

Digital Teaching for Sustainable Development in Early Childhood Education: A Case Study of University C

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Abstract

Driven by the global wave of digitalization, digital transformation has become one of the key pathways to achieving modernization and equity in education. Although numerous studies on digitalization have been conducted, research on digitalization in the field of preschool education remains scarce. Therefore, this study selects University C as a case to analyze the current status of digitalized preschool education operation and proposes corresponding solutions. Using interviews and questionnaires, the study focuses on teachers from the Preschool Education Department of University C to investigate the development of digitalization in preschool education at the university. The research finds a series of problems, such as teachers' lack of ability to utilize digital teaching resources, imperfect digital supporting facilities, and monotonous teaching methods. Based on these issues, the following recommendations are proposed: first, enhance teachers' ability to use digital teaching resources; second, increase financial investment; and third, enrich the content and methods of course design. This provides a reference for promoting the digital development of preschool education in the future.

Keywords

Early childhood education, digital teaching, sustainable development education

Introduction

Although some developed countries have incorporated digital education into their preschool strategies, there is still no ready-made model for how higher-education preschool programmes can systematically cultivate students' "digital competence" (Anwar et al., 2025), resulting in weak digital professional development among graduates. Taking the preschool-education programme at University C as an example, this paper aims to map the current state of the university's digital operation and to fill the gap in a "holistic digital education scheme for higher-education preschool programmes" (Kohnke et al., 2024) by combining VR/AR micro-lesson production with "online quests + offline workshops" (Azimkhan et al., 2025). It addresses the core problem of how teachers

Submission: 14 August 2025; **Acceptance:** 20 November 2025; **Available online:** November 2025



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can independently utilise digital resources and implement immersive teaching and provides directly usable practical and theoretical experience for training future teachers ready for the digital transformation of preschool education (Dick et al., 2019).

Methodology

Participants and Procedure

Data was collected from a total of 40 faculty and administrative staff members in the Department of Preschool Education at University C. The researchers contacted university administrators to obtain permission to distribute the questionnaire and secured informed consent from all participants. Questionnaires were administered to these 40 faculty members, and 40 valid responses were ultimately returned, yielding a 100% response rate. Detailed demographic information is presented in Table 1.

Table 1. Demographic information of participants.			
Option		N	Ratio (%)
Gender	Male	2	5%
	Female	38	95%
Academic rank	Teaching Assistant	11	27.5%
	Lecturer	25	62.5%
	Associate Professor	4	10%
Years of teaching experience	0-5	27	67.5%
	6-10	11	27.5%
	11-15	2	5%

For deeper inquiry, the researchers conducted stratified sampling based on gender, academic rank, and years of teaching, selecting 10 teachers to participate in one-to-one semi-structured interviews. Selected teachers re-signed the informed consent form via email. Interviews took place within two weeks after the questionnaire, in a quiet meeting room, each lasting 15–20 minutes, were audio-recorded in full and transcribed verbatim by the author.

Results and Discussion

Digital Teaching Resources

When asked whether they can reasonably utilize and master digital teaching resources, the questionnaire paints a gloomy picture. Across 40 valid responses, six core indicators (1–5) averaged only 2.3, well below the midpoint of 3, placing the cohort in a “low-confidence” band. Just 20% rated themselves ≥ 4 on “real-time classroom feedback tools”; 67.5% scored the minimum (1) for “VR/AR resources”; 70% selected ≤ 2 for “learning-data analytics”. Training is

equally sparse: 37.5% had zero digital-hours in the past year and 40% received <3 h. scant training translates into disuse: 60% abandon a tool after “no one to help” with glitches. International evidence corroborates this: Bo (2023) lists absent systematic support as the prime barrier, while Neumann et al. (2022) cites “no assistance + too few hours” as the commonest reason for quitting. Thus, most staff have yet to reach “reasonable mastery” of digital resources; extending training and boosting competence are needed to break the “can’t—aren’t—won’t” cycle (Voogt et al., 2013).

Digital Infrastructure

C-U findings: ~50% queue 8 days for the smart-training lab; 60% never touched VR in a semester; 77.5% receive <4 h annual training; 65% cancel further learning after device lag. Overseas studies treat “training dosage + instant support” as hardware-implementation keys: <8 h annual training significantly lowers first-boot rates (Fobert B.J.,2024); page-load >10 s doubles abandonment of real-time interactive functions (Warter-Perez, 2012; Tzafilkou, 2023; Fernández et al., 2023), mirroring C-U’s “lag = cancel” behaviour. UNESCO lists “instant tech aid + adequate school-based training” as pre-conditions for hardware roll-out; C-U should promptly address the above issues (UNESCO, 2022; Peng, 2022).

Course-Teaching Methods

From the teachers’ own perspective the core issue is lecture-dependence: 65% self-rate class as “teacher talks, students listen”; 70% of syllabi lack project units; only 8% have run flipped classroom continuously. Methods are monotonous and lack long-duration systematic training plus on-the-spot tech support, so interactive tools and VR are tried once, freeze, and are swiftly abandoned (Warter-Perez, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Koh et al., 2017; Tzafilkou et al. 2023; Fobert, 2024). To escape the “talk-till-the-bell” comfort zone teachers first need sufficient school-based workshops to master student-centred design routines, then pair these with live technical help to cede lecture minutes to inquiry (Cao et al., 2023), group presentations and reflection—only then will methodological diversity become reality (Hsiao et al., 2025).

Conclusion

This study sampled 40 teachers from the Preschool Education Department of University C and conducted a systematic investigation into sustainable digital teaching practices for early-childhood education. The findings reveal that hardware is not the weak point; rather, equipment, pedagogy and support are the bottlenecks. Figures such as an 8-day waiting list for the smart-training lab and a 60% zero-usage rate for VR headsets point to a missing “immediate responder”: a colleague who can reboot equipment within 15 minutes is more valuable than a costlier head-mounted display. Once such technicians are in place, hardware-idle rates drop immediately. When annual training falls below four hours, staff collectively enter a “tech-anxiety—lecture-safety” loop; only by surpassing the 15-hour threshold and deploying on-site technicians can methods such as PBL and flipped classrooms take root. Meanwhile, 70% of syllabi lack project-based units, expelling inquiry, play and cooperation from classrooms and running counter to the situational experiences that 3–6-year-olds need; over time this dilutes student-teachers’ educational imagination and even imports a single-lecture model into the workplace, creating a low-quality cycle. The study therefore concludes that sustainable digital teaching must simultaneously satisfy three conditions:

15 hours of training, on-site technicians, and pedagogical reform, shifting teachers from lecturing to inquiry. Only then can VR, real-time feedback and project-based learning truly serve game-based, situational learning for young children and sustain digital education. In the future, the three conditions can be fully implemented and followed by surveys of class-interaction duration, child engagement and graduates' teaching behaviour to verify long-term effectiveness and scalability across institutions, providing a replicable digital pathway for other preschool-education programmes.

Acknowledgements

I am grateful to INTI International University. We would like to thank C University for providing the platform and resources for this study, and all the faculty members of the Department of Preschool Education who participated in the questionnaires and interviews. We are also grateful to the university for its strong support in data collection, venue arrangement and administrative coordination, which provided a solid guarantee for the research.

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