

Table of Contents

Affect: Emotions

Implicit Strategies for Intelligent Tutoring Systems	1
<i>Imène Jraïdi, Pierre Chalfoun, and Claude Frasson</i>	
Rudeness and Rapport: Insults and Learning Gains in Peer Tutoring . . .	11
<i>Amy Ogan, Samantha Finkelstein, Erin Walker, Ryan Carlson, and Justine Cassell</i>	
On Pedagogical Effects of Learner-Support Agents in Collaborative Interaction	22
<i>Yugo Hayashi</i>	
Exploration of Affect Detection Using Semantic Cues in Virtual Improvisation	33
<i>Li Zhang</i>	
Measuring Learners Co-Occurring Emotional Responses during Their Interaction with a Pedagogical Agent in MetaTutor	40
<i>Jason M. Harley, François Bouchet, and Roger Azevedo</i>	
Visualization of Student Activity Patterns within Intelligent Tutoring Systems	46
<i>David Hilton Shanabrook, Ivon Arroyo, Beverly Park Woolf, and Winslow Burleson</i>	
Toward a Machine Learning Framework for Understanding Affective Tutorial Interaction	52
<i>Joseph F. Grafsgaard, Kristy Elizabeth Boyer, and James C. Lester</i>	
Exploring Relationships between Learners' Affective States, Metacognitive Processes, and Learning Outcomes	59
<i>Amber Chauncey Strain, Roger Azevedo, and Sidney D'Mello</i>	
Mental Workload, Engagement and Emotions: An Exploratory Study for Intelligent Tutoring Systems	65
<i>Maher Chaouachi and Claude Frasson</i>	

Affect: Signals

Real-Time Monitoring of ECG and GSR Signals during Computer-Based Training	72
<i>Keith W. Brawner and Benjamin S. Goldberg</i>	
Categorical vs. Dimensional Representations in Multimodal Affect Detection during Learning	78
<i>Md. Sazzad Hussain, Hamed Monkaresi, and Rafael A. Calvo</i>	
Cognitive Priming: Assessing the Use of Non-conscious Perception to Enhance Learner's Reasoning Ability	84
<i>Pierre Chalfoun and Claude Frasson</i>	

Games: Motivation and Design

Math Learning Environment with Game-Like Elements: An Incremental Approach for Enhancing Student Engagement and Learning Effectiveness	90
<i>Dovan Rai and Joseph E. Beck</i>	
Motivational Factors for Learning by Teaching: The Effect of a Competitive Game Show in a Virtual Peer-Learning Environment	101
<i>Noboru Matsuda, Evelyn Yarzebinski, Victoria Keiser, Rohan Raizada, Gabriel Stylianides, and Kenneth R. Koedinger</i>	
An Analysis of Attention to Student-Adaptive Hints in an Educational Game	112
<i>Mary Muir and Cristina Conati</i>	
Serious Game and Students' Learning Motivation: Effect of Context Using Prog&Play	123
<i>Mathieu Muratet, Elisabeth Delozanne, Patrice Torguet, and Fabienne Viallet</i>	
Exploring the Effects of Prior Video-Game Experience on Learner's Motivation during Interactions with HeapMotiv	129
<i>Lotfi Derbali and Claude Frasson</i>	
A Design Pattern Library for Mutual Understanding and Cooperation in Serious Game Design	135
<i>Bertrand Marne, John Wisdom, Benjamin Huynh-Kim-Bang, and Jean-Marc Labat</i>	

Games: Empirical Studies

Predicting Student Self-regulation Strategies in Game-Based Learning Environments	141
<i>Jennifer Sabourin, Lucy R. Shores, Bradford W. Mott, and James C. Lester</i>	
Toward Automatic Verification of Multiagent Systems for Training Simulations	151
<i>Ning Wang, David V. Pynadath, and Stacy C. Marsella</i>	
Using State Transition Networks to Analyze Multi-party Conversations in a Serious Game	162
<i>Brent Morgan, Fazel Keshkar, Ying Duan, Pádraig Nash, and Arthur Graesser</i>	
How to Evaluate Competencies in Game-Based Learning Systems Automatically?	168
<i>Pradeepa Thomas, Jean-Marc Labat, Mathieu Muratet, and Amel Yessad</i>	

Content Representation: Empirical Studies

Sense Making Alone Doesn't Do It: Fluency Matters Too! ITS Support for Robust Learning with Multiple Representations	174
<i>Martina A. Rau, Vincent Aleven, Nikol Rummel, and Stacie Rohrbach</i>	
Problem Order Implications for Learning Transfer	185
<i>Nan Li, William W. Cohen, and Kenneth R. Koedinger</i>	
Knowledge Component Suggestion for Untagged Content in an Intelligent Tutoring System	195
<i>Mario Karlovčec, Mariheida Córdova-Sánchez, and Zachary A. Pardos</i>	

Feedback: Empirical Studies

Automating Next-Step Hints Generation Using ASTUS	201
<i>Luc Paquette, Jean-François Lebeau, Gabriel Beaulieu, and André Mayers</i>	

The Effectiveness of Pedagogical Agents' Prompting and Feedback in Facilitating Co-adapted Learning with MetaTutor	212
<i>Roger Azevedo, Ronald S. Landis, Reza Feyzi-Behnagh, Melissa Duffy, Gregory Trevors, Jason M. Harley, François Bouchet, Jonathan Burlison, Michelle Taub, Nicole Pacampara, Mohamed Yeasin, A.K.M. Mahbubur Rahman, M. Iftekhar Tanveer, and Gahangir Hossain</i>	

Noticing Relevant Feedback Improves Learning in an Intelligent Tutoring System for Peer Tutoring	222
<i>Erin Walker, Nikol Rummel, Sean Walker, and Kenneth R. Koedinger</i>	

ITS in Special Domains

Multi-paradigm Generation of Tutoring Feedback in Robotic Arm Manipulation Training	233
<i>Philippe Fournier-Viger, Roger Nkambou, André Mayers, Engelbert Mephu-Nguifo, and Usef Faghihi</i>	

User-Centered Design of a Teachable Robot	243
<i>Erin Walker and Winslow Burleson</i>	

An Intelligent Tutoring and Interactive Simulation Environment for Physics Learning	250
<i>Lakshman S. Myneni and N. Hari Narayanan</i>	

Guru: A Computer Tutor That Models Expert Human Tutors	256
<i>Andrew M. Olney, Sidney D'Mello, Natalie Person, Whitney Cade, Patrick Hays, Claire Williams, Blair Lehman, and Arthur Graesser</i>	

Developing an Embodied Pedagogical Agent with and for Young People with Autism Spectrum Disorder	262
<i>Beate Grawemeyer, Hilary Johnson, Mark Brosnan, Emma Ashwin, and Laura Benton</i>	

Non Conventional Approaches

WEBSistments: Enabling an Intelligent Tutoring System to Excel at Explaining Rather Than Coaching	268
<i>Yue Gong, Joseph E. Beck, and Neil T. Heffernan</i>	

Automated Approaches for Detecting Integration in Student Essays	274
<i>Simon Hughes, Peter Hastings, Joseph Magliano, Susan Goldman, and Kimberly Lawless</i>	

On the WEIRD Nature of ITS/AIED Conferences: A 10 Year Longitudinal Study Analyzing Potential Cultural Biases	280
<i>Emmanuel G. Blanchard</i>	

Content Representation: Conceptual

Goal-Oriented Conceptualization of Procedural Knowledge	286
<i>Martin Možina, Matej Guid, Aleksander Sadikov, Vida Groznik, and Ivan Bratko</i>	
Context-Dependent Help for Novices Acquiring Conceptual Systems Knowledge in DynaLearn	292
<i>Wouter Beek and Bert Bredeweg</i>	
Towards an Ontology-Based System to Improve Usability in Collaborative Learning Environments	298
<i>Endhe Elias, Dalgoberto Miquilino, Ig Ibert Bittencourt, Thyago Tenório, Rafael Ferreira, Alan Silva, Seiji Isotani, and Patrícia Jaques</i>	
Program Representation for Automatic Hint Generation for a Data-Driven Novice Programming Tutor	304
<i>Wei Jin, Tiffany Barnes, John Stamper, Michael John Eagle, Matthew W. Johnson, and Lorrie Lehmann</i>	

Assessment: Constraints

Exploring Quality of Constraints for Assessment in Problem Solving Environments	310
<i>Jaime Galvez Cordero, Eduardo Guzman De Los Riscos, and Ricardo Conejo Muñoz</i>	
Can Soft Computing Techniques Enhance the Error Diagnosis Accuracy for Intelligent Tutors?	320
<i>Nguyen-Thinh Le and Niels Pinkwart</i>	

Dialogue: Conceptual

Identification and Classification of the Most Important Moments from Students' Collaborative Discourses	330
<i>Costin-Gabriel Chiru and Stefan Trausan-Matu</i>	
When Less Is More: Focused Pruning of Knowledge Bases to Improve Recognition of Student Conversation	340
<i>Mark Floryan, Toby Dragon, and Beverly Park Woolf</i>	

Coordinating Multi-dimensional Support in Collaborative Conversational Agents	346
<i>David Adamson and Carolyn Penstein Rosé</i>	
Textual Complexity and Discourse Structure in Computer-Supported Collaborative Learning	352
<i>Stefan Trausan-Matu, Mihai Dascalu, and Philippe Dessus</i>	
Dialogue: Questions	
Using Information Extraction to Generate Trigger Questions for Academic Writing Support	358
<i>Ming Liu and Rafael A. Calvo</i>	
Learning to Tutor Like a Tutor: Ranking Questions in Context	368
<i>Lee Becker, Martha Palmer, Sarel van Vuuren, and Wayne Ward</i>	
Learner Modeling	
Analysis of a Simple Model of Problem Solving Times	379
<i>Petr Jarušek and Radek Pelánek</i>	
Modelling and Optimizing the Process of Learning Mathematics	389
<i>Tanja Käser, Alberto Giovanni Busetto, Gian-Marco Baschera, Juliane Kohn, Karin Kucian, Michael von Aster, and Markus Gross</i>	
The Student Skill Model	399
<i>Yutao Wang and Neil T. Heffernan</i>	
Clustered Knowledge Tracing	405
<i>Zachary A. Pardos, Shubhendu Trivedi, Neil T. Heffernan, and Gábor N. Sárközy</i>	
Preferred Features of Open Learner Models for University Students	411
<i>Susan Bull</i>	
Do Your Eyes Give It Away? Using Eye Tracking Data to Understand Students' Attitudes towards Open Student Model Representations	422
<i>Moffat Mathews, Antonija Mitrovic, Bin Lin, Jay Holland, and Neville Churcher</i>	
Fuzzy Logic Representation for Student Modelling: Case Study on Geometry	428
<i>Gagan Goel, Sébastien Lallé, and Vanda Luengo</i>	

Learning Detection

Content Learning Analysis Using the Moment-by-Moment Learning Detector	434
<i>Sujith M. Gowda, Zachary A. Pardos, and Ryan S.J.D. Baker</i>	
Towards Automatically Detecting Whether Student Learning Is Shallow	444
<i>Ryan S.J.D. Baker, Sujith M. Gowda, Albert T. Corbett, and Jacklyn Ocumpaugh</i>	
Item to Skills Mapping: Deriving a Conjunctive Q-matrix from Data ...	454
<i>Michel C. Desmarais, Behzad Beheshti, and Rhouma Naceur</i>	

Interaction Strategies: Games

The Role of Sub-problems: Supporting Problem Solving in Narrative-Centered Learning Environments	464
<i>Lucy R. Shores, Kristin F. Hoffmann, John L. Nietfeld, and James C. Lester</i>	
Exploring Inquiry-Based Problem-Solving Strategies in Game-Based Learning Environments	470
<i>Jennifer Sabourin, Jonathan Rowe, Bradford W. Mott, and James C. Lester</i>	
Real-Time Narrative-Centered Tutorial Planning for Story-Based Learning	476
<i>Seung Y. Lee, Bradford W. Mott, and James C. Lester</i>	

Interaction Strategies: Empirical Studies

An Interactive Teacher's Dashboard for Monitoring Groups in a Multi-tabletop Learning Environment	482
<i>Roberto Martinez Maldonado, Judy Kay, Kalina Yacef, and Beat Schwendimann</i>	
Efficient Cross-Domain Learning of Complex Skills	493
<i>Nan Li, William W. Cohen, and Kenneth R. Koedinger</i>	
Exploring Two Strategies for Teaching Procedures	499
<i>Antonija Mitrovic, Moffat Mathews, and Jay Holland</i>	
Relating Student Performance to Action Outcomes and Context in a Choice-Rich Learning Environment	505
<i>James R. Segedy, John S. Kinnebrew, and Gautam Biswas</i>	

Using the MetaHistoReasoning Tool Training Module to Facilitate the Acquisition of Domain-Specific Metacognitive Strategies 511
Eric Poitras, Susanne Lajoie, and Yuan-Jin Hong

An Indicator-Based Approach to Promote the Effectiveness of Teachers' Interventions 517
Aina Lekira, Christophe Després, Pierre Jacoboni, and Dominique Py

Limiting the Number of Revisions while Providing Error-Flagging Support during Tests 524
Amruth N. Kumar

Dialogue: Empirical Studies

Towards Academically Productive Talk Supported by Conversational Agents 531
Gregory Dyke, David Adamson, Iris Howley, and Carolyn Penstein Rosé

Automatic Evaluation of Learner Self-Explanations and Erroneous Responses for Dialogue-Based ITSs 541
Blair Lehman, Caitlin Mills, Sidney D'Mello, and Arthur Graesser

Group Composition and Intelligent Dialogue Tutors for Impacting Students' Academic Self-efficacy 551
Iris Howley, David Adamson, Gregory Dyke, Elijah Mayfield, Jack Beuth, and Carolyn Penstein Rosé

How Do They Do It? Investigating Dialogue Moves within Dialogue Modes in Expert Human Tutoring 557
Blair Lehman, Sidney D'Mello, Whitney Cade, and Natalie Person

Building a Conversational SimStudent 563
Ryan Carlson, Victoria Keiser, Noboru Matsuda, Kenneth R. Koedinger, and Carolyn Penstein Rosé

Predicting Learner's Project Performance with Dialogue Features in Online Q&A Discussions 570
Jaebong Yoo and Jihie Kim

Young Researchers Track

Interventions to Regulate Confusion during Learning 576
Blair Lehman, Sidney D'Mello, and Arthur Graesser

Using Examples in Intelligent Tutoring Systems 579
Amir Shareghi Najar and Antonija Mitrovic

Semi-supervised Classification of Realtime Physiological Sensor Datastreams for Student Affect Assessment in Intelligent Tutoring	582
<i>Keith W. Brawner, Robert Sottolare, and Avelino Gonzalez</i>	
Detection of Cognitive Strategies in Reading Comprehension Tasks	585
<i>Terry Peckham</i>	
The Effects of Adaptive Sequencing Algorithms on Player Engagement within an Online Game	588
<i>Derek Lomas, John Stamper, Ryan Muller, Kishan Patel, and Kenneth R. Koedinger</i>	
A Canonicalizing Model for Building Programming Tutors	591
<i>Kelly Rivers and Kenneth R. Koedinger</i>	
Developmentally Appropriate Intelligent Spatial Tutoring for Mobile Devices	594
<i>Melissa A. Wiederrecht and Amy C. Ulinski</i>	
Leveraging Game Design to Promote Effective User Behavior of Intelligent Tutoring Systems	597
<i>Matthew W. Johnson, Tomoko Okimoto, and Tiffany Barnes</i>	
Design of a Knowledge Base to Teach Programming	600
<i>Dinesha Weragama and Jim Reye</i>	
Towards an ITS for Improving Social Problem Solving Skills of ADHD Children	603
<i>Atefeh Ahmadi Olounabadi and Antonija Mitrovic</i>	
A Scenario Based Analysis of E-Collaboration Environments	606
<i>Raoudha Chebil, Wided Lejouad Chaari, and Stefano A. Cerri</i>	
Supporting Students in the Analysis of Case Studies for Ill-Defined Domains	609
<i>Mayya Sharipova</i>	
Using Individualized Feedback and Guided Instruction via a Virtual Human Agent in an Introductory Computer Programming Course	612
<i>Lorrie Lehmann, Dale-Marie Wilson, and Tiffany Barnes</i>	
Data-Driven Method for Assessing Skill-Opportunity Recognition in Open Procedural Problem Solving Environments	615
<i>Michael John Eagle and Tiffany Barnes</i>	
 Posters	
How Do Learners Regulate Their Emotions?	618
<i>Amber Chauncey Strain, Sidney D'Mello, and Melissa Gross</i>	

A Model-Building Learning Environment with Explanatory Feedback to Erroneous Models	620
<i>Tomoya Horiguchi, Tsukasa Hirashima, and Kenneth D. Forbus</i>	
An Automatic Comparison between Knowledge Diagnostic Techniques	622
<i>Sébastien Lallé, Vanda Luengo, and Nathalie Guin</i>	
The Interaction Behavior of Agents' Emotional Support and Competency on Learner Outcomes and Perceptions	624
<i>Heather K. Holden</i>	
Accuracy of Tracking Student's Natural Language in Operation ARIES!, A Serious Game for Scientific Methods.....	626
<i>Zhiqiang Cai, Carol Forsyth, Mae-Lynn Germany, Arthur Graesser, and Keith Millis</i>	
Designing the Knowledge Base for a PHP Tutor	628
<i>Dinesha Weragama and Jim Reye</i>	
Domain Specific Knowledge Representation for an Intelligent Tutoring System to Teach Algebraic Reasoning	630
<i>Miguel Arevalillo-Herráez, David Arnau, José Antonio González-Calero, and Aladdin Ayesb</i>	
Exploring the Potential of Tabletops for Collaborative Learning.....	632
<i>Michael Schubert, Sébastien George, and Audrey Serna</i>	
Modeling the Affective States of Students Using SQL-Tutor	634
<i>Thea Faye G. Guia, Ma. Mercedes T. Rodrigo, Michelle Marie C. Dagami, Jessica O. Sugay, Francis Jan P. Macam, and Antonija Mitrovic</i>	
A Cross-Cultural Comparison of Effective Help-Seeking Behavior among Students Using an ITS for Math.....	636
<i>Jose Carlo A. Soriano, Ma. Mercedes T. Rodrigo, Ryan S.J.D. Baker, Amy Ogan, Erin Walker, Maynor Jimenez Castro, Ryan Genato, Samantha Fontaine, and Ricardo Belmontez</i>	
Emotions during Writing on Topics That Align or Misalign with Personal Beliefs.....	638
<i>Caitlin Mills and Sidney D'Mello</i>	
A Multiagent-Based ITS Using Multiple Viewpoints for Propositional Logic	640
<i>Evandro Costa, Priscylla Silva, Marlos Silva, Emanuele Silva, and Anderson Santos</i>	

Simulation-Based Training of Ill-Defined Social Domains: The Complex Environment Assessment and Tutoring System (CEATS)	642
<i>Benjamin D. Nye, Gnana K. Bharathy, Barry G. Silverman, and Ceyhan Eksin</i>	
Empirical Investigation on Self Fading as Adaptive Behavior of Hint Seeking	645
<i>Kazuhisa Miwa, Hitoshi Teraï, Nana Kanzaki, and Ryuichi Nakaike</i>	
Scripting Discussions for Elaborative, Critical Interactions	647
<i>Oliver Scheuer, Bruce M. McLaren, Armin Weinberger, and Sabine Niebuhr</i>	
Design Requirements of a Virtual Learning Environment for Resource Sharing	649
<i>Nikos Barbalios, Irene Ioannidou, Panagiotis Tzionas, and Stefanos Paraskeuopoulos</i>	
The Effectiveness of a Pedagogical Agent's Immediate Feedback on Learners' Metacognitive Judgments during Learning with MetaTutor ...	651
<i>Reza Feyzi-Behnagh and Roger Azevedo</i>	
Supporting Students in the Analysis of Case Studies for Professional Ethics Education	653
<i>Mayya Sharipova and Gordon McCalla</i>	
Evaluating the Automatic Extraction of Learning Objects from Electronic Textbooks Using ErauzOnt	655
<i>Mikel Larrañaga, Ángel Conde, Iñaki Calvo, Ana Arruarte, and Jon A. Elorriaga</i>	
A Cognition-Based Game Platform and Its Authoring Environment for Learning Chinese Characters	657
<i>Chao-Lin Liu, Chia-Ying Lee, Wei-Jie Huang, Yu-Lin Tzeng, and Chia-Ru Chou</i>	
Effects of Text and Visual Element Integration Schemes on Online Reading Behaviors of Typical and Struggling Readers	660
<i>Robert P. Dolan and Sonya Powers</i>	
Fadable Scaffolding with Cognitive Tool	662
<i>Akihiro Kashiwara and Makoto Ito</i>	
Mediating Intelligence through Observation, Dependency and Agency in Making Construals of Malaria	664
<i>Meurig Beynon and Will Beynon</i>	

Supporting Social Deliberative Skills in Online Classroom Dialogues: Preliminary Results Using Automated Text Analysis	666
<i>Tom Murray, Beverly Park Woolf, Xiaoxi Xu, Stefanie Shipe, Scott Howard, and Leah Wing</i>	
Using Time Pressure to Promote Mathematical Fluency	669
<i>Steve Ritter, Tristan Nixon, Derek Lomas, John Stamper, and Dixie Ching</i>	
Interoperability for ITS: An Ontology of Learning Style Models	671
<i>Judi McCuaig and Robert Gauthier</i>	
Skill Diaries: Can Periodic Self-assessment Improve Students' Learning with an Intelligent Tutoring System?	673
<i>Yanjin Long and Vincent Aleven</i>	
An Optimal Assessment of Natural Language Student Input Using Word-to-Word Similarity Metrics	675
<i>Vasile Rus and Mihai Lintean</i>	
Facilitating Co-adaptation of Technology and Education through the Creation of an Open-Source Repository of Interoperable Code	677
<i>Philip I. Pavlik Jr., Jacklyn Maass, Vasile Rus, and Andrew M. Olney</i>	
A Low-Cost Scalable Solution for Monitoring Affective State of Students in E-learning Environment Using Mouse and Keystroke Data	679
<i>Po-Ming Lee, Wei-Hsuan Tsui, and Tzu-Chien Hsiao</i>	
Impact of an Adaptive Tutorial on Student Learning	681
<i>Fethi A. Inan, Fatih Ari, Raymond Flores, Amani Zaier, and Ismahan Arslan-Ari</i>	
Technology Enhanced Learning Program That Makes Thinking the Outside to Train Meta-cognitive Skill through Knowledge Co-creation Discussion	683
<i>Kazuhisa Seta, Liang Cui, Mitsuru Ikeda, and Noriyuki Matsuda</i>	
Open Student Models to Enhance Blended-Learning	685
<i>Maite Martín, Ainhoa Álvarez, David Reina, Isabel Fernández-Castro, Maite Urretavizcaya, and Susan Bull</i>	
ZooQuest: A Mobile Game-Based Learning Application for Fifth Graders.....	687
<i>Gerard Veenhof, Jacobijn Sandberg, and Marinus Maris</i>	
Drawing-Based Modeling for Early Science Education	689
<i>Wouter R. van Joolingen, Lars Bollen, Frank Leenaars, and Hannie Gijlers</i>	

An OWL Ontology for IEEE-LOM and OBAA Metadata	691
<i>João Carlos Gluz and Rosa M. Vicari</i>	
Classifying Topics of Video Lecture Contents Using Speech Recognition Technology	694
<i>Jun Park and Jihie Kim</i>	
An Agent-Based Infrastructure for the Support of Learning Objects Life-Cycle	696
<i>João Carlos Gluz, Rosa M. Vicari, and Liliana M. Passerino</i>	
Cluster Based Feedback Provision Strategies in Intelligent Tutoring Systems	699
<i>Sebastian Gross, Xibin Zhu, Barbara Hammer, and Niels Pinkwart</i>	
A Web Comic Strip Creator for Educational Comics with Assessable Learning Objectives	701
<i>Fotis Lazarinis and Elaine Pearson</i>	
A Layered Architecture for Online Lab-Works: Experimentation in the Computer Science Education	703
<i>Mohamed El Amine Bouabid, Philippe Vidal, and Julien Broisin</i>	
A Serious Game for Teaching Conflict Resolution to Children	705
<i>Joana Campos, Henrique Campos, Carlos Martinho, and Ana Paiva</i>	
Towards Social Mobile Blended Learning	707
<i>Amr Abozeid, Mohammed Abdel Razek, and Claude Frasson</i>	
Learning Looping: From Natural Language to Worked Examples	710
<i>Leigh Ann Sudol-DeLyser, Mark Stehlik, and Sharon Carver</i>	
A Basic Model of Metacognition: A Repository to Trigger Reflection ...	712
<i>Alejandro Peña Ayala, Rafael Dominguez de Leon, and Riichiro Mizoguchi</i>	
Analyzing Affective Constructs: Emotions 'n Attitudes	714
<i>Ivon Arroyo, David Hilton Shanabrook, Winslow Burleson, and Beverly Park Woolf</i>	
Interactive Virtual Representations, Fractions, and Formative Feedback	716
<i>Maria Mendiburo, Brian Sulcer, Gautam Biswas, and Ted Hasselbring</i>	

An Intelligent System to Support Accurate Transcription of University
Lectures 718
Miltiades Papadopoulos and Elaine Pearson

Multi-context Recommendation in Technology Enhanced Learning 720
Majda Maâtallah and Hassina Seridi-Bouchelaghem

Author Index 723