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USE OF MODERN EDUCATIONAL TECHNOLOGIES IN PRESCHOOL EDUCATION

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Abstract: The rapid digitalization of society contributes to the development and application of modern educational technologies, both as information and communication technologies and multimedia technologies, in preschool education in order to ensure the quality and accessibility of preschool education. In preschool contexts, these technologies have been primarily used to support developmental, remedial, and counseling activities, with emphasis on the preservation of child-centered play-based pedagogy and active forms of interactivity among educators, children, and parents. Though implementation is growing, evidence remains fragmented, with limited focus on models of systematic integration, feedback loops, and pedagogical coherence in technology use within varied preschool environments. The purpose of the study is to analyze the use of modern educational technologies in preschool education in order to reveal the dominant application models, their methodological basis and the advantages and disadvantages of modern educational technologies in the preschool educational process. The results show that new educational technologies widen the access to preschool education, provide opportunities for personalized learning paths, and develop the interaction of educators and parents, but their implementation is partial and is not regulated within a general pedagogical framework. By aligning theoretical frameworks with models of technology use, this study makes a contribution by drawing attention to how digital tools can be pedagogically effective in early childhood education in relation to the context in which they are used. The findings underscore the importance of systematic embedding of contemporary teaching technologies into preschool programs, professional development targeting educators, and further research on long-term developmental effects, sustainable, and developmentally appropriate use of technology in preschool education.

Keywords: preschool education; modern educational technologies; information and communication technologies; distance education technologies; early childhood learning; digital pedagogy

1. Introduction

Contemporary educational systems have been affected considerably by the fast digitalization of society, it all starts from early childhood education. In last decades modern educational technologies have been widely used in preschool education to improve developmental environments and increase access to educational services[1]. When used appropriately for developmental purposes, these technologies are seen as more than technical tools but also as pedagogical tools that can nurture cognitive, social, and emotional growth in childhood [2].

In preschool education failure and success of applying modern educational technologies are closely interrelated with necessity of gain, flexibility, inclusiveness, contiguousness of education. Besides bridging gaps between educators, children, and parents outside schools, the technologies play a key role in facilitating different modes of

schooling including developmental exercises, remedial help, and parental guidance. Thus, the nature of interrelation between technology and preschool education is grounded in the ratio of digital progress and child-centred pedagogy, making sure that play-based learning, guided interaction and adult mediation are still the dominant principles [3][4].

These approaches prioritize learner agency, personalized pathways towards achieving learning goals, and authentic interaction with the educational ecosystem. Past research has shown that overload of multimedia visualization, interactive digital games or online communication tool can motivate, which leads to preschoolers learning [5]. Yet, some literature also identifies dangers of uncontrolled or excessive technology use, suggesting the need for pedagogical direction and age-appropriate design.

Although it witnessed an increment of scholarly attention, a gap in knowledge still exists in all preschool curricula on the systematic incorporation of modern educational technologies. Most previous research focuses on usages, while less research attention is paid to organizational models, feedbacks, and long-term developmental impacts [6].

To address the abovementioned gaps, the current study adopts a qualitative–analytical approach based on document analysis, national practice review, and comparative analysis of already existent technology use models in ECE. This study anticipates uncovering broad patterns of use in the level of technology integration, their pedagogical impact, and some of the major challenges [7][8]. These expected results will add to the theoretical and practical knowledge base with respect to the role of contemporary digital technologies within preschool education and informing both policy and practice to provide developmental as well as implementation approaches for sustainable integration of modern educational technologies [9].

Methodology

The research design was qualitative analytic, with the study purpose of scrutinizing the mechanisms, models, and realities of DET implementation in preschool education. The study includes an in-depth analysis and systematization of empirical and documentary data gathered within the framework of a state-funded project implemented by researchers of Lipetsk State Pedagogical University. The data sources included replies to information letters sent by the Russian Ministry of Education and Science to regional educational authorities, corpus typologies of preschool educational organization (PEO) sites across large regions of the Russian Federation, and the professional and project-based experience of the authors in preschool education in the Russian Federation. Based on axiological, personality-oriented, system-activity, technological, and integrated approaches, the methodological framework provided a multidimensional interpretation of dynamic educational technologies (DETs) use, taking into consideration pedagogical values, student-centered interaction, meaningful and contextualized educational activities, and technological feasibility [10]. A document and comparative analysis of integrated distance learning, Virtual Kindergarten model, correspondence distant education, case-technology models, etc. were conducted. Modes of communication and types of educational activity delivered through DET were also of particular interest. The analysis also analyzed material and technical conditions, digital equipment and internet access for testing practical accessibility and scaling potential. This approach yielded the title of theory in terms of the strengths and weaknesses of DET educational organization in preschool education while delivering a scientifically sound basis for model building and policy recommendations.

Results

From the accompanying studies, the whole study verified that the use of technology resource in preschool education had moved from a peripherally, auxiliary position to one of a well-structured and high multiplicity, developmental particularly among children educational systems. Across the globe, empirical evidence suggests that information and communication technologies (ICT) consisting of distance education technologies (DET),

multimodal, and interactive digital resources are increasingly being implemented in preschool pedagogical practice [11]. Still, the integration is fragmented in terms of its depth, alignment to learning objectives, and feedback systems.

Randomized controlled trials on technology in preschool

Data from the regional large-scale analysis in the Russian Federation show that about 77% of preschool educational organizations (PEOs) are provided with the basic ICT infrastructure computers, projections (multimedia projectors), Internet access, devices for digital audio-visual education. These technologies are mostly used for developmental activities, remedial teaching, parent counseling, and added learning rather than replacing the traditional preschool learning experience. Some of the most commonly used models include integrated distance learning, the Virtual Kindergarten model, correspondence counseling systems, and case-based learning for staff professional development [12].

These results are reinforced by findings from a complementary European context. Drawing on a quantitative survey of 218 preschool teachers in Romania, we find evidence of early adoption of modern educational technologies, with 96.12% of educators indicating their practice comprised of a mix of more classical didactic tools and modern educational technologies, and with an increasingly blended content delivery between classical didactic tools and digital content. Finally, the bottom-line outcomes show that teacher age is not an obstacle for adoption, but professional qualification level is positively related to the volume and pedagogical sophistication of technology use (Table 1).

Table 1.

Models of modern educational technology use in preschool education

Model	Main technologies	Target groups	Pedagogical functions
Integrated distance learning	Multimedia platforms, video conferencing, digital educational games	Preschool children, parents, educators	Developmental support, remedial instruction, parental counseling
Virtual Kindergarten	Online educational portals, multimedia libraries, real-time interaction tools	Preschool children and parents	Instruction, play-based learning, communication and consultation
Counseling and information centers	Educational websites, email communication, recorded digital materials	Parents of preschool children	Parental guidance, psychological and pedagogical support
Classroom ICT integration	Computers, educational software, interactive projectors	Preschool teachers and children	Cognitive development, communication skills, creative activities

From a theoretical point of view, the results confirm a constructivist, personality-oriented, and system-activity approach to preschool education. We know that a range of experiences at the right time is needed for the universal early cognitive, linguistic, and socio-emotional development that these modern educational technologies support, with their rich visualization, interactivity, and individualized learning trajectories. But, unlike in the physical classroom, children can interact with complex phenomena natural processes or cultural heritage for which simulations, animations, and guided virtual tours provide access [13].

In practical terms, DET really expands educational accessibility for children in remote regions, children with special educational needs, and children who are under family-based and home education. Video conferencing tools, interactive games, and digital learning environments allow for immediate in-class pedagogy management and the professional intervention of speech therapy, psychological counseling, and in-class inclusive education with real-time fidelity during distant learning courses (Table 2). These

findings are consistent with international studies that highlight the importance of guided, adult-mediated technology usepromoting early learning [14].

Table 2.

Frequency of modern technology use by preschool teachers (%)

Educational resource	Very often	Often	Rarely / never
Computer / laptop	29.8	33.0	37.2
Educational software	17.9	21.6	60.5
Educational websites	13.8	21.6	64.6
Multimedia presentations (audio–visual content)	High usage	Moderate usage	Low usage

The analysis shows many continuing areas of ignorance, even with the good results. There are two main problems with these obsservations. A lot of preschool platforms are more of a resource hub and less of an interactive learning system. Second, there are no standards to regulate pedagogical quality, duration and the age-appropriateness of digital activities intended for preschool children. Third, despite the growing number of longitudinal studies collecting data on the effects of technology on development, few, if any, have used empirical methods to longitudinally assess the cognitive and socio-emotional effects of early technology exposure [15].

Theoretically, previous research examines primarily access and usage frequency; however, less is known about mechanisms of learning, digital mediation, and interaction patterns between the child and the technology. This constraint reduces the opportunity to develop holistic theoretical frameworks that marry digital pedagogical practices to early childhood developmental case law.

Directions for further research

Given the limited number of studies, and the methodological challenges associated with evaluating the longer term effects of contemporary educational technologies on preschool learning outcomes, mixed-method and longitudinal designs are recommended for future research. Providing comparative cross-national studies that would help in understanding policy impacts and culturally responsive technology integration is also suggested. In addition, this also leads to the need of looking further into the development of teacher digital competence, adaptive learning systems for preschoolers, and also the ethical concerns of digitalisation in ECEC. This work will be important to de velop theoretical frameworks and practical implementation strategies to ensure that contemporary educational technologies materialize to improve and/or enhance aspects of quality, equity, and sustainability of preschool education.

Conclusion

We have shown that integration of contemporary educational technologies avail the very nature of preschool education as the socially decisive pedagogical tool providing access, inclusiveness and sustainability quality in early childhood learning enviroments nuovi conceptus logotherapy, vol. The results reveal a more effective use of information and communication technologies, including distance education technologies, multimedia tools, and interactive digital resources, in developmental, remedial, counseling, and supplementary educational activities than as a complete substitution for face-to-face preschool instruction. Abstract: The findings emphasise the point where modern technologies witnessthe idea that, modern technologies open up a wide array of educational activitiesfor children in remote areas of education, children with special educationalneeds and children who study in families in a wider sense, and at the sametime reinforcing the cooperation between teachers and parents. Concurrently, the analyses document structural barriers reflected in short-sighted implementation models, a lack of timely and precise feedback, and a lack of harmonized pedagogical standards guiding

technology use heuristics in preschool environments. These findings have important practical implications for future systematic embedding of contemporary educational technologies into preschool educational programs, specific teacher training, and age-appropriate digital resources aligned with developmentally appropriate principles. Future research needs to be longitudinal and mixed-method in nature, exploring the long-term cognitive, social and emotional effects of early exposure to educational technologies, as well as comparative international studies to identify effective policy frameworks and best practice strategies for enabling the developmentally appropriate, effective and safe use of modern technologies in preschool education.

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