# Piloting Diversity and Inclusion Workshops in Artificial Intelligence and Robotics for Children

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***Abstract*—This document is a model and instructions for LaTeX. This and the IEEEtran.cls file define the components of your paper [title, text, heads, etc.]. *CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.**

***Index Terms*—component, formatting, style, styling, insert**

## I. Introduction

Guarantey security, accessibitly and human dignity can be considered the pilar for inclusivity. However, the disparity of advances in education and technology is not creating enviroments to construct a faier society. Recently, Astobiza et al. reported the need of collaborations between industry and a multidisiplanry gropu of reserachers to address concernts on the paradigm of inclusivity in robotics [1]. Simiarly, Astobiza et al. suggested that inclusive robotics should be based on: "1) they should be easy to use and 2) they must contribute to making accessibility easier in distinct environments" [1]. Peixoto et al. in 2018 reported the use of robots as tool to promote diverity which lead to improve competences in communication, teamwork, leadhership, problem solving, resilence and entrreprenurship [2], [3]. Pannier et al. pointed out the challenges of increasing the participation of women and underrepresented minorities in the areas of Mechatronics and Robotics Engineering as well as the creation of community of educators to promote diversity and inclussion [4]. Pannier et al. mentioned that the prevalence of free and open-source software and hardware made mechatronics more accesible to a diverse group of population [4]. Also, Pannier et al touched on the evidence and importance of offering workshops to different ragne of underpresentend students that lead to inpires other programs to creat outreach activities for studnets, trainings, workshops,

This short paper presents our findinds on the first pilot workshop to promote diversity and inlcusion in Artificial Intelligence and Robotics.

## II. Diversity and Inclusivity of AIR4children with Non-tradional Education

### A. Alternative education programs

Alternative education programs such as Montessori, Waldorf and Regio Emilia considers children as active authors of their own development [5]. Such programs that in a way follow same phylosofies have been adopted internationally. However the contributes changes of technologies have been started to evolve. For instnace, Edwards pointed out the schools deriving from the same phylosogy might also need to obsersve teacher-child interactions, its enviroments and interview to the past and present parents and children [5] Recently, Aljabreen pointed out the adoptions of new technologies and how early child educatio is re-conceptualised [6]. Rogoff, B. (2003). The cultural nature of human development. Oxford: Oxford University Press.

### B. Montesory education

Elkin et al. in 2014 explored the how robots can be used in the Montessori curriculum [7]. Authors conclude that the confidence and experience in robotics is crucial to deliver and communicate the right experince to encourgage students [7]. Similry Elkin et al. posed the question on the revision of new curriculums of technology that do not deviate from the purpose of the Montesory classrom [7]. Drigas and Gkeka in 2016 reviewed the application of information and communication technologes in the Montesory Method [8]. Drigas and Gkeka mentioned the Manipulatives, as objects to develop motor skills or understan mathematical abstractions, are based on cultural areas, language, mathemaics and sensorial but little to none on technolgoical areas. Drigas and Gkeka reviewed Montesory materials of the 21st century where interactive systems with sounds and lights, touch application to enhace visual literacy or the development of compuitational thinking and contrictuons of the physical world [8] These indicate that the incorporation of such manipulatives with the use of robotics might led to reach scneraios to explore motor skill develipment, visualisation and computational thikning.

Recenlty, Scippo and Ardolino reported a longitudinal study of the use of computationla thinking in five years participants of primary shcool in a Montessori school [9] Scippo

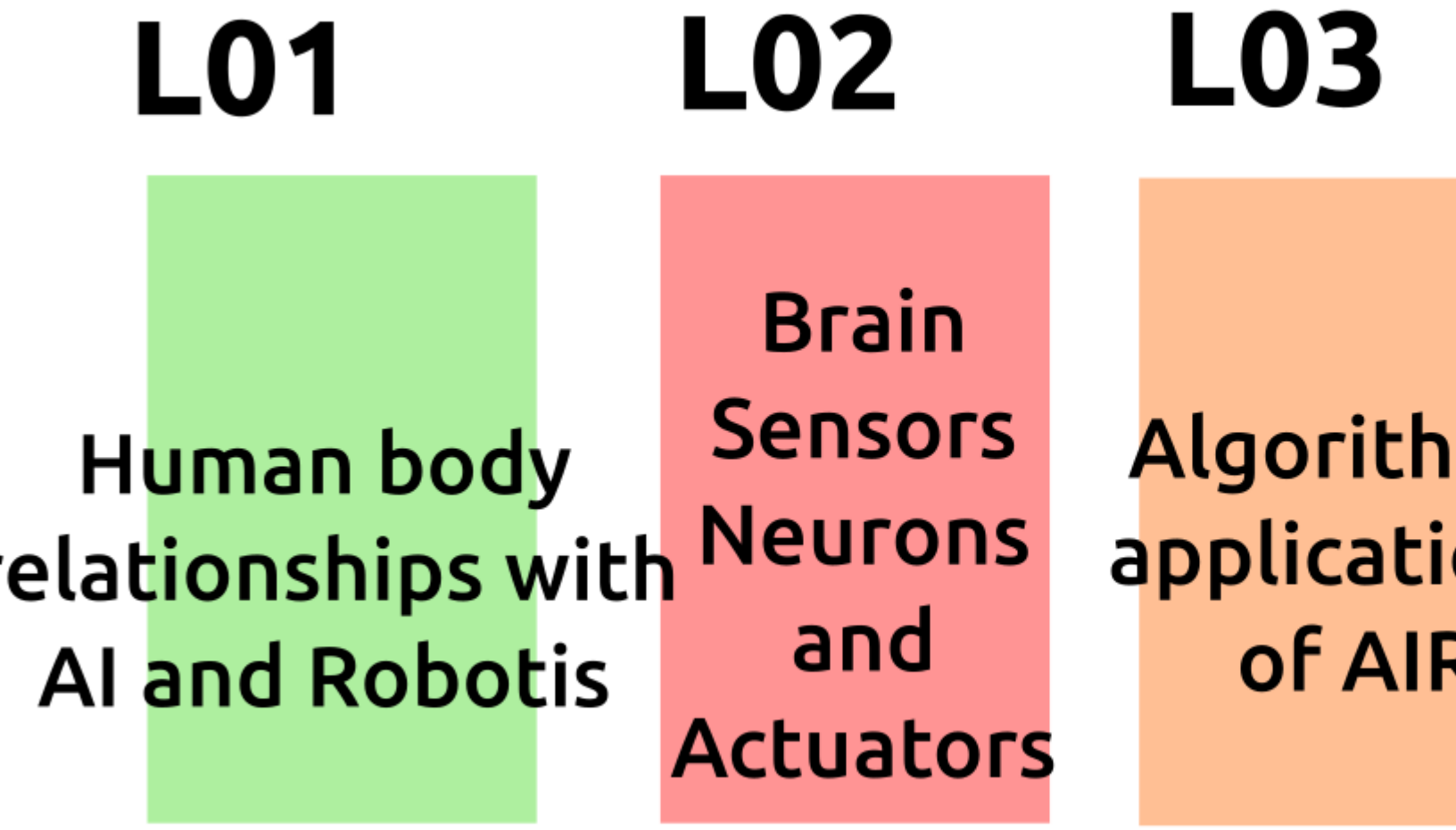


Fig. 1. Curriculum for four lessons (L01 to L04). Lesson 01 introduce the course, lesson 02 provides the basics of anatomy, lesson 03 covers algorihtms, and lesson 04 wraup and showcase the project of children.

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## V. Conclusions and Future Work

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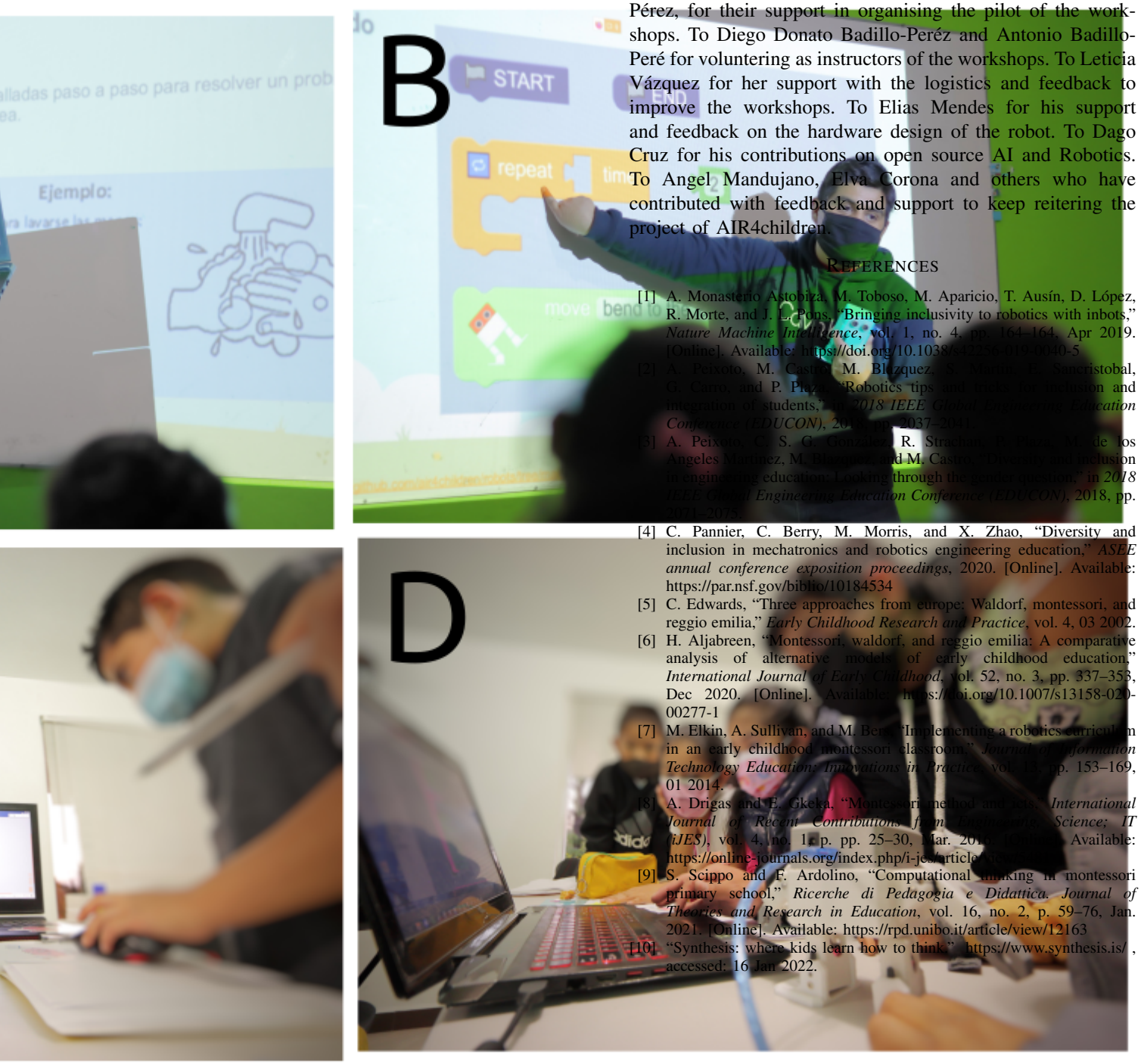


Fig. 2. Instructors demonstrating basics of AI and Robotics. Children engaging with robots, classmates and instructors.


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## REFERENCES


[1] A. Monasterio Astobiza, M. Toboso, M. Aparicio, T. Ausín, D. López, R. Morte, and J. L. Pons, "Bringing inclusivity to robotics with inbots," *Nature Machine Intelligence*, vol. 1, no. 4, pp. 164–164, Apr 2019. [Online]. Available: https://doi.org/10.1038/s42256-019-0040-5

[2] A. Peixoto, M. Castro, M. Blazquez, S. Martin, F. Sancristobal, G. Carro, and P. Plaza, "Robotics tips and tricks for inclusion and integration of students," in *2018 IEEE Global Engineering Education Conference (EDUCON)*, 2018, pp. 2037–2041.

[3] A. Peixoto, C. S. G. Gonzalez, R. Strachan, P. Plaza, M. de los Angeles Martinez, M. Blazquez, and M. Castro, "Diversity and inclusion in engineering education: Looking through the gender question," in *2018 IEEE Global Engineering Education Conference (EDUCON)*, 2018, pp. 2071–2075.

[4] C. Pannier, C. Berry, M. Morris, and X. Zhao, "Diversity and inclusion in mechatronics and robotics engineering education," *ASEE annual conference exposition proceedings*, 2020. [Online]. Available: https://par.nsf.gov/biblio/10184534

[5] C. Edwards, "Three approaches from europe: Waldorf, montessori, and reggio emilia," *Early Childhood Research and Practice*, vol. 4, 03 2002.

[6] H. Aljabreen, "Montessori, waldorf, and reggio emilia: A comparative analysis of alternative models of early childhood education," *International Journal of Early Childhood*, vol. 52, no. 3, pp. 337–353, Dec 2020. [Online]. Available: https://doi.org/10.1007/s13158-020-00277-1

[7] M. Elkin, A. Sullivan, and M. Bers, "Implementing a robotics curriculum in an early childhood montessori classroom," *Journal of Information Technology Education: Innovations in Practice*, vol. 13, pp. 153–169, 01 2014.

[8] A. Drigas and E. Gkeka, "Montessori method and ICTs," *International Journal of Recent Contributions from Engineering, Science; IT (iJES)*, vol. 4, no. 1, p. pp. 25–30, Mar. 2016. [Online]. Available: https://online-journals.org/index.php/i-jes/article/view/

[9] S. Scippo and F. Ardolino, "Computational thinking in montessori primary school," *Ricerche di Pedagogia e Didattica. Journal of Theories and Research in Education*, vol. 16, no. 2, p. 59–76, Jan. 2021. [Online]. Available: https://rpd.unibo.it/article/view/12163

[10] "Synthesis: where kids learn how to think," https://www.synthesis.is/ , accessed: 16 Jan 2022.