Guest Editorial Educational Inclusion Through ICT

***Abstract*— This guest editorial introduces the first group of articles in the Special Issue on Educational Inclusion Through ICT. This Special Issue integrates articles that focus on identifying, sharing, and valorizing experiences, projects, and best practices on inclusion and education with digital technologies. The articles were submitted and reviewed in an open format. The first group includes nine articles.**

***Index Terms*— Education, information technologies, human–computer interaction.**

I. Introduction

INFORMATION and communication technologies (ICT) are perceived as a facilitator of educational inclusion, allowing all people with some disability, whether intellectual, visual, hearing, or motor, to access formal education and, in short, to achieve the general objectives of education as a right, not as a privilege.

The concept of educational inclusion goes beyond educational integration. According to UNESCO, "inclusion is seen as the process of identifying and responding to the diversity of needs of all learners through increased participation in learning, cultures, and communities and reducing exclusion in education. It involves changes and modifications in content, approaches, structures, and strategies, with a common vision that includes all children of the appropriate age range and the conviction that it is the responsibility of the regular system to educate all children." Therefore, educational inclusion is a philosophy that should permeate the entire educational center: it will be present in the educational culture created in the school institution, trying to make everyone feel involved in the educational projects, strategies, and learning projects.

ICT can become suitable tools that can help respond to the educational needs of people with learning barriers. Our article focused on educational tools to work with disabilities, whether they are intellectual, motor, auditory, or visual.

Several experiences have shown that there are students with disabilities that require permanent support and others who only present temporary learning difficulties, such as attention deficit disorders, reading and writing problems, and difficulties in expressing their ideas. In any case, teachers require educational resources that can help compensate for the students' unfavorable situations. In this way, ICTs are revealed as a powerful tool to minimize the impact of disability and problems arising from specific educational needs for educational support, school promotion, and social integration [16]. In short, ICTs enable students with special needs in different educational contexts, which otherwise would not have access.

This Special Issue includes articles that seek to identify, share, and value experiences, projects, and good practices focused on promoting the use of ICTs to promote educational inclusion, equal opportunities, and educational equity in diversity, both academic and professional, in formal and/or informal contexts. Topics such as ICT and special education, accessible digital technologies, digital inclusion and education, natural interfaces to assist inclusive education, equality, equity, diversity, and ICT are addressed.

Therefore, this Special Issue presents nine articles on the aforementioned topics related to digital technologies and inclusive, equitable, and diverse education. The articles included in this Special Issue will be described below.

II. Experiences and cases of study

This section summarizes the nine articles included in the first part of the Special Issue on Educational inclusion Through ICT.

In [A1], the authors present some elements for continuous training of preschool and elementary school mathematics teachers in mathematics education, promoting spaces for permanent reflection and the creation of communities of practice of teachers who attend to diversity.

In [A2], Ramos-Aguiar and Álvarez-Rodríguez describe the development of a computer tool to understand emotions in children with autism spectrum disorder (ASD) using tangible interfaces and gamification techniques.

In [A3], Fachal *et al.* present a collaborative project related to creating a dictionary with technical terms in the area of computer science, created by and for students with hearing impairment. The dictionary is bilingual with operational signs in Argentine Sign Language (ASL) and Spanish.

In [A4], Gasca-Hurtado *et al.* present a software tool to create gamified experiences in the classroom with a methodological structure designed in a software engineering educational environment. The software products designed have as target audience non-profit organizations formed by people with disabilities and their families.

In [A5], Pérez *et al.* explore the impact of an intervention based on social robotics to stimulate episodic memory in children with intellectual disabilities. The results show that the intervention can improve the episodic memory of children with this type of disability.

On the other hand, in [A6], Cardona-Reyes *et al.* propose the use of virtual reality environments as an alternative to support the learning process in children with special educational needs such as attention deficit hyperactivity disorder (ADHD) and other associated disorders that occur in primary education. These proposed virtual reality environments are designed under a user-centered approach, and their contents are in line with expert therapeutic guidelines. In addition, a case study is presented in which the user experience is evaluated with

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elementary school children attending an educational institution in Mexico.

In addition, in [A7], Izaguirre *et al.* seek to identify teaching–learning (TL) methodologies applied together with mobile and extended reality applications developed for hearing impaired children.

In [A8], the authors present a study in different Latin American countries in order to understand the perceptions of teachers and students about the online environment experienced during the confinement derived from COVID-19, being this a health emergency with unprecedented needs.

Finally, in [A9], Oliva-Maza *et al.* describe a game with tangible technology designed for both intervention and diagnostic, formative, and summative assessment of phonological awareness in early childhood education.

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APPENDIX: RELATED ARTICLES

[A1] L. A. C. Miguez, "Continuous training of mathematics teachers to attend populations in contexts of diversity," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 355–364, Nov. 2021.

[A2] L. R. Ramos-Aguiar and F. J. Álvarez-Rodríguez, "Teaching emotions in children with autism spectrum through a computer program with tangible interfaces," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 365–371, Nov. 2021.

[A3] A. S. Fachal, M. J. Abásolo, and C. V. Sanz, "Dictionary of computer terms in LSA with operational signs proposed by and for hearing-impaired students," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 372–381, Nov. 2021.

[A4] G. P. Gasca-Hurtado, M. C. Gómez-Álvarez, J. A. Hincapié, and V. V. Zepeda, "Gamification of an educational environment in software engineering: Case study for digital accessibility of people with disabilities," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 382–392, Nov. 2021.

[A5] J. Pérez, M. Azuaje, C. León, and O. Pedroza, "Effects of social robotics on episodic memory in children with intellectual disabilities," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 393–399, Nov. 2021.

[A6] H. Cardona-Reyes, G. Ortiz-Aguiñaga, M. L. Barba-Gonzalez, and J. Muñoz-Arteaga, "User-centered virtual reality environments to support the educational needs of children with ADHD in the COVID-19 pandemic," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 400–409, Nov. 2021.

[A7] E. D. P. Izaguirre, M. J. Abásolo, and C. A. Collazos, "Educational methodologies for hearing impaired children supported by mobile technology and extended reality: Systematic analysis of literature," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 410–418, Nov. 2021.

[A8] C. A. Collazos, F. Pozzi, and M. Romagnoli, "The use of e-learning platforms in a lockdown scenario—A study in Latin American countries," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 419–423, Nov. 2021.

[A9] A. Oliva-Maza, N. Ayuso-Escuer, T. Coma-Roselló, and E. F. Torres-Moreno, "Mystery of the runaway letrabytes: Inclusive assessment of phonological awareness with tangible gamification," *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje*, vol. 16, no. 4, pp. 424–432, Nov. 2021.

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