

Conference Name: Teacher 2025 – International Teaching Conference, 18-19 November, Singapore
Conference Dates: 18-Nov- 2025 to 19-Nov- 2025
Conference Venue: The National University of Singapore Society (NUSS) The Graduate Club, Suntec City Guild House, 3 Temasek Boulevard (Tower 5), #02- 401/402 Suntec City Mall, Singapore
Appears in: PUPIL: International Journal of Teaching, Education and Learning (ISSN 2457-0648)
Publication year: 2025

Heidi Claassens, 2025

Volume 2025, pp. 513-514

DOI- <https://doi.org/10.20319/ictel.2025.513514>

This paper can be cited as: Claassens, H.(2025). Integrating Robotics into Play-Based Learning with Innovative Teaching Strategies for Foundation Phase Student Teachers. Teacher 2025 – International Teaching Conference, 18-19 November, Singapore. Proceedings of Teaching & Education Research Association (TERA), 2025, 513-514

INTEGRATING ROBOTICS INTO PLAY-BASED LEARNING WITH INNOVATIVE TEACHING STRATEGIES FOR FOUNDATION PHASE STUDENT TEACHERS

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Abstract

This empirical study investigates the integration of robotics and coding into play-based learning for Foundation Phase student teachers at a University of Technology, aligning with South Africa's Fourth Industrial Revolution (4IR) goals. Coding, now as essential as literacy and numeracy, fosters computational thinking critical for young learners. Seven robotics devices, Bluebot, Rugged Robot, Oti-bot, Cody Block, Kubo, Dash, and Botley, were utilised to enhance STEM education. While these tools hold promise, effective pedagogy remains vital for early childhood education. Guided by the Positive Technological Development (PTD) framework, the study promotes both technological proficiency and holistic development, encouraging positive interpersonal behaviours. Eighteen Foundation Phase student teachers participated, with data collected via a qualitative survey featuring open-ended questions. Thematic analysis identified key patterns in their experiences. The research addresses: (1) How do student teachers perceive robotics in play-based learning? (2) What innovative strategies

effectively integrate robotics and coding? (3) How does the PTD framework shape robotics-focused activities? Findings indicate that student teachers view robotics as engaging, effectively fostering computational thinking through play-based learning. The PTD framework informed activity design, promoting technical and social skills. Unplugged activities and simplified programming languages, such as outdoor grids and coding cards, reduced cognitive load and enhanced engagement. This study underscores the value of developmentally appropriate strategies, preparing young learners for the 4IR.

Keywords:

Robotics, Coding, Play-Based Learning, Computational Thinking, Early Childhood Education, Educational Technology, Fourth Industrial Revolution (4IR)