Principles.....	219
Figure 4.9: The Proposed Conceptual Design Model of AC4LV.....	228
Figure 4.10: Relevancy of the Proposed Elements in the Components of AC4LV.....	234
Figure 4.11: Understanding of the Proposed Design Principles in AC4LV Elements'.....	235
Figure 4.12: The Terms, Connections and Flows, and Readability of the Conceptual Design Model of AC4LV.....	235
Figure 4.13: Revised Conceptual Design Model of AC4LV.....	243

Figure 5.1: Pre-production Phase	247
Figure 5.2: Navigation Specification between Topics in AC4LV	250
Figure 5.3: Navigation Specification between Topics and Activities in AC4LV	251
Figure 5.4: Production Phase	255
Figure 5.5: Post-Production Phase	257
Figure 5.6: Principles of ARCS Model Mapped to Development Process of AC4LV	259
Figure 5.7: The Prototype of AC4LV	259
Figure 5.8: Structural of AC4LV	262
Figure 5.9: Initial Welcome Element	264
Figure 5.10: The Actor Addressing the Element of Welcome, Title, and Objective of the Course	264
Figure 5.11: Audio Element Applied in the AC4LV	268
Figure 5.12: The Use of Texts in the AC4LV	270
Figure 5.13: Graphics and Animations in the AC4LV	270
Figure 5.14: Interface Layout in the AC4LV	271
Figure 5.15: Sample of Bad and Good Action	272
Figure 5.16: Lecturing Presented by “Smiley”	272
Figure 5.17: Instruction-based and Demonstration in the AC4LV	274
Figure 5.18: Auditory Explanation	275
Figure 5.19: Samples of Activity-based Applied in the AC4LV	276
Figure 5.20: Integration of Text, Graphic, Audio, Animation, and Transition to Cater Information Accessibility.....	278

Figure 5.21: Sample of Snapshots for Navigational Button in the AC4LV.....	279
Figure 5.22: Sample of Snapshots of Pleasurability Aspects Addressed in the AC4LV	281
Figure 5.23: Separator Scene Applied in AC4LV	282
Figure 5.24: Instructor in AC4LV.....	284
Figure 5.25: General Interaction Applied in AC4LV	285
Figure 5.26: Closing Segment Addressed in AC4LV	286
Figure 5.27: Sample of Snapshot of Constructivism Theory Applied in AC4LV ...	287
Figure 5.28: Sample of Snapshots of Connectivism Theories Associated with AC4LV	287
Figure 5.29: Sample of Snapshot of Multimedia Learning Theory Adapted in AC4LV	288
Figure 5.30: Sample of Snapshots of Multiple Intelligence Theory Applied in AC4LV.....	289
Figure 5.31: Mastery Learning and PBL Approaches Mapped to AC4LV	291
Figure 5.32: Active Learning and Self-paced Learning Approaches Adapted in AC4LV	291
Figure 6.1: Two Cycles of Pilot Test	295
Figure 6.2: Two Cycles of User Experience Testing	295
Figure 6.3: Group 1	298
Figure 6.4: Group 2	298
Figure 6.5: Subjects involved in Pilot Test II	302

Figure 6.6: Cohen’s Kappa Value from Rater 1 and Rater 2 for Observation Session	313
Figure 6.7: Cohen’s Kappa Value from Rater 1 and Rater 2 for Interview Session	313
Figure 6.8: Experience of Using Computer	315
Figure 6.9: Experience of Using TC	315
Figure 6.10: Subjects involved in User Experience I.....	316
Figure 6.11: Speak-aloud the Content.....	317
Figure 6.12: Navigate the AC4LV	318
Figure 6.13: Subjects Concentrate on the Content Comfortably and Relax	320
Figure 6.14: Ensuring the Similar Content	321
Figure 6.15: Experience of Using Computer	328
Figure 6.16: Experience of Using TC	328
Figure 6.17: Flow of the User Experience II.....	329
Figure 6.18: Subject Reactions on Audio in the AC4LV.....	331
Figure 6.19: Selecting Attributes in the AC4LV	332
Figure 6.20: Recognizing the Graphic	333
Figure 6.21: Recognizing the Navigational Button.....	335
Figure 6.22: Sample of Self Interaction with the AC4LV	336
Figure 6.23: Sample of Social Interaction with the AC4LV.....	336
Figure 6.24: Amused.....	339
Figure 6.25: Enjoyed.....	339
Figure 6.26: Sense of Humor	339
Figure 6.27: Happy	340

List of Appendices

Appendix A: Sample of Application Letter to Conduct Preliminary Investigation and Endorsement from the School Principle	393
Appendix B: Sample of Invitation Email to Expert and Response Email from the Expert	394
Appendix C: Sample of Consent Form for Expert.....	395
Appendix D: Sample of Appointment Letter for Expert.....	396
Appendix E: Expert Review (Instrument)	397
Appendix F: Sample of Expert Comments'	399
Appendix G: Script and Storyboard of AC4LV	400
Appendix H: Sample of Approval Letter to Conduct Pilot Test.....	425
Appendix I: Sample of Permission Letter from Parents for Video Recording	426
Appendix J: The Sematic Network	427
Appendix K: Sample of Application Letter to Conduct User Experience Testing and Endorsement from the School Principle	429

List of Abbreviations

AAC	Augmentative and Alternative Communication
AC	Assistive Courseware
AC4LV	Assistive Courseware for Low Vision
ACS	American Community Survey
ADDIE	Analysis Design Development Implementation
ASHA	American Speech Language Hearing Association
AT	Assistive Technology
CAI	Computer-assisted Instruction
CAL	Computer-assisted Learning
CBT	Computer-based Training
CCTVs	Closed Circuit Televisions
CD	Conceptual Definition
CDHL	Center for Childhood Deafness and Hearing Loss
CDM	Courseware Development Model
EBU	European Blind Union
FCTD	Family Center on Technology and Disability
GRIT	Global Research Innovation and Technology
GUIDE	General User Interface for Disorder of Execution
GPS	Global Positioning System
IDEA	Individuals with Disabilities Education Act
ICT	Information and Communication Technology
IPO	Input-Process-Output

ID	Instructional Design
ISD	Instructional System Development
ILO	International Labor Office
JAWS	Job Access With Speech
KAIMal	Kemahiran Asas Individu Masalah Penglihatan
LD	Learning Disabilities
LFC	Leveraged Freedom Chair
MAB	Malaysian Association for the Blind
ML	Meaningful Learning
MOE	Ministry of Education
MI	Multiple Intelligence
NECIC	National Early Childhood Intervention Council
NICHCY	National Dissemination Center for Children with Disabilities
ODI	Office for Disability Issues
OD	Operation Definition
PWDs	People with Disabilities
PDA s	Personal Digital Assistants
PERS	Personalized Emergency Response Systems
PBL	Problem-based Learning
RLM	Reality Learning Media
SGD	Speech Generating Devices
TDD	Telecommunication Device for the Deaf
TTY	Teletypewriter

TC	Typical Courseware
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organization
UCD	User Centred Design
VI	Visual Impairment
VI	Visually-impaired
VOCA	Voice Output Communication Aids
WHO	World Health Organization



List of Publications and Awards

Journals:

- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2014). A comparative analysis on conceptual design model of Assistive Courseware (AC) for visually-impaired learners (AC4VI). *Australian Journal of Basic and Applied Sciences*, 8(4), 75–80. Retrieved from <http://ajbasweb.com/old/ajbas/2014/Special/75-80.pdf>
- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2014). Critical analysis in proposing a conceptual design model of assistive courseware for low vision (AC4LV) learners. *International Journal of Computer Applications*, 92(10), 18–25. doi:10.5120/16044-5173%0A
- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2014). The design principles of Assistive Courseware for Low Vision (AC4LV) learners. *ARN Journal of Engineering and Applied Sciences*, 3 (10), 1447–1456. Retrieved from http://www.arnjournals.com/jeas/research_papers/rp_2015/jeas_0215_1614.pdf
- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2015). Expert review on conceptual design model of Assistive Courseware for Low Vision (AC4LV) Learners. *International Journal of Conceptions on Management and Social Sciences*, 3(2), 35–39. Retrieved from <http://www.worldairco.org/IJCMSS/May2015Paper14.pdf>

Chapter in Book:

- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2013). Preliminary investigation on creative educational content for visually-impaired (VI) learners. In H. Badioze Zaman, P. Robinson, O. Patrick, T. K. Shih, & S. Velastin (Eds.), *Advances in Visual Informatics* (3rd ed., pp. 408–417). Switzerland: Springer International Publishing. doi:10.1007/978-3-319-02958-0

Conference Proceedings:

- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2013). A comparative analysis on conceptual design model of Assistive Courseware (AC) for visually-impaired learners (AC4VI). *Proceedings of the International Conference on Engineering and Technology (ICET '13)*, 75–80.
- **Nurulnawati, A., Ariffin, A. M., & Siti Mahfuzah, S.** (2014). Reviews and critiques on learning theories towards proposing a conceptual design model of assistive courseware for low vision (AC4LV) learners.

Proceedings of the 7th Knowledge Management International Conference (KMICe '14), 760–765.

- **Nurulnadwan, A.**, Ariffin, A. M., & Siti Mahfuzah, S. (2014). Conceptual design model of Assistive Courseware for Low Vision (AC4LV) Learners. *Proceedings of the International Conference on Advances in Educational Technology (ICAET '14)*, 44–53.
- **Nurulnadwan, A.**, Ariffin, A. M., & Siti Mahfuzah, S. (2014). Integrating Multimedia Learning Theory in Assistive Courseware for Low Vision (AC4LV) Learners. *Proceedings of the 3rd International Conference on Interactive Digital Media (ICIDM' 14)*.
- **Nurulnadwan, A.**, Ariffin, A. M., & Siti Mahfuzah, S. (2014). The design principles of Assistive Courseware for Low Vision (AC4LV) learners. *Proceedings of the Advancement in Information Technology International Conference (ADVCIT' 14)*, 222-230.
- **Nurulnadwan, A.**, Ariffin, A. M., & Siti Mahfuzah, S. (2015). First cycles of user experience on Assistive Courseware for young Low Vision (AC4LV) learners. *Proceedings of the 5th International Conference on Computing and Informatics (ICOCI '15)*, 180-186.

Awards:

- **Bronze Medal** at the Malaysian Technology Exhibition 2013 (MTE 2013), Kuala Lumpur:
 - Project Title: *Assistive Learning Materials for Low Vision Learners*
 - Project Members: Ariffin Abdul Mutalib, **Nurulnadwan Aziz**, Siti Mahfuzah Sarif
- **Best Paper Award**
 - 3rd International Conference on Interactive Digital Media (ICIDM 2014) 2-4 December 2014.
 - The Pacific Sutera Hotel @ Sutera Harbour Resort Kota Kinabalu, Sabah.
 - Title: Integrating Multimedia Learning Theory in Assistive Courseware for Low Vision (AC4LV) Learners.
 - Author: **Nurulnadwan Aziz** , Ariffin Abdul Mutalib , Siti Mahfuzah Sarif.
- **Silver Medal** at the National Innovation and Invention Competition Through Exhibition 2015 (iCompEx '15), Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS):
 - Project Title: *Assistive Courseware for Low Vision Children*
 - Project Members: **Nurulnadwan Aziz**, Ariffin Abdul Mutalib, Siti Mahfuzah Sarif

CHAPTER ONE

INTRODUCTION

1.1 Overview

This introductory chapter provides some background of study which deliberates on issues that lead to the motivation aspects of the study, specification of the problem, preliminary investigation, extraction of research gap, and formulation of research objective. It also discusses the scope and limitations of the study, significance of study, theoretical and research framework, as well as operational definitions of terms used throughout the study.

1.2 Background of Study

Everybody is gifted with certain ability. It depends on how far a person can explore their potentials to utilize the abilities optimally. It is similar with disabled people but the approach is definitely dissimilar. In the process of exploring the potentials, learning should take place. However, it is not an easy task for disabled people especially the school-aged children to grasp new knowledge fluently as normal children. Eventhough it is not an easy task, generating knowledge is very important to everybody including the disabled because only knowledge could develop and differentiate the level among people. It is emphasized in the Quran clearly through Surah Az-Zumar [verse: 9]:

The contents of
the thesis is for
internal user
only

REFERENCES

- Abdul Nasir, Z., Syamila Zakiah, A. W., Juliana Aida, A. B., Adzira, H., & Abdul Aziz, A. N. (2011). Interactive multimedia-based learning for Network Cable Installation course. *2011 International Conference on User Science and Engineering (i-USEr)*, 157–162. doi:10.1109/iUSEr.2011.6150556
- Abtahi, M. S. (2012). Interactive multimedia learning object (IMLO) for dyslexic children. *Procedia - Social and Behavioral Sciences*, 47, 1206–1210. doi:10.1016/j.sbspro.2012.06.801
- Adnan, A. B. (2012). Factors of unemployment - Is disability a factor? *SOCSO Return to Work Conference 2012- Transforming the Social Landscape*, 1–14. Retrieved from http://www.rtwmalaysia.com/2012/images/stories/presentation2012/En._Adnan_B_Abu_Bakar.pdf
- Alethea, B. (2009). Applications of high and low fidelity prototypes in researching intuitive interaction. *Undisciplined! Design Research Society Conference*, 1–17. Retrieved from <http://shura.shu.ac.uk/458/1/fulltext.pdf>
- Alghadyan, A. A. (2011). Diabetic retinopathy – An update. *Saudi Journal of Ophthalmology*, 25(2), 99–111. doi:10.1016/j.sjopt.2011.01.009
- Alhaji, T., Wang, L., Wheeler, K., Zhao, W., Sun, Y., Stallones, L., & Xiang, H. (2010). Prevalence of disability among adolescents and adults in rural China. *Disability and Health Journal*, 3(4), 282–288. doi:10.1016/j.dhjo.2010.01.002
- Allday, R. A., Duhon, G. J., Blackburn-Ellis, S., & Van Dycke, J. L. (2010). The biasing effects of labels on direct observation by preservice teachers. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 34(1), 52–58. doi:10.1177/0888406410380422
- Allen, D. E., Donham, R. S., & Bernhardt, S. A. (2011). Problem-based learning. *New Directions for Teaching and Learning*, (128), 21–30. doi:10.1002/tl.465
- Al-Rowaily, M. A. (2010). Prevalence of refractive errors among pre-school children at King Abdulaziz Medical City, Riyadh, Saudi Arabia. *Saudi Journal of Ophthalmology*, 24(2), 45–48. doi:10.1016/j.sjopt.2010.01.001
- Altrichter, H., Posch, P., & Somekh, B. (2008). *Teachers investigate their work*. London and New York: Routledge.

- American Department of Justice. (2010). Nondiscrimination on the basis of disability in state and local government services. *Federal Register*, 75(178), 1–74. Retrieved from http://www.ada.gov/regs2010/titleII_2010/titleII_2010_fr.pdf
- Ammenwerth, E., Iller, C., & Mansmann, U. (2003). Can evaluation studies benefit from triangulation? A case study. *International Journal of Medical Informatics*, 70(2-3), 237–248. doi:10.1016/S1386-5056(03)00059-5
- Andharini, D.C., & Ari, B. (2012). Personalized learning path of a web-based learning system. *International Journal of Computer Applications*, 53(7), 17–22. doi:10.5120/8434-2206
- Andreou, Y., & McCall, S. (2010). Using the voice of the child who is blind as a tool for exploring spatial perception. *British Journal of Visual Impairment*, 28(2), 113–129. doi:10.1177/0264619609360285
- Appasamy, V., Gamboa, R. A., Al-Atabi, M., & Namasivayam, S. (2014). Measuring happiness in academic environment: A case study of the School of Engineering at Taylor's University (Malaysia). *Procedia - Social and Behavioral Sciences*, 123, 106–112. doi:10.1016/j.sbspro.2014.01.1403
- Apple Incorporated. (2013). *Apple's commitment to accessibility*. Retrieved from <http://www.apple.com/accessibility/>
- Ariffin, A. M. (2009). *Conceptual design of reality learning media (RLM) model based on entertaining and fun constructs*. (Doctoral dissertation, Universiti Utara Malaysia, 2009). Retrieved from <http://etd.uum.edu.my/1521/>
- Auster, E. R. (2006). Creating active learning in the classroom: A systematic approach. *Journal of Management Education*, 30(2), 333–353. doi:10.1177/1052562905283346
- Azizinezhad, M., & Hashemi, M. (2011). Humour: A pedagogical tool for language learners. *Procedia - Social and Behavioral Sciences*, 30, 2093–2098. doi:10.1016/j.sbspro.2011.10.407
- Bakır, S. (2011). Is it possible to have students think creatively with the help of active learning techniques? *Procedia - Social and Behavioral Sciences*, 15, 2533–2539. doi:10.1016/j.sbspro.2011.04.140
- Baneke, A. (2012). Review: Targeting trachoma: Strategies to reduce the leading infectious cause of blindness. *Travel Medicine and Infectious Disease*, 10(2), 92–96. doi:10.1016/j.tmaid.2012.01.005

- Bart, O., Jarus, T., Erez, Y., & Rosenberg, L. (2011). How do young children with DCD participate and enjoy daily activities? *Research in Developmental Disabilities*, 32(4), 1317–1322. doi:10.1016/j.ridd.2011.01.039
- Bashir, M., Afzal, M. T., & Azeem, M. (2008). Reliability and validity of qualitative and operational research paradigm. *Pakistan Journal of Statistics and Operational Research*, 4(1), 35–45. Retrieved from <http://www.pjsor.com/index.php/pjsor/article/viewFile/59/38scientific>
- Battaglia, M. P. (2011). Nonprobability sampling. In *Encyclopedia of Survey Research Methods*. SAGE Publications Ltd.
- Bendová, P., Čecháčková, M., & Šádková, L. (2014). Inclusive education of pre-school children with special educational needs in kindergartens. *Procedia - Social and Behavioral Sciences*, 112, 1014–1021. doi:10.1016/j.sbspro.2014.01.1263
- Bernd, T., Van Der Pijl, D., & De Witte, L. P. (2009). Existing models and instruments for the selection of assistive technology in rehabilitation practice. *Scandinavian Journal of Occupational Therapy*, 16(3), 146–158. doi:10.1080/11038120802449362
- Bertoni, A. (2013). Analyzing product-service systems conceptual design: The effect of color-coded 3D representation. *Design Studies*. doi:10.1016/j.destud.2013.02.003
- Beverley, C. A., Bath, P. A., & Barber, R. (2011). Health and social care information for visually-impaired people. *Aslib Proceedings*, 63(2), 256–274. doi:10.1108/00012531111135691
- Bloom, B. S. (1981). *All our children learning* (Vol. 3). New York: McGraw-Hill.
- Bocconi, S., Dini, S., Ferlino, L., & Martinoli, C. (2007). ICT educational tools and visually impaired students: Different answers to different accessibility needs. In C. Stephanidis (Ed.), *Universal Access in Human-Computer Interaction. Applications and Services* (pp. 491–500). Germany: Springer Berlin Heidelberg. doi:10.1007/978-3-540-73283-9_55
- Bodemer, D., Ploetzner, R., Feuerlein, I., & Spada, H. (2004). The active integration of information during learning with dynamic and interactive visualisations. *Learning and Instruction*, 14(3), 325–341. doi:10.1016/j.learninstruc.2004.06.006
- Boeije, H. R. (2010). *Analysis in qualitative research*. Washington, D.C.: SAGE Publications Ltd.

- Boghossian, P. (2006). Behaviorism, constructivism, and socratic pedagogy. *Educational Philosophy and Theory*, 38(6), 713–722. doi:10.1111/j.1469-5812.2006.00226.x.
- Bolonkin, A. (2012). 7- Human emotions, happiness, and pleasure. *Universe, Human Immortality and Future Human Evaluation*, 53–57. doi:10.1016/B978-0-12-415801-6.00007-4
- Bonwell, C.C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom (Report No. ED340272)*. Retrieved from <http://www.oid.ucla.edu/about/units/tatp/old/lounge/pedagogy/downloads/active-learning-eric.pdf>
- Borg, J., Larsson, S., Östergren, P., Rahman, A. S. M. A., Bari, N., & Khan, A. H. M. N. (2012). User involvement in service delivery predicts outcomes of assistive technology use : A cross-sectional study in Bangladesh. *BMC Health Services Research*, 12(1), 330–339. doi:10.1186/1472-6963-12-330
- Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: A research note. *Qualitative Research*, 8(1), 137–152. doi:10.1177/1468794107085301
- Brault, M. W. (2011). School-aged children with disabilities in U.S. metropolitan statistical areas : 2010. *United State Census Bureau, 1401*, 1–8. Retrieved from <https://www.census.gov/prod/2011pubs/acsbr10-12.pdf>
- Brault, M. W. (2012). Americans with disabilities: 2010. Household economics studies. *United State Census Bureau*, 1–24. Retrieved from <http://www.census.gov/prod/2012pubs/p70-131.pdf>
- Breau, L. M., & Camfield, C. S. (2011). Pain disrupts sleep in children and youth with intellectual and developmental disabilities. *Research in Developmental Disabilities*, 32(6), 2829–2840. doi:10.1016/j.ridd.2011.05.023
- Bretz, R., & Johnson, L. (2000). An innovative pedagogy for teaching and evaluating computer literacy. *Information Technology and Management*, 1(4), 283–292. doi:10.1023/A:1019185311206
- Brucker, B., Scheiter, K., & Gerjets, P. (2014). Learning with dynamic and static visualizations: Realistic details only benefit learners with high visuospatial abilities. *Computers in Human Behavior*, 36, 330–339. doi:10.1016/j.chb.2014.03.077
- Bult, M. K., Verschuren, O., Jongmans, M. J., Lindeman, E., & Ketelaar, M. (2011). What influences participation in leisure activities of children and youth with physical disabilities? A systematic review. *Research in Developmental Disabilities*, 32(5), 1521–1529. doi:10.1016/j.ridd.2011.01.045

- Burla, L., Knierim, B., Barth, J., Liewald, K., Duetz, M., & Abel, T. (2014). From text to codings: Intercoder reliability assessment in qualitative content analysis. *Nursing Research*, 57(2), 113–7. doi:10.1097/01.NNR.0000313482.33917.7d
- Bushro, A., & Halimah, B. Z. (2008). Multimedia mathematics courseware based on the multiple intelligences model (MI-MathS). *2008 International Symposium on Information Technology*, 1–5. doi:10.1109/ITSIM.2008.4631736
- Büyükduman, İ., & Şirin, S. (2010). Learning portfolio (LP) to enhance constructivism and student autonomy. *Procedia - Social and Behavioral Sciences*, 3, 55–61. doi:10.1016/j.sbspro.2010.07.012
- Campbell, J. L., Quincy, C., Osserman, J., & Pedersen, O. K. (2013). Coding in-depth semistructured interviews: Problems of unitization and intercoder reliability and agreement. *Sociological Methods & Research*, 42(3), 294–320. doi:10.1177/0049124113500475
- Cann, A., & Matson, C. (2014). Sense of humor and social desirability: Understanding how humor styles are perceived. *Personality and Individual Differences*, 66, 176–180. doi:10.1016/j.paid.2014.03.029
- Carlson, K.A., & Winquist, J. R. (2011). Evaluating an active learning approach to teaching introductory statistics: A classroom workbook approach. *Journal of Statistics Education*, 19(1), 1–23. Retrieved from www.amstat.org/publications/jse/v19n1/carlson.pdf
- Carroll, J. B. (1989). The Carroll model: A 25-year retrospective and prospective view. *Educational Researcher*, 18(1), 26–31. Retrieved from <http://www.eric.ed.gov/ERICWebPortal>
- Chang, T., Kaasinen, E., & Kaipainen, K. (2013). Persuasive design in mobile applications for mental well-being: Multidisciplinary expert review. In B. Godara & K. S. Nikita (Eds.), *Wireless Mobile of Communication and Healthcare: Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering* (pp. 154–162). Springer Berlin Heidelberg. doi:10.1007/978-3-642-37893-5_18
- Chang, Y., & Chen, C. (2011). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of English learning using augmented reality. *2011 IEEE International Conference on Multimedia and Expo*, 1–6. doi:10.1109/ICME.2011.6012177
- Chen, C.-M., & Wang, H.-P. (2011). Using emotion recognition technology to assess the effects of different multimedia materials on learning emotion and performance. *Library & Information Science Research*, 33(3), 244–255. doi:10.1016/j.lisr.2010.09.010

- Chickering, A. W., & Gamson, Z. F. (1999). Development and adaptations of the seven principles for good practice in undergraduate education. *New Directions for Teaching and Learning*, 80, 75–81. doi:10.1016/0307-4412(89)90094-0
- Cho, V., Cheng, T. C. E., & Lai, W. M. J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers & Education*, 53(2), 216–227. doi:10.1016/j.compedu.2009.01.014
- Churchill, D. (2007). Towards a useful classification of learning objects. *Educational Technology Research and Development*, 55(5), 479–497. Retrieved from <http://daniel.cite.hku.hk/lo/Papers/Classification.pdf>
- Churchill, D. (2011). Conceptual model learning objects and design recommendations for small screens key concepts and issues. *Educational Technology and Society*, 14(1), 203–216. Retrieved from http://www.ifets.info/journals/14_1/18.pdf
- Cohen, L., Manion, L., & Keith, M. (2011). *Research methods in education*. Routledge, Taylor & Francis Group NY.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. London and New York: Routledge, Taylor & Francis Group.
- Cook, A.M., & Polgar, J. M. (2007). *Cook and Hussey's assistive technologies: Principles and practice*. St Louis, Mo.: Mosby Elsevier.
- Cooper, J., Lewis, R., & Urquhart, C. (2004). Using participant or non-participant observation to determine information behaviour. *Information Research*, 9(4), 1–15. doi:10.1.1.102.4939
- Cooperstein, S. E., & Kocevar-Weidinger, E. (2004). Beyond active learning: a constructivist approach to learning. *Reference Services Review*, 32(2), 141–148. doi:10.1108/00907320410537658
- Copolillo, A., & Ivanoff, S. D. (2011). Assistive technology and home modification for people with neurovisual deficits. *NeuroRehabilitation*, 28(3), 211–20. doi:10.3233/NRE-2011-0650
- Corbin, J., & Morse, J. M. (2003). The unstructured interactive interview: Issues of reciprocity and risks when dealing with sensitive topics. *Qualitative Inquiry*, 9(3), 335–354. doi:10.1177/1077800403251757
- Cross, D. R. (2007). Observational methods. *Child Psychology*, 1–12. Retrieved from <http://www.davidcross.us/classes/child/ObservationalMethods.pdf>

- Dalgarno, B. (2001). Technologies supporting highly interactive learning resources on the Web: An analysis. *Journal of Interactive Learning Research*, 12(2), 153–171. Retrieved from <http://www.editlib.org/p/8417>
- Davis, A. M. (1992). Operational prototyping: A new development approach. *Software IEEE*, 9(5), 70–78. doi:10.1109/52.156899
- Dawe, M. (2006). Desperately seeking simplicity : How young adults with cognitive disabilities and their families adopt assistive technologies. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1143–1152. doi:10.1145/1124772.1124943
- Demissie, B. S., & Solomon, A. W. (2011). Magnitude and causes of childhood blindness and severe visual impairment in Sekoru District, Southwest Ethiopia: A survey using the key informant method. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 105(9), 507–11. doi:10.1016/j.trstmh.2011.04.007
- Díaz-Bossini, J. M., & Moreno, L. (2014). Accessibility to mobile interfaces for older people. *Procedia Computer Science*, 27(2014), 57–66. doi:10.1016/j.procs.2014.02.008
- Dicicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, 40(4), 314–321. doi:10.1111/j.1365-2929.2006.02418.x
- Dick, W., Carey, L., & Carey, J. O. (1996). *The systematic design of instruction* (4th Ed.). New York, NY: Harper Collin.
- Dick, W., & Carey, L. (2004). *The systematic design of instruction*. Boston, MA: Allyn & Bacon.
- Diepen, N. M. Van, Stefanova, E., & Miranowicz, M. (2009). Mastering skills using ICT : An active learning approach. *Research, Reflections, and Innovations in Integrating ICT in Education*, 1, 226–233. Retrieved from <http://www.pdst.ie/sites/default/files/Active learning ICT.pdf>
- Din, R., Norman, H., Kamarulzaman, M. F., Shah, P. M., Karim, A., Mat Salleh, N. S., ... Mastor, K. A. (2012). Creation of a knowledge society via the use of mobile blog: A model of integrated meaningful hybrid e-training. *Asian Social Science*, 8(16), 45–56. doi:10.5539/ass.v8n16p45
- Docherty, S., & Sandelowski, M. (1999). Focus on qualitative methods: Interviewing children. *Research in Nursing & Health*, 22(2), 177–185. doi:10.1002/(SICI)1098-240X(199904)22:2<177::AID-NUR9>3.3.CO;2-8

- Domagk, S., Schwartz, R. N., & Plass, J. L. (2010). Interactivity in multimedia learning: An integrated model. *Computers in Human Behavior*, 26(5), 1024–1033. doi:10.1016/j.chb.2010.03.003
- Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J.J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380–392. doi:10.1016/j.compedu.2012.12.020
- Dove, M. K. (2012). Advancements in assistive technology and AT laws for the disabled. *Delta Kappa Gamma Bulletin Summer 2012*, 78(4), 23–29. doi:10.107/S1355617711001548
- Driscoll, L. (2011). Introduction to primary research: Observations, surveys, and interviews. In P. Lowe, C. & Zemliansky (Ed.), *Writing Spaces: Readings on Writing* (Vol. 2, pp. 153–174). United States of America: Parlor Press.
- Dube, W.B., Ahearn, W.H., Lionello-DeNolf, K., & McIlvane, W. J. (2009). Behavioral momentum: Translational research in intellectual and developmental disabilities. *The Behavior Analyst Today*, 10(2), 238–254. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=7&sid=79ad4538-b3ae-4724-bf99-b2828e20ecab%40sessionmgr12&hid=2>
- Dulfer, M. N., Polesel, J., & Rice, S. (2012). *The experience of education: The impacts of high stakes testing on school students and their families an educator's perspective*. Melbourne: The University of Melbourne.
- Dunlosky, J., & Thiede, K. W. (1998). What makes people study more? An evaluation of factors that affect self-paced study. *Acta Psychologica*, 98(1), 37–56. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9581124>
- Dursin, A. G. (2012). Information design and education for visually impaired and blind people. *Procedia - Social and Behavioral Sciences*, 46, 5568–5572. doi:10.1016/j.sbspro.2012.06.477
- Dwolatzy, B., Kennedy, I. G., & Owens, J. D. (2002). Modern software engineering methods for developing courseware. *Engineering Education 2002:Professionals Engineering Scenarios*. doi:10.1049/ic:20020113
- Efendioğlu, A. (2012). Courseware development model (CDM): The effects of CDM on primary school pre-service teachers' achievements and attitudes. *Computers & Education*, 59(2), 687–700. doi:10.1016/j.compedu.2012.03.015

- Elenchothy, D., Rohani, A.T., Mokhtar, N., & Aminuddin, H. (2010). Enhancing algebraic conceptual knowledge with aid of module using mastery learning approach. *Procedia - Social and Behavioral Sciences*, 8, 362–369. doi:10.1016/j.sbspro.2010.12.051
- Ellis, K. (2009). Multimedia for primary school children learning sign language. *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction*. doi:10.1145/1738826.1738843
- Esteban-Millat, I., Martínez-López, F. J., Huertas-García, R., Meseguer, A., & Rodríguez-Ardura, I. (2014). Modelling students' flow experiences in an online learning environment. *Computers & Education*, 71, 111–123. doi:10.1016/j.compedu.2013.09.012
- Eugène, C. (2006). How to teach at the university level through an active learning approach? Consequences for teaching basic electrical measurements. *Measurement*, 39(10), 936–946. doi:10.1016/j.measurement.2006.09.001
- European Standard EN ISO 9999. (2010). *Assistive products for persons with disability- Classification and terminology*. Retrieved from <https://www.astandis.at/shopV5/Preview.action;jsessionid=43550DB9A2663CE40B22BFB58F29AF11?preview=&dokkey=362746&selectedLocale=en>
- Family Center on Technology and Disability. (2012). *Assistive technology solutions*. Retrieved from http://www.fctd.info/assets/assets/21/AT_solutions-may2012.pdf
- Fontana, A., & Frey, J. H. (1994). Interviewing the art of science. In N. A. Y. L. Denzin (Ed.), *The Handbook of Qualitative Research* (pp. 361–376). Thousands Oaks: SAGE Publications Ltd.
- Fraser, J., & Gutwin, C. (2000). A framework of assistive pointers for low vision users. *Proceedings of the Fourth International ACM Conference on Assistive Technologies - Assets '00*, 9–16. doi:10.1145/354324.354329
- Freelon, D. G. (2010). ReCal : Intercoder reliability calculation as a web service. *International Journal of Internet Science*, 5(1), 20–33. Retrieved from http://5.9.69.25/www-ijis-net/ijis5_1/ijis5_1_freelon.pdf
- Freitas Alves, C. C., Martins Monteiro, G. B., Rabello, S., & Freire Gasparetto, M.E.R. Carvalho, K. M. (2009). Assistive technology applied to education of students with visual impairment. *Revista Panamericana de Salud Pública*, 26(2), 148–153. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=4&sid=698e4f1d-51c2-40ab-8eab-42b4d48d8fea%40sessionmgr115&hid=1>

- French, G. (2007). Children's early learning and development. *National Council for Curriculum and Assessment (NCCA)*. Retrieved from [http://www.ncca.ie/uploadedfiles/curriculum/ld background paper may.pdf](http://www.ncca.ie/uploadedfiles/curriculum/ld%20background%20paper%20may.pdf)
- Fu, F. L., Su, R. C., & Yu, S. C. (2009). EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education*, 52(1), 101–112. doi:10.1016/j.compedu.2008.07.004
- Furió, D., González-Gancedo, S., Juan, M. C., Seguí, I., & Rando, N. (2013). Evaluation of learning outcomes using an educational iPhone game vs. traditional game. *Computers & Education*, 64, 1–23. doi:10.1016/j.compedu.2012.12.001
- Furtado, J. M., Lansingh, V. C., Carter, M. J., Milanese, M. F., Peña, B. N., Ghersi, H. A., ... Silva, J. C. (2012). Causes of blindness and visual impairment in Latin America. *Survey of Ophthalmology*, 57(2), 149–177. doi:10.1016/j.survophthal.2011.07.002
- Gamble, M. J., Dowler, D. L., & Orslene, L. E. (2006). Assistive technology : Choosing the right tool for the right job. *Journal of Vocational Rehabilitation*, 24(2), 73–80. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=7&sid=f12c379c-fd11-4aad-81b5-0137cac8f26f%40sessionmgr11&hid=6>
- Garcia, I., & Pacheco, C. (2013). A constructivist computational platform to support mathematics education in elementary school. *Computers & Education*, 66(2013), 25–39. doi:10.1016/j.compedu.2013.02.004
- Gardner, H., & Hatch, T. (1989). Multiple intelligence go to school: Educational implications of the theory of multiple intelligence. *Educational Researcher*, 18(8), 4–10. Retrieved from <http://www.jstor.org/stable/1176460>
- Giannakos, M. N. (2013). Enjoy and learn with educational games: Examining factors affecting learning performance. *Computers & Education*, 68, 429–439. doi:10.1016/j.compedu.2013.06.005
- Gilutz, S., & Nielsen, J. (2007). *Usability of websites for children*. Retrieved from <http://www.mngroup.com/reports/kids>
- Global Research Innovation and Technology. (2012). *Leverage Freedom Chair (LFC)*. Retrieved from <http://www.gogrit.org/lfc.html>
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597–606. Retrieved from <http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf>

- Guion, L. A., Diehl, D. C., & McDonald, D. (2011). *Triangulation: Establishing the validity of qualitative studies*. Department of Family Youth and Community Sciences, Florida Cooperative Extension Service, University of Florida.
- Guney, A., & Al, S. (2012). Effective learning environments in relation to different learning theories. *Procedia - Social and Behavioral Sciences*, 46, 2334–2338. doi:10.1016/j.sbspro.2012.05.480
- Haniz, I. (2007). Special education, inclusive practices and the teaching of science and mathematics to children with special needs. *Proceedings of International Conference on Science and Mathematics*, 1–7. Retrieved from <http://www.recsam.edu.my/cosmed/cosmed07/AbstractsFullPapers2007/keynotes & plenary%5CPL001A.pdf>
- Harrel, M.C., & Bradley, M. A. (2009). *Data collection methods semi structured interviews and focus groups*. United States: RAND Corporation.
- Hartson, H. R., Andre, T. S., & Williges, R. C. (2003). Criteria for evaluating usability evaluation methods. *International Journal of Human-Computer Interaction*, 15(1), 145–181. doi:10.1.1.136.9688
- He, W. (2013). Examining students' online interaction in a live video streaming environment using data mining and text mining. *Computers in Human Behavior*, 29(1), 90–102. doi:10.1016/j.chb.2012.07.020
- Heracleous, P., Beutemps, D., Ishiguro, H., & Hagita, N. (2011). Towards augmentative speech communication. In I. Ipsic (Ed.), *Speech and Language Technologies* (pp. 303–318). Europe: InTech. doi:10.5772/16622
- Herrington, J. (1997). *Authentic learning in interactive multimedia environments*. (Doctoral Dissertation, Cowan University Faculty of Science, Technology and Engineering, 1997). Retrieved from http://www.academia.edu/176919/Authentic_learning_in_interactive_multimedia_environments
- Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information system research. *MIS Quarterly*, 28(1), 75–105. Retrieved from <http://aisel.aisnet.org/misq/vol28/iss1/6/>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235–266. doi:10.1023/B:EDPR.0000034022.16470.f3
- Hollands, H., Brox, A. C., Chang, A., Adilman, S., Chakraborti, B., Kliever, G., & Maberley, D. A L. (2009). Correctable visual impairment and its impact on quality of life in a marginalized Canadian neighbourhood. *Canadian Journal of*

Ophthalmology. Journal Canadien D'ophtalmologie, 44(1), 42–48.
doi:10.3129/i08-167

Holt, C. (2007). *Computer programs for classroom games*. Retrieved from <http://people.virginia.edu/~cah2k/programs.html>

Hsieh, P. A. J., & Cho, V. (2011). Comparing e-Learning tools' success: The case of instructor–student interactive vs. self-paced tools. *Computers & Education*, 57(3), 2025–2038. doi:10.1016/j.compedu.2011.05.002

Hsu, C. L., & Liao, Y. C. (2014). Exploring the linkages between perceived information accessibility and microblog stickiness: The moderating role of sense of community. *Information & Management*, 1–51. doi:10.1016/j.im.2014.08.005

Hung, W., Jonassen, D. H., Liu, R. (2008). Problem-based learning. In M. P. Spector, J.M., Merrill, M.D., Merriamboer, J.V., & Driscoll (Ed.), *Handbook of Research on Educational Communications and Technology* (3rd Edition., pp. 485–500). New York: Taylor & Francis Group. doi:10.1007/978-1-4419-1428-6_210

Iacono, J. C., Brown, A., & Holtham, C. (2011). The use of the case study method in theory testing: The example of steel e-marketplaces. *The Electrical Journal of Business Research Methods*, 9(1), 57–65. Retrieved from <http://www.ejbrm.com>

Individuals with Disabilities Education Act. (2004). *Public law 108-446*. Retrieved from <http://nichcy.org/wp-content/uploads/docs/PL108-446.pdf>

International Statistical Classification of Diseases and Related Health Problems. (2010). *Instruction manual*. Retrieved from http://www.who.int/classifications/icd/ICD10Volume2_en_2010.pdf

Jack, E. P., & Raturi, A. S. (2006). Lessons learned from methodological triangulation in management research. *Management Research News*, 29(6), 345–357. doi:10.1108/01409170610683833

Jacko, J. A., & Vitense, H. S. (2001). A review and reappraisal of information technologies within a conceptual framework for individuals with disabilities. *Universal Access in the Information Society*, 1(1), 56–76. doi:10.1007/s102090100003

Jiang, L., & Yi, M. (2011). Development of electronic teaching material of modern P.E. educational technology upon problem-based learning. *International Conference on E-Education, Entertainment and E-Management*, 367–370. doi:10.1109/ICeEEM.2011.6137865

- John Clarkson, P., & Coleman, R. (2013). History of inclusive design in the UK. *Applied Ergonomics*, 1–13. doi:10.1016/j.apergo.2013.03.002
- Johnson, C., & Gooliaff, S. (2010). Teaching to strengths: Engaging young boys in learning. *Reclaiming Children and Youth*, 21(4), 28–32. Retrieved from <https://reclaimingjournal.com/>
- Joyojeet, P., Manas, P., & Rakesh, B. (2011). Assistive technology for vision-impairments: An agenda for the ICTD community. *Proceedings of the International World Wide Web Conference*, 513–522. Retrieved from <http://wwwconference.org/www2011/proceeding/companion/p513.pdf>
- June, R. (2011). Promising future for creative content industry. *Bussiness Time*. Retrieved from <http://blis2.bernama.com.eserv.uum.edu.my/mainHomeBypass.do>
- Kaczmarek, L. D., Kashdan, T. B., Drajzkowski, D., Bujacz, A., & Goodman, F. R. (2014). Why do greater curiosity and fewer depressive symptoms predict gratitude intervention use? Utility beliefs, social norm, and self-control beliefs. *Personality and Individual Differences*, 66, 165–170. doi:10.1016/j.paid.2014.03.032
- Kaczmarek, L. D., Kashdan, T. B., Kleiman, E. M., Baczkowski, B., Enko, J., Siebers, A., ... Baran, B. (2013). Who self-initiates gratitude interventions in daily life? An examination of intentions, curiosity, depressive symptoms, and life satisfaction. *Personality and Individual Differences*, 55(7), 805–810. doi:10.1016/j.paid.2013.06.013
- Kährik, P., Leijen, Ä., & Kivestu, T. (2012). Developing music listening skills using active learning methods in secondary education. *Procedia - Social and Behavioral Sciences*, 45, 206–215. doi:10.1016/j.sbspro.2012.06.557
- Kajornboon, A. B. (2005). Using interviews as research instruments. *E-Journal for Researching Teachers*, 2(1), 1–452. Retrieved from <http://www.culi.chula.ac.th/research/publications/4> Research and Academic Articles.pdf
- Kamei-hannan, C., Howe, J., Herrera, R. R., & Erin, J. N. (2012). Perceptions of teachers of students with visual impairments regarding assistive technology: A follow-up study to a university course. *Journal of Visual Impairment and Blindness*, 106(10), 666–679. Retrieved from <http://connection.ebscohost.com/c/articles/82713668/perceptions-teachers-students-visual-impairments-regarding-assistive-technology-follow-up-study-university-course>

- Keates, S., Clarkson, P. J., Harrison, L. A., & Robinson, P. (2000). Towards a practical inclusive design approach. *Proceedings on the 2000 Conference on Universal Usability - CUU '00*, 45–52. doi:10.1145/355460.355471
- Keeney, R. L., & Winterfeldt, D. V. (1991). Complex technical problems. *IEEE Transactions on Engineering Management*, 38(3), 191–201. doi:10.1109/17.83752
- Keller, J. (2000). How to integrate learner motivation planning into lesson planning: The ARCS model approach. *VIII Semanario Santiago: Running Head: Integrating Motivation*. Retrieved from <http://apps.fischlerschool.nova.edu/toolbox/instructionalproducts/itde8005/weekly/2000-Keller-ARCSLessonPlanning.pdf>
- Kerkmann, F. (2012). Accessibility of web search engines: Towards a deeper understanding of barriers for people with disabilities. *Library Review*, 61(8), 608–621. doi:10.1108/00242531211292105
- Khadka, J., Ryan, B., Margrain, T. H., Woodhouse, J. M., & Davies, N. (2012). Listening to voices of children with a visual impairment: A focus group study. *British Journal of Visual Impairment*, 30(3), 182–196. doi:10.1177/0264619612453105
- Khairuddin, K., Noor Faezah, M. Y., & Md. Jan, N. (2010). Refining technical and learning accessibility elements on e-learning for user with visual impairment. *2010 International Symposium on Information Technology*, 1–4. doi:10.1109/ITSIM.2010.5561331
- Khedif, L. Y. B., Engkamat, A., & Jack, S. (2014). The evaluation of users' satisfaction towards the multimedia elements in a courseware. *Procedia - Social and Behavioral Sciences*, 123, 249–255. doi:10.1016/j.sbspro.2014.01.1421
- Kiley, M., Mullins, G., Peterson, R. F., & Rogers, L. (2000). *Leap into...problem-based learning*. Australia: University of Adelaide. Retrieved from http://ebooks.adelaide.edu.au/dspace/bitstream/2440/71220/1/hdl_71220.pdf
- Kim, J., Kang, P., & Choi, I. (2014). Pleasure now, meaning later: Temporal dynamics between pleasure and meaning. *Journal of Experimental Social Psychology*, 1–42. doi:10.1016/j.jesp.2014.07.018
- Kim, Y. (2010). The pilot study in qualitative inquiry: Identifying issues and learning lessons for culturally competent research. *Qualitative Social Work*, 10(2), 190–206. doi:10.1177/1473325010362001

- Kimonen, E., & Nevalainen, R. (2005). Active learning in the process of educational change. *Teaching and Teacher Education*, 21(6), 623–635. doi:10.1016/j.tate.2005.05.003
- Knox, K. C. (2012). It's all in the translation. *Information Today*, 29(8), 21. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=9&sid=8664fa9d-2664-4aeb-9ffb-6cc81fa7d1bf%40sessionmgr115&hid=121>
- Konicek, K., Hyzny, J., & Allegra, R. (2003). Electronic reserves: the promise and challenge to increase accessibility. *Library Hi Tech*, 21(1), 102–108. doi:10.1108/07378830310467445
- Kring, A. M., & Barch, D. M. (2014). The motivation and pleasure dimension of negative symptoms: neural substrates and behavioral outputs. *European Neuropsychopharmacology: The Journal of the European College of Neuropsychopharmacology*, 24(5), 725–736. doi:10.1016/j.euroneuro.2013.06.007
- Kuusela, H., & Paul, P. (2000). A comparison of concurrent and retrospective verbal protocol analysis. *American Journal of Psychology*, 113(3), 387–404. doi:10.2307/1423365.
- Lacey, A., & Luff, D. (2001). *Trent focus for research and development in primary health care: An introduction qualitative data analysis*. Sheffield: Trent Focus.
- Lambert, S. D., & Loiselle, C. G. (2008). Combining individual interviews and focus groups to enhance data richness. *Journal of Advanced Nursing*, 62(2), 228–237. doi:10.1111/j.1365-2648.2007.04559.x
- Leader, S., & Thompson, R. W. (1999). The structured interview. *RTO HFM Workshop*, 1–10. Retrieved from <http://ftp.rta.nato.int/public//PubFulltext/RTO/MP/RTO-MP-055///MP-055-12.pdf>
- Lee, H., & Templeton, R. (2008). Ensuring equal access to technology: Providing assistive technology for students with disabilities. *Theory Into Practice*, 47(3), 212–219. doi:10.1080/00405840802153874
- Leech, B. L. (2006). Asking questions: Techniques for semistructured interviews. *Political Science and Politics*, 35(4), 665–668. Retrieved from <http://links.jstor.org/sici?sici=1049-0965%28200212%2935%3A4%3C665%3AAQTFSI%3E2.O.C0%3B2->

- Li, J., Ma, S., & Ma, L. (2012). The study on the effect of educational games for the development of students' logic-mathematics of multiple intelligence. *Physica Procedia*, 33, 1749–1752. doi:10.1016/j.phpro.2012.05.280
- Liffick, B. W. (2003). Assistive technology in computer science. *Proceedings of the International Symposium on Information and Communication Technologies*, 46–51. doi:1.717.872.3536
- Limna, T., Sae-tang, C., Jantaraprim, C., Tandayya, P., & Niyompol, W. (2007). Linux user interface and front-end operation for the visually impaired. *Proceedings of the 1st International Convention on Rehabilitation Engineering & Assistive Technology in Conjunction with 1st Tan Tock Seng Hospital Neurorehabilitation Meeting*, 179–184. doi:10.1145/1328491.1328537
- Loiacono, E. T., Djamasbi, S., & Kiryazov, T. (2013). Factors that affect visually impaired users' acceptance of audio and music websites. *International Journal of Human Computer Studies*, 71, 321–334. doi:10.1016/j.ijhcs.2012.10.015
- Lombardi, I. (2012). Not-so-serious games for language learning. Now with 99,9% more humour on top. *Procedia of Computer Science*, 15, 148–158. doi:10.1016/j.procs.2012.10.066
- LoPresti, E. F., Bodine, C., & Lewis, C. (2008). Assistive technology for cognition. *IEEE Engineering in Medicine and Biology Magazine: The Quarterly Magazine of the Engineering in Medicine & Biology Society*, 27(2), 29–39. doi:10.1109/EMB.2007.907396
- Luo, H. (2011). Qualitative research on educational technology: Philosophies, methods and challenges. *International Journal of Education*, 3(2), 1–16. doi:10.5296/ije.v3i2.857
- Maaik, J., & Menno, D. T. (2003). Exploring two methods of usability testing: Concurrent versus retrospective think-aloud protocols. *International Professional Communication Conference*, 285–287. Retrieved from <http://ieeexplore.ieee.org.ezaccess.library.uitm.edu.my/stamp/stamp.jsp?tp=&arnumber=1245501>
- Maćesić-Petrović, D., Vučinić, V., & Eškirović, B. (2010). Cognitive development of the children with visual impairment and special educational treatment. *Procedia of Social and Behavioral Sciences*, 5, 157–162. doi:10.1016/j.sbspro.2010.07.065
- Malaysian Commissioner of Law Revision. (2006). *Communications and multimedia act 1998*. Retrieved from <http://www.agc.gov.my/Akta/Vol.12/Act588.pdf>

- Malaysian Department of Social Welfare. (2013). *Disability*. Retrieved from http://www.jkm.gov.my/index.php?option=com_content&view=article&id=363:a-Pendaftaran&Itemid=&lang=en
- Malaysian Government. (2013). *Disabled persons*. Retrieved from http://www.malaysia.gov.my/EN/Relevant_Topics/Society_and_Life/Citizen/SocialWelfareandCommunication/DisabledPersons/Pages/DisabledPersons.aspx
- Malaysian Ministry of Education. (2011). *Modul pendidikan khas bermasalah penglihatan*. Retrieved from http://www.lmsipda.net/ppg_lms/file.php/1/MODUL_PPG_SEMESTER_1/PK_U3101_Pengenalan_Kepada_Pendidikan_Khas.pdf
- Malaysian Ministry of Education. (2012). *Panduan pengajaran dan pembelajaran kemahiran asas individu masalah penglihatan*. Putrajaya: Malaysian Government.
- Malik, S., & Janjua, F. (2011). Active lecturing: An effective pedagogic approach. *International Journal of Academic Research*, 3(2), 963–968. doi:10.7813/2075-4124.2013
- March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, 15, 251–266. doi:10.1016/0167-9236(94)00041-2
- Marianne, W. L. (1998). Iterative triangulation: A theory development process using existing case studies. *Journal of Operations Management*, 16(4), 455–469. doi:10.1016/S0272-6963(98)00024-2
- Martin, J. J., & Choi, Y. S. (2009). Parents' physical activity-related perceptions of their children with disabilities. *Disability and Health Journal*, 2(1), 9–14. doi:10.1016/j.dhjo.2008.09.001
- Martínez, L., & Pluke, M. (2014). Mandate M 376: New software accessibility requirements. *Procedia Computer Science*, 27(2014), 271–280. doi:10.1016/j.procs.2014.02.030
- Martyn, B. M. (2007). Clickers in the classroom: An active learning approach. *Educause Quaterly*, (2), 71–74. Retrieved from <http://net.educause.edu/ir/library/pdf/eqm0729.pdf>
- Marzita, P., Mazlini, A., Mohd Hairry, I., Noraini, M. N., & Che Nidzam, C. (2014). An analysis of comfortable teaching and learning environment: Community response to climate change in school. *Procedia - Social and Behavioral Sciences*, 116, 285–290. doi:10.1016/j.sbspro.2014.01.209

- Masmuzidin, M. Z., Jiang, J., & Wan, T. (2012). Learning moral values through virtual technology: The development and evaluation of Malaysian virtual folktales- Hikayat Land. *Procedia - Social and Behavioral Sciences*, 31, 315–322. doi:10.1016/j.sbspro.2011.12.061
- Mates, B.T., & Booth, C. (2012). Information power to all patrons. *Library Technology Report*, 48(7), 7–13. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=5&sid=8f418f3a-d9f1-4b5f-9e7b-1a84913528f0%40sessionmgr4&hid=121>
- Matson, J. L., Mahan, S., & LoVullo, S. V. (2009). Parent training: A review of methods for children with developmental disabilities. *Research in Developmental Disabilities*, 30(5), 961–968. doi:10.1016/j.ridd.2009.01.009
- Mayer, R. E. (1989). Models for understanding. *Review of Educational Research*, 59(1), 43–64. doi:10.3102/00346543059001043
- Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.
- Mayer, R. E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction*, 13(2), 125–139. doi:10.1016/S0959-4752(02)00016-6
- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, 38(1), 43–52. doi:10.1207/S15326985EP3801_6
- Mazyrah, M., Wan Fatimah, W. A., Shahrina, M. N., & Suziah, S. (2008). A conceptual framework for english language courseware using storytelling approach: Case study in University Teknologi Petronas. *Information Technology Symposium*, 1–6. doi:10.1109/ITSIM.2008.4631704
- McCord, L., & McCord, W. (2010). Online learning: Getting comfortable in the cyber class. *Teaching and Learning in Nursing*, 5(1), 27–32. doi:10.1016/j.teln.2009.05.003
- Mechlova, E., & Malcik, M. (2012). ICT in changes of learning theories. *International Conference on Emerging eLearning Technologies and Applications (ICETA)*, 253–262. doi:10.1109/ICETA.2012.6418326
- Melissa, N. L., Yen, A., & See, C. M. (2011). Employment of people with disabilities in Malaysia: Drivers and inhibitors. *International Journal of Special Education*, 26(1), 112–124.
- Meme, Z. R. (2010). Empowering persons with disabilities in Malaysia. *10th BGM of the East Asia Pasific Regional Council of Cheshire Home*, 1–27. Retrieved

from [http://www.sabahcheshirehome.org/eapacrc2010/download/COUNCIL OF CHESHIRE HOME - Empowering PWDs -dto meme.pdf](http://www.sabahcheshirehome.org/eapacrc2010/download/COUNCIL_OF_CHESHIRE_HOME_-_Empowering_PWDs_-_dto_meme.pdf)

- Microsoft Corporation. (2013). *Types of assistive technology products*. Retrieved from <http://www.microsoft.com/enable/at/types.aspx>
- Miles, D. R., Steiner, M. J., Luken, K. J., Sanderson, M. R., Coyne-Beasley, T., Herrick, H., ... Ford, C. A. (2011). Health and educational status of children raised by a caregiver with a disability. *Disability and Health Journal*, 4(3), 185–191. doi:10.1016/j.dhjo.2011.03.004
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.
- Mills, M. (2010). Deaf jam: From inscription to preproduction to information. *Social Text*, 28(1), 35–58. doi:10.1215/01642472-2009-059
- Miñón, R., Moreno, L., Martínez, P., & Abascal, J. (2014). An approach to the integration of accessibility requirements into a user interface development method. *Science of Computer Programming*, 86(2014), 58–73. doi:10.1016/j.scico.2013.04.005
- Minou, T., & Manuchehr, T. (2012). Analysis of the recent international documents toward inclusive education of children with disabilities. *Cypriot Journal of Educational Sciences*, 7(3), 229–243. Retrieved from <http://www.world-education-center.org/index.php/cjes/article/view/7.3.8/7.3.8>
- Mohd Najib, A. R. (2011). Full text of Prime Minister's 2012 budget speech at the Dewan Rakyat. Retrieved from <http://blis2.bernama.com.eserv.uum.edu.my/mainHomeBypass.do>
- Mohd Najib, A. R. (2012, September 27). The 2013 budget speech. *New Straits Time*. Retrieved from <http://www.nst.com.my/2013budget/full-text-of-the-2013-budget-speech-1.149226>
- Moran, J. M., Rain, M., Page-Gould, E., & Mar, R. A. (2014). Do I amuse you? Asymmetric predictors for humor appreciation and humor production. *Journal of Research in Personality*, 49, 8–13. doi:10.1016/j.jrp.2013.12.002
- Morfidi, E., Papachristos, N. M., & Mikropoulos, T. A. (2010). Teachers' implementation of a hypermedia application for children with severe learning disabilities. *2010 International Conference on Intelligent Networking and Collaborative Systems*, 267–273. doi:10.1109/INCOS.2010.25
- Mtebe, J. S., & Twaakyondo, H. M. (2012). Developing and using animations and simulations to teach computer science courses: The case of University of Dar Es

- Salaam. 2012 *International Conference on E-Learning and E-Technologies in Education (ICEEE)*, 240–246. doi:10.1109/ICeLeTE.2012.6333383
- Muhammad Haziq, L.A., Syariffanor, H., & Shahril, P. (2009). MyLexics : An assistive courseware for dyslexic children to learn basic Malay language. *Newsletter ACM SIGACCESS Accessibility and Computing*, (95), 3–9. doi:10.1145/1651259.1651260
- Mulhall, A. (2003). In the field: Notes on observation in qualitative research. *Journal of Advanced Nursing*, 41(3), 306–13. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12581118>
- Murray, I., & Armstrong, H. (2004). A computing education vision for the sight impaired. In Y. Raymond, L., & Alison (Ed.), *Conferences in Research and Practices in Information Technology* (pp. 201–206). Dunedin, New Zealand: Australian, Computer Society, Inc. Retrieved from <http://crpit.com/confpapers/CRPITV30Murray.pdf>
- Nantanoot, S. (2013). *Accessibility evaluation of online learning management system for person with visual impairment*. (Doctoral Dissertation, School of Informatics and Computing, Indiana University).
- National Early Childhood Intervention Council. (2013). *Children with disabilities in Malaysia*. Retrieved from www.necicmalaysia.org/view_file.cfm?fileid=129
- Nielsen, J., Clemmensen, T., & Yssing, C. (2002). Getting access to what goes on in people's heads? - Reflections on the think-aloud technique. *Proceedings of the Second Nordic Conference on Human-Computer Interaction*, 101–110. doi:10.1145/572020.572033
- Nik Siti Hanifah, N. A., Tao, R. W., & Ping, J. (2011). Immersive environment courseware evaluation. *Procedia Social and Behavioral Sciences*, 15(2011), 1667–1676. doi:10.1016/j.sbspro.2011.03.350
- Niroo, M., Nejhad, G. H. H., & Haghani, M. (2012). The effect of Gardner theory application on mathematical/logical intelligence and student's mathematical functioning relationship. *Procedia - Social and Behavioral Sciences*, 47, 2169–2175. doi:10.1016/j.sbspro.2012.06.967
- Nor Azah, A. A., Roznim, M. R., & Khairunnisa, R. (2010). Preschool multimedia interactive courseware: Classifying object (mengelaskan objek) PMICMO. *2010 Second WRI World Congress on Software Engineering*, 318–322. doi:10.1109/WCSE.2010.41

- Norazzila, S., Tengku Norainun, T. S., & Mohd Shahir, L. (2010). Mastery learning assessment model (MLAM) in teaching and learning mathematics. *Procedia - Social and Behavioral Sciences*, 8, 294–298. doi:10.1016/j.sbspro.2010.12.040
- Norfarhana, A., Wan Fatimah, W. A., & Emelia Akashah, P. A. (2010). Multimedia design and development in “Komputer Saya” courseware for slow learners. *Second International Conference on Computer Research and Development*, 354–358. doi:10.1109/ICCRD.2010.44
- Norfarhana, A., Wan Fatimah, W.A., & Emelia Akashah, P. A. (2012). Development and usability study of multimedia courseware for slow learners: “Komputer Saya.” *2012 International Conference on Computer & Information Science (ICCIS)*, 1110–1114. doi:10.1109/ICCISci.2012.6297192
- Norshuhada, S., & Shahizan, H. (2010). *Design research in software development: Constructing and linking research questions, objectives, methods, and outcomes*. Sintok: Penerbit Universiti Utara Malaysia.
- Nurulnadwan, A., Nur Hazwani, M. R., & Ariffin, A. M. (2011). Visually impaired children’s acceptances on assistive courseware. *American Journal of Applied Sciences*, 8(10), 1019–1026. doi:10.3844/ajassp.2011.1019.1026
- Nurulnadwan, A., Nur Hazwani, M. R., Erratul Shiela, E., & Ariffin, A. M. (2010). Assistive courseware for the visually impaired based on theory of multiple intelligence. *Proceedings of the Knowledge Management International Conference*, 192–197.
- Nurulnadwan, A., Nur Hazwani, M. R., Erratul Shiela, E., & Ariffin, A. M. (2011). Assistive courseware for the visually impaired based on theory of multiple intelligence and SECI model. *American Journal of Economics and Business Administration*, 3(1), 150–156. doi:10.3844/ajebasp.2011.150.156
- O’Dea, M. (2012). *Assistive technology: A system of support for including students with disabilities within general education programs*. [Powerpoint slides] Special Education Consultant, Learning Resource Center-Central NJDOE/Office of Special Education Programs.
- O’Donoghue, T., & Punch, K. (2003). *Qualitative educational research in action: Doing and reflecting*. New York: RoutledgeFalmer.
- Obikwelu, C., & Read, J. C. (2012). The serious game constructivist framework for children’s learning. *Procedia Computer Science*, 15, 32–37. doi:10.1016/j.procs.2012.10.055
- Office for Disability Issues. (2010). *Equality act 2010 guidance*. Retrieved from <http://odi.dwp.gov.uk/docs/wor/new/ea-guide.pdf>

- Ohene-Djan, J., & Shipsey, R. (2008). Principles for inclusive software design of learning technologies. *2008 Eighth IEEE International Conference on Advanced Learning Technologies*, 989–990. doi:10.1109/ICALT.2008.254
- Orji, H. U. (2007). *Effects of U.S. presidents' leadership roles on global security: A case Carter and Bush*. (Doctoral Dissertation, University of Phoenix, 2007). Retrieved from <http://gradworks.umi.com/3285584.pdf>
- Othman, T. (2013). *ATLAS.ti: Pengenalan analisis data kualitatif 140 ilustrasi langkah demi langkah*. Kuala Lumpur, Malaysia: MPWS Rich Publication.
- Oxford Dictionary. (2014). *Oxford Dictionaries Language Matters*. Oxford University Press: UK.
- Özyurt, Ö., Özyurt, H., Baki, A., & Güven, B. (2013). Integration into mathematics classrooms of an adaptive and intelligent individualized e-learning environment: Implementation and evaluation of UZWEBMAT. *Computers in Human Behavior*, 29(3), 726–738. doi:10.1016/j.chb.2012.11.013
- Pange, J., Lekka, A., & Toki, E. I. (2010). Different learning theories applied to diverse learning subjects: A pilot study. *Procedia - Social and Behavioral Sciences*, 9, 800–804. doi:10.1016/j.sbspro.2010.12.237
- Pathak, A., & Intratat, C. (2012). Use of semi-structured interviews to investigate teacher perceptions of student collaboration. *Malaysian Journal of ELT Research*, 8(1), 1–10. Retrieved from <http://www.melta.org.my/majer/ParthakA.pdf>
- Patomäki, S., Raisamo, R., Salo, J., Pasto, V., & Hippula, A. (2004). Experiences on haptic interfaces for visually impaired young children. *Proceedings of the 6th International Conference on Multimodal Interfaces*, 281–288. doi:10.1145/1027933.1027979
- Patton, M. (1990). *Qualitative evaluation and research methods*. Beverly Hills, CA: Sage.
- Patton, M. Q. (2002). *Qualitative research and evaluation method*. Thousand Oaks: SAGE Publication Ltd.
- Peppers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007a). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77. doi:10.2753/MIS0742-1222240302
- Permvattana, R., Murray, I., & Hollier, S. (2006). Innovations in tertiary online for students who are blind or vision impaired. *2006 7th International Conference*

on *Information Technology Based Higher Education and Training*, 507–512.
doi:10.1109/ITHET.2006.339804

- Pernice, K., & Nielson, J. (2001). *Usability guidelines for accessible web design*. Retrieved from http://media.nngroup.com/media/reports/free/Usability_Guidelines_for_Accessible_Web_Design.pdf
- Phellas, C. N., Bloch, A., & Seale, C. (2011). Structured methods: Interviews, questionnaires, and observation. In C. Seale (Ed.), *Researching Society and Culture* (3rd Edition., pp. 181–205). United Kingdom: SAGE Publications Ltd.
- Plant, K. M., & Sanders, M. R. (2007). Reducing problem behavior during caregiving in families of preschool-aged children with developmental disabilities. *Research in Developmental Disabilities*, 28(4), 362–385. doi:10.1016/j.ridd.2006.02.009
- Ploetzner, R., & Lowe, R. (2004). Dynamic visualisations and learning. *Learning and Instruction*, 14(3), 235–240. doi:10.1016/j.learninstruc.2004.06.001
- Preece, J., Rogers, Y., & Sharp, H. (2007). *Interaction design: Beyond human-computer interaction* (2nd ed.). England: John Wiley & Sons.
- Pugsley, L. (2011). How to...Begin to get to grips with educational theory. *Education for Primary Care*, 22(4), 266–268. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21781396>
- Punch, S. (2002). Research with children: The same or different from research with adults? *Childhood*, 9(3), 321–341. doi:10.1177/0907568202009003005
- Rahmah, L. Y., Hafiza, A., & Tengku Nazatul, T. P. (2012). Affective engineering of background colour in digital storytelling for remedial students. *Procedia - Social and Behavioral Sciences*, 68, 202–212. doi:10.1016/j.sbspro.2012.12.220
- Rahmah, L. Y., & Tengku Nazatul, T. P. (2012). Reading activities using the scaffolding in MEL-SindD for down syndrome children. *Procedia - Social and Behavioral Sciences*, 35(2011), 121–128. doi:10.1016/j.sbspro.2012.02.070
- Raisamo, R., Hippula, A., Patomäki, S., Tuominen, E., Pasto, V., & Hasu, M. (2006). Testing usability of multimodal applications with visually impaired. *MultiMedia, IEEE*, 13(3), 70–76. doi:10.1109/MMUL.2006.68
- Rapley, T. J. (2001). The art (fulness) of open-ended interviewing: Some considerations on analysing interviews. *Qualitative Research*, 1(3), 303–323. doi:10.1177/146879410100100303

- Rashid, A., Sharif, M., Narina, A. S., & Rosman, Y. (2014). Personality and happiness among academicians in Malaysia. *Procedia - Social and Behavioral Sciences*, 116, 4209–4212. doi:10.1016/j.sbspro.2014.01.918
- Rasmeet, K. C., & Ahalya, S. (2011). The effect of visual impairment on quality of life of children aged 3-16 years. *The British Journal of Ophthalmology*, 95(5), 642–645. doi:10.1136/bjo.2010.182386
- Reichle, J. (2011). Evaluating assistive technology in the education of persons with severe disabilities. *Journal of Behavioral Education*, 20(1), 77–85. doi:10.1007/s10864-011-9121-1
- Retournard, J.F., & Evans-Klock, C. (2010). *Disability in the workplace: Company practices*. Geneva, Switzerland: International Labour Organization (ILO).
- Ripat, J. D., & Woodgate, R. L. (2011). Locating assistive technology within an emancipatory disability research framework. *Technology and Disability*, 23(2), 87–92. doi:10.3233/TAD-2011-0315
- Rogers, Y., Sharp, H., & Preece, J. (2011). *Interaction design: Beyond human computer interaction* (3rd ed.). England: John Wiley & Sons.
- Rossafri, M. (2012). The design, development and evaluation of an adaptive multimedia learning environment courseware among history teachers. *Procedia Technology*, 1, 72–76. doi:10.1016/j.protcy.2012.02.014
- Roulston, K., DeMarrais, K., & Lewis, J. B. (2003). Learning to interview in the social sciences. *Qualitative Inquiry*, 9(4), 643–668. doi:10.1177/1077800403252736
- Rubin, A., & Babbie, E. R. (2008). *Research methods for social work*. Belmont, CA: Thomson Brooks/Cole.
- Sabri, S., Firdaus, Y., & Shahrizal, N. (2013). EZ-Arabic for children: A virtual learning resource tool for Malaysian primary schools. *Procedia - Social and Behavioral Sciences*, 90, 396–404. doi:10.1016/j.sbspro.2013.07.108
- Sabrina, M. R. (2012). *An exploration of the process of brand identity building and internal organisational culture*. (Doctoral dissertation, Lincoln University, 2012).
- Sakini, M. S. (2011). Malaysia creative content industry has grown tremendously, says info. *Bernama*. Retrieved from <http://blis2.bernama.com.eserv.uum.edu.my/mainHomeBypass.do>

- Salminen, A. (2008). European research related to assistive technology for disabled children. *Technology and Disability*, 20(3), 173–178. Retrieved from <http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=7&sid=482269b7-dbb0-4182-a742-8e13d0c979d8%40sessionmgr113&hid=121>
- Sampson, D. G., & Zervas, P. (2010). Technology-enhanced training for people with disabilities: The eAccess2Learn framework. *2010 International Conference on Intelligent Networking and Collaborative Systems*, 244–251. doi:10.1109/INCOS.2010.66
- Samson, A. C., Lackner, H. K., Weiss, E. M., & Papousek, I. (2012). Perception of other people's mental states affects humor in social anxiety. *Journal of Behavior Therapy and Experimental Psychiatry*, 43(1), 625–631. doi:10.1016/j.jbtep.2011.08.007
- Sandhya, S., & Devi, K. A. S. (2011). Accessibility evaluation of websites using screen reader. *2011 7th International Conference on Next Generation Web Services Practices*, 338–341. doi:10.1109/NWeSP.2011.6088201
- Savita, K. S., & Nur Athirah, A. P. (2011). Malay sign language courseware for hearing-impaired children in Malaysia. *World Applied Sciences Journal*, 12, 59–64. Retrieved from [http://idosi.org/wasj/wasj12\(CA&KM\)2011.htm](http://idosi.org/wasj/wasj12(CA&KM)2011.htm)
- Schatz, E. (2009). *Nesting semi-structured interviews in surveys or censuses: More than the sum of the parts*. Retrieved from <http://www.colorado.edu/ibs/pubs/pop/pop2009-0008.pdf>
- Scherer, M. J., Craddock, G., & Mackeogh, T. (2011). The relationship of personal factors and subjective well-being to the use of assistive technology devices. *Disability and Rehabilitation*, 33(10), 811–817. doi:10.3109/09638288.2010.511418
- Scherer, M. J., & Glueckauf, R. (2005). Assessing the benefits of assistive technologies for activities and participation. *Rehabilitation Psychology*, 50(2), 132–141. doi:10.1037/0090-5550.50.2.132
- Schmidt, H. G., Rotgans, J. I., & Yew, E. H. J. (2011). The process of problem-based learning: what works and why. *Medical Education*, 45(8), 792–806. doi:10.1111/j.1365-2923.2011.04035.x
- Schmidt-Weigand, F., Kohnert, A., & Glowalla, U. (2010). A closer look at split visual attention in system- and self-paced instruction in multimedia learning. *Learning and Instruction*, 20(2), 100–110. doi:10.1016/j.learninstruc.2009.02.011

- Schneider, J., Leeder, S.R., Gopinath, B., Wang, J.J., & Mitchell, P. (2010). Frequency, course, and impact of correctable visual impairment (uncorrected refractive error). *Survey of Ophthalmology*, 55(6), 539–560. doi:10.1016/j.survophthal.2010.02.004
- Schnotz, W., & Lowe, R. (2003). External and internal representations in multimedia learning. *Learning and Instruction*, 13(2), 117–123. doi:10.1016/S0959-4752(02)00015-4
- Schurink, J., Cox, R. F. A., Cillessen, A. H. N., Rens, G. H. M. B., & Boonstra, F. N. (2011). Low vision aids for visually impaired children: A perception-action perspective. *Research in Developmental Disabilities*, 32(3), 871–882. doi:10.1016/j.ridd.2011.01.027
- Seo, Y. J., & Woo, H. (2010). The identification, implementation, and evaluation of critical user interface design features of computer-assisted instruction programs in mathematics for students with learning disabilities. *Computers & Education*, 55(1), 363–377. doi:10.1016/j.compedu.2010.02.002
- Sesen, B. A., & Tarhan, L. (2010). Promoting active learning in high school chemistry: Learning achievement and attitude. *Procedia - Social and Behavioral Sciences*, 2(2), 2625–2630. doi:10.1016/j.sbspro.2010.03.384
- Shandra, C. L., Avery, R.C., Hogan, D. P., & Msall, M. E. (2012). Child and adult disability in the 2000 Census: disability is a household affair. *Disability and Health Journal*, 5(4), 241–248. doi:10.1016/j.dhjo.2012.07.004
- Shannon, P., & Tappan, C. (2011). A qualitative analysis of child protective services practice with children with developmental disabilities. *Children and Youth Services Review*, 33(9), 1469–1475. doi:10.1016/j.childyouth.2010.11.014
- Shaw, C., Brady, L., & Davey, C. (2011). *Guidelines for research with children and young people*. NCB Research Centre, London.
- Sheng, W. B., & Lifeng, K. (2012). Mastery learning in the context of university education education. *Journal of the NUS Teaching Academy*, 2(4), 206–222. Retrieved from http://www.nus.edu.sg/teachingacademy/jnusta/v2n4/v2n4p206_Kang.pdf
- Silius, K., & Tervakari, A. (2003). An evaluation of the usefulness of web-based learning environments: The evaluation tool into the portal of Finnish Virtual University. *International Conference on Network Universities and E-Learning*, 1–10. doi:10.1.1.123.5095

- Silva, M. L. Da, Gonçalves, D., & Silva, H. (2014). User-tuned content customization for children with autism spectrum disorders. *Procedia Computer Science*, 27, 441–448. doi:10.1016/j.procs.2014.02.048
- Sinha, A. C., & Baumann, B. (2010). Anesthesia for ocular trauma. *Current Anaesthesia & Critical Care*, 21(4), 184–188. doi:10.1016/j.cacc.2010.05.001
- Siti Mahfuzah, S. (2011). *Conceptual design model of computerized personal-decision aid (ComPDA)*. (Doctoral dissertation, Universiti Utara Malaysia, 2011). Retrieved from <http://etd.uum.edu.my>
- Siti Zaharah, M., & Nor Azan, M. Z. (2011). Accessible courseware for kids with hearing impaired (MudahKiu): A preliminary analysis. *2011 International Conference on Pattern Analysis and Intelligent Robotics*, 197–202. doi:10.1109/ICPAIR.2011.5976944
- Siu, K. W. M., & Lam, M. S. (2012). Public computer assisted learning facilities for children with visual impairment: Universal design for inclusive learning. *Early Childhood Education Journal*, 40(5), 295–303. doi:10.1007/s10643-011-0502-9
- Sobihatun Nur, A. S. (2010). *The development and effects of a persuasive multimedia learning environment (PMLE) in reducing children dental anxiety*. (Doctoral dissertation, Universiti Sains Malaysia, 2010).
- Sobihatun Nur, A. S., Wan Ahmad Jaafar, W. Y., & Azillah, M. A. (2010). Using persuasive design principles in motivational feeling towards children dental anxiety (CDA). In T. Ploug, P. Hasle, & H. Oinas-Kukkonen (Eds.), *Persuasive Technology* (pp. 223–237). Berlin, Heidelberg: Springer-Verlag. doi:10.1007/978-3-642-13226-1_23
- Sodnik, J., Jakus, G., & Tomažič, S. (2011). Multiple spatial sounds in hierarchical menu navigation for visually impaired computer users. *International Journal of Human-Computer Studies*, 69, 100–112. doi:10.1016/j.ijhcs.2010.10.004
- Southwell, K.L., & Slater, J. (2012). Accessibility of digital special collections using screen readers. *Library Hi Tech*, 30(3), 457–471. doi:10.1108/07378831211266609
- Stumbo, N. J., Martin, J. K., & Hedrick, B. N. (2009). Assistive technology: Impact on education, employment, and independence of individuals with physical disabilities. *Journal of Vocational Rehabilitation*, 30(2), 99–110. doi:10.3233/JVR-2009-0456
- Suziah, S., Siti Nur Syazana, M. S., Mean, F. O., & Halabi, H. (2010). Understanding domain expert's perspectives and expectations in assistive

technology. *2010 International Symposium on Information Technology*, 1164–1167. doi:10.1109/ITSIM.2010.5561491

Syamsul Bahrin, Z. (2011). *Mobile game-based learning (mGBL) engineering model*. (Doctoral dissertation, Universiti Utara Malaysia, 2011). Retrieved from <http://etd.uum.edu.my/2807/>

Syazwan, N., & Wan Fatimah, W. A. (2010). Implementation of design and learning theories in multimedia courseware development: Lines & planes in 3-Dimensions. *2010 International Conference on User Science Engineering*, 93–97. doi:10.1109/IUSER.2010.5716730

Synofzik, M., Schlaepfer, T. E., & Fins, J. J. (2012). How happy is too happy? Euphoria, neuroethics, and deep brain stimulation of the nucleus accumbens. *AJOB Neuroscience*, 3(1), 30–36. doi:10.1080/21507740.2011.635633

Tan, H. K., Schmidt, D., Stanford, M., Teär-Fahnehjelm, K., Ferret, N., Salt, A., & Gilbert, R. (2007). Risk of visual impairment in children with congenital toxoplasmic retinochoroiditis. *American Journal of Ophthalmology*, 144(5), 648–653. doi:10.1016/j.ajo.2007.07.013

Targher, S., Ocelli, V., & Zampini, M. (2012). Audiovisual integration in low vision individuals. *Neuropsychologia*, 50(5), 576–82. doi:10.1016/j.neuropsychologia.2011.10.021

Taylor-powell, E., & Steele, S. (1996). Collecting evaluation data: Direct observation. *University of Wisconsin-Extension*. Retrieved from <http://learningstore.uwex.edu/assets/pdfs/G3658-5.pdf>

Teddle, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, 1(1), 77–100. doi:10.1177/2345678906292430

Teo, H. H., Chan, H. C., Wei, K. K., & Zhang, Z. (2003). Evaluating information accessibility and community adaptivity features for sustaining virtual learning communities. *International Journal of Human-Computer Studies*, 59(5), 671–697. doi:10.1016/S1071-5819(03)00087-9

Thao, L., & Quynh, L. (1997). Web-based evaluation of courseware. *Australian Society for Computers in Learning in Tertiary Education*. Retrieved from <http://cms.ascilite.org.au/conferences/perth97/papers/Le/Le.html>

Thurlings, M., Vermeulen, M., Bastiaens, T., & Stijnen, S. (2013). Understanding feedback: A learning theory perspective. *Educational Research Review*, 9(1), 1–15. doi:10.1016/j.edurev.2012.11.004

- Tullis, J. G., & Benjamin, A. S. (2011). On the effectiveness of self-paced learning. *Journal of Memory and Language*, 64(2), 109–118. doi:10.1016/j.jml.2010.11.002
- Turner, D. W. (2010). Qualitative interview design : A practical guide for novice investigators. *The Qualitative Report*, 15(3), 754–760. Retrieved from <http://www.nova.edu/ssss/QR/QR15-3/qid.pdf>
- United Nations Educational Scientific and Cultural Organization. (2012). *Education for all movement*. Retrieved from <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-all/>
- University of Strathclyde. (2013). *Unstructured observation*. Retrieved from <http://www.strath.ac.uk/aer/materials/3datacollection/unit5/unstructuredobservation/>
- Vaishnavi, V., & Kuechler, W. (2007). *Design science research methods and patterns: Innovating information and communication technology*. New York: Auerbach Publications.
- Van der Zee, K. I., Bakker, A. B., & Bakker, P. (2002). Why are structured interviews so rarely used in personnel selection? *Journal of Applied Psychology*, 87(1), 176–184. doi:10.1037//0021-9010.87.1.176
- Vaquer, N. (2011). A voice and a choice for students with special needs. *Philadelphia Social Innovations Journal*, 1(1), 1–3. Retrieved from http://www.philasocialinnovations.org/site/images/stories/psij/downloads/psij_journal_0411.pdf
- Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: The kappa statistic. *Family Medicine*, 37(5), 360–363. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/15883903>
- Waldron, D., & Layton, N. (2008). Hard and soft assistive technologies: Defining roles for clinicians. *Australian Occupational Therapy Journal*, 55(1), 61–64. doi:10.1111/j.1440-1630.2007.00707.x
- Walsh, T. R., Irwin, D. E., Meier, A., Varni, J. W., & DeWalt, D. A. (2008). The use of focus groups in the development of the PROMIS pediatrics item bank. *Quality of Life Research*, 17(5), 725–735. doi:10.1007/s11136-008-9338-1
- Walsh-Gallagher, D., Mc ConKey, R., Sinclair, M., & Clarke, R. (2013). Normalising birth for women with a disability: The challenges facing practitioners. *Midwifery*, 1–6. doi:10.1016/j.midw.2011.10.007

- Wan Ahmad Jaafar, W. Y., Siti Nor Jannah, A., & Mohamed Zamri, M. Z. (2012). Application of persuasive multimedia to raise stress awareness among the secondary school students. *IERI Procedia*, 3, 105–113. doi:10.1016/j.ieri.2012.09.018
- Wan Ahmad Jaafar, W. Y., & Sobihatun Nur, A. S. (2010). Usability design strategies for children: Developing children's learning and knowledge in decreasing their dental anxiety. *US-China Education Review*, 7(9), 86–96. Retrieved from <http://eric.ed.gov/?id=ED514799>
- Warren, A. D. (2012). *Mastery learning: A basic introduction*. University of Buffalo, New York. Retrieved from <http://etc.buffalo.edu/eventResources/shopOfHorrorsResources/BloomTaxonomy.pdf>
- Wei, X., & Zhou, H. (2011). Functional design of the virtual learning community based on the connectivism learning theory. *International Conference on Electrical and Control Engineering (ICECE)*, 6599–6602. doi:10.1109/ICECENG.2011.6056958
- Weinberg, R., Salim, S., & Shields, M. B. (2010). Glaucoma and systemic diseases. *Survey of Ophthalmology*, 55(1), 64–77. doi:10.1016/j.survophthal.2009.03.006
- Wheeler, K., Yang, Y., & Xiang, H. (2009). Transportation use patterns of U.S. children and teenagers with disabilities. *Disability and Health Journal*, 2(3), 158–164. doi:10.1016/j.dhjo.2009.03.003
- Winter, A. G., Bollini, M. A., Delatte, D. H., Benjamin, M., Hanley, H. F. O., & Scolnik, N. K. (2010). The Design and fabrication of the East African trial leveraged freedom chair. *RESNA Annual Conference*, 1–8. Retrieved from http://web.resna.org/library/conference_2010/PDF_Versions/Mobility/StudentScientific/Part2/WinterA.pdf
- Wong, M.E., & Cohen, L. (2011). School, family and other influences on assistive technology use: Access and challenges for students with visual impairment in Singapore. *British Journal of Visual Impairment*, 29(2), 130–144. doi:10.1177/0264619611402759
- Worah, S., Douglas, S., McNaughton, D., & Kennedy, P. (2010). Augmentative and alternative communication: Resource guide for teachers. *State Education Resource Center*, 1–8. Retrieved from http://aac-lerc.psu.edu/documents/aac_serc.pdf
- World Health Organization. (2013). *Disabilities*. Retrieved from <http://www.who.int/topics/disabilities/en/>

- World Health Organization. (2014). *Visual impairment and blindness*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs282/en/>
- Wu, W. H., Chiou, W. B., Kao, H. Y., Alex Hu, C. H., & Huang, S. H. (2012). Re-exploring game-assisted learning research: The perspective of learning theoretical bases. *Computers & Education*, 59(4), 1153–1161. doi:10.1016/j.compedu.2012.05.003
- Yamauchi, S. (2009). Advanced interdisciplinary human research in assistive technology for elderly persons and persons with disabilities. *Advanced Robotics*, 23(11), 1455–1458. doi:10.1163/016918609X12469660188450
- Yang, Y., Leung, H., Yue, L., & Deng, L. (2013). Generating a two-phase lesson for guiding beginners to learn basic dance movements. *Computers & Education*, 61(166), 1–20. doi:10.1016/j.compedu.2012.09.006
- Youjing, L., & Wujing, L. (2011). Developing a learning ecosystem of higher education enabled by Netvibes. *International Conference on Electrical and Control Engineering*, 6518–6522. doi:10.1109/ICECENG.2011.6056913
- Zatul Amilah, S., Nurulnadwan, A., Ariffin, A.M., & Mohd Saifullizam, J. (2011). Assistive courseware for hearing impaired learners in Malaysia based on theory of multiple intelligences (MI). *International Journal of Computer Science and Emerging Technologies*, 2(6), 370–377. Retrieved from <http://ojs.excelingtech.co.uk/index.php/IJCSET/article/view/249/189>
- Zenios, M. (2011). Epistemic activities and collaborative learning: Towards an analytical model for studying knowledge construction in networked learning settings. *Journal of Computer Assisted Learning*, 27(3), 259–268. doi:10.1111/j.1365-2729.2010.00394.x
- Zhang, M. (2014). Who are interested in online science simulations? Tracking a trend of digital divide in Internet use. *Computers & Education*, 76, 205–214. doi:10.1016/j.compedu.2014.04.001
- Zhang, Y., & Wildemuth, B. M. (2009). Unstructured interviews. In B. M. Wildemuth (Ed.), *Applications of Social Research Methods to Questions in Information and Library Science* (pp. 222–231). Westport, CT: Libraries Unlimited.
- Zuraini Hanim, Z., & Wan Fatimah, W. A. (2011). Application of design and learning theories in multimedia courseware development, “Li2D.” *National Postgraduate Conference*, 1–5. doi:10.1109/NatPC.2011.6136268