Tech *Time: My Time in Kindergarten*

Innovation Literature Review

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Transforming Tech Time: Why Structured Digital Routines Matter in Kindergarten

In early childhood education, the integration of technology is essential for developing foundational skills, fostering engagement, and promoting digital literacy—particularly in Title I schools like Smith Elementary, where many bilingual students are learning both academic content and a new language. During small group instruction, technology centers are meant to support independent practice; however, frequent interruptions due to login difficulties or confusion about next steps—especially among emergent readers—disrupt instructional flow. These challenges highlight the need for age-appropriate, visually guided routines that support autonomy. This literature review synthesizes research on structured digital routines, visual tools like QR codes, and blended learning strategies to inform an innovation plan that transforms tech time into a more independent and purposeful experience for young learners.

Barriers to Independent Tech Use in Bilingual Kindergarten Classrooms

Research indicates that the effectiveness of technology in early childhood education depends on its developmental appropriateness and accessibility (Lim & Wardrip, 2024). In under-resourced kindergarten classrooms, students often face difficulties navigating digital routines, which contributes to frequent instructional interruptions and reduced teaching quality (Hsin et al., 2014; Blackwell et al., 2013). Studies emphasize that the absence of structured digital routines can compromise classroom management and result in lost instructional time (Northrop & Killeen, 2013). Visual support and predictable routines are especially beneficial for emergent bilingual learners, fostering greater independence and confidence when using technology (Neumann, 2018). Additionally, when digital instructions are unclear, both students

and teachers experience increased stress, particularly in bilingual classrooms where language barriers may further complicate task execution (Escamilla et al., 2014).

A Visual and Guided Approach to Tech Time: QR Codes, WebQuests, and Routine

To address recurring digital confusion and classroom interruptions, research supports the use of structured, visual, and interactive tools that guide students step by step through independent tasks. Studies suggest that using multimedia platforms such as Google Slides or Genially allows educators to create interactive, developmentally appropriate guides that promote autonomy while reducing the need for teacher redirection (Neumann, 2018; Pérez & Chang, 2020). A sample implementation may start with a “tech mission” video, followed by step-by-step login instructions, and conclude with an engaging reward activity accessible through a QR code. The use of QR codes has gained attention in early childhood research for their ability to create seamless transitions between digital and physical learning environments. Veronica, Yunianti, and Sa’ida (2023) found that QR code-based materials helped children aged 5–6 develop greater independence and cognitive engagement, supporting instructional continuity in early learning environments. This approach not only supports routine building but also integrates gamified learning elements that increase motivation.

Furthermore, the use of consistent visual prompts and interactive feedback has been shown to improve students' task completion and reduce confusion during digital learning tasks (Couse & Chen, 2010). Incorporating these design principles helps establish predictable routines that students can follow independently. In bilingual settings, minimizing text and emphasizing visuals and audio support can significantly enhance accessibility for emergent bilingual learners. By providing a self-guided digital path, this innovation empowers

students to take ownership of their learning while allowing teachers to maintain uninterrupted small-group instruction.

Empowering Young Learners: Independence, Engagement, and Digital Literacy

Implementing a structured and interactive digital guide in the kindergarten technology center offers multiple benefits that extend beyond classroom management. One of the most significant advantages is the development of student independence. When students can follow a clear, consistent routine with visual prompts, they become more confident in their ability to complete digital tasks without constant adult assistance. This shift not only supports autonomy but also cultivates a stronger sense of responsibility and task ownership (Bers, 2018). Furthermore, Lim and Wardrip (2024) explain that although preservice teachers often support child-centered approaches, their technology use tends to be adult- or software-driven. This misalignment highlights the importance of critically reflecting on how technology is used in early childhood settings to ensure it aligns with pedagogical goals.

Reducing interruptions during small-group instruction creates a more focused and productive learning environment for both the teacher and the students receiving targeted support. Research has shown that minimizing off-task behavior during center time increases instructional time and allows for more effective individualized instruction (Northrop & Killeen, 2013). Additionally, the use of QR codes and interactive features taps into students' natural curiosity and provides engaging academic reinforcement through games, videos, or challenges (Burke, 2020).

The consistent use of visual routines also benefits bilingual and emergent readers by providing accessible pathways to digital learning without over-reliance on text. This can improve

comprehension and digital fluency in a developmentally appropriate way (Escamilla et al., 2014). Furthermore, when students experience success in navigating technology on their own, they are more likely to stay motivated, persist in tasks, and transfer those problem-solving skills to other contexts. The overall result is a classroom that operates more smoothly, with students who feel empowered, engaged, and capable.

Recent studies have continued to emphasize the value of technology in early education when properly supported by teacher guidance and design. Crozier (2021) found that while early childhood educators recognize the importance of digital tools, their successful use depends on access to training and adequate classroom resources. Without these supports, even promising innovations may not be sustained effectively.

Another area of growing interest is the use of QR codes to extend learning opportunities. According to a study in the *Journal of Early Childhood Research*, Quick response codes have the potential to connect physical classroom materials with rich digital content, allowing children to explore lessons beyond traditional boundaries.

Blended learning approaches have also been shown to benefit early learners by combining digital activities with hands-on experiences. These models help personalize learning paths and support both independent exploration and teacher-led guidance. Research by Tomar and Sharma (2022) supports this perspective, highlighting that blended learning strategies in early childhood promote engagement, adaptability, and autonomy when appropriately guided. Similarly, findings published in *Path of Science* outline how K–2 students can thrive when digital learning is strategically integrated.

Finally, Gündoğmuş (2024) highlighted the critical role of digital literacy in preparing children for a tech-driven society. The study recommends introducing digital literacy skills early in life through age-appropriate, guided activities that promote exploration, problem-solving, and collaboration.

Redefining Tech Time for the 21st-Century Kindergarten Classroom

The research review highlights the importance of intentional and developmentally appropriate technology integration in early childhood classrooms. By establishing structured digital routines, utilizing visual guides, and embedding interactive tools like QR codes, students can become more independent and engaged learners. These strategies not only address common classroom challenges—such as instructional interruptions and task confusion—but also align with best practices for supporting emergent bilingual students and early readers.

The proposed innovation has the potential to transform the technology center from a source of distraction into a purposeful, self-directed learning space. As students gain confidence in navigating digital tasks, they build essential skills in autonomy, problem-solving, and digital literacy. Most importantly, this process supports the creation of a more harmonious and engaging learning environment—one where technology serves not just as a tool, but as a meaningful bridge toward deeper, more focused learning experiences.

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