

Premier Reference Source

Optimizing Student Engagement in Online Learning Environments



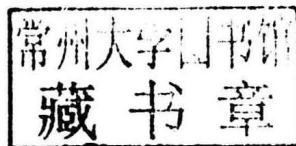
A.V. Senthil Kumar

IGI Global
DISSEMINATOR OF KNOWLEDGE

Optimizing Student Engagement in Online Learning Environments

A.V. Senthil Kumar

Hindusthan College of Arts and Science, India



A volume in the Advances in Educational Technologies and Instructional Design (AETID) Book Series



Published in the United States of America by

IGI Global
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

Copyright © 2018 by IGI Global. All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronic or mechanical, including photocopying, without written permission from the publisher. Product or company names used in this set are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark.

Library of Congress Cataloging-in-Publication Data

Names: Kumar, A. V. Senthil, 1966- editor.

Title: Optimizing student engagement in online learning environments / A.V.

Senthil Kumar, editor.

Description: Hershey, PA : Information Science Reference, 2018. | Includes bibliographical references.

Identifiers: LCCN 2017020274 | ISBN 9781522536345 (hardcover) | ISBN 9781522536352 (ebook)

Subjects: LCSH: Web-based instruction. | Motivation in education. | Engagement (Philosophy)

Classification: LCC LB1044.87 .O8 2018 | DDC 371.33/4--dc23 LC record available at <https://lccn.loc.gov/2017020274>

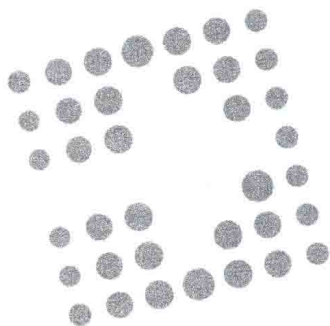
This book is published in the IGI Global book series Advances in Educational Technologies and Instructional Design (AE-TID) (ISSN: 2326-8905; eISSN: 2326-8913)

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.



Advances in Educational Technologies and Instructional Design (AETID) Book Series

Lawrence A. Tomei
Robert Morris University, USA

ISSN:2326-8905
EISSN:2326-8913

MISSION

Education has undergone, and continues to undergo, immense changes in the way it is enacted and distributed to both child and adult learners. From distance education, Massive-Open-Online-Courses (MOOCs), and electronic tablets in the classroom, technology is now an integral part of the educational experience and is also affecting the way educators communicate information to students.

The **Advances in Educational Technologies & Instructional Design (AETID) Book Series** is a resource where researchers, students, administrators, and educators alike can find the most updated research and theories regarding technology's integration within education and its effect on teaching as a practice.

COVERAGE

- Digital Divide in Education
- Adaptive Learning
- Hybrid Learning
- Social Media Effects on Education
- Educational Telecommunications
- Higher Education Technologies
- Online Media in Classrooms
- Bring-Your-Own-Device
- Instructional Design
- K-12 Educational Technologies

IGI Global is currently accepting manuscripts for publication within this series. To submit a proposal for a volume in this series, please contact our Acquisition Editors at Acquisitions@igi-global.com or visit: <http://www.igi-global.com/publish/>.

The Advances in Educational Technologies and Instructional Design (AETID) Book Series (ISSN 2326-8905) is published by IGI Global, 701 E. Chocolate Avenue, Hershey, PA 17033-1240, USA, www.igi-global.com. This series is composed of titles available for purchase individually; each title is edited to be contextually exclusive from any other title within the series. For pricing and ordering information please visit <http://www.igi-global.com/book-series/advances-educational-technologies-instructional-design/73678>. Postmaster: Send all address changes to above address. ©© 2018 IGI Global. All rights, including translation in other languages reserved by the publisher. No part of this series may be reproduced or used in any form or by any means – graphics, electronic, or mechanical, including photocopying, recording, taping, or information and retrieval systems – without written permission from the publisher, except for non commercial, educational use, including classroom teaching purposes. The views expressed in this series are those of the authors, but not necessarily of IGI Global.

Titles in this Series

For a list of additional titles in this series, please visit: www.igi-global.com/book-series

Deviant Communication in Teacher-Student Interactions Emerging Research and Opportunities

Eletra Gilchrist-Petty (The University of Alabama in Huntsville, USA)

Information Science Reference • ©2018 • 133pp • H/C (ISBN: 9781522527794) • US \$125.00 (our price)

Culturally Engaging Service-Learning With Diverse Communities

Omobolade O. Delano-Oriaran (St. Norbert College, USA) Marguerite W. Penick-Parks (University of Wisconsin – Oshkosh, USA) and Suzanne Fondrie (University of Wisconsin – Oshkosh, USA)

Information Science Reference • ©2018 • 359pp • H/C (ISBN: 9781522529002) • US \$225.00 (our price)

Enhancing Education and Training Initiatives Through Serious Games

John Denholm (The University of Manchester, UK & University of Warwick, UK) and Linda Lee-Davies (The University of Manchester, UK & Wroton College of Fairleigh Dickinson University, USA)

Information Science Reference • ©2018 • 311pp • H/C (ISBN: 9781522536895) • US \$185.00 (our price)

A Simplex Approach to Learning, Cognition, and Spatial Navigation Emerging Research and Opportunities

Pio Alfredo Di Tore (University of Salerno, Italy)

Information Science Reference • ©2018 • 116pp • H/C (ISBN: 9781522524557) • US \$125.00 (our price)

Digital Transformation and Innovation in Chinese Education

Hiller A. Spires (North Carolina State University, USA)

Information Science Reference • ©2018 • 362pp • H/C (ISBN: 9781522529248) • US \$195.00 (our price)

Applications of CALL Theory in ESL and EFL Environments

James Perren (Alliant International University, USA) Ken Kelch (Alliant International University, USA) Jin-suk Byun (Alliant International University, USA) Seth Cervantes (Alliant International University, USA) and Setareh Safavi (Alliant International University, USA)

Information Science Reference • ©2018 • 360pp • H/C (ISBN: 9781522529330) • US \$195.00 (our price)

Visual Imagery, Metadata, and Multimodal Literacies Across the Curriculum

Anita August (Sacred Heart University, USA)

Information Science Reference • ©2018 • 295pp • H/C (ISBN: 9781522528081) • US \$210.00 (our price)

Cases on Audio-Visual Media in Language Education

Catherine Hua Xiang (London School of Economics and Political Science, UK)

Information Science Reference • ©2018 • 419pp • H/C (ISBN: 9781522527244) • US \$195.00 (our price)



701 East Chocolate Avenue, Hershey, PA 17033, USA

Tel: 717-533-8845 x100 • Fax: 717-533-8661

E-Mail: cust@igi-global.com • www.igi-global.com

Preface

Online learning is an emerging technology which provides dynamic features to enhance the learning experience of an individual through self-disciplined manner. The key success of this system is delivering content over internet and it can be accessed by the learners over internet and it can be accessed by the learners anywhere and anytime. Such online based educational software strives to fulfil the learners' expectations in terms of providing comfortable online environment. Although, the e-learning systems are greatly acknowledged as an efficient solution, most of these systems do not consider the learners' motivation with respect to teaching strategies and contents. There are many evidences in the traditional system that lack of motivation implies poor quality of learning. The success of an online course depends greatly on how actively engaged students are with the instructor, with their classmates, with the content, with technology, and with course management tools. Interactivity in any teaching and learning context involves students responding to information, seeking instructors' feedback, reflecting in the feedback, and acting to appropriately tailor personal learning experience (Hingsheng Dai, 2007).

Recent software collections were taken various attempts to accommodate the learners' motivational states through attractive designs, graphical representations and gaming features. Since it has been proven successful in several cases, especially in the learners' perspective, students are not always focused on their learning and even they might try for some other actions to succeed in an educational environment. The online learning system needs an ability to recognize the learners' attitude and behavior. Detecting disengagement status from learners' action would offer the opportunity to make online learning more efficient, drastically reducing the disengaged learners and reengage them back thereby it reduces the attrition ratio. The motivational based disengagement system is still in an informing stage with respect to assessing the learners' attitude and characteristics.

Learning environments aim to deliver efficacious instruction, but rarely take into consideration the motivational factors involved in the learning process. However, motivational aspects like engagement play an important role in effective learning-engaged learning gain more in recent years, there has been increased interest in engagement during learning. This is of particular interest in the science, technology, engineering and mathematics domain. The online learning system gets more attraction in recent days and its resources are playing a pivotal role in the internet based education. One of the most critical elements for student success and retention in E-learning classes is being able to be discipline learner with good habits. Students must be able to understand the lesson format be able to moreover software tools for greater comprehension of course content. Educational Data Mining (EDM) is an emerging field in latest era, which exploits statistical, machine learning and data mining algorithms over different types of educational data. The main objective of Educational Data Mining is to solve the educational related issues (Baker & Yacel, 2009).

A study with data mining techniques to analyze various patterns of online learning behaviors, identified students' behavioral patterns and preferences in the online learning processes, differential active and passive learners, and found important parameters for performance prediction (Hung & Zhang, 2008). A study about the educators' task by employing any kind of analysis, how well the greatness in the test and the corresponding Elaborated Feedback (EF) were designed or tailored towards the individual needs of the students (Pechenizkiy, Calers, Vasilyeval, & De Bra, 2008). A collaborative educational data mining tool through association rule mining is used to improve live 3-learning courses and allowing teachers with similar course profiles to share and score discovered information (Garcia & Romero, 2011).

Enormous research information can be drawn through data mining and apply suitable research to educational problems in learning, cognition and assessment (Sachin & Vijay, 2012). Classification models has been applied for prediction of students' performance, and cluster models for grouping students based on their cognitive styles in e-learning environment (Joranovic, Vakicevic, Milovanovic, & Minovic, 2012).

This book seeks to provide the latest research and developments to determine the disengagement detection of students or learners through online learning system. Different tools, techniques and systems used to determine the disengagement detection of students or learners through online learning system will provide guidance to the professionals who will use this book to inform their practices. Being able to detect the disengagement status automatically this book would offer the opportunity to make online learning more efficient, drastically reducing the disengaged learners and reengage them back thereby it reduces the attrition ratio. Detecting and analyzing students' disengagement in online learning using various tools, techniques and systems will help to automatically detect disengagement learners and offer the opportunity to make online learning more efficient, enabling tutors and systems to target disengaged learners to reengage them and thus to reduce the attrition.

The audience of this book will widely vary from Professors, Tutors, individuals, researchers, scientists, academicians, students and libraries. This book will generate tremendous interest in terms of solutions to detect students' disengagement in online learning through the relevant information from learners' action and would offer the opportunity to make online learning more efficient, drastically reducing the disengaged learners and reengage them back, thus will have highly acceptable scholarly value and at the same time potentially contribute to this very specific sector of research.

ORGANIZATION OF CHAPTERS

The book has been divided into three sections: "Concepts and Practices," "Tools and Techniques," and "Methodologies and Cases." Altogether there are 12 chapters covering wider range of concepts, techniques, and methodologies.

Chapter 1 discusses briefly about the online learning, advantages and disadvantages of online learning, importance of motivation in Online learning, types of motivation, the motivational theories related to student engagement and finally discuss about various disengagement detection techniques in online learning.

Chapter 2 investigates how learners with different cultural background differ in their interaction style and visual behavior in multimedia-enhanced education, more specifically between groups from the African vs. Asian regions. The cross-cultural investigation done in this chapter collectively contributes towards effective use of multimedia technologies in education that ultimately increases learners' engagement and retention.

Chapter 3 deals with a study which explores the cloud-based educational environment and discusses how universities may take advantage of cloud computing in terms of students' social presence in relation to satisfaction and perceived learning. This study conducted a survey consisting of 13 questions among students from a public university in the southern region of peninsular Malaysia. The total number of respondents is 103 students. Through this study, a basis for the investigation of cloud computing in higher education is successfully established.

Chapter 4 discusses the various student engagement practices used today and their applicability to computer science students in online learning. The investigation will refer to case studies published and their relation to the concepts presented in this chapter. The chapter also provides, a framework of best practices for student engagement for computer science students.

Chapter 5 develops the idea of using online virtual reality (OVR) or online augmented reality (OAR) concepts for redesigning academic laboratory equipment or any kind of virtual classes to enhance the efficiency of learning process. This chapter provides a clear picture which results in virtual world can get more and more similar to the reality.

Chapter 6 explains how online education is currently led with MOOC education platform in a scalable way to satisfy the need of the specialized student community. It also illustrates how MOOC fills the knowledge gap between the academics and industry by offering the on-demand courses, which may not be available in the course curriculum. This chapter identifies and narrates the implementation issues in the MOOC model. The future research challenges are also summarized in this chapter.

Chapter 7 presents different learning styles, which are exhibited by the learners in an online environment. It identifies myriad ICT (information and communication technology) tools and shows association between learning styles and respective ICT tools. This chapter also shows possible implication towards online education and practices.

Chapter 8 provides an eye-tracking method to provide a useful experimental design for exploring reading performance of university online learners. Different eye-tracking experiments were carried out to help informing the teachers to improve the learning environment and be able to do more accurate assessment about what the students were attending to on the screen.

Chapter 9 presents the reasons how learners may decline to adapt the learning material or may deviate from their goals. Also the chapter discusses that a user model is needed to respond to different needs of a learner. This chapter provides an intuitionist fuzzy approach to handle the uncertainty of learner's mind while learning the concepts.

In Chapter 10, a new approach for end-user application analytics system is discussed and a methodology for developing model oriented decision support application using this approach is proposed.

Chapter 11 describes the process of developing both an engaging and motivating online ethics course for future engineers; and includes major concepts in engineering ethics beginning with why engineering students should study ethics at all. In this chapter various levels of ethics are examined, which include personal, organizational, and global ethics, and how each level then applies to the profession of engineering. Finally, the chapter explores engaging online methods for teaching ethics to engineering students throughout.

Chapter 12 promotes Multimedia Learning in the sphere of Medical Education and Practice. It describes how learners can acquire educational experiences as e-learning experiences. The chapter illustrates that the main reasons for not having achieved on-line learning are the Complexity of the Content, and the Type of Learning, which are unique, in some sense set apart from the main paradigm for learning that governs most other sciences.

CONCLUSION

Online learning system is persistently evolving and it requires new strategies to motivate to learners. Several approaches are proposed to deal with motivational aspects such as game features, attractive designs, whiteboards, clickers and animated agents. Knowledge about the engagement status and the motivational characteristics of learners would enhance the educational systems with detection capabilities and ultimately, with personalized intervention strategies targeting the motivational status and characteristics of the learners. Disengagement results in dropout in online learning and it requires serious concern. Hence, it would result into high costs for the states, which meet all the expenditures in education. Online learning system would be improved by tracking learners' disengagement that in turn would allow personalized interventions at appropriate times to reengage students.

A. V. Senthil Kumar
Hindusthan College of Arts and Science, India

REFERENCES

- Baker, R. S. J. D., & Yacel, K. (2009). The State of Educational Data Mining in 2009: A Review and Future Visions. *Journal of Educational Data Mining*, 1(1), 3–17.
- Garcia, E., Romero, C., Ventura, S., & de Castro, C. (2011). A Collaborative Educational Data Mining Tool. *The Internet and Higher Education*, 14(2), 77–88. doi:10.1016/j.iheduc.2010.07.006
- Hingsheng Dai. (2007). *Ideas for Effective Online Instructions*. Author.
- Hung, J. I., & Zhung, K. (2008). Revealing Online Learning Behaviors and Activity: Patterns and Making Predictions with Data Mining Techniques in Online Learning. *MERLOT Journal of Online Learning and Teaching*, 4(4), 420–437.
- Joranovic, M., Vakicevic, M., Milovanovic, M., & Minovic, M. (2012). Using Data Mining on Student Behavior and Cognitive Style Data for Improving E-Learning Systems: A Case Study. *International Journal of Computational Intelligence Systems*, 5(3), 597–610. doi:10.1080/18756891.2012.696923
- Pechenizkiy, M., Calers, T. G. K., Vasilyeval, E., & De Bra, P. M. E. (2008). Mining the Student Assessment Data: Lessons drawn from a Small-Scale Case Study. *1st International Conference on Educational Data Mining*, 187-191.
- Sachin, R. B., & Vijay, M. S. (2012). A Survey and Future Vision of Data Mining in Educational Field. *2nd IEEE International Conference on Advanced Computing & Communication Technology*, 96-100. doi:10.1109/ACCT.2012.14

Section 1

Concepts and Practices

Table of Contents

Preface	xiii
----------------------	------

Section 1 **Concepts and Practices**

Chapter 1

Impact of Student Engagement in Online Learning Environments	1
<i>A. V. Senthil Kumar, Hindusthan College of Arts and Science, India</i>	
<i>P. V. Praveen Sundar, Hindusthan College of Arts and Science, India</i>	

Chapter 2

Cultural Implications for Student Engagement in Online Learning	28
<i>Samiullah Paracha, United Nations University – Macao, China</i>	
<i>Toshiro Takahara, Kobe Institute of Computing, Japan</i>	
<i>Sania Jehanzeb, Ritsumeikan Asia Pacific University, Japan</i>	

Chapter 3

Cloud Computing Assessment for Students' Social Presence in Relation to Satisfaction and Perceived Learning	59
<i>Marva Mirabolghasemi, Islamic Azad University – Lahijan Branch, Iran</i>	
<i>Noorminshah A. Iahad, Universiti Teknologi Malaysia, Malaysia</i>	
<i>Sahar Hosseinikhah Choshaly, Islamic Azad University – Lahijan Branch, Iran</i>	

Chapter 4

Student Engagement Practices for Computer Science Students in Online Learning Environments	83
<i>Stephanos Mavromoustakos, University of Windsor, Canada</i>	
<i>Areeba Kamal, University of Windsor, Canada</i>	

Section 2

Tools and Techniques

Chapter 5

Modern Online Learning Tools Over the Platform of Virtual/Augmented Reality	101
---	-----

Jafar Ghazanfarian, University of Zanjan, Iran
Ehsan Khavasi, University of Zanjan, Iran
Hamid Yousefi, University of Zanjan, Iran
Mojtaba Amiraslanspour, University of Zanjan, Iran
Saba Teymouri, University of Zanjan, Iran
Reza Bayat, K. N. Toosi University of Technology, Iran

Chapter 6

MOOC for Student Learning and Active Engagement	127
---	-----

K. Saravanan, Anna University – Tirunelveli, India

Chapter 7

Learning Styles and Online Tools: How to Construct an Effective Online Learning Environment.....	147
--	-----

Md. Shahadat Hossain Khan, Islamic University of Technology, Bangladesh
Md. Rashedul Huq Shamim, Islamic University of Technology (IUT), Bangladesh
Mutwalibi Nambobi, Islamic University in Uganda, Uganda

Chapter 8

Detecting Online Learners' Reading Ability via Eye-Tracking	163
---	-----

Samiullah Paracha, United Nations University – Macao, China
Ayaka Inuoue, Kobe Institute of Computing, Japan
Sanja Jehanzeb, Ritsumeikan Asia Pacific University, Japan

Section 3

Methodologies and Cases

Chapter 9

Optimizing Student Engagement in Online Learning Environments: Intuitionistic Fuzzy Logic in Student Modeling.....	187
--	-----

Mukta Goyal, Jaypee Institute of Information Technology, India
Rajalakshmi Krishnamurthy, Jaypee Institute of Information Technology, India

Chapter 10

New Frontiers for E-Learning in Education: A Big Data Application	220
---	-----

Mohammad Zubair Khan, Taibah University, Saudi Arabia
Yasser M. Alginahi, Taibah University, Saudi Arabia

Chapter 11

Developing an Engaging Online Engineering Ethics Course for Future Engineers 241

Julie M. Little, Taylor University, USA

Patricia S. Fox, Indiana University-Purdue University, USA

Chapter 12

Autonomous Learning and Skill Accreditation: A Paradigm for Medical Studies..... 266

Dionysios Politis, Aristotle University of Thessaloniki, Greece

Petros Stagiopoulos, AXEPA, Greece

Sophia Aidona, Aristotle University of Thessaloniki, Greece

*Georgios Kyriafinis, AHEPA University Hospital, Greece & Aristotle University of
Thessaloniki, Greece*

Ioannis Constantinidis, Aristotle University of Thessaloniki, Greece

Compilation of References 297

About the Contributors 331

Index..... 336

Detailed Table of Contents

Preface	xiii
----------------------	------

Section 1 **Concepts and Practices**

Chapter 1

Impact of Student Engagement in Online Learning Environments	1
<i>A. V. Senthil Kumar, Hindusthan College of Arts and Science, India</i>	
<i>P. V. Praveen Sundar, Hindusthan College of Arts and Science, India</i>	

Online learning is a fast-growing technology in an educational field which uses internet as a media to deliver the educational contents to the students. The main research area in online learning is to identify the disengaged learners and motivate them. The success of online learning systems depends on how quickly it identifies the disengaged learners and techniques used to reengage them. Through this chapter, we are going to discuss briefly about the online learning, advantages and disadvantages of online learning, importance of motivation in online learning, types of motivation, the motivational theories related to student engagement and finally discuss about various disengagement detection techniques in online learning.

Chapter 2

Cultural Implications for Student Engagement in Online Learning	28
<i>Samiullah Paracha, United Nations University – Macao, China</i>	
<i>Toshiro Takahara, Kobe Institute of Computing, Japan</i>	
<i>Sania Jehanzeb, Ritsumeikan Asia Pacific University, Japan</i>	

The main goal of this research is to investigate how learners with different cultural background differ in their interaction style and visual behavior in multimedia-enhanced education, more specifically between groups from the African vs. Asian regions. The researchers conducted a controlled eye-tracking experiment to explore and evaluate the visual behavior of African, Afghan, Japanese and Chinese learners when scanning through different online multimedia contents. The analysis of their eye-gaze patterns and heat-maps revealed significant differences in terms of learners' interaction style, gender, color, text or multimedia preferences. This cross-cultural investigation collectively contributes towards effective use of multimedia technologies in education that ultimately increases learners' engagement and retention.

Chapter 3

Cloud Computing Assessment for Students' Social Presence in Relation to Satisfaction and Perceived Learning	59
---	----

Marva Mirabolghasemi, Islamic Azad University – Lahijan Branch, Iran

Noorminshah A. Iahad, Universiti Teknologi Malaysia, Malaysia

Sahar Hosseinikhah Choshaly, Islamic Azad University – Lahijan Branch, Iran

Many higher education institutions are hoping to enhance student engagement in learning environment for improving the educational experiences and outcomes. Therefore, providing expectations of learners and using new technology environments to facilitate their teaching and learning activities are prominent to make universities competitive. A solution can be cloud computing which is the newest alternative in current educational environments and has significant impact on teaching and learning. This study explores the cloud-based educational environment and discusses how universities may take advantage of cloud computing in terms of students' social presence in relation to satisfaction and perceived learning. This study conducted a survey consisting of 13 questions among students from a public university in the southern region of peninsular Malaysia. The total number of respondents is 103 students. Through this study, a basis for the investigation of cloud computing in higher education is successfully established.

Chapter 4

Student Engagement Practices for Computer Science Students in Online Learning Environments	83
--	----

Stephanos Mavromoustakos, University of Windsor, Canada

Areeba Kamal, University of Windsor, Canada

Online learning has many challenges, and student engagement is one of them. Computer science students differ from most other disciplines. As a consequence, students typically find it easier to adapt to the new learning environment, but at the same time, they are more demanding on the tools and services offered to enhance their learning experience and engagement. This chapter discusses the various student engagement practices used today and their applicability to computer science students in online learning. The investigation will refer to case studies published and their relation to the concepts presented in this chapter. Computer science student engagement in online platforms is directly associated with positive learning experience from the content and context to interface to the interaction design a course embodies. Finally, a framework of best practices for student engagement for computer science students will be provided.

Section 2

Tools and Techniques

Chapter 5

Modern Online Learning Tools Over the Platform of Virtual/Augmented Reality	101
---	-----

Jafar Ghazanfarian, University of Zanjan, Iran

Ehsan Khavasi, University of Zanjan, Iran

Hamid Yousefi, University of Zanjan, Iran

Mojtaba Amiraslanpour, University of Zanjan, Iran

Saba Teymouri, University of Zanjan, Iran

Reza Bayat, K. N. Toosi University of Technology, Iran

In this chapter, we are to develop the idea of using online virtual reality (OVR) or online augmented reality (OAR) concepts for redesigning academic laboratory equipment or any kind of virtual classes to enhance the efficiency of learning process. One of the main advantages of OVR is the interactions of students with each other from different locations. In the framework of the OVR lab, students are beyond the physical limitations. In virtual classroom environments similar to the real classrooms, one can walk in and see auxiliary objects made by the teacher to improve the learning efficiency. The VR setup provides the opportunity for surgeons to have a realistic picture of post-operation. In the subject of interior design, students can easily change and select various elements including the texture, color levels, the context, lights, shadows, and location of various apparatus. A questionnaire was set to get feedbacks from the students with very much positive result. The virtual world can get more and more similar to the reality.

Chapter 6

MOOC for Student Learning and Active Engagement	127
<i>K. Saravanan, Anna University – Tirunelveli, India</i>	

Online education is currently led with MOOC education platform in a scalable way to satisfy the need of the specialized student community. With the adoption of MOOC, students not only study for course credits, but also to learn the newest technologies in the market. Several MOOC providers offer thousands of online courses using knowledge experts in the fields. Thus, MOOC fills the knowledge gap between the academics and industry by offering the on-demand courses, which may not be available in the course curriculum. These MOOC courses are offered either free or payment. At the successful completion of the course, most MOOC platforms give the certification to the participants. MOOC is already doing revolution in higher education and online education. This chapter deals with MOOC model and its evolution and need. The different types and categories of MOOCs are listed. The different MOOC providers and their course criteria are also discussed. This chapter identifies and narrates the implementation issues in the MOOC model. The future research challenges are also summarized.

Chapter 7

Learning Styles and Online Tools: How to Construct an Effective Online Learning Environment.....	147
<i>Md. Shahadat Hossain Khan, Islamic University of Technology, Bangladesh</i>	
<i>Md. Rashedul Huq Shamim, Islamic University of Technology (IUT), Bangladesh</i>	
<i>Mutwalibi Nambobi, Islamic University in Uganda, Uganda</i>	

Very few studies in the existing literature elaborated about the learners learning preference and their preferred ICT tools while they were engaging in an online course. In order to fill this gap, this chapter presents different learning styles, which are exhibited by the learners in an online environment. It identifies myriad ICT (information and communication technology) tools and shows association between learning styles and respective ICT tools. It has four main broad areas to discuss: provides general importance of incorporating ICT tools in an online environment; presents four types of learners in an online context, which are characterized by following previous theoretical framework; identifies different learning activities, which are preferred by the four learners; and provides ICT tools along with their web address that are linked with online activities. This chapter shows possible implication towards online education and practices.

Chapter 8

Detecting Online Learners' Reading Ability via Eye-Tracking 163

Samiullah Paracha, United Nations University – Macao, China

Ayaka Inuoue, Kobe Institute of Computing, Japan

Sania Jehanzeb, Ritsumeikan Asia Pacific University, Japan

Nurturing the motivation to read is an important instructional goal. There can be a number of reasons for a learner to have problems with reading in online learning environments: (1) eyes being unable to scan easily along a line of print; or (2) as a result of concentrating on controlling the eyes concentration, the short-term memory become impaired. The study reported in this chapter used eye tracking method to provide a useful experimental design for exploring reading performance of university online learners. Different eye-tracking experiments were carried out to help informing the teachers to improve the learning environment and be able to do more accurate assessment about what the students were attending to on the screen.

Section 3

Methodologies and Cases

Chapter 9

Optimizing Student Engagement in Online Learning Environments: Intuitionistic Fuzzy Logic in Student Modeling 187

Mukta Goyal, Jaypee Institute of Information Technology, India

Rajalakshmi Krishnamurthy, Jaypee Institute of Information Technology, India

In today's scenario, e-learning has become a significant part of the academic environment as well as of the corporate training sectors. Advancement in Information and Communication Technologies (ICTS) has brought new intersection of education, teaching, and learning that defines e-learning. E-learning systems deliver information for education at any time and at any place in an efficient manner. E-learning system consists of course content or learning materials in the form of nodes. These nodes are linked such that users can traverse the other nodes in the hypermedia environment. These learning concepts are available synchronously and asynchronously in different ways of representation. This presents learning materials in a disorganized manner to the learners. Due to this, learners may decline to adapt the learning material or may deviate from their goals. This requires a user model to respond to different needs of a learner. To handle the uncertainty of learner's mind while learning the concepts an intuitionistic fuzzy approach is used.

Chapter 10

New Frontiers for E-Learning in Education: A Big Data Application 220

Mohammad Zubair Khan, Taibah University, Saudi Arabia

Yasser M. Alginahi, Taibah University, Saudi Arabia

Big Data research is playing a leading role in investigating a wide group of issues fundamentally emerging concerning Database, Data Warehousing, and Data Mining research. Analytics research is intended to develop complex procedures running over large-scale data repositories with the objective of extracting useful knowledge hidden in such repositories. A standout amongst the most noteworthy application