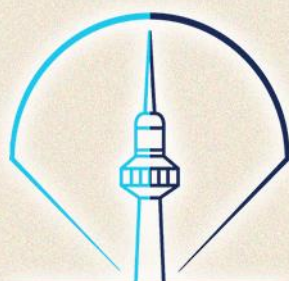


CUICIID 2024

16, 17 y 18 de Octubre



CUICIID

**Congreso Universitario Internacional sobre
Comunicación, Innovación, Investigación y Docencia**

<https://cuiciid.net> DOI: <https://doi.org/10.15178/CUICIID2024>

ISBN: 978-84-09-59-704-8





Reservados todos los derechos. Queda rigurosamente prohibida, sin la autorización escrita de los titulares del *Copyright*, bajo las sanciones establecidas de las leyes, la reproducción parcial o total de esta obra por cualquier medio o procedimiento incluidos la reprografía y el tratamiento informático para su uso comercial.

Fórum XXI no se hace responsable de las opiniones vertidas en este texto ni estas suponen necesariamente que concuerden con las suyas, siendo de la exclusiva responsabilidad de quien las emite.

Libro de actas del Congreso CUICIID 2024

© 2024 David Caldevilla Domínguez (Editor) Correo: davidcaldevilla@ccinf.ucm.es

© 2024 Editorial: Fórum Internacional de Comunicación y Relaciones públicas (Fórum XXI)

CIF: G-79544136

C/ Cine 38. Bajo. 28024 Madrid (Reino de España) Web: www.forumxxi.net

Tel: (+ 34) 91 518 07 65

Móvil y Whatsapp: (+ 34) 669 831 136

ISBN: 978-84-09-59704-8

Depósito legal: No necesario para ediciones digitales

abiertas DOI: <https://doi.org/10.15178/CUICIID2024>

Si quiere recibir información periódica sobre las novedades de nuestro grupo editor envíe un correo electrónico a: administracion@forumxxi.net

USING SOCIAL ROBOTS AND STORYTELLING FOR PERSONALIZED AND INCLUSIVE MATHEMATICS LEARNING

Antonio Vitale* and **Umberto Dello Iacono**

U. degli studi di Macerata (Italia)* and U. degli studi della Campania “Luigi Vanvitelli” (Italia)

Artificial intelligence (AI) is a very powerful technology that many people now use almost as a routine. The impact of this new technology has already been felt in many areas of society, and education is not to be excluded. Artificial intelligence in education, called AIED, promotes the development of learning environments that are as inclusive as possible. The use of social robots can be helpful in making this happen, also in mathematics education. Nowadays, these robots are entering educational settings, where they are being mainly used for inclusive and personalized learning.

Universal Design for Learning (UDL) is a very powerful tool for inclusive educational design. It is an educational framework aimed to address the specific needs of each learner, including learners with special educational needs, by using teaching strategies and technological tools. In particular, the first principle of UDL, that of representation, can provide an opportunity for all students to access information (e.g., data from a mathematical problem).

Narrative can also be seen as a fruitful tool for inclusive mathematics learning. It represents the way in which the individual, as a socio - culturally situated subject, organizes her experience. In accordance with Bruner, narrative thinking can support logical thinking. For this reason, story - problems, that is, problems situated in a narrative context, can foster all students' understanding of the problem situation and, as a result, facilitate problem - solving processes.

An effective implementation of UDL, by using AI technologies, can lead to a personalization of each individual learner's learning experiences fostering the development of skills on both cognitive and affective levels. We used the social robot Pepper to implement inclusive and personalized learning paths in mathematics. Pepper is a robot that can act as a mediator between students and the learning environment. It facilitates communication, provides emotional support, and encourages active participation.

In this paper, we examine the cooperation between the first UDL principle (i.e., providing students with multiple forms of engagement), the mathematical story-problems, and AI challenges. AI can be seen as a key link between static and dynamic mathematical storytelling by using Pepper to personalize learning. We carried out a pilot case study in which we implemented a mathematical story-problem told by Pepper, who responded in a personalized pattern based on the student's answers. In this way, the learner played an active role in the resolution process. The research inquiry focused on the interaction between Pepper and six learners. Preliminary findings showed involvement of all students in solving the story-problem through the dynamic and personalized model with Pepper. Combining UDL practices with the characteristics of social robots, such as Pepper, can promote equity, inclusion and involvement of all students.

Keywords: Inclusive mathematics education; Universal Design for Learning; Social Robots; Educational Robotics; Narrative.