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RESEARCH ARTICLE

Preparing Cambodian Primary Education for the Age of AI: Readiness, Curriculum Design, and Teacher Empowerment

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ABSTRACT

This paper examines the integration of artificial intelligence and digital technologies into Cambodian primary education as a foundational step toward preparing learners for a technology-oriented future. It argues that early exposure to digital tools can foster creativity, rational thinking, problem-solving skills, and responsible digital citizenship among young learners. Drawing on international and cross-regional educational practices, the study explores culturally appropriate approaches that may be adapted to Cambodia's diverse primary school contexts. The discussion focuses on three central areas: the readiness of Cambodian primary schools for digital learning, age-appropriate design of digital curricula, and the professional empowerment of teachers in technology-mediated classrooms. The paper also addresses persistent challenges related to infrastructure limitations, educational equity, and community resistance, which continue to hinder effective implementation. To address these concerns, it proposes scalable strategies based on public–private collaboration and pilot-based models that enable continuous evaluation and refinement. The study concludes by emphasizing the need for sustained governmental investment in digital education to ensure that children

across geographic and socio-economic backgrounds are equitably prepared to participate in an AI-driven educational and social environment.

Keywords: Artificial intelligence in education; digital learning; primary education; educational equity; teacher empowerment

FULL PAPER

Introduction

In the 21st century, being able to use technology has gone from being a nice-to-have skill to a must-have skill. More and more, researchers suggest that being digitally fluent, or being able to use digital tools to find, understand, create, and share information, is important for full participation in society. (Belshaw, 2014; Mee et al., 2025). Warschauer (2004) States that being able to use technology and having access to it have a significant impact on educational fairness and the potential to climb the social ladder. Most people nowadays agree that teaching youngsters to use computers and think rationally is an essential part of preparing them for the future. Cambodia's elementary school system still has many problems. Even though many other countries have started teaching subjects like visual programming, pattern recognition, and AI-related logic puzzles, this is still the case. The Ministry of Education, Youth, and Sport (MoEYS, 2021) Notes that there are still significant gaps in how simple it is for pupils to obtain instructional technology, especially between urban and rural schools. UNESCO (2022) It is claimed that students in rural Cambodia face even more challenges, as roads are poor, teachers are poorly trained, and they do not spend enough time in digital settings.

The digital divide is not only about technology; it is also about chances. Warschauer (2003) states that a second-level digital divide, which concerns how technology is used rather than accessed, widens the gap in educational attainment. In Cambodia, this is seen in the lack of age-appropriate digital information in Khmer, teachers who know little about technology, and the absence of early initiatives to teach kids about AI. If action is not taken quickly, this gap could become permanent, worsening the differences between generations (Van Dijk, 2006). Smartphones, digital assistants, and personalized learning platforms are all getting AI very quickly. Increasingly, young people are adopting algorithmic systems, often without even

knowing it. According to Luckin and Holmes (2016), allowing kids to use AI at an early age not only makes technology less mysterious but also helps them learn to think critically and make moral decisions.

The purpose of this research is to investigate and propose approaches to teach AI and digital curiosity in Cambodian primary schools that take into account their unique needs. It is based on Papert's (1980) The theory that "*learning by making*" is a way for even young kids to understand computers. The study focuses on low-cost, creative, and culturally appropriate approaches to using technology in early education. It does this by looking at examples from throughout the world, such as Finland's early digital literacy plan. (Farisia & Syafi, 2024) and localized ASEAN pilot initiatives (ASEAN Secretariat, 2022). The primary purpose of the publication is to interest kids aged 6 to 12 in digital technology and teach them how to solve problems. According to Resnick et al. (2009)Employing digital tools in engaging, hands-on ways can help people learn more and improve their minds. The focus of this study is on Cambodian primary school kids ages 6 to 12, to narrow the gaps between urban and rural schools. It discusses how age-appropriate curriculum design, inclusive teaching approaches, and context-sensitive implementation models can help youngsters learn about AI and digital literacy. The paper's purpose is to provide new, scalable strategies that account for both structural and cultural factors in Cambodia's unique educational environment.

Researchers have found that using digital tools in early education has a significant impact on how youngsters learn and think. Plowman and McPake (2013) Are two educational theorists who claim that when young learners use digital devices in a planned and purposeful way, they not only get used to technology but also improve at solving problems, seeing patterns, and reasoning. Their research demonstrates that young children are not just passive consumers of media; it also underscores that technology can be a powerful tool for active learning when used in ways that make it engaging.

Papert (1980) agrees with the idea of learning through making. He says that digital tools like programmable toys and visual coding platforms enable kids to learn by exploring, experimenting, and trying things out repeatedly. This constructivist approach shifts how kids learn from just getting information to actually using it, helping them become producers of knowledge. Ackermann (2001) also argues a difference between Piaget's constructivism and Papert's constructionism. The latter is more about learning by doing, especially in digital environments. Bers (2020) improves on this by showing that coding exercises in preschool settings help kids not just with their computational thinking but also with their emotional management

and storytelling skills. She explains how platforms like Scratch Jr can help kids express their thoughts, structure their stories, and develop their reasoning skills. These are all mental activities that help children better understand cause and effect. Edwards (2016) also says that integrating digital media into play-based learning can help kids learn to think symbolically and collaborate to solve challenges.

In Cambodia, where many classrooms still use rote memorization, these tech-based, inquiry-based activities offer a potential shift from the way things are usually taught. Digital tools that enable manipulation, hypothesis testing, and creative expression might help Cambodian teachers build a school culture of curiosity and resilience. Ackermann (2001) and Edwards (2016) Both claim that these kinds of environments help youngsters develop a maker mindset, enabling them to take intellectual risks, learn from their mistakes, and think for themselves.

Preparing for the Future with AI

AI is soon becoming a regular part of the economies and societies. Kids nowadays are growing up in a world where AI is a massive part of it. Voice-activated assistants, recommendation algorithms, and adaptive learning systems are all examples of this. As Luckin and Holmes (2016) Emphasize, it is no longer sufficient for students to be passive users of technology; they must understand the logic and structure behind intelligent systems if they are to function ethically and effectively in a digital society. Teaching basic AI principles like classification, sequencing, and pattern recognition in elementary school might help kids understand these ideas early on.

According to Wing (2006)Computational thinking should be seen as a basic literacy skill, just as important as reading and math. Her study recommends starting to use algorithmic reasoning in everyday educational activities as soon as possible. These early experiences can help kids understand more sophisticated STEM concepts and build flexible thinking skills that they can use in all areas of life. Also, the rise of AI calls for an ethical side to schooling. Jones and Mitchell (2016) Say that digital citizenship should be taught early on because kids need to learn how to use the internet securely, respectfully, and responsibly. This means knowing how important privacy is, how digital footprints can affect you, and how important it is to be empathetic when talking to people online.

Cambodia may learn a lot from global and regional programs that have effectively taught AI and digital literacy in primary schools. Finland has included programming in the national curriculum for grades 1-9. This includes not only coding abilities but also creative problem-solving and collaboration (Korhonen et al., 2023).

Finland's comprehensive approach to education includes digital skills in all courses, based on the idea that computational thinking is a fundamental skill for the 21st century. The "*Code for Fun*" program in Singapore, which started in 2014 by the Infocom Media Development Authority, is another excellent example (2021). This program combines coding and robotics for elementary school students and is backed by teacher training and relationships with businesses. It works because it balances technical exposure with participation and creativity. Other countries, like Cambodia, might use it as a model. ASEAN neighbors are also making progress, like others. The Vietnamese Ministry of Education has started pilot programs in both urban and rural schools to teach coding and digital literacy. (Nguyen et al., 2024). These programs are being run in partnership with commercial tech companies.

These programs are designed to meet Vietnam's unique educational demands and limitations, making them good case studies for Cambodia. Thailand's Digital Economy and Society Development Plan (DEPA, 2016) Contains AI teaching modules for elementary school children that focus on ethics, awareness, and basic reasoning. These efforts, on a global and regional scale, demonstrate that it is possible to teach digital skills to young people, even in places with lower and intermediate incomes. Unwin and Unwin (2017) Says that successful ICT4D (Information and Communication Technologies for Development) projects are based on the realities of the places where they are happening, such as language, culture, infrastructure, and community support. This means that Cambodia needs to ensure that digital and AI education is tailored to its people's needs, both in what is taught and how it is taught. This should be done in a way that is sensitive to the culture and fair to everyone, regardless of their social or economic status, as summarized in Table 1.

Table 1: The Argument for Early Digital Exposure

No.	Part	Key Points
1.	How using technology early can help the brain.	It helps youngsters learn by letting them explore and build their confidence. It also helps them be more creative, logical, and good at solving problems.
2.	AI is helping learners get ready for the future.	Sets the stage for understanding AI; promotes digital citizenship, responsible use, and adaptability.

No.	Part	Key Points
3.	Precedents on a global and local level	Finland, Singapore, Vietnam, and Thailand all offer flexible frameworks that emphasize localized, inclusive approaches.

In Cambodia, the quality and availability of primary education vary widely, especially between cities and rural areas. Researchers like Bredenberg (2022) Say that schools in places like Phnom Penh have started to employ digital technology. However, most rural schools still lack basic necessities, such as reliable electricity, internet access, and digital learning tools. This difference between cities and rural areas makes it exceedingly challenging to make digital education equal for everyone. Edwards et al. (2020) and Rogers and Anderson (2019) Add that systemic concerns, including too many students in a classroom, teachers not being paid enough, and old-fashioned teaching methods, are also significant barriers to innovation in Cambodian education. Over the last ten years, more kids have been enrolling in primary schools. However, retention and learning outcomes remain a challenge, especially in rural provinces, where dropout rates are substantially higher than the national average. (UNESCO, 2022). A lot of the time, teachers do not know how to use technology effectively in their lessons.

According to Luo and Chea (2018) and (UNDP, 2020)Schools cannot use digital technology effectively even when they acquire it because they do not receive sufficient training, and there is not enough useful digital information available to them. These issues with organization and teaching illustrate how crucial it is to develop context-sensitive ways to use technology in schools that go beyond simply putting it in classrooms. Trucano (2010) Says that if schools use technology, they need to modify how teachers teach, how schools are governed, and how the community gets involved. If not, it could become a resource that is unnecessary or misused.

Cambodia's Ministry of Education, Youth, and Sport (MoEYS) has made progress in bringing digital learning to schools during the past few years. The "Policy and Strategy on Information and Communication Technology in Education" (MoEYS, 2014) is a long-term plan to improve teaching and learning through ICT at all levels. But the execution hasn't been consistent due to a shortage of funds, infrastructure issues, and differences in regional capacity. The "Digital Education Action Plan 2021–2025" is one of the pilot programs that MoEYS has initiated. The goal of this

plan is to make more digital materials available, increase teacher training, and for the public and commercial sectors to work together (MoEYS, 2021). Civil society groups and non-governmental organizations (NGOs) have been tremendously helpful in these endeavours. Teach For Cambodia, for example, has piloted blended learning methods in schools that lack adequate resources. The STEM Cambodia Foundation also wants girls to learn coding and robotics at a young age. UNICEF and UNESCO are two international development organizations that have also collaborated with MoEYS to develop digital learning systems that can grow. This was especially critical during the COVID-19 pandemic, which made the need for technology-based home schooling even more urgent.

Nget et al. (2024) Believe that these partnerships are an excellent way for people from diverse fields to work together, but they need better planning to make sure they last and align with national goals. Cambodia's digital education is even better now that the business sector is involved. Companies like Smart Axiata have sponsored projects to connect schools and teach people how to utilize technology. This has helped close the access gaps. Brehm and Silova (2014) Think that investing in the system should not be replaced by relying on outside partners. Instead, they should work with the government to strengthen institutions and communities.

Cambodia's language and culture should adopt AI and digital tools in elementary schools, where Khmer is still the primary language used in public schools, and many youngsters in rural areas do not speak any foreign languages, especially English. According to Skutnabb-Kangas and Heugh (2013)Digital education systems need to be simple to use and accessible to everyone to be useful. This means that when adapting digital tools, especially those that use AI-powered language models or content delivery systems, Khmer-language interfaces and culturally relevant information must come first. Ayres (2003) and Huot and Em (2024) Suggest that for digital learning to become popular, it needs to be relevant to students' lives, including their traditions, community knowledge, and sense of national identity. If the knowledge or curriculum brought in is not tailored to the children's needs, it could make them feel they do not belong or worsen educational problems.

Moreover, pedagogical styles in Cambodia are still heavily influenced by Confucian heritage values, which emphasize respect for authority, memorization, and deference to the teacher (Huot, Kuon, et al., 2024; Tan, 2020). These rules help keep classes in order, but they can also make it tougher for students to be open and ask questions, which is what digital learning is all about. As Huot and Hok (2025) suggest, teacher professional development programs need to help teachers blend

traditional teaching with more student-centered, exploratory approaches that help students become more fluent with technology and think critically.

At its core, more individuals are recognizing that Cambodian culture and morals should serve as the basis for digital education. If digital education covers topics such as Buddhist beliefs, local folklore, and environmental stewardship, it can be more useful and keep students interested. This culturally sensitive method not only helps kids learn better but also makes them feel proud of their country and national identity as the world becomes more global, as depicted in Table 2.

Table 2: Setting Digital Education in Cambodia in the Right Place

No.	Pay Attention	Important Details
1.	Right now, what is happening in primary school classrooms?	Getting a digital education is complicated because cities and towns have different infrastructure and train their teachers in different ways. The best way to learn is still the same as it has always been. People do not use technology enough since they do not know how to.
2.	The government runs partnerships and programs.	The Ministry of Education and Youth Services (MoEYS) has started ICT and digital education policies. NGOs and businesses fill the gaps with experimental initiatives and training. It is still hard to coordinate and make things last.
3.	Things to remember regarding culture and language	Learning about and adjusting to the Khmer language and culture is very important. Traditional values influence how teachers teach. When something is relevant, people are more interested. Teachers' training should include both old and new ways of doing things.

The Right Way for Young Learners to Use AI and Digital Tools

When designing a digital and AI-based curriculum for Cambodian primary school students, the most important considerations are whether it is age-appropriate, easy to access, and culturally relevant. Kids ages 6 to 12 learn best when they play and do things. The child's willingness to learn and explore should be the basis for the curriculum. This helps pupils learn since they can explore, interact, and get feedback. When kids play games, especially with technology, they learn a

lot. They learn via seeing, hearing, and touching. They also remember abstract ideas better when they relate them to events in the real world.

In many Cambodian classrooms, the instructor remains the primary focus, and students are expected to memorize material. Adding digital instruction that lets students explore could make a significant difference. For instance, mixing storytelling with basic coding or problem-solving challenges through simple games can make learning more interesting and help kids learn both digital skills and subject matter. Digital learning should not become a passive activity that is mostly screen time. Instead, it should combine physical activity with digital interaction. For example, students could program a robot to follow paths drawn on the classroom floor or use augmented reality apps that require them to move around and look at things.

The local culture, society, and language should also be considered when designing the curriculum. The things that Cambodian kids read and do in school should be based on their own lives, experiences, and surroundings. (Huot & Em, 2025). This relevance makes students more interested and helps them link abstract digital ideas to real-life situations. Curriculum planners must also consider fairness and accessibility, ensuring that the materials can be used across a variety of educational settings, including rural schools with limited resources. Using easy-to-understand, child-friendly tools is important for helping young people understand AI and digital literacy. Scratch Jr, Code.org, and Tynker are all great visual programming languages to start with when you want to teach kids how to code and think like a computer in a fun, not scary, way. (Baghiroh et al., 2024).

Students can create animations, games, and stories by dragging and dropping code chunks on these platforms. This helps them learn about logic, sequencing, and cause-and-effect relationships without having to write complicated syntax. Story-based and game-based learning can also help kids understand basic AI ideas in addition to coding. For instance, sorting objects by color, shape, or size in an analog game can be similar to how machine learning systems find patterns. Digital games that have players choose what to do depending on criteria like "*if the object is round, go left; if it is square, go right*" also teach decision trees and logical operations, which are the building blocks of AI systems. Not only do these exercises help with logical reasoning, but they also make people want to know how robots "*think*." Digital literacy should also include basic skills for being safe online and being responsible with technology. Kids should be educated from a young age about the importance of keeping passwords hidden, being careful about revealing personal information, and understanding what will happen if they do something online. Short movies,

interactive stories, and group conversations can be used to teach kids about things like digital compassion, cyberbullying, and how much time they should spend on screens. It will be easier for people to understand and remember these issues if they are presented in language appropriate to their age, especially in Khmer.

AI and digital technologies should not be taught in isolation; instead, they should be integrated into the elementary school curriculum to build on what students already know. In language classes, for example, students can use digital storytelling apps to compose and narrate their own tales, fostering creativity and language development simultaneously. (Huot et al., 2025). These platforms allow for voice recording, animation, and visual storytelling, which support literacy while developing digital fluency. In science classes, simulations and virtual labs can help students learn about natural phenomena that would be hard to demonstrate in real life due to limited resources. For example, apps that display the life cycle of a plant or the phases of the moon interactively let people see and touch abstract scientific ideas.

Virtual experiments also encourage inquiry-based learning, as students can make guesses and test different factors in a secure, reusable digital space. Interactive platforms that make abstract ideas like addition, subtraction, multiplication, and geometry more real can help with math. Students who have trouble with standard textbook methods can better comprehend when they use visual models, such as number lines, pie charts, or manipulatives. Games that reward problem-solving and provide fast feedback can boost motivation and build confidence in arithmetic skills. When technology is integrated into the regular curriculum rather than taught as a separate subject, students begin to see digital tools as a natural part of their learning. This method also helps convince people, such as school officials and parents, who might not initially think digital literacy is necessary, that it is.

The success of any effort to use AI and digital tools in elementary school depends on how well the teachers can do their jobs. Professional development should be a primary priority in Cambodia, as many teachers have limited experience with educational technology (Huot, Hok, et al., 2024). Training programs should be thorough, ongoing, and offered in Khmer, with examples and scenarios that are relevant to the culture and align with how things are taught in the area. The first training courses should help people feel more comfortable using basic digital tools, foster a positive attitude toward technology, and dispel fears about how difficult it is to use. Teachers should be able to use the same tools as their pupils, such as Scratch Jr or narrative apps, so that they can learn from a student's perspective. These

seminars should also focus on teaching methods, like helping students work together on projects, using technology in lessons, and promoting learning through questions (Huot & Loch, 2025). A peer mentorship system can be set up to ensure that teachers who are good with technology help their coworkers by working together, giving feedback, and regularly teaching example lessons.

Partnerships with NGOs and teacher training institutes can further strengthen this ecosystem by offering advanced training and certification in teaching with technology. In addition, classroom implementation needs both logistical and emotional assistance. Teachers need access to trustworthy equipment, digital content that can be used offline (*particularly in places without internet), and materials that can be printed for use* with digital activities. Building a school culture that supports innovation and lifelong learning is just as vital. School leaders and administrators need to be involved in the digital transformation process so they can continue to encourage it and provide resources where needed.

Challenges and Barriers

One of the most significant problems with digital education in Cambodia is the absence of infrastructure, especially in rural and remote locations. Many primary schools still lack reliable energy, functioning classrooms, and the computers and other equipment they need to teach digitally. Schools in Phnom Penh and other metropolitan centers are starting to use technology, but these changes are not happening everywhere. According to the World Bank (2021)More than 30% of public elementary schools in Cambodia lack reliable electricity, and fewer than 15% have internet connectivity. Even where basic infrastructure exists, service reliability is inconsistent. Devices such as tablets and laptops often remain unused due to a lack of maintenance, insufficient charging capability, or software compatibility issues.

As Khan et al. (2023) emphasize, digital education requires more than just distributing devices; it depends on the availability of technical support systems, regular maintenance, and access to updated software and content. Without addressing these gaps, digital education risks becoming a symbolic initiative rather than a practical reality. Further compounding this issue is the lack of digital content in Khmer. Most AI-related educational tools are created in English or other global languages, limiting their utility in Cambodian classrooms. For rural students, many of whom speak only Khmer, this creates a linguistic barrier that undermines the promise of inclusivity and engagement. The absence of offline-compatible educational materials further restricts access in areas where internet connectivity is either unavailable or prohibitively expensive. The role of the teacher is pivotal in the

success of any educational innovation, yet many Cambodian primary school teachers remain underprepared for technology-enhanced instruction.

Traditionally trained through a system that emphasizes memorization and teacher-centred pedagogy, most teachers have had little exposure to child-centred, inquiry-based approaches, let alone digital tools. (MoEYS, 2019). According to (Zhao & Frank, 2003)Their perceived self-efficacy often shapes a teacher's attitude toward technology. If teachers feel unprepared or unsupported, they are less likely to adopt new methods. In Cambodia, where many teachers have limited or no prior experience with computers, the sudden introduction of AI-based curricula can seem intimidating or irrelevant. Moreover, few professional development opportunities are tailored to the needs of Khmer-speaking educators. Many available resources are in English and make use of foreign examples that may not resonate with Cambodian cultural or classroom realities. (Unwin & Unwin, 2017). Practical teacher training must be localized, continuous, and practical. One-off workshops or foreign-led seminars often fail to produce sustainable change. Instead, programs should offer long-term mentoring, hands-on demonstrations, and opportunities for peer learning. As Fullan (2016) Asserts that meaningful educational change is gradual and iterative. Cambodian educators need time, support, and institutional encouragement to confidently integrate digital tools in ways that complement their existing teaching practices.

The promise of digital education to level the playing field is often compromised by the very inequalities it seeks to address. In Cambodia, digital access is highly uneven, with disparities rooted in geography, income, and gender. Students in urban private schools are far more likely to engage with technology than their rural or low-income peers. This digital divide reflects and reinforces broader social inequalities, including those related to household income, parental education, and community infrastructure (Horiuchi et al., 2018). Gender disparities also play a critical role. Girls in rural areas often face socio-cultural expectations that limit their access to technology. In many cases, boys are prioritized when it comes to using shared devices or attending extracurricular coding clubs. Heemskerk et al. (2009) argue that unless digital initiatives are designed with gender inclusivity in mind, they tend to replicate offline biases. In Cambodia, this means ensuring that digital programs actively include girls, not only as learners but also as leaders and creators in tech-based activities. Children with disabilities face another layer of exclusion. Many digital tools are not accessible to learners with visual, auditory, or cognitive impairments. Without inclusive design principles, such as text-to-speech functions

or alternative input devices, AI and digital education may inadvertently leave behind one of the most vulnerable student populations.

To ensure equity, digital education in Cambodia must be targeted, adaptive, and inclusive. This involves developing Khmer-language resources, offering support in marginalized regions, and integrating universal design principles. Policymakers and educators must view digital equity not as an optional add-on, but as a fundamental requirement for national educational advancement. Resistance to innovation, especially in deeply rooted educational systems, is common and must be understood within its cultural context. In Cambodia, skepticism about the value of digital learning exists among teachers, parents, and even policymakers. Many parents in rural communities are unfamiliar with digital technologies and worry that screen time may be detrimental to their children's moral development or distract them from traditional academic subjects like reading and math. Teachers who are untrained in digital pedagogy may perceive AI as abstract, overly complex, or irrelevant to their local context. (Huot & Hok, 2025). Language is a particularly critical challenge. As most AI and digital learning tools are designed in English, there is a widespread perception that these subjects are only for elite or urban students. Important AI-related concepts, such as algorithms, machine learning, and data privacy, often lack intuitive equivalents in Khmer, limiting their accessibility and reinforcing the perception that digital education is foreign or unattainable. As Fullan (2016) Points out that innovation must be culturally embedded to take root.

To address this, digital education must be localized, not just linguistically but also culturally. Content should reflect Cambodian heritage, values, and real-life applications. For example, AI lessons can use local examples, such as sorting rice types or recognizing traditional Khmer patterns, to teach classification and pattern recognition. As Rogers (2003) Notes in his Diffusion of Innovation theory, adoption of new ideas depends heavily on perceived compatibility with existing cultural norms and values. Community engagement also plays a crucial role in overcoming resistance. Schools can hold technology fairs, involve parents in hands-on workshops, and showcase student projects to demonstrate the relevance and benefits of digital education. When communities see the tangible outcomes, such as improved problem-solving, creativity, or engagement, they are more likely to support digital initiatives.

Scalable Models and Strategic Recommendations

Launching small-scale pilot programs tailored to the Cambodian context is a practical and strategic starting point for introducing AI and digital literacy in primary

schools. As Fullan (2007) argues, meaningful educational reform must begin at the local level, where stakeholders can engage directly with new content and methods. These pilots should be inclusive of both urban and rural areas and designed collaboratively with local educators, parents, and community leaders. Zhao (2012) emphasizes that educational innovation must be locally adaptable and globally informed, suggesting that localized pilots enable both contextual relevance and scalability. These initiatives should embed digital activities into existing subjects rather than creating siloed content. For instance, a pilot in Kampong Cham might integrate visual programming into the language arts curriculum using storytelling apps that support Khmer. At the same time, a school in Phnom Penh could focus on digital science simulations. As Kennedy and Lee (2018) found in their study of Cambodian classrooms, initiatives that build on familiar practices and languages are more likely to be accepted and sustained over time.

Public-private partnerships (PPPs) are critical for scaling digital access, especially in resource-constrained settings. According to Wagner et al. (2005)Collaboration between government agencies, technology providers, and NGOs can help overcome the resource bottleneck that limits the spread of ICT in developing countries. In Cambodia, where budget constraints and uneven infrastructure present real obstacles, PPPs can provide a sustainable channel for funding, distributing, and maintaining digital education tools. Bali and Caines (2018) Note that ethical partnerships should prioritize equity and local empowerment rather than one-size-fits-all solutions. In practice, this might involve telecom companies providing discounted internet access to rural schools, or global edtech companies working with Cambodian developers to create AI learning apps in Khmer.

The Ministry of Education, Youth and Sport (MoEYS) should play a central coordinating role, as Berman and McLaughlin (1976) stress that policy coherence and local ownership are crucial for successful innovation at scale. True digital transformation requires more than devices and software; it demands a sustainable ecosystem that includes ongoing teacher development, infrastructure maintenance, and curricular integration. As Kozma (2005) contends, a *systems approach* is essential to ICT education policy, in which technological interventions are embedded within broader institutional and pedagogical frameworks. For teachers to confidently lead AI-infused learning, they need consistent, culturally relevant training. Leu et al. (2015) emphasize the importance of ongoing professional development in digital literacy that goes beyond surface-level skills and supports pedagogical integration. In Cambodia, this might involve mentorship programs pairing tech-savvy urban teachers with rural counterparts, the establishment of

regional training hubs, and the provision of accessible e-learning modules in Khmer. Moreover, sustainability depends on curriculum reform. According to Mishra and Koehler (2006), the Technological Pedagogical Content Knowledge (TPACK) model supports effective integration by aligning tools, content, and pedagogy. Cambodia's national curriculum should gradually embed digital and AI concepts into core subjects, reinforcing their importance while reducing cognitive overload on teachers and students.

Robust monitoring and evaluation (M&E) systems are vital for assessing the impact, equity, and scalability of digital initiatives. UNESCO (2020) Emphasizes that data-driven decision-making enables policymakers to identify gaps, iterate effectively, and ensure accountability. Evaluation frameworks should include both quantitative indicators, such as student digital proficiency and device usage rates, and qualitative feedback from teachers, students, and parents. Bryk et al. (2015) Advocate for continuous-improvement models in which schools operate as learning organizations, adjusting interventions based on real-time feedback.

In Cambodia, local feedback loops can be facilitated through regular community forums, classroom observations, and teacher reflection journals. These participatory mechanisms ensure that digital education evolves in response to the lived experiences of those it is meant to serve. The overarching vision must be bold yet grounded: Cambodian children should grow up not just as passive users of technology, but as creative thinkers, digital citizens, and future problem-solvers. As Resnick (2017) Asserts, coding is not just a technical skill; it is a new way to think and express. Early exposure to AI can help children see themselves as inventors and contributors in a global digital society. This vision aligns with the Sustainable Development Goals (SDGs), particularly SDG 4, which calls for inclusive and equitable quality education and lifelong learning opportunities for all. (Un & Sok, 2022). By planting the seeds of AI and digital curiosity now, Cambodia can shape a future generation that is not only tech-literate but also critically aware, culturally rooted, and socially engaged. As Trucano (2010) Emphasizes, the power of digital education lies not in the technology itself, but in how it is used to empower learners and transform systems.

Conclusion

This paper represents both a crucial opportunity and an essential step toward shaping a future-ready generation. As digital technologies and artificial intelligence increasingly influence every aspect of life, from communication and learning to employment and governance, early exposure to these tools is no longer a luxury but

a foundational skill. Introducing AI and digital concepts at the primary level lays the groundwork for cognitive development, creativity, and problem-solving, while also fostering digital citizenship and ethical use of technology. By adopting age-appropriate, play-based, and culturally relevant approaches, Cambodia can make these concepts accessible and engaging for young learners across diverse settings. Rural and urban disparities must be addressed through inclusive strategies that ensure equitable access to digital infrastructure, trained educators, and localized learning content. A holistic strategy that combines curriculum development, teacher training, public-private collaboration, and sustained community engagement will be critical to long-term success. The journey toward digital literacy in primary education requires vision, commitment, and adaptability. However, with thoughtful planning and shared effort, Cambodia can transform its classrooms into spaces of curiosity, innovation, and empowerment. In doing so, the country not only prepares its children for the challenges of the 21st century but also invests in a more equitable, informed, and connected society. Ultimately, planting these digital seeds today will allow the nation to harvest the fruits of a more resilient and inclusive future tomorrow.

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