

The Prospects of Science, Engineering, and Technology in Education: The Pathway to Acquiring Appropriate Digital Technology Education for Early Learners in Liberia

¹ Gehleigbe Bobson Bleh, MAdE, MA, PhD, ² Prof. Samuel N. Duo, PhD., ³ Edwin Yeliky Gonquoui, BSc (Hons), MPhil.

¹Head of Department, Early Childhood Education, African Methodist Episcopal University, Monrovia, Liberia & Director for Sia Barbara Ferguson Kamara Early Childhood Development Center, Nimba University

² PhD, Vice President for Academic Affairs/ Head SIHELI Project, Nimba University

³ Academic Coordinator, Nimba University

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ABSTRACT

This study investigated the Prospects of Science, Engineering and Technology in Education, with emphasis on the pathway to acquiring appropriate digital technology education for early learners in Liberia under the age of six, as the world becomes increasingly digital technology-driven. The purpose of this study was to investigate the perceptions of parents and teachers on the appropriate use of digital technology in early childhood education, identify strengths, challenges, and support needs for using digital technology appropriately with children under six years, and the probable implications for ECE pedagogy in Liberia. The study employed a mixed methods research approach, including an open-ended questionnaire, documenting the backgrounds of 60 respondents about the appropriate use of digital technology with children under the age of six years, instructional use and benefit of digital technology, challenges and support needs. The "Likert Scale" was used for ease of basic statistical data analysis, focusing on eight schools in the Sanniquellie-Mahn and Bain-Garr Districts of Nimba County. Findings revealed that 78.3% of respondents believe that digital technology frequently or constantly encourages children's curiosity and creativity, indicating a strong perception of its positive impact; while 11.7% feels it is infrequently or not ever effective, showing that digital technology is generally seen as a valuable tool for stimulating exploration and imaginative thinking in children. The study recommends that (1) parent/caregiver and teachers be trained to acquire knowledge and skills in use of appropriate digital technology for young children including children with disabilities; (2) that the Ministry of Education ensure provision of developmentally digital technology resources and support at early learning (ECE) centers in all school districts in Liberia; and (3) provide the safety and ethical use of digital technology more appropriately and effectively with young children to become digital technology citizens.

Keywords: Digital Technology, Developmentally Appropriate, Pedagogy, Early Learners

INTRODUCTION

This paper critically examines the pathway to acquiring appropriate digital technology education for early learners in Liberia. The study draws on key national policy documents on Early Childhood Development (ECD), which define Early Childhood Education (ECE) as a pre-primary program for children aged three to five. ECE in Liberia operates at three levels: Beginner (Nursery II) for three-year-olds, Kindergarten I (KG I) for four-year-olds, and Pre-first (Kindergarten II, KG II) for five-year-olds (Liberia National Inter-Sectorial Policy on Early Childhood Development, 2021; Liberia Early Learning Framework and Development Standards, 2021; Education Law, 2018).

According to the Liberia Education Sector Analysis (2016), the country has approximately 800,000 children aged 0–5 years, of which 539,660 (49.3%) children between 2–5 years are enrolled in early childhood education

programs, while 50.7% remain out of school. This situation contradicts Section 4.3.4 of the Revised Education Act of 2011, which mandates that “the age range for attendance in early childhood programs shall be from three (3) to five (5) years, provided no child shall be denied attendance in early childhood education programs” (Union, A., Early Childhood Education in Africa: Implementing Agenda 2063).

In this context, the pathway to acquiring appropriate digital technology education for early learners in Liberia depends on transforming the perceptions of parents and teachers toward the use of digital tools in early childhood settings. Both groups must be adequately trained to support young children in developing competencies across Literacy, Art, Science, Technology, Engineering, Mathematics, and Play (LASTEMP) curricular areas. Parents, as the first teachers, play a foundational role in nurturing these skills, while teachers reinforce and extend learning experiences in formal settings (Kothmann, 2019).

However, many children are exposed to passive, non-interactive screen media and inappropriate graphical content, which fails to support their expressive, creative, and cognitive development. The main goal of this research, therefore, is to investigate how children under six years can appropriately use digital technology and explore the implications for early years’ pedagogy in Liberia.

Digital technologies are widely used in Early Childhood Education (ECE) globally to enhance children’s development in language, literacy, art, science, and mathematics (Bird & Edwards, 2015). When used appropriately, these tools strengthen children’s cognitive domains, especially critical thinking and problem-solving skills, preparing them for future challenges in a technology-driven world. Yet, studies show that many parents and teachers remain uncertain about how to select and apply suitable electronic learning activities for young children (Korat & Segal-Drori, 2016). Similarly, Verhoeven et al. (2020) found that the effectiveness of early digital literacy programs varies significantly depending on the technology used and the educators’ competence.

For parents and teachers to maximize the educational benefits of technology, they must develop digital literacy skills themselves. Passive exposure to technology alone does not promote interactive learning (Nacher et al., 2015). In comparing desktop computers with modern mobile devices, Nacher and colleagues (2015) emphasize that touch-screen tablets and smartphones offer simple, tactile interfaces, such as touching, pointing, scribbling, and swiping, that help children engage meaningfully with digital environments. Likewise, Hoffman and Paciga (2014) and Price et al. (2015) note that these intuitive features enable children to become familiar with digital tools earlier than previous generations.

When integrated with developmentally appropriate practices, digital technologies stimulate early learners’ holistic growth across learning domains (Rousey, 2020). However, negative attitudes, limited confidence, and inadequate training among teachers and parents continue to hinder effective technology integration. Pongsakdi, Kortelainen, and Veermans (2021) stress that enhancing teachers’ digital pedagogical skills through targeted in-service training is essential for improving instructional productivity and learner engagement.

The pathway to acquiring appropriate digital technology education for early learners in Liberia involves aligning policy with practice, building digital capacity among educators and parents, and ensuring equitable access to safe, developmentally appropriate technologies. By doing so, Liberia can nurture a generation of early learners who are not only technology users but also creative, and critical thinkers ready to participate as global digital citizens.

Purpose of the Study

The purpose of this study is to critically examine the pathway to acquiring appropriate digital technology education for early learners in Liberia by exploring the perceptions, experiences, and capacity needs of early childhood teachers and parents. Additionally, investigate the appropriate use of digital technology by learners under the age of six and the possible implications for early year pedagogy in Liberia. Digital Technology are widely used in childhood education (ECE) in various forms to support the development of young children’s emergent skills in language and literacy, art, science, engineering, mathematics, and play (LASTEM). Acquiring appropriate digital technology education during early childhood, benefits children in all domains of learning,

especially cognitive domain, where children learn critical thinking, and problem-solving skills to effectively face the complex challenges in the future. Review of cross-section of related literature show that many parents and teachers are unsure of how to choose appropriate e-learning activities for certain aspects of early language and emergent literacy (Korat & Segal-Drori, 2016) and, indeed, e-learning EC programs with different digital technologies have shown varying degrees of effectiveness in improving young children's language and literacy skills in experimental studies (Verhoeven et al., 2020). For parents and teachers to better utilize digital technologies for early learner, they must learn and acquire the appropriate skills to be able effectively use digital technology. The passive use of digital technology will not help children learn interactively with the digital technology device(s). In the context of instructional use and benefits, there key content areas such as Language and Literacy Skills, Art skills, Science, Technology, Engineering, and Mathematics, and Play-Based Learning knowledge and skills (Bird, J., & Edwards, S., 2015), of which researcher coins the acronym as LASTEMP curricular, that benefit young learners. When digital Technology is use appropriately in these content areas, it builds up children's skills. As young children grow from infancy to preschool age, they naturally develop skills in LASTEMP together. The neurons that are responsible for children skills in LASTEMP curricular are built up in the brain. The role of a mature or experienced adult such as parents, teachers and caregiver is needed to tap upon these skills to help the child to acquire the skills (Vygotsky, L., & Cole, M., 2018).

Problem Statement

Despite global recognition of digital technology as a catalyst for enhancing learning experiences in early childhood education (ECE), Liberia continues to face challenges in integrating technology appropriately within early learning environments. Although national education policies, such as the Liberia National Inter-Sectorial Policy on Early Childhood Development (2021) and the Education Reform Act (2011) emphasize quality, inclusive, and equitable early education, there remains a gap between policy intentions and practical classroom realities. Many early childhood educators and parents lack adequate digital literacy skills to guide young learners' effective and safe engagement with technology. Moreover, while some studies suggest that technology can make learning fun, foster creativity, and support developmental outcomes, concerns persist about the appropriateness of available digital content and the capacity of teachers to use these tools effectively.

Findings from this study reveal that although technology is widely perceived as engaging and beneficial, a large proportion of teachers require additional training to integrate it meaningfully into instruction. Furthermore, inconsistencies in perceptions regarding the developmental suitability of digital materials highlight a pressing need for guidance and professional support. Therefore, the problem lies not in the availability of technology itself, but in how effectively it is used to enhance early learning outcomes in Liberia's ECE settings.

Objectives of the Study

The study sought:

1. To examine teachers' perceptions of digital technology as a tool for enhancing engagement, creativity, and developmental appropriateness in early learning.
2. To assess the extent to which digital tools support teachers in planning, organizing, and evaluating children's learning progress, including the challenges of access.
3. To determine teachers' professional development needs and propose strategies for building digital competence and promoting effective technology integration in early childhood education programs in Liberia.

Research Questions

The study focused on addressing the following research questions:

1. What are early childhood teachers' perceptions of the role of digital technology in making learning engaging, creative, and developmentally appropriate for young children?

2. To what extent do digital tools assist teachers in planning, organizing, and assessing children's learning, and what challenges do they face in accessing quality devices and reliable internet?
3. What professional development needs and capacity-building strategies are required to enhance teachers' effective use of digital technology in early childhood education in Liberia?

Significance of the Study

The findings of this study provide valuable insights for policymakers, educators, and curriculum developers in aligning Liberia's early childhood digital education practices with national and international standards, such as UNESCO's ECCE Framework and Agenda 2063. Results from the study indicate that most teachers recognize the positive role of technology in making learning engaging, fun, and creative for young children. This evidence supports the need for continued policy efforts to integrate digital learning into early childhood education and ensure that implementation reflects both global best practices and Liberia's educational priorities.

The study further highlights a significant gap in teachers' digital competence and professional readiness. Although access to quality devices and reliable internet is generally sufficient in urban and suburban communities, the majority of respondents expressed a strong need for additional training and the availability internet to effectively use digital technology in the classroom. This underscores the importance of targeted professional development programs that enhance teachers' digital literacy and confidence, thereby improving instructional quality and learner engagement across early learning settings in urban and rural communities.

Additionally, the study emphasizes the need for developmentally appropriate digital materials and stronger collaboration between parents and educators. Respondents were divided on the suitability of existing digital resources, indicating the necessity of carefully selecting or designing content that supports holistic child development in Literacy, Art, Science, Technology, Engineering, Mathematics, and Play (LASTEMP) areas. By involving parents in digital literacy initiatives, the study promotes a home-school partnership that reinforces responsible and effective technology use. Overall, these findings contribute new knowledge to early childhood digital education in Liberia and offer practical recommendations for improving policy, practice, and research.

REVIEW OF RELATED LITERATURE

This literature review explores how digital technologies support children develop skills in language, literacy, arts, science, technology, mathematics and play (LASTEMP).

Digital Technology builds young children's language and literacy skills.

According to Monica Turturean (2015), parent education is one of the most important family literacy which follows to help parents to improve their skills, becoming the primary teacher for their children, and to learn them to be full partners in the education of their children. For his perspective on role of education in children's lives, Martin Luther stressed that parents have the primary role of education their children (Arnold, M. (2019) to be able to read on their own so that they would have independent access to the holy scriptures in the Bible (Luther, M. (1530). Teachers also have the responsibility of becoming digital literate in the technological age as they have new responsibilities and new tools teaching language and literacy.

In her review on how digital technology can support language and literacy outcomes in years settings, Billington, (2016), reported that there is an emerging body of largely small-scale work that shows that technology can have a positive impact on literacy outcomes such that young children use of tablets can support increased alphabetical knowledge, awareness of print concepts and emergent writing in pre-school children (Nuemann and Neumann, 2014). There are software that targets early literacy skills such as letter recognition, phonemic awareness, vocabulary, and comprehension skills (Kharashi, 2019).

Billington in the review presented the four research evidences how digital technology builds children's language and literacy skills. First, children should have access to a wide range of digital technologies, both at home and in the learning environment including the use of tablet and touch screen devices (2016). Second, at home parents

should embed digital technology effectively within their pedagogy to promote young children's language and literacy skills, based on the available research and what we know about how children acquire language and literacy skills (Murcia, Campbell, Aranda (2018). Third, digital technology should be used to support the sharing of information with parents about ways they can support their child's language and literacy development skills and share good practice, literacy methods or resources such as the social media and email and modeling with storytelling or sharing nursery rhymes. Fourth, practitioners should support parents to use digital technology to encourage their child's language and literacy skills (Billington, 2016). Plowman (2015) recommends that since children model their parent's behavior around the use of technology, parents should scaffold and supporting technology use with children in everyday life. Donahue (2014), in his book on Family engagement in the digital age, "argues that we need to consider building digital literacy skills of parents to encourage language development and literacy skills of their children." The use of digital Technology can help young children to develop vocabulary skills. Appropriate conditions and suitable materials such as talking toys can inspire young children to learn a new language effortlessly Clark, M. (2013). Such technology can be used as an engaging, supplementary tool to foster vocabulary learning for young children (Güngör, B. (2018). Güngör recommends that with these teachers should create learning environments that focus on oral language skills to develop vocabulary and incorporate technological tools (2018). Using digital technology in early childhood settings requires teachers to prepare themselves to use technology in early childhood language instruction; for instance using the interactive white board, also known as a Smart Board, which is now more common to use in early childhood instruction because it helps to enhance learning and teaching (Kharashi, 2019).

Digital Technology Builds Young Children's Arts Skills

According to Laverick, D. (2015), teaching with technology and interactive media help to promote creativity and arts-based learning in young children while Leung, Choi, and Yuen (2020) confirm visual arts give children a powerful language with which to express themselves aesthetically, cognitively and creatively through the use of symbolic representations.

Citing a recent study by number of international scholars, showed how digital Technology relate to children's learning experiences at school, arguing that open-ended digital devices such as tablet computers, cameras and video recorders, may allow children to produce more creative content, such as drawings, photos and films (Laverick, 2015). In an article on art Technology Integration, Victoria Pavlou (2020) believes the emergence of new media provides new tools for promoting critical thinking and creativity in an environment that encourages collaboration, co-authoring and sharing ideas and artworks with audiences. Embedding new media in art lessons and integrating art with other disciplines not only promotes visual competence but also transversal competences necessary for the future lives of children. Despite the many benefits that this process entails, there is still no broad integration of new media in art lessons or art integration through technology in primary schools, as teachers are often oblivious of the new possibilities and means of engaging children

Digital Technology Builds Young Children's STEM Curricular Skills

Some theorists have profoundly asserted that children are natural scientists and if this assertion is true the answer to the question "Do young children naturally develop the foundations of science, technology, engineering, and math (STEM)? And should teachers and parents use STEM curricular to build early learners skills? Douglas and Sarama (2016), in their response to the argument about teaching Math, Science, and Technology in the Early Grades asserted that, first young children possess a sophisticated informal knowledge of math, which enable them to frequently ask scientific questions, such as why questions. Second, during free play early learners involve into substantial amounts of foundational math as they explore patterns, shapes, and spatial relations; compare magnitudes; and count objects. Hence, early learners' knowledge of and interest in math and science predicts later success in STEM (Douglas H. Clements and Julie Sarama, 2016). With the belief that young children naturally develop the foundations of science, technology, engineering, and math (STEM), education stakeholders should develop a framework that will give teachers the pedagogical skills to teach STEM curricula using digital technology in early grades to build and enhance their skills since it predicts later success in STEM. Clements and Sarama (2016) emphasized that building young children's digital technology skills in STEM learning must encompass more than facts or simple skills; rather, the classroom should be filled with interesting,

appropriate technology to engage in math and science that follow research-based learning paths that include a goal, a developmental progression, and instructional activities.

Digital Technology Develops Young Children Skills through Play-Based Learning

The role of play in the life of children cannot be overemphasized. When a parent or teacher takes away play from children, you take away their wellbeing. In the American Journal of Play, Hinitz (2023) agrees with Montessori that play is children's work, nevertheless, one should view play from many perspectives, and that is, from all parts of the curricular spectrum, beginning with the "free" or "natural" school of ... Digital Technology is increasingly acknowledged as an important aspect of childhood education. A significant problem for childhood education has been how to understand the pedagogical use of technology in a sector that values play-based learning (Edwards, S., 2013; Roberts, P., & Knaus, M., 2023). This study presents a new framework to understand how children learn to use technology through play. The Digital Play Framework presents a series of indicators for how children learn to use Technology as cultural tools, first by exploring the functionality of Technology through epistemic activity, and second by generating new content through ludic activity (Leung, S. K., et al., 2020; Loudoun, F. M., 2024).

Digital Technology for Inclusive Excellence and Equity

In his research paper on "Future of Digital Education and the Role Of Inclusive Education and Equity," Siddiqi (2024) asserted that the diverse needs of learners in a world that is increasingly interconnected and technologically advanced, promoting inclusivity, digital education stand as out as a tool to bridge gaps and offer access to high-quality learning opportunities for individuals from various socio-economic backgrounds, locations, and abilities. In their recent work on promoting quality inclusion in early childhood care and education, the authors emphasized that inclusive practices should be utilized in Early Childhood Care and Education (ECCE) settings to promote equitable and inclusive learning experiences for all children (Soukakou, E., Dionne, C., & Palikara, O. (2024, February). While this paper emphasizes acquiring appropriate digital Technology by early learners in Liberia under the age of six, it is therefore expedient to include early learners with disabilities. Therefore, providing access with equity should not be ignored by parents, teachers, and civil authority. These learners need assistive technologies at home and school. Assistive technology devices are those devices that are designed to specifically help a student with learning (Boyd, B. F. 2008; Lohmann, M. J., et al., 2019). Parents and teachers must ensure that assistive and instructional digital technology devices, such as pencil grips, typoscopes, text magnifiers, tape recorders, Readers, and braille are available (Ahmad, F. K., 2015; Tamakloe, D., & Agbenyega, J. S., 2017). Others are text-to-speech - a computer voice that reads text aloud for people with visual or reading disabilities and speech-to-text-a computer software that types words as they are spoken. These assistive technology devices are useful for individuals who have some forms of learning disabilities (Lewis, R. B., & Lewis, R. B. (1998).

Online Safety for children use of digital technology and Digital Citizenship

Digital technologies are an integral part of children's daily lives, which presents both opportunities and risks for them. While not all online risks may necessarily lead to harm (Livingstone, 2013), it is still crucial to equip children and young people with the necessary knowledge and skills to navigate the digital world safely and responsibly (Cortesi et al., 2020). Digital-based learning is a well-established way to encourage safer online behavior among children and young people.

Livingstone and Smith (2014) define harm in the context of online risks as a probabilistic outcome, which is not inevitable for every encounter with online risk. They suggest conceptualizing online risks as affording harm, where harm depends on various contingencies. Nwachukwu, (2023), takes a comprehensive approach, emphasizing the importance of safeguarding personal and sensitive information and being aware of and mitigating various online risks like cyber bullying, identity theft, and exposure to inappropriate content. This underscores the significance of digital literacy and responsible online behavior. By practicing positive online behavior, children and young people can decrease their risk of harm and increase their self-efficacy and resilience. While there is some overlap between cyber security and online safety, this study uses the terminology of online safety to align with the literature on education regarding internet harms. Children are a vulnerable

segment of society. For instance, cyber bullying, misinformation and risks associated with artificial intelligence (AI) (Campbell et al., 2025) are some of the recent online risks towards children and young people in recent years. As children engage more with online digital technology education platforms, it is crucial to adopt relevant and engaging online safety education to protect them from online risks and harms.

RESEARCH METHODOLOGY

A mixed-methods research strategy was used in the study. To examine the variations across the groups' replies, the Likert scale responses were cross-tabulated with participant demographic and experience data. The study focused on eight schools in the Sanniquellie-Mahn and Bain-Garr Districts of Nimba County to investigate how parents/caregivers and educators felt about early learners in Liberia under the age of six obtaining appropriate digital technology and the potential ramifications for early childhood education in the country.

The results showed that 78.3% of respondents strongly believe that digital technology frequently or constantly fosters children's creativity and curiosity, while 11.7% believe that it does so infrequently or never. This suggests that digital technology is generally regarded as a useful tool for encouraging children's imaginative thinking and exploration. The target demographic consisted of 80 persons who are employed as instructors and parent/caretakers in both public schools and home-based learning centers. Of these, 37 were female and 43 were male, representing the eight schools.

A questionnaire of 16 items was used to gather data; two open-ended questions and the bulk of Likert-type items based on a scale from "Never True" to "Rarely True," "Sometimes True" to "Often True," and "Always True" was included. The Likert scale was employed by the researcher to gauge the opinions, convictions, attitudes, and incentives of survey participants about the appropriate use of digital technology by early learners. Thirty-three men and twenty-seven women comprised the 60 respondents selected, which included five school principals from four public schools and four home-based learning centers, 31 classroom teachers, three co-teachers, and twenty-one parents/caregivers.

Every ethical concern was taken into account in this study. Participation in the study was optional, and participants were advised by the researcher of their freedom to leave at any time without incurring any fees. Each participant signed an informed permission form, and confidentiality of information was guaranteed for both data handling and outcome publication.

The researcher used the Statistical Package for the Social Sciences (SPSS) version 22 to analyze the data. Demographics, backgrounds, roles of respondents, years of experience, inclusion of early learners, the benefits of digital technology devices, and appropriate use were all described in the study using descriptive statistics (frequencies and percentages) to determine the outcomes of the survey.

RESULTS/DISCUSSION

This study looked at the prospect of science, technology, engineering, and mathematics (STEM) in education, with emphasis on the pathway to acquiring appropriate digital technology education for early learners in Liberia under the age of six. It also looked at how parents/caregivers and teachers in the Sanniquellie-Mahn and Bain-Garr Districts of Nimba County view the proper use of digital technology in early childhood education. In order to ascertain the likely values for ECE pedagogy in Liberia, it identifies respondents' strengths, challenges, and support requirements for using digital technology with children under six years of age.

Demographic Characteristics of Respondents

The researcher gathered demographic data from participants, including gender and school type. These variables helped to contextualize the study participants' working settings in the Sanniquellie-Mahn and Bain-Garr Districts of Nimba County and provided a thorough understanding of the study subjects.

Table 1: Demographic Characteristics of Respondents

Variable	Category	F	(%)
Gender	Male	33	55.0
	Female	27	45.0
	Total	60	100
Name of School	Zolowee Home-based Learning Center	8	13.3
	Sehkeinpa Home-based School	11	18.3
	Zuluyee Home-based School	7	11.7
	Zuluyee Public School	4	6.7
	Neingbein Home-based School	6	10.0
	Zolowee Public School	7	11.7
	Sehkeinpa Public School	8	13.3
	Neingbein Public School	9	15.0
	Total	60	100
Role in School	Classroom Teacher	31	51.7
	Co-Teacher	3	5.0
	Parent/Caregiver	21	35.0
	Principal	5	8.3
	Total	60	100
Years of Experience	1–3 years	26	43.3
	4–7 years	8	13.3
	8–11 years	7	11.7
	12 years and above	19	31.7
	Total	60	100

Source: Field Data (2025)

Table 1 revealed a slight male dominance, with 55% males and 45% females. This near balance reflects a fair gender representation, suggesting that both male and female perspectives were adequately captured, thereby enhancing the reliability and inclusiveness of the study's findings.

The table further indicates that respondents were drawn from eight schools, comprising both home-based learning centers and public schools. The largest proportion came from Sehkeinpa Home-based School (18.3%), while the least came from Zuluyee Public School (6.7%). This distribution demonstrates broad institutional representation, ensuring that the data reflect experiences across different educational settings and community-based learning environments.

The table further established that the majority of participants were classroom teachers (51.7%), followed by parents/caregivers (35%), principals (8.3%), and co-teachers (5%). This result indicates that most respondents were directly involved in teaching and learning processes, with a supportive contribution from caregivers and administrators. The variety of roles strengthens the study's perspectives on school operations and instructional practices.

The finding on respondents' professional experience varied, with 43.3% having 1-3 years and 31.7% having 12 years or more. Those with 4-7 years (13.3%) and 8–11 years (11.7%) formed smaller groups. This pattern reveals a mix of novice and experienced educators, suggesting that the study incorporated both fresh perspectives and long-term professional insights.

The demographic characteristics portray a diverse and representative sample, encompassing balanced gender participation, wide school coverage, varied professional roles, and differing levels of experience. This diversity enhances the validity and depth of the research findings, providing a comprehensive understanding of the respondents' backgrounds and their implications for early learning and educational practices.

Table 2: Technology helps make learning fun and engaging for young children

Responses	F (%)
Never True	3 (5)
Rarely True	8 (13.3)
Sometimes True	27 (45)
Often True	1 (1.7)
Always True	21 (35)
Total	60 (100)

Table 2 indicates that most respondents perceive technology as a helpful tool for making learning fun and engaging for young children. While 45% say, it is *sometimes* effective and 35% say it is *always* effective, a smaller portion (18.3%) feel it is *rarely* or *never* effective. Overall, the data suggests that technology generally enhances children's learning experiences, though its impact may vary.

Table 3: Digital tools would help me plan, organize, and assess children's learning progress

Reponses	F (%)
Never True	7 (11.7)
Rarely True	12 (20)
Sometimes True	21 (35)
Often True	9 (15)
Always True	11 (18)
Total	60 (100)

Respondents have a moderate perception of digital tools' usefulness in planning, organizing, and assessing children's learning. While 35% view them as *sometimes* helpful and 33% see them as *often* or *always* helpful,

about 31.7% believe they are *rarely* or *never* helpful. Overall, digital tools are seen as beneficial, but their effectiveness is not universally recognized.

Table 4: Technology encourages children's curiosity and creativity.

Responses	F (%)
Never True	1 (1.7)
Rarely True	5 (8.3)
Sometime True	7 (11.7)
Often True	18 (30)
Always True	29 (48.3)
Total	60 (100)

Most respondents (78.3%) believe that technology *often* or *always* encourages children's curiosity and creativity, indicating a strong perception of its positive impact. Only a small proportion (11.7%) feels it is *rarely* or *never* effective, showing that technology is generally seen as a valuable tool for stimulating exploration and imaginative thinking in children.

Table 5: Access to quality devices and reliable internet is a challenge in my setting.

Responses	F (%)
Never True	48 (80)
Rarely True	12 (20)
Total	60 (100)

The majority of respondents (80%) do not view access to quality devices and reliable internet as a challenge, while a smaller portion (20%) rarely have trouble. Overall, access to technology and internet connectivity is generally sufficient in their setting.

Table 6: Need additional training to effectively use digital technology with young learners.

Responses	F (%)
Rarely True	6 (10)
Sometimes True	5 (8.3)
Often True	5 (8.3)
Always True	44 (73.3)
Total	60 (100)

A large majority of respondents (73.3%) feel they *always* need additional training to use digital technology effectively with young learners, indicating a strong demand for professional development. Only a small proportion (26.6%) feel the need is occasional or minimal.

Table 7: Many available digital materials are not developmentally appropriate for early learners

Responses	F (%)
Not True	19 (31.7)
Rarely True	11 (18.3)
Some Times True	10 (16.7)
Often True	9 (15)
True	10 (16.7)
Total	60 (100)

Respondents were divided on the developmental appropriateness of digital materials for early learners. Half believe some materials are *sometimes, often, or always* inappropriate, while the other half (*not true* or *rarely true*) feel they are generally suitable. This highlights a need for careful selection of age-appropriate digital resources.

The researcher gathered demographic information from instructors and parents/caregivers, including respondents' years of experience, gender, school type, and positions in their schools. Data collecting also covered the advantages and usage of digital technology and related gadgets by early learners, as well as the problems and training requirements of using digital technology in a developmentally appropriate manner. These factors provided a thorough comprehension of the study of participants' perceptions of the instructional use and advantages of digital technology use in the first five years of children's lives in the Nimba County districts of Sanniquellie-Mahn and Bain-Garr.

Respondents Place of Assignment in the Nimba County districts of Sanniquellie-Mahn and Bain-Garr.

Of the sixty respondents in the sample, thirty-two were from public early learning centers and thirty-two were from four home-based centers. There were 60 valid responses overall, including 33 male and 27 female responses. With 55% of respondents being men and 45% being women, there is a significant gender gap in the survey, suggesting that men participated in it at a slightly higher rate.

These seven elements show that the first step in providing early learners in Liberia with an appropriate digital technology education is changing the way parents and educators see the usage of digital technologies in early childhood settings. To help young children build competences throughout the Literacy, Art, Science, Technology, Engineering, Mathematics, and Play (LASTEMP) curriculum areas, both groups need to receive sufficient training.

According to the research's findings, the majority of parents and caregivers are open to receiving training on how to utilize digital tools appropriately so they may effectively instruct early learners under six in different digital technologies.

CONCLUSION AND RECOMMENDATIONS

Early learners in Liberia are citizens of the global digital community; therefore acquiring appropriate digital technology education for young learners in Liberia under the age of six is an imperative. The study concludes by offering a thorough examination of the prospects of science, engineering, and technology in education, with emphasis on the appropriate use of digital technology in the early years. Data gathered from a sample of 60 participants (parents/caregivers and instructors) from a variety of demographic groups shows that early learners use digital technology with considerable benefits. There is a high desire for professional development, as seen by the vast majority of respondents (73.3%) believing they constantly require more training in order to use digital

technology with young learners. Just 26.6% of respondents believe the need is infrequent or negligible. The use of digital technology and interactive media with young children in a developmentally appropriate early childhood education classroom also highlights issues and the need for training (Donohue, C. Ed., 2014; Mantilla, A., & Edwards, S., 2019; Demirtaş İlhan, S., 2023). These results are in line with earlier studies that showed a high need for professional development to enhance instruction and learning as well as the responsible use of digital technology with young children (Ogegbo, A. A., & Aina, A., 2020). The Government of Liberia through the Ministry of Education and in collaborating ministries should foster an holistic approach that mitigate the acquisition of appropriate digital education by Liberia citizens under the age of five years. This will place Liberian children at the competitive with other children in the global community.

In view of the findings, first, the study recommends that parent/caregiver and teachers acquire knowledge and skills in use of appropriate digital technology for young children including children with disabilities. Second, the Ministry of Education must ensure provision of developmentally digital technology resources and support at early learning (ECE) centers in all school districts in Liberia. And lastly, the provision of safety and ethical use of digital technology more appropriately and effectively with young children to become digital technology citizens and that screen time for early learners should be limited and balanced with physical activities and social interaction.

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