EDUCATING PRESERVICE TEACHERS TO INTRODUCE EDUCATIONAL ROBOTICS INTO THEIR FUTURE PRESCHOOL CLASSROOM

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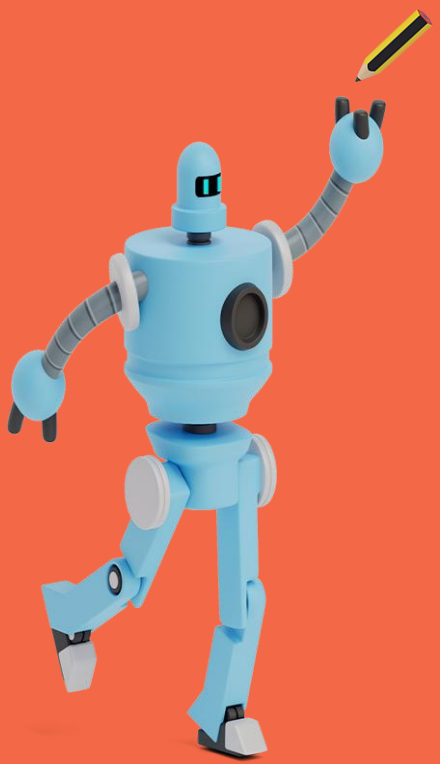
OUTLINE OF THE PRESENTATION



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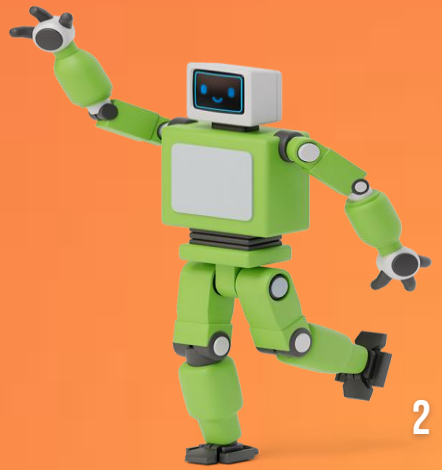
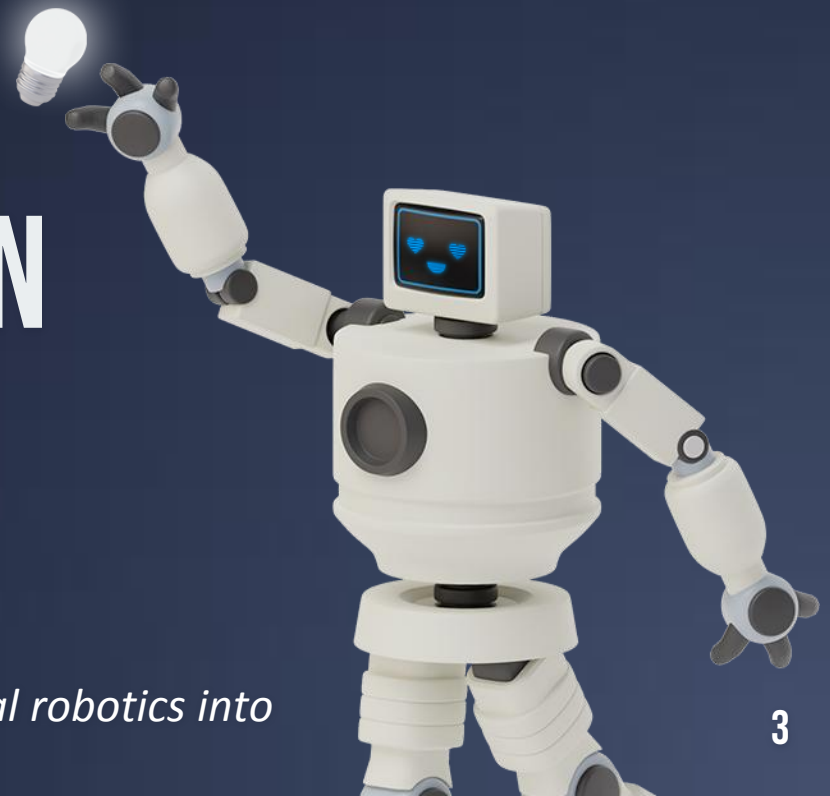


INTRODUCTION



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INTRODUCTION (1/2)

- Technology in early childhood education as
  → a tool to prepare students and future citizens for their role in society (Kalogiannakis and Papadakis, 2017; Mertala, 2019).

- Educational robotics (ER) kits offer a playful and enjoyable experience to young children to engage in STEM activities.

- Educators can easily engage children in creative activities and physical play with robotic kits.

- They can easily take advantage of the latest technology based on children's prior experiences (MacDonald et al., 2020).

INTRODUCTION (2/2)

- A strong relationship between early childhood educators' attitudes towards technology and their actions in early childhood settings (Kalogiannakis, Ampartzaki, Papadakis and Skaraki, 2018; Vidal-Hall, Flewitt, and Wyse, 2020).

- Robotics can help teachers expand interest in STEM concepts and make CT and STEM activities more appealing for students and teachers.

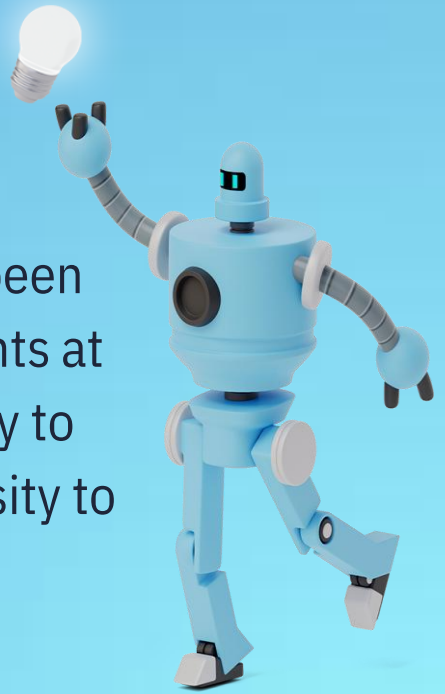
- Teacher earlier experience in robotics education can help educators revisit their instructional designs and integrate interactive teaching approaches (Bers, 2008).

INTRODUCTION (3/3)

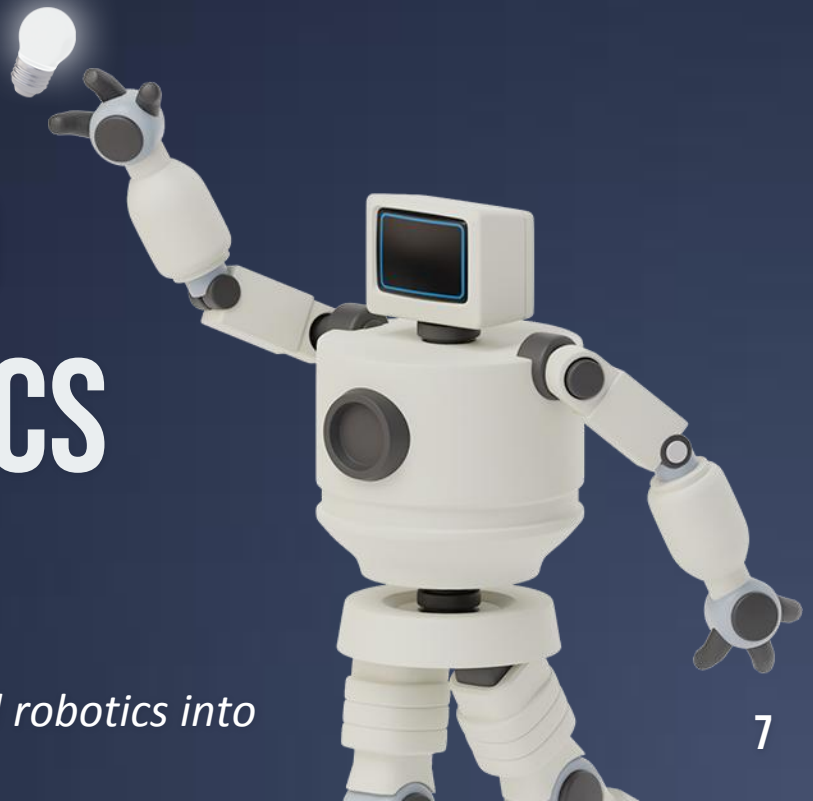
- At a low or moderate cost, several educational resources introduce coding activities at very young ages in programmable toys (Walsh & Campbell, 2018).

- the preservice teachers need to be equipped with digital and pedagogical competencies to include CT in schools actively (Marín-Marín , Costa ,Moreno-Guerrero, López-Belmonte, 2022; Papadakis, Kalogiannakis, Zaranis, 2021).

- A teaching intervention has been implemented to place students at the centre of the CT discovery to leverage their inherent curiosity to engage with content through coding experiences.



BASED BLOCK PROGRAMMING AND EDUCATIONAL ROBOTICS



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LITERATURE REVIEW (1/2)

- Teachers must undertake new responsibilities and develop different forms of interactions with children to connect their activities to technology through fun and engaging activities (Walsh & Campbell , 020).

- Furthermore, digital activities in preschool education, based on CT and coding activities and focusing on elements such as fantasy, curiosity, and challenge, raise the interest and motivation of children.

- This type of learning is based on curiosity to stimulate children to find new ways to solve problems and increase children's satisfaction.

- The need to introduce CT concepts and necessary algorithmic and coding skills in preschool education has driven numerous commercial and research-based toys and kits.

LITERATURE REVIEW (2/2)

The Scratch 3 visual programming environment

- Scratch is maybe the most popular programming environment for novice programmers .

- Scratch users can create projects by dragging and dropping visual blocks of commands on the screen. This coding method reduces the cognitive load to recall commands and strict syntax requirements .

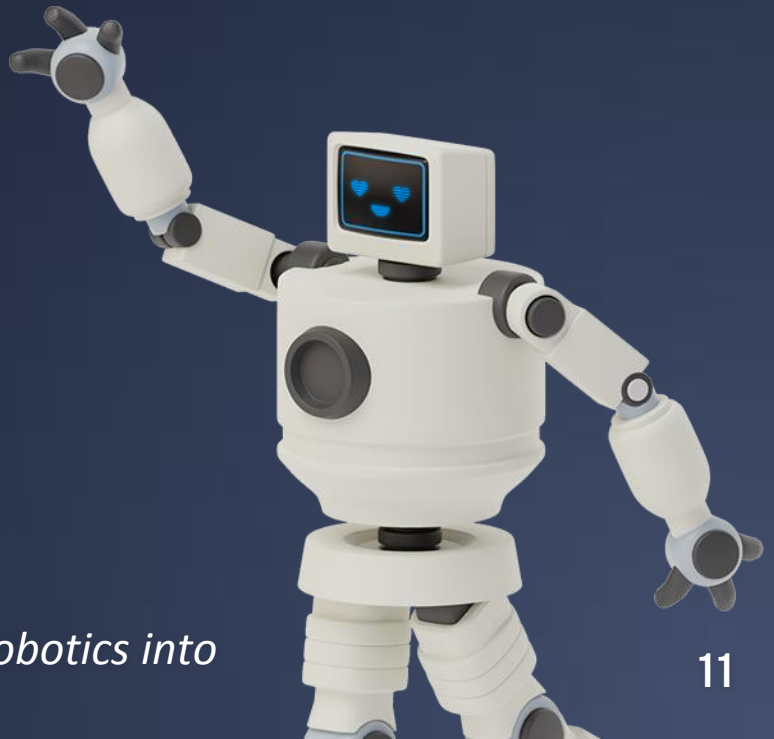
The Makey Makey educational robotic kit

- Makey Makey is a robotic device used in teaching and learning. It is a low-cost electronic board that plugs into any keyboard computer. Additionally, it includes actuators and sensors for enhanced experiences with the physical world. Unlike other robotic tools, the device's potential is connecting familiar elements like bananas or aluminium foil.

RESEARCH QUESTION

Can Scratch and Makey-Makey be considered as effective tools for introducing preservice teachers to concepts related to both CT and programming during their training in institutions of higher education?

THE TEACHING INTERVENTION



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SAMPLING

Participants

- The participants were 23 Greek female preservice early childhood students who took a university course in the winter semester of 2021-2022 in the Department of Preschool Education.

- The participants voluntarily attended the course, and national and international research ethics guidelines were followed.

Study design

• The intervention focused on:
- activities that strengthened CT concepts and coding connections to other concepts.

- developing positive attitudes and behaviours in preservice childhood students based on educational robotics problem activities.

The intervention's development was based on the Makey Makey and Scratch 3.

The intervention focused on project-based and inquiry-based learning as a pedagogical strategy, solving real problems with the teacher and peers' support.

Data collection

- Quantitative and Qualitative

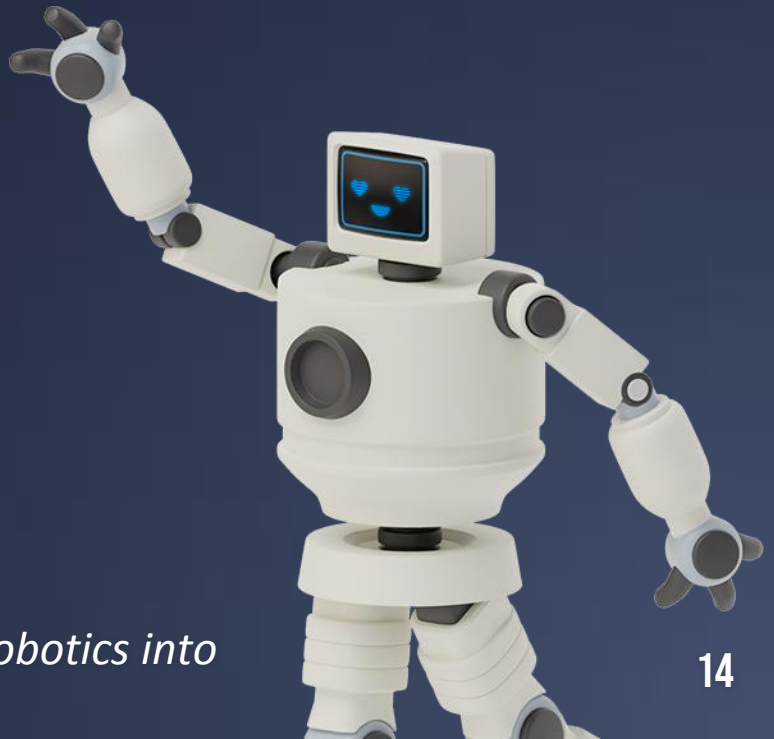
DATA ANALYSIS

- The pre-test and post-test results were analyzed to verify educational robotics activities' influence on the acquisition of computational thinking skills.

- The dependent variable was the students' computational thinking and programming skills, considering seven dimensions, evaluated through Dr. Scratch (http://drscratch.org/

- Students' self-efficacy analysis: The Teachers' Self-Efficacy in Computational Thinking (TSECT) questionnaire (Bean, Weese, Feldhausen, Bell, 2015) was used to evaluate students' self-efficacy beliefs regarding CT concepts and coding skills in their future teaching practices.

RESULTS



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RESUTLS (1/2)

- The differences between the pre-test and post-test were analysed with a paired sample test and revealed a statistically significant increase from pre-test ($M = 9.72$, $SD = 2.55$) to post-test ($M = 14.57$, $SD = 1.22$), $t(22) = 2.34$, $p < .0001$.

- After the teaching intervention, we can conclude that the students felt confident enough to create projects with Scratch and Makey Makey and, more importantly, use these tools as an educative tool within the preschool classroom.

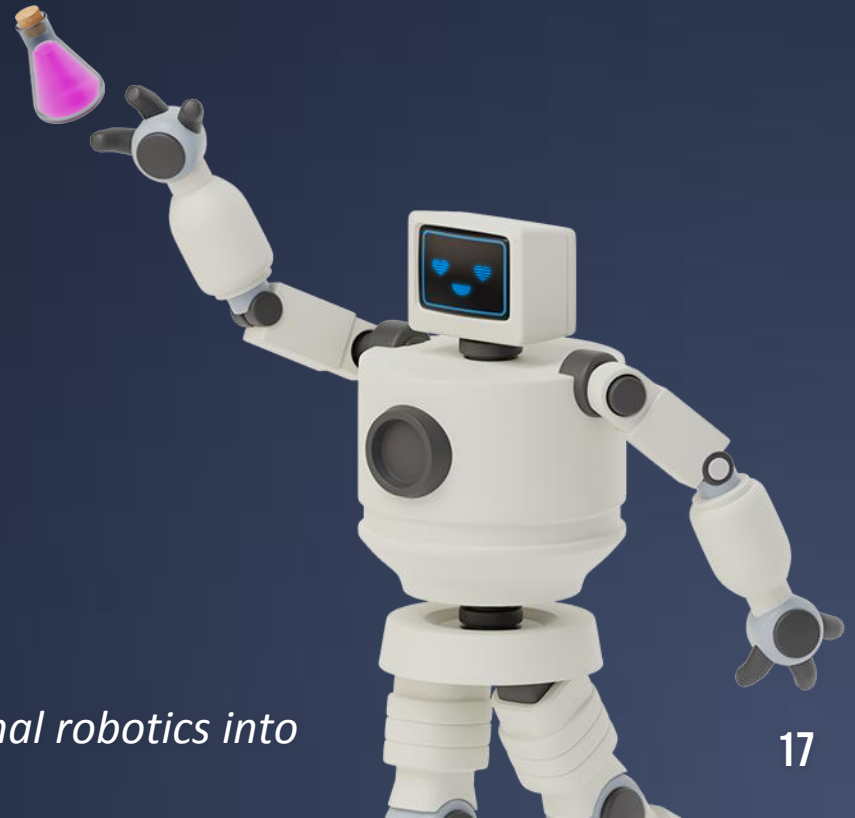
- The two researchers also conducted the student focus group interviews using a semi-structured interview protocol. Students noted that they could handle the cognitive course effort, and they feel confident in introducing relative CT and coding activities in the preschool classroom.

RESUTLS (2/2)

- The students mentioned that they experienced a significant improvement in their representations towards CT or coding. Although the lack of CT and coding knowledge was a significant challenge before the teaching intervention, they mentioned that they do not consider themselves novices after the course completion.

- These students reflected on their intention to incorporate similar activities in their future teaching career and practice in kindergarten during their university studies in the following semesters.

DISCUSSION - CONCLUSIONS



DISCUSSION - CONCLUSION (1/2)

- Given the increasing number of young children using apps that promote CT concepts and coding skills and the abundance of robotic toys or kits available for educational activities, preschool educators are responsible for introducing these new forms of technology into the preschool learning experiences (Walsh & Campbell, 2020).

- With the pace of technology change (Zourmpakis, Papadakis, Kalogiannakis, 2021), it is paramount that preservice teachers be provided with training opportunities through their university studies that will intensely focus on CT pedagogy and coding literacy, which can be easily transferred to young students with minimal difficulty.

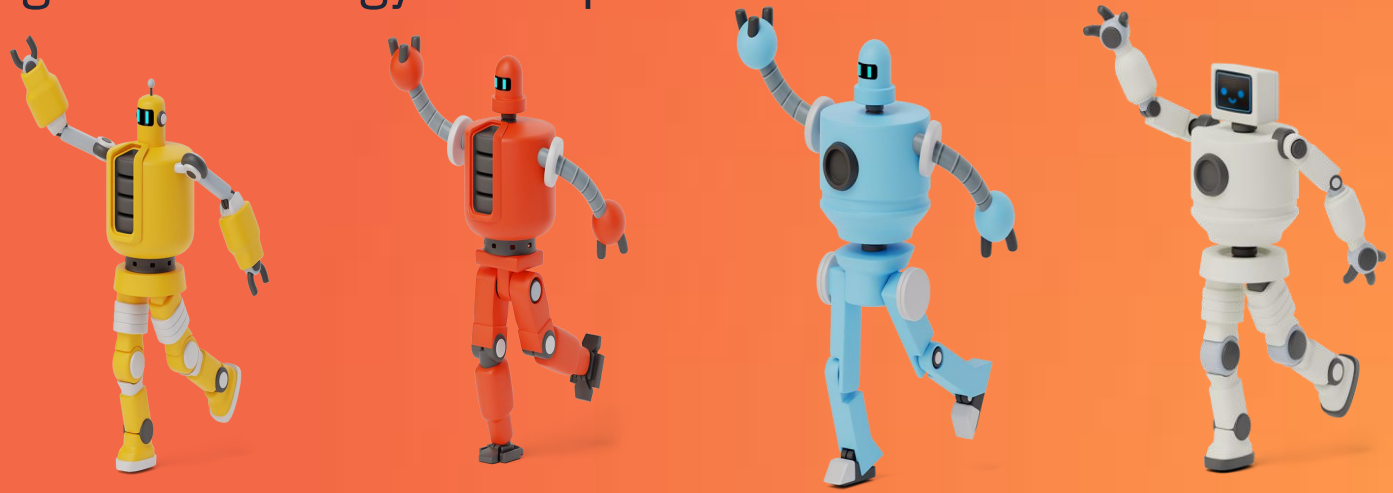
DISCUSSION - CONCLUSION (2/2)

- This study provides implications for the implementation of coding literacy in educational institutions.

- Given the importance of CT and coding skills, understanding how best to support preservice teachers in meaningfully and successfully implementing coding literacy is of great importance.

FURTHER RESEARCH

- More geographical areas is needed to help the researchers understand whether similar trends are evident elsewhere.
- Such research would aim to develop a professional learning model for integrating digital technology in the preschool classroom.



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Questions?

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