

2021 XVI Latin American Conference on Learning Technologies (LACLO 2021)

**Arequipa, Peru
19 – 21 October 2021**



**IEEE Catalog Number: CFP21H36-POD
ISBN: 978-1-6654-2359-5**

**Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP21H36-POD
ISBN (Print-On-Demand):	978-1-6654-2359-5
ISBN (Online):	978-1-6654-2358-8

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2021 XVI Latin American Conference on Learning Technologies (LACLO) **LACLO 2021**

Table of Contents

Message from the General Chairs	xxi
Message from the Program Chairs	xxii
Organizing Committee	xxiv
Program Committee	xxv

Technical Session 1: Prediction, Academic Performance

Chair: Manuel Ibarra

Predicting Student Performance Using Feature Selection Algorithms for Deep Learning Models.....	1
<i>Thereza P.P. Padilha (Federal University of Paraíba Rio Tinto, Brazil), Gernel Lumacad (St. Rita's College of Balingasag Cagayan de Oro, Philippines), and Richard Catrambone (Georgia Institute of Technology Atlanta, United States)</i>	
“Prediction” in Educational Research: a Bibliographic Mapping of Academic Production Over Time	8
<i>Federico Ferrero (Universidad Santiago de Compostela and Universidad Nacional de Córdoba, Argentina)</i>	
FlipMyLearning: A Tool for Monitoring and Predicting Learner Behavior in Moodle	16
<i>Jorge Maldonado-Mahauad (Universidad de Cuenca, Ecuador), Bryan Aguilar (Universidad de Cuenca, Ecuador), and Edison Sigua (Universidad de Cuenca, Ecuador)</i>	

Technical Session 2: Covid 19 - Strategies

Chair: Antonio Silva Sprock

Tools, Resources and Techniques for Active Learning at COVID-19 - A Look at the Private Brazilian Higher Education Network	24
<i>Tadeu Modeira de Classe (Universidade Federal do Estado do Rio de Janeiro, Brasil) and Ronney Moreira Castro (Universidade Federal do Estado do Rio de Janeiro, Brasil)</i>	

Teaching Computational Thinking and Introduction to Programming through Robotics amid the Covid-19 Pandemic — An Experience Report	32
<i>Alexandre Scaico (Universidade Federal da Paraíba Rio Tinto, Brasil), Willams Pinto Ferreira (Universidade Federal da Paraíba Rio Tinto, Brasil), Emmanuel Mendes Alves (Universidade Federal da Paraíba Rio Tinto, Brasil), and Pasqueline Dantas Scaico (Universidade Federal da Paraíba Rio Tinto, Brasil)</i>	
Constraints, Effectiveness and Solutions in Using Google Classroom as a Learning Management System During Covid-19 Pandemic: A Systematic Literature Review	38
<i>Danielli A. Lima (Universidade de São Paulo (USP), Brasil) and Seiji Isotani (Universidade de São Paulo (USP), Brasil)</i>	

Technical Session 3: Collaborative, Innovations, Educational Research **Chair: Karina Rosas**

Online Collaborative Learning: Analysis of the Current State	44
<i>Madeleine Palacios-Núñez (Universidad San Ignacio de Loyola, Perú) and Angel Deroncele-Acosta (Universidad San Ignacio de Loyola, Perú)</i>	
Meaningful Learning: Towards a Meta-Regulated Learning Model in Hybrid Education	52
<i>Marybel Mollo-Flores (Universidad San Ignacio de Loyola, Perú) and Angel Deroncele-Acosta (Universidad San Ignacio de Loyola, Perú)</i>	

Technical Session 4: Learning Analytics and EDM **Chair: José Sullá**

Systematic Mapping of Moodle Dashboards Focused on Learning Analytics Tasks	60
<i>Belisa Centenaro (Universidade Federal de Santa Catarina, Brasil), Cristian Cechinel (Universidade Federal de Santa Catarina, Brasil), Vinicius Ramos (Universidade Federal de Santa Catarina, Brasil), Tiago Primo (Universidade Federal de Pelotas, Brasil), and Roberto Munoz (Universidad de Valparaíso, Chile)</i>	
Educational Data Mining With Learning Analytics And Unsupervised Algorithms: Analysis And Diagnosis In Basic Education	67
<i>Arianne Sarmiento Torcate (University of Pernambuco, Brazil) and Cleyton Mário de Oliveira Rodrigues (University of Pernambuco, Brazil)</i>	
Analyzing Data from Computer Science Graduates to Assist in the Revision of the Course Pedagogical Project	75
<i>Roberto P. do Nascimento (Universidade Federal do Oeste do Pará (UFOPA), Brasil), Luiz H. C. Nunes (Universidade Federal do Oeste do Pará (UFOPA), Brasil), Mariana W. Buarque do Nascimento (Instituto Federal do Pará (IFPA), Brasil), Carla M. C. Paxiúba (Universidade Federal do Oeste do Pará (UFOPA), Brasil), and Josiovan R. Reis (Universidade Federal do Oeste do Pará (UFOPA), Brasil)</i>	

Technical Session 5: Covid 19 - Strategies

Chair: Luis Álvarez González

Digital Competence, Role Stress and Engagement: Towards Positive Mental Health in Latin American Teachers	83
<i>Angel Deroncele-Acosta (Universidad San Ignacio de Loyola, Perú), Patricia Medina-Zuta (Universidad San Ignacio de Loyola, Perú), Félix Fernando Goñi-Cruz (Universidad San Ignacio de Loyola, Perú), María Isabel Ramírez-Garzón (Pontificia Universidad Javeriana, Colombia), Orlando Fernández-Aquino (Universidad Uberaba, Brasil), Eldis Román-Cao (Universidad Técnica de Manabí, Ecuador), Mariel M. Montes-Castillo (Universidad de Sonora, México), and Eloísa Gallegos-Santiago (Universidad Autónoma de Baja California, México)</i>	
Motivation in First Year Engineering Students of the Online Course "Computer Programming in Python" in the Context of a Pandemic by COVID-19	91
<i>Solange Barros Bustos (Universidad San Sebastián Valdivia, Chile) and Luis Álvarez-González (Universidad Austral de Chile Valdivia, Chile)</i>	
The Clinical Case in Dentistry: Overview of Online Learning During the Pandemic	97
<i>Claudia Gabriela Otazú Aldana (Universidad San Ignacio de Loyola, Perú) and Patricia Medina Zuta (Universidad San Ignacio de Loyola, Perú)</i>	

Technical Session 6: Collaborative, Innovations, Educational Research

Chair: Luis Melgar

Technology, Pedagogy and Content (TPACK Framework): Systematic Literature Review	104
<i>Ana Cecilia Alemán-Saravia (Universidad San Ignacio de Loyola, Perú) and Angel Deroncele-Acosta (Universidad San Ignacio de Loyola, Perú)</i>	
Development of Computational Thinking Skills: An Experience With Undergraduate Students	112
<i>Leticia Laura-Ochoa (Universidad Nacional de San Agustín de Arequipa, Peru) and Norka Bedregal-Alpaca (Universidad Nacional de San Agustín de Arequipa, Peru)</i>	
Google Classroom and Reading Skills in Secondary School Students at Centro Educativo Parroquial 1327 Ancón, Lima, Peru, 2020	118
<i>Jadmi Gao-Chung (Universidad San Martín de Porres, Peru), Nancy Salsavilca-Manco (Universidad Privada Norbert Wiener, Peru), Andrea Sotelo-Guadalupe (Universidad César Vallejo, Universidad Tecnológica del Perú, Peru), L. Fabiola Guadalupe-Sifuentes (Universidad Nacional Mayor de San Marcos, Peru), and Alfredo Diaz-Guadalupe (Universidad Nacional Mayor de San Marcos, Peru)</i>	

Technical Session 7: Learning Analytics and EDM

Chair: Edson Pimentel

Guidelines for Data Collection Planning in Virtual Learning Environments for Application of Educational Process Mining	123
<i>Eduardo Machado Real (Federal University of ABC (UFABC), Brazil; State University of MS (UEMS), Brazil) and Edson Pinheiro Pimentel (Federal University of ABC (UFABC), Brazil)</i>	

A Learning Analytics Dashboard for Moodle: Implementing Machine Learning Techniques to Early Detect Students at Risk of Failure	130
<i>Cristian Cechinel (Universidade Federal de Santa Catarina, Brasil), Mateus de Freitas dos Santos (Universidade Federal de Santa Catarina, Brasil), Caio Barrozo (Universidade Federal de Santa Catarina, Brasil), Jesiel Emerim Schardosim (Universidade Federal de Santa Catarina, Brasil), Eduardo de Vila (Universidade Federal de Santa Catarina, Brasil), Vinicius Ramos (Universidade Federal de Santa Catarina, Brasil), Tiago Primo (Universidade Federal de Pelotas, Brasil), Roberto Munoz (Universidad de Valparaiso, Chile), and Emmanuel Marques Queiroga (Instituto Federal Sul-rio-grandense, Brazil)</i>	
Model for Prediction of Student Dropout in a Computer Science Course	137
<i>Alexandre G. Costa (Universidade Federal de Pelotas, Brazil), Julio C. B. Mattos (Universidade Federal de Pelotas, Brazil), Tiago Thompsen Primo (Universidade Federal de Pelotas, Brazil), Cristian Cechinel (Universidade Federal de Santa Catarina - UFSC, Brazil), and Roberto Muñoz (Universidad de Valparaiso, Chile)</i>	

Technical Session 8: Covid 19 - Strategies

Chair: Julio César Ponce Gallegos

Here to Stay After the Pandemic: Sentiment Analysis of Higher Education Teachers at UNAM	144
<i>Patricia González-Flores (Coordinación de Universidad, Abierta, Innovación Educativa y Educación a Distancia, UNAM, México), Cinthia Rodríguez Maya (Posgrado en Ciencia e Ingeniería de la Computación, UNAM, México), and Irma Rocio Zavala Sierra (Coordinación de Universidad, Abierta, Innovación Educativa y Educación a Distancia, UNAM, México)</i>	
Impact of the Pandemic on the Performance of Students in Higher Education Courses	151
<i>Luis Barboza (Software Engineering, CESAR School, Brazil), Anderson A. De Borba (IBMEC, Brazil), Rafael Ferreira Mello (Software Engineering, CESAR School, Brazil), and Erico Teixeira (Software Engineering, CESAR School, Brazil)</i>	
Distance Learning as an Emergency Strategy: Students' Opinions About its Implementation During the COVID-19 Pandemic	158
<i>Norma Baron-Ramirez (Universidad de Colima, México), Julio Cesar Ponce Gallegos (Universidad Autónoma de Aguascalientes, México), Antonio Siloa Sprock (Universidad Central de Venezuela, Venezuela), Beatriz Angélica Toscano de la Torre (Universidad Autónoma de Nayarit, México), Juan Contreras-Castillo (Universidad de Colima, México), and Juan Carlos Meza Romero (Universidad de Colima, México)</i>	

Technical Session 9: Collaborative, Innovations, Educational Research

Chair: José Esquicha

State of the Art of Teaching-Learning of Artificial Intelligence at Early Ages	165
<i>Maria-Jose Ojeda-Bazaran (Universidad Nacional de Loja (UNL), Ecuador), Luis Chamba-Eras (Universidad Nacional de Loja (UNL), Ecuador), Edison Coronel-Romero (Universidad Nacional de Loja (UNL), Ecuador), Milton Labanda-Jaramillo (Universidad Nacional de Loja (UNL), Ecuador), Lorena Conde-Zhingre (Universidad Internacional del Ecuador (UIDE), Ecuador), Daniel Irene-Robalino (Universidad Técnica Particular de Loja, Ecuador), Washington Fierro-Saltos (Universidad Estatal de Bolívar (UEB), Ecuador), Angel Orellana-Malla (Educativa Santa Mariana de Jesús, Instituto Superior Tecnológico Daniel Álvarez Burneo, Ecuador), Mabel Romero-Flores (Educativa Santa Mariana de Jesús, Instituto Superior Tecnológico Daniel Álvarez Burneo, Ecuador), Gilmar Cueva-Alvarado (Educativa Santa Mariana de Jesús, Instituto Superior Tecnológico Daniel Álvarez Burneo, Ecuador), Irene Chamba-Eras (Corporación Ecuatoriana para el Desarrollo de la Investigación y la Academia (CEDIA), Ecuador), and Daysi Erreyes-Pinzon (Corporación Ecuatoriana para el Desarrollo de la Investigación y la Academia (CEDIA), Ecuador)</i>	
E-Learning for the Development of Critical Thinking: A Systematic Literature Review	173
<i>Angel Deroncela-Acosta (Universidad César Vallejo, Perú), Mercedes Nagamine-Miyashiro (Universidad César Vallejo, Perú), Daniela Medina-Coronado (Universidad César Vallejo, Perú), Ana Margoth Rivera-Portugal (Universidad Nacional de San Agustín de Arequipa, Perú), Hania Carola Berroa-Garate (Universidad Nacional de San Agustín de Arequipa, Perú), Deysi Yvon Flores-Llerena (Universidad Católica de Santa María, Perú), and Paola Huarca-Flores (Universidad Católica de Santa María, Perú)</i>	
Efficacy of the Merrill Instructional Model to Develop Algebraic Thinking in Students from 8 to 10 Years Old	181
<i>Jonathan Gonsalo Palacios Laura (Universidad Nacional de San Agustín de Arequipa, Perú), Miluska Brigit Tito Andrade (Universidad Nacional de San Agustín de Arequipa, Perú), and Fabiola Mary Talavera Mendoza (Universidad Nacional de San Agustín de Arequipa, Perú)</i>	

Technical Session 10: Flipped Learning - Innovation

Chair: Paulo Ramirez

Case-Based Learning and Flipped Classroom for Teaching Administrative Processes	189
<i>Ana E. Velasquez Tica (Universidad Nacional Micaela Bastidas de Apurímac, Perú), Carlos Quispe (Universidad Nacional de San Antonio abad del Cusco, Perú), Hugo D. Calderon-Vilca (Universidad Nacional Mayor de San Marcos, Perú), Mario Aquino Cruz (Universidad Nacional Micaela Bastidas de Apurímac, Perú), Carlos Frisancho Enríquez (Universidad Nacional de San Antonio Abad del Cusco, Perú), and Jaime Guevara Rios (Universidad Nacional Micaela Bastidas de Apurímac, Perú)</i>	

Micro-Learning and Flipped Classroom to Improve Learning Motivation in Psychology Students..	196
<i>Eliana M. Ibarra-Cabrera (Universidad Nacional de San Antonio Abad del Cusco, Perú), Herwin Alayn Huillcen Baca (Universidad Nacional José María Arguedas, Perú), Manuel J. Ibarra (Universidad Nacional Micaela Bastidas de Apurímac, Perú), Carlos Quispe (Universidad Nacional de San Antonio Abad del Cusco, Perú), Yalmar Ponce (Universidad Nacional José María Arguedas, Perú), and Cesar Cuentas (Universidad Nacional Micaela Bastidas de Apurimac, Perú)</i>	
Flipped Classroom and Development of Mathematical Competencies in Engineering Students	202
<i>Alejandro Manuel Ecos Espino (Universidad Nacional de Moquegua, Perú), Nilton León Calvo (Universidad Nacional de Moquegua, Perú), Joffré Huamán Núñez (Universidad Nacional Micaela Bastidas, Perú), Edgar Zenon Vilca Mansilla (Universidad Nacional Micaela Bastidas, Perú), Oscar Manuel García Cajo (Universidad Nacional de Huancavelica, Perú), Zoraida Rocío Manrique Chávez (Universidad Nacional Intercultural de la Amazonia, Perú), Miriam Jesús Legua Barrios (Universidad Privada San Juan Bautista, Perú), and Siloia Soledad López Ibáñez (Universidad Nacional Micaela Bastidas, Perú)</i>	

Technical Session 11: Educational Innovation

Chair: María del Pilar Ponce

E-Learning Teacher Digital Competence: Construct Validation of a Scale in Times of Pandemic	209
<i>Edith Norma Carlos Bonifacio (Universidad San Ignacio de Loyola, Perú) and Patricia Medina Zuta (Universidad San Ignacio de Loyola, Perú)</i>	
An Automatic Teacher Activity Recognition System Based on Speech Transcriptions	216
<i>Pablo Uribe (University of Chile, Chile), Danner Schlotterbeck (University of Chile, Chile), Abelino Jiménez (University of Chile, Chile), Roberto Araya (University of Chile, Chile), Daniela Caballero (University of Chile, Chile), and Johan Van der Molen Moris (University of Cambridge, Great Britain)</i>	
Active Learning Techniques in Remote Learning: a Case Study in Road Design Courses in Ecuador	224
<i>Yasmany Garcia-Ramirez (Universidad Técnica Particular de Loja, Ecuador)</i>	

Technical Session 12: Collaborative, Innovations, Educational Research

Chair: Karina Rosas

DiLLeMa: A Framework for Collaborative Multi-Cultural Lecturing Material in International University Colleges	230
<i>Takfarinas Saber (Lero - The Irish Software Research Centre; Dublin City University, Ireland) and Malika Bendeche (Lero - The Irish Software Research Centre; ADAPT – Science Foundation Ireland Research Centre; Dublin City University, Ireland)</i>	

Cooperative and Interdisciplinary Project of Carbon Dioxide Measurements for High School Students	236
<i>Montserrat Rodriguez-Paz (IES Val Miñor, Spain), Javier Diz-Bugarin (IES Escolás Proval, Spain), and Jose L. Rodríguez-Fernández (IES Escolás Proval, Spain)</i>	
Global Readiness for Immersive Virtual Space Adoption: The Case of Ohyay	244
<i>Ismaila Temitayo Sanusi (University of Eastern Finland, Finland), Sunday Adewale Olaleye (University of Oulu, Finland), Friday Joseph Agbo (University of Eastern Finland, Finland), and Cloneria N. Jatileni (University of Eastern Finland, Finland)</i>	
Digital Competencies of Teachers in The Context of Professional Development	252
<i>Jelena Maksimović (University of Niš, Serbia), Lazar Stošić (Don State Technical University, Russia), Łukasz Tomczyk (Pedagogical University of Cracow, Poland), and Miljana Stamenković (University of Niš, Serbia)</i>	

Technical Session 13: Accessibility - Innovation

Chair: Mario Chacón Rivas

Financial Education: A Debt to the Deaf Community	258
<i>Catalina Espinach-Giutta (Finance specialist and administrative assistant at Includtec, Instituto Tecnológico de Costa Rica, Costa Rica), Alina Soto-López (Sign Language Interpreter, Includtec, Instituto Tecnológico de Costa Rica, Costa Rica), Ivannia Alfaro-Urena (Coope Ande No.1 RL., San José, Costa Rica), and Mario Chacón-Rivas (Instituto Tecnológico de Costa Rica, Costa Rica)</i>	
Proposal to Create a System for Teaching Reading and Writing for Adults	263
<i>Elaine Pasqualini (Faculdade de Tecnologia de Ourinhos, Brazil), Viviane de F. Bartholo (Faculdade de Tecnologia de Ourinhos, Brazil), Andrea C. S. Lorenzetti (Centro Paula Souza, Brazil), Deyvid K. Martim (Centro Paula Souza, Brazil), Ronaldo M. Ferreira (Centro Paula Souza, Brazil), Tamara A. C. Barbosa (Centro Paula Souza, Brazil), Victor M. Paulin (Centro Paula Souza, Brazil), and Vinicius R. Quadrado (Centro Paula Souza, Brazil)</i>	
Didactic Strategy for the Development of Literacy Skills Supported by Learning Objects	269
<i>Yaneth Cristina Cano Cano (Institución Educativa Juan María Céspedes, Colombia), Sergio Augusto Cardona Torres (Universidad del Quindío, Colombia), and Martha Luz Valencia Castrillón (Universidad del Quindío, Colombia)</i>	

Technical Session 14: Educational Needs - Technological Innovation

Chair: Vinicius Ramos

TôSabendo: A Platform to Create Engaging Teaching and Learning Experiences	275
<i>Tarsys Fonseca Franca (Federal University of Ouro Preto, Brazil), Cibele Oliveira Ferreira (Federal University of Ouro Preto, Brazil), Daiane Leandro de Oliveira (Federal University of Ouro Preto, Brazil), Guilherme Tavares de Assis (Federal University of Ouro Preto, Brazil), Anderson Almeida Ferreira (Federal University of Ouro Preto, Brazil), and Elton José da Silva (Federal University of Ouro Preto, Brazil)</i>	

Recommender Systems in Education: Systematic Mapping	282
<i>Flavio Oliveira (Faculdade de Computação e Informática (FCI) Universidade Presbiteriana Mackenzie - São Paulo, Brazil) and Ismar Frango (Faculdade de Computação e Informática (FCI) Universidade Presbiteriana Mackenzie - São Paulo, Brazil)</i>	
Experiments in Selection Processes of Students for a Crammer	290
<i>Francisco de Assis Zampiroli (Federal University of ABC, Brazil), Valério Ramos Batista (Federal University of ABC, Brazil), João Marcelo Borovina Josko (Federal University of ABC, Brazil), Leonardo José Steil (Federal University of ABC, Brazil), and Sandra Cristina Trevisan (Federal University of ABC, Brazil)</i>	

Technical Session 15: Educational Research - Technological Innovation

Chair: Guillermo Calderon

Research in Teaching Practice in Non-Face-to-Face Education	296
<i>Mario Aquino Cruz (Universidad Nacional Micaela Bastidas Apurímac, Perú), Herwin Alayn Huillcen Baca (Universidad Nacional José María Arguedas, Perú), Manuel J. Ibarra (Universidad Nacional Micaela Bastidas Apurímac, Perú), José Abdón Sotomayor Chahuaylla (Universidad Nacional Micaela Bastidas Apurímac, Perú), Flor de Luz Palomino Valdivia (Universidad Nacional José María Arguedas, Perú), and Yonatan Mamani-Coaquira (Universidad Nacional Micaela Bastidas Apurímac, Perú)</i>	
Benchmark Application for Scenario Analysis in the Educational Chatbots Development	302
<i>Victor Malcolm R. Santos (Federal Institute of Paraíba, Brazil), Francisco Petrônio A. Medeiros (Federal Institute of Paraíba, Brazil), Heremita B. Lira (Federal Institute of Paraíba, Brazil), and Nadja Nóbrega Rodrigues (Federal Institute of Paraíba, Brazil)</i>	
Evaluation of the Knowledge Construction Process in the Application of the Pedagogical Architecture “Debate of Thesis”	310
<i>Francisco Xavier da Silva (IFMS, Brazil), Miriam Garcia Müller (Rede Municipal de Ensino de Canoas, Brazil), Rafaela de Araujo Sampaio Lima (IFAM, Brazil), Ricardo Daniell Prestes Jacaúna (IFAM, Brazil), Andrea Pereira (IFFAR, Brazil), and Crediné Silva de Menezes (UFRGS, FACED - PPGIE, Brazil)</i>	

Technical Session 16: Innovation - Game Based Learning

Chair: Klinge Villalba

Usability of an Online Judge for Concurrent Programming Education	318
<i>Jeisson Hidalgo-Céspedes (Universidad de Costa Rica, Costa Rica), Gabriela Marin-Raventós (Universidad de Costa Rica, Costa Rica), and Marta Eunice Calderón-Campos (Universidad de Costa Rica, Costa Rica)</i>	
Pixel Python RPG: Repurposing an Entertainment Game to an Open Educational Resource for Computer Programming Fundamentals	326
<i>Josivan Pereira da Silva (Mackenzie Presbyterian University, Brazil), Paulo Henrique Gonçalves Pimentel (Cruzeiro do Sul University Sao Paulo, Brazil), Luciano Gonçalves Pimentel (Cruzeiro do Sul University Sao Paulo, Brazil), and Ismar Frango Silveira (Mackenzie Presbyterian University, Brazil)</i>	

Games and Virtual Environments in the Teaching-Learning of Linear Programming	334
<i>Norka Bedregal-Alpaca (Universidad Nacional de San Agustín de Arequipa, Peru), Leticia Laura-Ochoa (Universidad Nacional de San Agustín de Arequipa, Peru), and Olha Sharhorodska (Universidad Nacional de San Agustín de Arequipa, Peru)</i>	

Technical Session 17: Educational Innovation - Technological Innovation

Chair: Katherine Espinal

Graduation Mentoring Recommender - Hybrid Recommendation System for Customizing the Undergraduate Student's Formative Path	342
<i>Marques Gerson A. (Universidade do Vale do Rio dos Sinos, São Leopoldo), Rigo S. J (Universidade do Vale do Rio dos Sinos, São Leopoldo), and Alves Isa Mara da Rosa (Universidade do Vale do Rio dos Sinos, São Leopoldo)</i>	
Interactive ENEM: Exams with Statistics and Free Access	350
<i>Francisco de Assis Zampiroli (Federal University of ABC, Brazil), Irineu Antunes Júnior (Federal University of ABC, Brazil), Leonardo José Steil (Federal University of ABC, Brazil), and Leandro Teodoro (Federal University of ABC, Brazil)</i>	
Automated Assessment of Parametric Programming in a Large-Scale Course	357
<i>Francisco de Assis Zampiroli (Federal University of ABC, Brazil), Cristiane M. Sato (Federal University of ABC, Brazil), Heitor Rodrigues Savegnago (Federal University of ABC, Brazil), Valerio Ramos Batista (Federal University of ABC, Brazil), and Guiou Kobayashi (Federal University of ABC, Brazil)</i>	

Technical Session 18

Chair: Klinge Viillalba

Implications of Digital Citizenship in Social Media to Build a Safe Environment in the Covid-19 Situation	364
<i>Leslie Salas-Valdivia (Catholic University of Santa Maria, Peru) and Olger Gutierrez-Aguilar (National University of San Agustín, Peru)</i>	
Key Factors for the Success of Connectivism in the E-Learning Modality in the Context of Covid-19	368
<i>Leslie Salas-Valdivia (Catholic University of Santa Maria, Peru) and Olger Gutierrez-Aguilar (National University of San Agustín, Peru)</i>	

Technical Session 19

Chair: Raidell Avello

Appropriation of the Maker Methodology to Stimulate Invisible Learning in High School Students in Times of Covid-19	372
<i>Leslie Salas-Valdivia (Catholic University of Santa Maria, Peru) and Olger Gutierrez-Aguilar (National University of San Agustín, Peru)</i>	

The Virtual Teaching Process and Academic Self-Efficacy in Learning and the Intention to Drop Out University Studies in Times of Covid-19	376
<i>Olger Gutierrez-Aguilar (National University of San Agustín, Peru), Juliana Bautista-Lopez (National University of San Agustín, Peru), Estefany Sánchez-Meza (National University of San Agustín, Peru), Ruth Falcon-Huamani (National University of San Agustín, Peru), Yuma Condori-Surco (National University of San Agustín, Peru), and Ygnacio Tomaylla-Quispe (National University of San Agustín, Peru)</i>	
Key Factors for the Success of E-Learning in High School Students in Times of Covid-19	383
<i>Sandra Chicaña-Huanca (National University of San Agustín, Peru), Sharmila Cano-Villafuerte (National University of San Agustín, Peru), and Olger Gutierrez-Aguilar (National University of San Agustín, Peru)</i>	

Technical Session 20: Innovation - Solutions for Learning

Chair: Alvaro Fernandez

Enhanced Compiler Messages of Error in Python with Focuses in Readability in CS1	389
<i>Gabriel Carvalho (Universidade Federal de Santa Catarina, Brazil), Vinicius Ramos (Universidade Federal de Santa Catarina, Brazil), Cristian Cechinel (Universidade Federal de Santa Catarina, Brazil), Juary Costa Rocha (Universidade Federal de Santa Catarina, Brazil), Anabela Gomes (Instituto Superior de Engenharia de Coimbra Coimbra, Portugal), and António José Mendes (University of Coimbra Coimbra, Portugal)</i>	
Augmented Reality Application “HardwareAR” to Improve the Learning of Internal Components of a Computer	397
<i>Pablo E. Ataucusi Romero (COAR – Ministerio de educación Apurímac, Perú), Edison Ataucusi Romero (Universidad Nacional José María Arguedas, Perú), Mario Aquino Cruz (Universidad Nacional Micaela Bastidas de Apurímac, Perú), Antonio Arque Pantigozo (Universidad Nacional Tecnológica de Lima Sur, Perú), Manuel J. Ibarra Cabrera (Universidad Nacional Micaela Bastidas de Apurímac, Perú), and Eliana M. Ibarra-Cabrera (Universidad Nacional de San Antonio Abad del Cusco, Perú)</i>	
Educational Robotics as a Physical Sciences Teaching Tool	404
<i>Oscar Jhon Vera Ramirez (Universidad Nacional de Moquegua, Perú), José Emmanuel Cruz de la Cruz (Universidad Nacional del Altiplano, Perú), and Wilson Antony Mamani Machaca (Universidad Nacional del Altiplano, Perú)</i>	

Technical Session 21: Educational Innovation - Technological Innovation

Chair: Cristian Malaga

Decentralized Social Network for the Campus: Historical Claims Meet Contemporary Needs	408
<i>Jéssica S. Oliveira (Universidade de Brasília (UnB), Brazil), Germana M. da Nóbrega (Universidade de Brasília (UnB), Brazil), Fernando W. Cruz (Universidade de Brasília (UnB), Brazil), and Roberta B. Oliveira (Universidade de Brasília (UnB), Brazil)</i>	

A Method for Adapting Granularity of Mathematical Proofs Using Metamath	416
<i>Lucas Vieira de Oliveira (Universidade Federal do ABC - UFABC, Brasil)</i>	
<i>and Edson Pinheiro Pimentel (Universidade Federal do ABC - UFABC, Brasil)</i>	
ReaCloud: A Proposal for the Dissemination of Open Educational Resources Supported by Semantic Web Technologies	423
<i>Fernanda Kipper B. S. (Universidade Federal de Pelotas, Brazil),</i>	
<i>Dirceu A. Maraschin Jr (Universidade Federal de Pelotas, Brazil),</i>	
<i>Karlise Nascimento (Universidade Federal de Pelotas, Brazil), Cris</i>	
<i>Elena Padilha (Universidade Federal de Pelotas, Brazil), Tiago</i>	
<i>Thompsen Primo (Universidade Federal de Pelotas, Brazil), and Julio</i>	
<i>C.B. Mattos (Universidade Federal de Pelotas, Brazil)</i>	

Technical Session 22: Educational Research - Technological Innovation

Chair: Oscar Ramirez

Phubbing Among Adolescents and Problematic Smartphone use by their Parents - A New Challenge for Media Education	431
<i>Lukasz Tomczyk (Jagiellonian University Cracow, Poland), Laura Fedeli</i>	
<i>(University of Macerata Macerata, Italy), Lazar Stošić (Don State</i>	
<i>Technical University, Russia), Elma Selmanagic Lizde (University of</i>	
<i>Sarajevo Sarajevo, Bosnia & Herzegovina), and Valéria Farinazzo</i>	
<i>Martins (Universidade Presbiteriana Mackenzie São Paulo, Brasil)</i>	
A Brief Review of Immersive Virtual Environments for Teaching Microbiology	435
<i>Larissa Fernandes (Universidade Tecnológica Federal do Paraná), Mateus</i>	
<i>Calzavara da Silva (Universidade Tecnológica Federal do Paraná),</i>	
<i>Armando Paulo Da Silva (Universidade Tecnológica Federal do Paraná),</i>	
<i>and Eduardo Filgueiras Damasceno (Universidade Tecnológica Federal do</i>	
<i>Parana)</i>	
Mathematics Digital Teaching Material in the First Year of Engineering	438
<i>Verónica L. Vanoli (Facultad Regional Bahía Blanca, Universidad</i>	
<i>Tecnológica Nacional, Argentina), Mónica García Zatti (Facultad</i>	
<i>Regional Bahía Blanca, Universidad Tecnológica Nacional, Argentina),</i>	
<i>Marta Vidal (Facultad Regional Bahía Blanca, Universidad Tecnológica</i>	
<i>Nacional, Argentina), and Lorena Cofré (Facultad Regional Bahía</i>	
<i>Blanca, Universidad Tecnológica Nacional, Argentina)</i>	
Peruvian Students' Knowledge and the Use of Digital Technology During the COVID-19 Pandemic	442
<i>María Chávez-Chuquimango (Universidad Peruana de Ciencias Aplicadas,</i>	
<i>Perú), Ambrosio Tomás-Rojas (Universidad Peruana de Ciencias</i>	
<i>Aplicadas, Perú), and Eliana Gallardo-Echenique (Universidad Peruana</i>	
<i>de Ciencias Aplicadas, Perú)</i>	

Technical Session 23: Educational Research - Technological Innovation

Chair: Julio Vera

Influence of a Mobile Application with Augmented Reality ANATOMY-3D in Learning of Bone System	446
<i>Herwin Alayn Huillcen Baca (National University José María Arguedas, Perú), Eddy Contreras Benites (National University José María Arguedas, Perú), Flor de Luz Palomino Valdivia (National University José María Arguedas, Perú), Manuel J. Ibarra (National University Micaela Bastidas, Perú), Mario Aquino Cruz (National University Micaela Bastidas, Perú), and Ivan Soria Solis (National University José María Arguedas, Perú)</i>	
Influence of Educational Software "Kindermat" in Learning of Geometric Shapes in Five-year-old Children	450
<i>Flor de Luz Palomino Valdivia (National University José María Arguedas, Perú), Alfredo Zúñiga Rodas (National University José María Arguedas, Perú), Herwin Alayn Huillcen Baca (National University José María Arguedas, Perú), Manuel J. Ibarra (National University Micaela Bastidas, Perú), Mario Aquino Cruz (National University Micaela Bastidas, Perú), and Ivan Soria Solis (National University José María Arguedas, Perú)</i>	
Digital Competences Assessment Application	454
<i>Ketia Kellen Araújo da Silva (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil), Adalto Selau Sparremerger (Escola de Tecnologia da Informação, Brazil), and Patricia Alejandra Behar (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil)</i>	
Support for the Design of Learning Modules: An Approach from Assessment	458
<i>Oriel A. Herrera (Universidad Católica de Temuco, Chile), Patricia Mejías (Universidad Católica de Temuco, Chile), and Alejandra Cid (Universidad Católica de Temuco, Chile)</i>	

Technical Session 24: Educational Research - Technological Innovation

Chair: Guillermo Calderon

Research in Open Education in Latin America: Towards an Agenda of Collaboration Between Networks	462
<i>Virginia Rodés (Universidad de la República, Uruguay) and Francisco Iniesto (The Open University, Reino Unido)</i>	
Promoting a Critical View on Data, Among University Teachers	466
<i>Manuel Podetti (Universidad de la República, Uruguay), Virginia Rodés (Universidad de la República, Uruguay), Caroline Kuhn (Bath Spa University, United Kingdom), Javiera Atenas (University of Suffolk, United Kingdom), and Carolina Veiga (Montevideo, Uruguay)</i>	
Semantic Enrichment of Open Dataset Related to Sustainable Development Goals using Open Knowledge Graphs	470
<i>Diego Fernando Pinto Orellana (Universidad Técnica Particular de Loja, Ecuador) and Nelson Piedra (Universidad Técnica Particular de Loja, Ecuador)</i>	

Exploring Success Factors of CRM Strategies in Higher Education Institutions: A Case Study of CRM-UTPL for Conversion of Prospects in University Students	474
<i>Greyson Paul Alberca Prieto (Universidad Técnica Particular de Loja, Ecuador) and Nelson Piedra (Universidad Técnica Particular de Loja, Ecuador)</i>	

Technical Session 25: Educational Research - Technological Innovation
Chair: Norma Barón

Procedure for Assessing the Quality of University Courses: Can a Single Value Give Qualitative Information?	478
<i>Yasmany García-Ramírez (Universidad Técnica Particular de Loja, Ecuador)</i>	
Evaluating Educational Innovation at UNAM: A Proposal of Criteria and Indicators	482
<i>Roberto Santos Solórzano (Universidad Nacional Autónoma de México, México)</i>	
Analysis of the Educational Resources used in the Course Fundamentals of Informatics in the Face of the COVID-19 Pandemic	486
<i>Irene Hernández Ruiz (Universidad Nacional, Costa Rica) and Luis Alejandro Fallas Carvajal (Universidad Nacional, Costa Rica)</i>	
Educational Virtualization Model in Initial Teacher Training	490
<i>Carlos Atúnca-Prieto (Universidad San Ignacio de Loyola, Perú) and Angel Deroncele-Acosta (Universidad San Ignacio de Loyola, Perú)</i>	

Technical Session 26: Educational Research - Technological Innovation
Chair: José Sullá

Developing Student Understanding of Calculus Concepts Through Flipped Classroom	494
<i>Yony Raúl Santaría Leuyacc (Universidad Nacional Mayor de San Marcos, Perú) and Jorge Luis Crisostomo Parejas (Universidad Nacional Mayor de San Marcos, Perú)</i>	
Proposal for the Design and Implementation of a XBlock in Open edX to Support Learning Analytics	498
<i>Jonnathan Campoberde (Universidad de Cuenca, Ecuador), Miguel Á. Macías (Universidad de Cuenca, Ecuador), and Jorge Maldonado-Mahauad (Universidad de Cuenca, Ecuador)</i>	
Multisensorial Audiobooks: Improving Accessibility with WCAG Standard	502
<i>Helder Yukio Okuno (Federal Center for Technological Education Celso Suckow da Fonseca - CEFET/RJ, Brazil), Byatriz Rosa de Moura (Federal Center for Technological Education Celso Suckow da Fonseca - CEFET/RJ, Brazil), Silvino Netto (Federal Center for Technological Education Celso Suckow da Fonseca - CEFET/RJ, Brazil), and Gustavo Guedes (Federal Center for Technological Education Celso Suckow da Fonseca - CEFET/RJ, Brazil)</i>	
Face Verification Experiments on Moodle Quiz	506
<i>Daniel Gonçalves da Silva (Federal University of ABC, Brazil) and Francisco de Assis Zampirolli (Federal University of ABC, Brazil)</i>	

Technical Session 27: Educational Games - Technological Innovation

Chair: Nestor Torres Gamarra

Mighty Math Knight: A Game for Learning Basic Math Operations	510
<i>Luciana da Costa Varjolo (CEFET/RJ, Rio de Janeiro, Brazil), Rodrigo de Souza Santos (UERJ, Rio de Janeiro, Brazil), and Gustavo Guedes (CEFET/RJ, Rio de Janeiro, Brazil)</i>	
Andragogical Games and Distance Learning in Higher Education - A Systematic Mapping	514
<i>David Barreto (Universidade Federal Rural de Pernambuco, Brasil), Juliana R. Basto Diniz (Universidade Federal Rural de Pernambuco, Brasil), and Rodrigo N.P.M. Souza (Universidade Federal Rural de Pernambuco, Brasil)</i>	
Challenges and Opportunities on Using Games to Support IoT Systems Teaching	518
<i>Bruno Pedraça de Souza (Universidade Federal do Rio de Janeiro - UFRJ, Brazil) and Claudia Maria Lima Werner (Universidade Federal do Rio de Janeiro - UFRJ, Brazil)</i>	
NinjaMath: Role Playing Game for Learning Factoring	522
<i>Nelson David Zapata Osorio (Facultad de Ciencias Exactas y Aplicadas, Instituto Tecnológico Metropolitano, Colombia) and Alberto Alejandro Piedrahita Ospina (Facultad de Ciencias Exactas y Aplicadas, Instituto Tecnológico Metropolitano, Colombia)</i>	

Technical Session 28: Educational Innovation

Chair: Kevin Tejada

Developing a Didactic Sequence for Introducing Computational Thinking in the Early Years of Elementary School	526
<i>Diego S. Siloa (Universidade Federal Rural de Pernambuco, Brasil), Sérgio L. Melo (Universidade Federal Rural de Pernambuco, Brasil), and Juliana R. Basto Diniz (Universidade Federal Rural de Pernambuco, Brasil)</i>	
Computational Thinking and Block-Based Programming for Beginning Engineering Students: Systematic Review of the Literature	530
<i>Ronald Paucar Curasma (Universidad Nacional Autónoma de Tayacaja Daniel Hernández Morillo, Perú), Klinge Orlando Villalba-Condori (Universidad Continental, Perú), Nolan Jara Jara (Universidad Nacional Mayor de San Marcos, Perú), Rosa Quispe Llamoca (Universidad de Lima, Perú), Julio Cesar Cabrera Chávez (Universidad Nacional de Ingeniería, Perú), and María del Pilar Ponce-Aranibar (Universidad Católica de Santa María, Perú)</i>	
Enhancing Software Engineering Courses with a Mobile Gamified Platform: Results of a Mixed Approach	534
<i>Diego Iquira (Universidad Nacional de San Agustín, Perú), Marisol Galarza (Universidad Nacional de San Agustín, Perú), and Olha Sharhorodska (Universidad Nacional de San Agustín, Perú)</i>	

Formative Evaluation Of Teaching Mathematics In The COVID-19 Pandemic	538
<i>Rosario Trujillo Huaman (National University of San Marcos, Perú), John Trujillo Trejo (National University of San Marcos, Perú), Armando Fermin Pérez (National University of San Marcos, Perú), Maria Cáceres Huamán (National University of San Marcos, Perú), Johnny Avendaño Quiroz (National University of San Marcos, Perú), and Victor Bustamante Olivera (National University of San Marcos, Perú)</i>	

Technical Session 29: Educational Innovation

Chair: Maria Del Pilar Ponce

Toward the Development of Information Literacy Skills: A Framework for Beginners in Higher Education	542
<i>Elizabeth Vidal (Universidad Nacional de San Agustín de Arequipa, Perú), Maria-Ludgarda Apaza (Universidad Nacional de San Agustín de Arequipa, Perú), Melquisedec Ortega (Universidad Nacional de San Agustín de Arequipa, Perú), Ada Huamantuna (Universidad Nacional de San Agustín de Arequipa, Perú), and Roberto Aquepucho (Universidad San Antonio Abad del Cusco, Perú)</i>	
Virtual Learning Objects and LMS, A Strategic Alliance Between the Teaching-Learning Process and Generic Competences	546
<i>Patricia Mejias (Universidad Católica de Temuco, Chile), Oriel Herrera (Universidad Católica de Temuco, Chile), Alejandro Mellado (Universidad Católica de Temuco, Chile), and Marcelo Faundez (Universidad Católica de Temuco, Chile)</i>	
Analyzing Topics Similarity in Undergraduate Syllabus using Embedding Techniques	550
<i>Alvaro Fernández Del Carpio (Universidad Católica de Santa María, Perú) and Karina Rosas Paredes (Universidad Católica de Santa María, Perú)</i>	
Towards the Proposal of a Specific Domain Model for Educational Data Mining: Problem Identification	554
<i>Emilcy Hernández-Leal (Universidad de Medellín) and Néstor Duque-Méndez (UNIVERSIDAD NACIONAL DE COLOMBIA)</i>	

Technical Session 30: Educational Innovation

Chair: Cristian Malaga

Studygrammers: Learning Influencers as a Source of Credibility	558
<i>Sandra Arango-Montoya (Universidad Peruana de Ciencias Aplicadas, Peru) and Eliana Gallardo-Echenique (Universidad Peruana de Ciencias Aplicadas, Peru)</i>	
Teaching Competencies in Information Communication and Active Methodologies for the Development of Learning Ecologies in Higher Education	562
<i>Lucía Alonso Varela (Universidad de la República, Uruguay) and Crediné Silva de Menezes (Universidade Federal do Rio Grande do Sul, Brasil)</i>	

Teaching Experience in Programming through Free Online Resources	566
<i>Pedro Mirabal (Unversidad Católica de Temuco, Chile), Teresa Pérez (Universidad de Matanzas, Cuba), Emilio Soler (Universidad de Matanzas, Cuba), and Oriel A. Herrera (Unversidad Católica de Temuco, Chile)</i>	
Gamified Forms: A Proposal for Teaching Training Based on Computational Thinking	570
<i>Claudio Ferreira Rodrigues (Mestrando em ensino de Ciências e Matemática Taubaté, Brasil) and Ismar Frango Silveira (Universidade Presbiteriana Mackenzie-SP, Universidade Cruzeiro do Sul-SP, Brasil)</i>	
Author Index	575