Héctor Cardona-Reyes
Eliana Gallardo-Echenique
Editors

CISETC 2021

CONGRESO INTERNACIONAL SOBRE EDUCACIÓN Y TECNOLOGÍA EN CIENCIAS

Universidad Católica Santo Toribio de Mogrovejo,
Chiclayo-Perú
16 al 18 de Noviembre del 2021 Proceedings
Preface

In a world that is increasingly shaped by science and technology, the need for multi-literate citizenry and workforce for the 21st century has never been greater [1]. The advent of new and emerging technologies has highlighted the need to equip students with the knowledge and skills set necessary they'll need to succeed in a post-pandemic world with a growing emphasis on STEAM (Science, Technology, Engineering, the Arts and Math) [2]. STEAM is an educational discipline that ties all the subjects to each other in an interdisciplinary way as well as to the full spectrum of the rapidly changing global world we live in. Experts and scholars agree that science, technology, engineering, arts, and math will drive new innovations across different disciplines, institutional contexts, and regions [3]. STEAM education includes grades from pre-school to post-doctoral levels and from formal (e.g., classrooms), informal (e.g., afterschool programmes), and non-formal (e.g., vocational education), open (e.g., MOOCs) and distance education (e.g. Web-based courses) [4], [5].

To be prepared for the demands of modern societies, all learners must have an equitable access to STEAM knowledge and skills [6]. STEAM education has been recognized as an important educational reform to prepare students for the twenty-first century incorporating a unique perspective offered by linking critical thinking, collaboration, innovation, creativity, and productivity [7], [8]. It is an opportunity for scholars and students to collaboratively understand how people learn with modern technology.

This need has led to a paradigm shift from traditional educational philosophy towards innovative and progressive methods of teaching to create more personalized learning experiences, to inspire learning, and to prevent any possible future skills gap. Emerging technologies (i.e., educational technology, information technology, nanotechnology, biotechnology, cognitive science, robotics, and artificial intelligence) are reshaping the educational landscape [6]. They need to adapt to the inevitable impacts in teaching and learning, leading to their reconceptualization following the principles underlying the interdisciplinary STEAM approach; through the design of interactive, collaborative, and inquiry-based learning environments [9].

Educational research literature indicates that successful integration of technology in STEAM education, requires reconstruction of curricula and methods of teaching, learning, and assessment to more closely align with the affordances of new technologies and with STEAM pedagogy [1], [7]. STEAM education should exploit the capabilities and possibilities of modern technologies to create high quality learning experiences that foster students' innovation, creativity, communication and collaboration, critical thinking, and problem-solving skills.

For the edition of this Conference Proceedings, the focus is on the interdisciplinary approach to learning and skills development that transcends throughout cognitive fields and focuses on addressing authentic, real-world problems by means of the complex use of technological tools.
In terms to exploit the capabilities and possibilities of new and emerging technologies, there is a necessity for scholarly publications investigating these technologies' infiltration into STEAM as well as international best practices in the design, development, and educational use of new and emerging technologies in support of learners' STEAM learning processes and outcomes.

CISETC 2021 welcomes relevant contributions from research scholars in authentic contexts. This is an ambitious effort to discuss the challenges surrounding the implementation of modern technologies into the learning process taking in consideration the strengths and limitations of STEAM approaches.

The studies and research that appear in this volume are aimed at the development of computational thinking; and, at broadening student and teacher participation, taking the inclusion of all without distinction of race, sex, or socioeconomic position [10]. This edition presents new initiatives, to ensure theoretical and practical contributions to science education research overall and achievement gaps in both STEAM and non-STEAM fields. Besides, CISETC 2021 shows a series of practical implications which directly affect groups such as teachers, students, researchers, policymakers, education, and training Institutions. This knowledge has been collated in this volume intended to provide guidance to international and national actors on the potential role of STEAM education to provoke thought among practitioners and academics to understand their implications and maximize the potential opportunities, to encourage critical assessments, and to provide pedagogical tools to underpin STEAM’s transdisciplinary.

December 2021

The editors.
References


### Organizing Committee
- Emma Margarita Wong (Universidad Católica Santo Toribio de Mogrovejo, Chiclayo, Perú)
- Klinge Villalba-Condori (Universidad Católica de Santa María, Perú)
- Agustín Aduríz-Bravo (Universidad de Buenos Aires, Argentina)
- Aman Yadav (Michigan State University EEUU)
- Lung-Hsiang Wong (Nanyang Technological University Singapur)
- Jari Lavonen (Universidad de Helsinki, Finlandia)
- Eliana Gallardo Echenique (Universidad Peruana de Ciencias Aplicadas, Perú)
- Carla Gamarra Flores (Universidad Católica Santo Toribio de Mogrovejo, Chiclayo, Perú)
- Mery Mendoza Rodas (Universidad Católica Santo Toribio de Mogrovejo, Chiclayo, Perú)
- Jimena Campodónico Bustíos (Universidad Católica Santo Toribio de Mogrovejo, Chiclayo, Perú)

### Scientific Committee
- Agustín Aduríz-Bravo (Universidad de Buenos Aires, Argentina)
- Augustino Caminero (UNED, España)
- Alejandro Javier Hadad (FI-UNER, Argentina)
- Alfonso Infante (Universidad de Huelva, España)
- Alicia García-Holgado (GRIAL Research Group, University of Salamanca, España)
- Alicia Mon (Universidad Nacional de La Matanza, Argentina)
- Álvaro García Martínez (Universidad Distrital Francisco José de Caldas, Colombia)
- Aman Yadav (Michigan State University, EEUU)
- Ana Morales (Universidad Central de Venezuela, Venezuela)
- Andrés Chiappe (Universidad de La Sabana, Colombia)
- Angel Fidalgo (Universidad Politécnica de Madrid, España)
- Angela Calabrese (Michigan State University, EEUU)
- Antoni Granollers (Universidad de Lleida, España)
- Antonio Silva Sprock (Universidad Central de Venezuela, Venezuela)
- Arturo Moquillaza (Pontificia Universidad Católica del Perú, Perú)
- Ary Millyviita (Universidad de Helsinki, Finlandia)
- August Climent-Ferrer (Ramon Llull University, España)
- Azemeth Patiño (Université Laval, Canada)
- Carina González (Universidad de La Laguna, España)
- Carmen Batanero (Universidad de Granada, España)
- Cristina Bender (Universidad Nacional del Rosario, Argentina)
- Cristina Valls (Universitat Rovira i Virgili, España)
- Daniela Vieira (Universidad Oberta, Portugal)
- Davinia Hernández (Universitat Pompeu Fabra, España)
- Deborah Fields (Utah State University, EEUU)
- Dennis Arias Chávez (Universidad Continental, Perú)
- Diego Torres (Lífia, Fac. Informática, UNLP, Argentina)
- Eliana Gallardo Echenique (Universidad Peruana de Ciencias Aplicadas, Perú)
- Esteban Gonzales Clua (Universidad de Fluminense, Brasil)
- Faraón Llorens Largo (University of Alicante, España)
Fernando Bordignon (Universidad Pedagógica Nacional, Argentina)
Francisco Javier Álvarez Rodríguez (Universidad Autónoma de Aguascalientes, México)
Francisco José García Peñalvo (Grupo Grial, España)
Héctor Cardona (Centro de Investigación en Matemáticas A.C., México)
Huizilopochtli Luna García (Universidad Autónoma de Zacatecas, México)
Humberto Muñoz Bautista (Universidad Autónoma de Aguascalientes, México)
Ignacio Aguaded (Universidad de Huelva, España)
Ismar Frango (Universidad Presbiteriana de Mackensie, Brasil)
Jaime Muñoz (Universidad Autónoma de Aguas Calientes, México)
Jari Lavonen (Universidad de Helsinki, Finlandia)
Jhon Guerra (Universidad de los Andes, Colombia)
João Vilhete Viegas d’Abreu (Universitat Estatal de Campinas, Brasil)
Joey Huang (Indiana University Bloomington, EEUU)
Jorge Maldonado (Universidad de Cuenca, Ecuador)
Jorge Sanabria (Universidad Católica del Perú, Perú)
José Antonio Pow Sang Portillo (Pontificia Universidad Católica del Perú, Perú)
José Eder Guzmán Mendoza (Universidad Autónoma de Aguascalientes, México)
Juan Manuel González Calleros (Benemérita Universidad Autónoma de Puebla, México)
Julio Cesar Ponce Gallegos (Universidad Autónoma de Aguascalientes, México)
Julio Guerra (Universidad de Pittsburgh, EEUU)
Klinge Villalba (Universidad Católica Santa María, Perú)
Luis Marquès Molás (Universidad Rovira i Virgili, España)
Lung Hsiang Wong (Nanyang Technological University, Singapur)
Margarida Romero (LINE, Université Côte d’Azur, Nice, Francia)
María Lozano (Universidad de Cuenca, Ecuador)
Mónica Carreño (Universidad de los Andes, Colombia)
Nguyen-Thinh Le (Humboldt-Universität zu Berlin, Alemania)
Pablo Torres-Carrion (Universidad Técnica Particular de Loja, Ecuador)
Patricia Paderewski (University of Granada, España)
Raidell Avello (Universidad de Cien Fuegos, Cuba)
Sampson Dimitrios (University of Piraeus, Grecia)
Sandra Cano (Pontificia Universidad Católica de Valparaíso, Chile)
Shelley Shwu Ching (National Tsing Hua University, Taiwan)
Sit Cheung Kong (Universidad de Educación de Hon Kong, Hon Kong)
Thierry Viéville (INRIA, France)
Úrsula Freundt-Thurne (Universidad Peruana de Ciencias Aplicadas, Perú)
Vanessa Agredo (Unicauca, Colombia)
Wenli Chen (Nanyang Technological University, Singapur)
Yolanda Camacho González (Universidad Autónoma de Nayarit, México)
Contents

Modification of Scientific Skills through a Robotics Ecology Program
Jhon Holguin-Alvarez, Juana Cruz-Montero, Jenny Ruiz-Salazar & Fernando Ledesma-Pérez 10

Development and Validation of a Gamified Videogame for Math Learning in Attention Deficit Hyperactivity Disorder Children (ADHD)
Rodrigo Castro, Deyby Huamanchahua 17

Self-Perception of Digital Competences Among Peruvian Teachers
Ambrosio Tomás-Rojas, Ursula Freund-Thurne, Eliana Gallardo-Echenique & Jorge Bossio 26

Process Mining Model to Guarantee the Privacy of Personal Data in the Healthcare Sector
Sebastian Saavedra, José Llatas & Jimmy Armas-Aguirre 34

Predictive Model for Assigning Exercises to Students in Spreadsheet Functions Using Artificial Neural Networks
Edwar Saire-Peralta 44

Levels of Information Literacy and its Influence in Reciprocal Teaching in Communication Sciences Students
Guillermo Ocrospona, Doris Fuster-Guillen, Yolvi Ocaña & Klinge Villalba-Condori 53

Use and Design of Virtual and Remote Free Access Experiments: World Pendulum Alliance and DLab in Times of COVID 19
Freddy Torres-Payoma, Manuel Escobar, Leyton Castro, Karla Triana & Diana Herrera 61

Vocational Preferences Towards STEM Degrees in High School Students in Peru
Iván Montes-Iturriza, Eduardo Franco-Chalco & Klinge Orlando Villalba-Condori 69

Raising Awareness in the Adoption of COVID-19 Preventive Measures in Higher Education Students Through an Epidemiological Surveillance Mobile App
Jessie Bravo, María Arangurí, Roger Alarcón & Fiorella Li 77

Real-time Identification of the Emotional State in The Classroom to Improve the Teaching-learning Process
Edward Flores, José Livia, Alfredo García & María Dávila 86
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and Implementation of a Virtual Laboratory for Electromagnetics Teaching in Engineering</td>
<td>Nereyda Castro-Gutiérrez, Jesús Flores-Cruz &amp; Fermín Acosta-Magallanes</td>
<td>105</td>
</tr>
<tr>
<td>Cloud Application for the Generation of Static Websites Through the Recognition of Wireframes using Artificial Intelligence</td>
<td>Cesar Gutiérrez, Rodrigo Lara &amp; Daniel Sabauste</td>
<td>114</td>
</tr>
<tr>
<td>Logical Positivism and its Contributions to Science Teachers Education</td>
<td>Marco Aurélio Clemente Gonçalves &amp; Agustín Aduriz-Bravo</td>
<td>123</td>
</tr>
<tr>
<td>Sentiment Analysis in the Feedback of Peer Evaluation Activities</td>
<td>René Elizalde-Solano, Ma. Carmen Cabrera-Loayza, Elizabeth Cadme &amp; Nelson Piedra</td>
<td>127</td>
</tr>
<tr>
<td>Virtual Platforms under University Teaching During the COVID-19 Pandemic in Peru: Perception of University Students</td>
<td>Agueda Muñoz del Carpio Toia, Oliverio Pichardo-Diestra, Klinge Villalba-Condori &amp; Sively Mercado-Mamani</td>
<td>146</td>
</tr>
</tbody>
</table>