

**A STUDY OF THE ADOPTION OF ICT IN EARLY CHILDHOOD  
LEARNING IN NIGERIA**

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**BENIN CITY, EDO STATE.**

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**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF  
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CITY, EDO STATE, NIGERIA.**

**MAY 2024**

## **APPROVAL**

This Project is hereby approved in partial fulfillment of the requirements for the award of  
Bachelor of Science (B.Sc.) Degree in computer science at the University of Benin, Benin City

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**Prof. Mrs. F. Egbokhare**  
**(PROJECT SUPERVISOR)**

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**DATE**

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**Prof. Godspower O. Ekuobase, Ph.D**  
**(HEAD OF DEPARTMENT)**

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**DATE**

## **DECLARATION**

This is to declare that this research project titled “A STUDY OF THE ADOPTION OF ICT IN EARLY CHILDHOOD LEARNING IN NIGERIA” is solely the result of my work except where acknowledge are being derived from other resources or person.

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**Onoriode Oghenetega Precious**  
**PSC1506307**

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**Date**

## **CERTIFICATION**

This is to certify that this research project titled “A STUDY OF THE ADOPTION OF ICT IN EARLY CHILDHOOD LEARNING IN NIGERIA” was carried out by ONORIODE OGHENETEGA PRECIOUS with Matriculation number PSC1506307 in the Department of Computer Science under the supervision of PROF. MRS. F. EGBOKHARE as been prepared in accordance with the regulation governing the preparation of project in the Faculty of Physical Sciences, University of Benin, Benin City, Edo State.

Signature: \_\_\_\_\_

PROF. MRS. F. EGBOKHARE

(Project Supervisor)

\_\_\_\_\_

Date

## **DEDICATION**

This work is dedicated to God Almighty for His strength, wisdom, understanding, love, protection, inspiration and guidance He granted me throughout my course of study.

## ACKNOWLEDGEMENT

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## Abstract

This study examined the adoption of Information and Communication Technology (ICT) in early childhood learning in Nigeria through the development and evaluation of an interactive educational system designed for kindergarten children. The study was motivated by the challenges associated with traditional teaching methods, including limited learner engagement, inadequate educational resources, and the need for innovative approaches to enhance literacy development among young learners. The primary objective was to develop an interactive educational database that supports alphabet learning and promotes literacy skills through engaging, child-friendly activities. A survey research design was adopted, and data were

collected using structured questionnaires administered to teachers in selected public and private schools in Edo State, Nigeria. A total of 25 valid responses were analyzed using descriptive statistics. Findings revealed that teachers strongly support the integration of interactive educational technologies into kindergarten education, with all respondents agreeing that such systems can enhance learner engagement and learning outcomes. The study also identified major challenges facing kindergarten education, including inadequate funding, insufficient infrastructure, and lack of technical support. Based on the findings, an interactive educational system was designed and implemented using the MERN stack (MongoDB, Express.js, React.js, and Node.js). The system incorporates interactive games, colorful graphics, personalized learning features, and curriculum-aligned educational content. The study concludes that ICT-driven educational systems have significant potential to improve early childhood learning in Nigeria by making learning more engaging, accessible, and effective. It recommends increased investment in educational technology infrastructure, teacher training, parental involvement, and the development of culturally relevant digital learning resources to support the successful adoption of ICT in early childhood education..

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background of the Study**

Early literacy development is fundamental to a child's academic success. Mastering the alphabet is the cornerstone upon which reading and writing skills are built (Moats, 2009). This project proposes the development of an engaging and interactive database application designed to teach kindergarten children the alphabet in a fun and stimulating way.

Research has consistently shown a clear link between early alphabet recognition and later reading fluency (National Early Literacy Panel, 2008). Children who develop strong phonemic awareness and grasp letter-sound relationships have a distinct advantage when they embark on their reading journey. This project aims to capitalize on this critical learning window by providing an interactive tool specifically designed for kindergarteners to solidify their alphabet knowledge and foster a love for learning.

The integration of technology into kindergarten classrooms has demonstrated promising results in enhancing student engagement and fostering early literacy skills (Lai et al., 2018). Educational applications offer a dynamic and personalized learning experience, catering to diverse learning styles and allowing children to explore concepts at their own pace. This project proposes a database-driven application that surpasses static content by offering a variety of engaging activities for each letter of the alphabet. These activities could include tracing exercises for letter formation, matching games to reinforce letter recognition, and sound identification activities to strengthen phonemic awareness.

However, a critical analysis of existing alphabet learning applications reveals limitations. Many applications rely solely on rote memorization, failing to cater to the diverse learning styles present in kindergarten classrooms (Chen et al., 2018). Furthermore, accessibility features like

audio narration for visual learners or adjustable text size are often absent, hindering inclusivity (Mussel & Dyson, 2019). This project aims to address this gap by creating an application that incorporates activities that cater to visual, auditory, and kinesthetic learners. For example, visual learners might benefit from animations or brightly colored graphics, while auditory learners might thrive with interactive sound effects and spoken instructions. Kinesthetic learners could be engaged through tracing exercises or touch-based activities. Additionally, the database will prioritize accessibility features, ensuring all children, regardless of learning style or ability, can benefit from the application.

This project offers several potential benefits. Firstly, the interactive and engaging nature of the application can make learning the alphabet more enjoyable for children, fostering a positive association with learning from a young age. Secondly, the personalized learning approach can cater to individual needs and learning styles, ensuring all children progress at their own pace and feel a sense of accomplishment. Finally, the application can serve as a valuable tool for teachers to supplement their instruction and assess student progress in a fun and engaging way.

## **1.2 Problem Statement**

Despite the recognized significance of early literacy skills, a notable challenge persists among kindergarten children in Nigeria regarding the acquisition of alphabet knowledge through conventional teaching methodologies. The predominant methods of rote memorization and repetitive drills often fail to captivate the attention of young learners, resulting in limited retention and understanding of letter-sound relationships.

Existing educational resources tailored for alphabet instruction in kindergarten settings frequently lack interactivity and struggle to accommodate the diverse learning needs of children. Educators are confronted with the daunting task of discovering effective and stimulating

approaches to introduce alphabets to their young students, particularly in an era where digital technology assumes an increasingly pivotal role in educational practices.

Moreover, there exists a pressing necessity for educational tools that not only impart alphabet knowledge but also offer avenues for active practice and reinforcement. The scarcity of access to high-quality educational materials further compounds educators' challenges, impeding their ability to deliver effective alphabet instruction and foster literacy development within kindergarten classrooms.

Hence, the primary issue addressed by this project is the dearth of engaging and interactive educational resources specifically designed for teaching alphabets to kindergarten children in Nigeria. Through the development of a bespoke educational system tailored to meet these unique requirements, the project endeavors to equip educators with a comprehensive toolset capable of enriching the learning experience and advancing literacy development among young learners.

### **1.3 Aim and Objectives**

#### **Aim**

The aim of this study is to develop an interactive educational system tailored to the needs of kindergarten children in Nigeria.

#### **Objectives**

1. To develop an interactive educational database optimized for teaching alphabets to kindergarten children, ensuring user-friendly navigation and engagement.
2. To evaluate the effectiveness of the educational database in promoting alphabet learning and literacy skills among kindergarten children, through user feedback and assessment data.

3. To assess the usability and practicality of the educational database for educators, considering factors such as ease of implementation, integration into existing curriculum, and alignment with educational standards.

#### **1.4 Scope of the Work**

The project's primary focus is on developing an interactive educational database tailored for kindergarten alphabet learning. This database will boast a user-friendly interface designed to engage young learners effectively. It will incorporate multimedia elements such as animations to reinforce alphabet recognition. Educators will gain access to a plethora of comprehensive resources within the database, facilitating effective instruction and literacy development in the classroom.

Overall, the project aims to revolutionize kindergarten alphabet instruction by leveraging technology to create an engaging and effective learning tool. By providing educators with a comprehensive educational resource, it seeks to foster a love for learning and lay a solid foundation for academic success among kindergarten children. Through collaboration, evaluation, and ongoing refinement, the educational database will evolve to meet the changing needs of early childhood education, supporting educators and empowering young learners on their educational journey.

#### **1.5 Significance of the Study**

This study on the development of an interactive educational database for teaching alphabets to kindergarten children holds significant importance within the field of early childhood education and technology integration. It aims to address several critical aspects, contributing to the enhancement of early childhood learning experiences.

Firstly, the project seeks to enrich the learning journey of kindergarten children by providing them with engaging and interactive educational tools. Traditional methods of alphabet instruction

may sometimes fall short in capturing the attention of young learners. By incorporating multimedia elements and user-friendly interfaces, the database endeavors to create a dynamic and immersive learning environment that fosters a positive attitude towards alphabet learning. Moreover, the study acknowledges the challenges faced by educators in effectively engaging young learners in alphabet instruction. Through the provision of innovative resources within the database, educators are empowered to enhance their teaching practices and support literacy development in their students. By equipping educators with comprehensive teaching materials, the project aims to improve the effectiveness of alphabet instruction in kindergarten classrooms. Furthermore, the significance of this study extends to its contribution to the overall literacy development of kindergarten children. Alphabet proficiency is fundamental to literacy development in early childhood, serving as the cornerstone for future reading and writing skills. By focusing on enhancing alphabet recognition and pronunciation skills, the database aims to lay a strong foundation for the literacy journey of young learners. Additionally, the study underscores the importance of integrating technology into educational practices. In today's digital age, technology plays a vital role in enhancing learning experiences and preparing children for the future. By embracing technology and leveraging innovative educational approaches, educators can create engaging and effective learning experiences that cater to the diverse needs of young learners.

This study holds significant implications for early childhood education, offering valuable insights into the integration of technology into alphabet instruction for kindergarten children. Through the development of an interactive educational database, the project aims to enhance the learning experiences of young learners, support educators in their instructional efforts, and

promote literacy development in kindergarten classrooms. By embracing technology and innovation, this study contributes to the advancement of early childhood education practices and the cultivation of lifelong learning skills in young children.

## **1.6 Methodology**

This section outlines the structured approach employed, utilizing Structured Systems Analysis and Design (SSAD) methodology, for the development of the interactive educational system tailored to the needs of kindergarten children in Nigeria. Additionally, the methodology includes the study of existing methods through interviews and observations. The technology stack chosen for development is the MERN stack (MongoDB, Express.js, React, Node.js).

### **Preliminary Investigation:**

The initial phase involved conducting interviews and observations in diverse kindergarten settings across Nigeria. Utilizing SSAD principles, this phase aimed to understand existing educational methods and practices. Data collected through interviews and observations provided valuable insights into the challenges faced by teachers and opportunities for improvement in early childhood education.

### **Feasibility Study:**

A feasibility study was conducted to assess the viability of developing an interactive educational system for kindergarten children in Nigeria within the SSAD framework. This involved evaluating available resources, analyzing technological infrastructure, and considering educational expertise. Additionally, SSAD techniques were employed to identify potential risks and constraints impacting system development and implementation.

### **System Analysis:**

Structured Systems Analysis was employed to gather requirements through continued interviews with kindergarten teachers, educational experts, and stakeholders. SSAD methodologies

facilitated the development of use cases, data flow diagrams, and other modeling techniques to capture system functionality. The analysis phase focused on understanding user needs and defining system requirements.

### **System Design:**

Utilizing SSAD principles, the system architecture was designed to accommodate the specific needs of kindergarten children in Nigeria. Detailed design specifications for the user interface, educational content, and interactive features were developed. Stakeholder feedback was incorporated into the design process to ensure alignment with learning objectives and user preferences.

### **Prototype Development:**

Based on the SSAD design specifications, a prototype of the interactive educational system was developed using the MERN stack. Core features and functionalities were implemented iteratively, allowing for ongoing refinement based on stakeholder feedback. The prototype development phase aimed to demonstrate system functionality and usability in accordance with SSAD methodologies,

### **System Evaluation:**

The prototype underwent evaluation through usability testing sessions with kindergarten children and teachers. SSAD techniques were used to collect and analyze feedback on usability, engagement, and effectiveness in supporting learning objectives. Evaluation findings were utilized to refine the prototype iteratively, ensuring the final system met the requirements identified during the analysis phase.

## **1.6 Organization of the Project**

This project is organized into five chapters, each focusing on different aspects of the development and implementation of an interactive educational system tailored to the needs of kindergarten children in Nigeria.

This chapter provides an overview of the research topic, including the background, problem statement, objectives, significance, scope, and organization of the thesis.

Chapter 2 reviews existing literature relevant to interactive educational systems for kindergarten children, including theoretical frameworks, relevant studies, and the state of the art in Nigeria and globally.

Chapter 3 delves into the analysis and design phases of the interactive educational system. It explores the requirements analysis, design methodology, system architecture, and user interface design.

Chapter 4 discusses the practical implementation of the interactive educational system. It covers the technology stack selection, development process, coding, testing, and deployment.

Chapter 5 summarizes the findings of the research, draws conclusions based on the analysis, discusses contributions to knowledge, and provides recommendations for future work in this field.

Each chapter is structured to provide a comprehensive understanding of the development process and the implications of the interactive educational system for kindergarten children in Nigeria utilized to refine the prototype iteratively, ensuring the final system met the requirements identified during the analysis phase.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Introduction to Early Childhood Education**

Introduction to early childhood education (ECE) is multifaceted, encompassing diverse perspectives and approaches that shape the experiences of young children during their formative years. Massing and Matheson (2021) underscore the significance of an intercultural perspective in understanding ECE, emphasizing the importance of cultural diversity and context in shaping educational practices. Wood (2020) further highlights the dynamic nature of ECE, characterized by contestation, transformation, and re-conceptualization. These introductory insights provide a foundation for exploring the complexities and nuances inherent in early childhood education.

At its core, ECE is concerned with the holistic development of young children, encompassing their cognitive, social, emotional, and physical well-being. It recognizes the critical importance of the early years in laying the foundation for lifelong learning and development. Moreover, ECE acknowledges the diverse needs, backgrounds, and experiences of children, advocating for inclusive and equitable educational practices that cater to individual differences.

The intercultural perspective highlighted by Massing and Matheson (2021) emphasizes the need to respect and honor diverse cultural beliefs, values, and practices within early childhood settings. This perspective acknowledges that cultural context significantly influences educational philosophies, curriculum approaches, and pedagogical practices. By embracing cultural diversity, ECE practitioners can create inclusive learning environments that celebrate children's unique identities and promote cross-cultural understanding.

Wood (2020) draws attention to the dynamic nature of ECE, characterized by ongoing debates, shifts in educational paradigms, and evolving understandings of child development. This dynamic landscape prompts educators and researchers to engage in critical reflection, questioning traditional assumptions and exploring innovative approaches to early childhood pedagogy. It encourages a reconceptualization of ECE that challenges conventional notions and embraces new possibilities for enhancing children's learning experiences.

## **2.2 History of Early Childhood Care and Education (ECCE)**

The history of early childhood education (ECE) is a rich tapestry woven with diverse influences, philosophies, and practices that have evolved over centuries. Bodrova and Leong (2024) shed light on the Vygotskian approach to ECE, which emphasizes the role of social interaction, cultural tools, and scaffolding in fostering children's cognitive development. This approach draws on the theories of Lev Vygotsky, a renowned psychologist whose work has had a profound impact on ECE practices worldwide.

Traditionally, these practices were predominantly informal, relying on the involvement of family members, households, and communities. However, the formalization of these practices began to emerge in the nineteenth century with the establishment of kindergartens for educational purposes and day nurseries for childcare across various regions including Europe, North America, Brazil, China, India, Jamaica, and Mexico (UNESCO, 2017).

Vygotsky's theories, rooted in socio-cultural theory, highlight the importance of the social context in shaping children's learning experiences. According to Vygotsky, children's cognitive development is scaffolded through interactions with more knowledgeable peers and adults, who provide support and guidance to help them acquire new skills and knowledge. This perspective

underscores the significance of play-based learning, collaborative activities, and the use of cultural tools in ECE settings (Bodrova & Leong, 2024).

The history of ECE is influenced by various socio-economic and cultural factors that have shaped educational practices across different time periods and regions. Li et al. (2020) delve into the impact of timing in ECE programs, exploring how factors such as starting age, program duration, and time since the end of the program influence cognitive and achievement outcomes for young children. This research highlights the complexities of designing and implementing ECE programs that effectively support children's development and prepare them for future success.

Throughout history, ECE has undergone significant transformations in response to changing societal norms, educational philosophies, and scientific discoveries. From informal caregiver arrangements in ancient civilizations to the establishment of formal preschools and kindergartens in the 19th century, the evolution of ECE reflects society's evolving attitudes towards childhood, education, and the role of caregivers and educators (Li et al., 2020).

In conclusion, the history of early childhood education is a dynamic narrative shaped by a multitude of influences, theories, and practices. From the Vygotskian approach to socio-cultural theory, from ancient civilizations to modern-day research, the journey of ECE is marked by resilience, innovation, and a commitment to nurturing the potential of young children.

The initiation of state-driven expansion of early childhood care and education (ECCE) services originated in the Russian Federation during the early twentieth century, aligning with socialist ideals aiming to promote gender equality in both workforce participation and public life, while

also instituting public education from an early age (Marope & Kaga, 2015). This approach was adopted by other socialist or former socialist nations such as Cambodia, China, and Vietnam

The 1990s marked a significant turning point in the evolution of early childhood care and education (ECCE), largely spurred by the swift and consecutive ratification of the 1989 United Nations Convention on the Rights of the Child (CRC). This Convention, which explicitly refers to the child encompassing individuals under the age of 18 or the legal age of majority, reinforced the principles outlined in the 1960 UNESCO Convention and Recommendation against Discrimination in Education, which inherently should have encompassed young children. With its moral authority and widespread ratification, the CRC formally acknowledged children as rights holders, emphasizing their entitlement to survival and development, participation in decisions affecting them based on their evolving capacities, and protection from discrimination, with the overarching principle of their best interests. While recognizing the primary role of parents and legal guardians in child rearing and development, the CRC also mandates states to support them in fulfilling these responsibilities (Nunes, Corsino, & Didonet, 2010).

Another significant catalyst for the advancement of ECCE was the adoption of the World Declaration on Education For All (EFA) in March 1990 in Jomtien, Thailand. Aligned with General Comment 7, the Jomtien Declaration explicitly asserted that 'learning begins at birth' and advocated for 'early childhood care and initial education'. This groundbreaking acknowledgment of ECCE as an essential component of basic education was reiterated in the primary goals set forth at the 1990 UN World Summit for Children. A decade later, in 2000, this expanded perspective on basic education was reaffirmed in the Dakar Framework for Action on EFA, adopted at the World Education Forum, emphasizing comprehensive ECCE expansion, particularly for the most vulnerable and disadvantaged children, as the first of the six EFA goals.

Unfortunately, unlike other EFA goals, this objective was presented as broad and aspirational without specific numerical targets or clear benchmarks (Nunes, Corsino, & Didonet, 2010).

ECCE received additional reinforcement through the Millennium Development Goals (MDGs), albeit with some limitations. Established during the UN Millennium Summit in 2000,

two MDGs directly addressed early childhood development: (i) enhancing maternal health, aiming to reduce maternal mortality rates by three-quarters and ensure universal access to reproductive health services (MDG4), and (ii) reducing the under-five mortality rate by two-thirds between 1990 and 2015 (MDG5). Consequently, the health aspects related to children and mothers within ECCE became integral to a global initiative to address the needs of the world's poorest, while aspects concerning childcare and early education were not specifically addressed.

### **2.3 Existing Interactive Educational Systems**

Globally, there has been a growing recognition of the importance of early childhood education (ECE) in laying the foundation for lifelong learning and development. With advancements in technology, there has been a parallel shift towards integrating interactive educational systems into kindergarten settings worldwide. These systems encompass a wide range of digital tools, including educational apps, multimedia resources, and interactive platforms, designed to engage young learners and enhance their cognitive, social, and emotional development.

In South Africa, efforts are underway to address the diverse learning needs of students within the educational system. Smit, Preston, and Hay (2020) analyze the development of education for learners with diverse learning needs in the South African context, employing a bio-ecological systems analysis to understand the multifaceted factors influencing educational outcomes for students with disabilities.

Research presented in the *Advances in Social Science, Education, and Humanities Research*, volume 449, *Proceedings of the International Conference of Early Childhood Education (ICECE 2019)* by Zulfitriah ZR explores the use of multimedia technology in early childhood literacy, underscoring the importance of incorporating interactive multimedia tools to foster literacy skills among young learners (Zulfitriah, 2019). Similarly, studies have highlighted the

effectiveness of interactive educational systems in promoting language development, numeracy skills, and critical thinking abilities in kindergarten children across diverse cultural contexts.

In the United States, initiatives such as the PBS Kids Playtime Pad have gained prominence, offering young learners access to educational games and activities aimed at supporting their holistic development (PBS, 2023). Platforms like ABCmouse and Khan Academy Kids have also emerged as popular resources, providing comprehensive online learning experiences tailored specifically for young children. These platforms leverage interactive elements such as games, videos, and interactive lessons to engage learners and facilitate skill development (ABCMouse, 2023; Khan Academy, 2023).

Meanwhile, in Indonesia, efforts to harness interactive educational systems for kindergarten children have been notable. Government-led programs like the Indonesia Smart Learning Initiative emphasize the integration of technology into early childhood education, advocating for the use of interactive and multimedia-based learning materials to enhance student engagement and learning outcomes (Indonesia Smart Learning Initiative, 2023). Furthermore, research conducted by Zulfitriah ZR highlights the benefits of using multimedia technology to promote early childhood literacy in Indonesian kindergarten settings (Zulfitriah, 2019).

## **2.4 Relevance of Interactive Educational Systems in Nigeria**

The relevance of interactive educational systems in Nigeria is a topic of significant importance, particularly in the context of advancing educational outcomes and addressing the diverse needs of learners in the country. Nwankwo, Umezuruike, and Njoku (2020) explore the enhancement of learning systems through the incorporation of interactive intelligent components, shedding light on the potential of such systems to transform educational practices in Nigeria.

In recent years, Nigeria has witnessed a rapid expansion of its educational infrastructure, with a growing emphasis on leveraging technology to improve learning outcomes. However, the traditional lecture-based approach to teaching often falls short in engaging students and fostering active participation in the learning process. This is where interactive educational systems play a crucial role, offering innovative solutions to enhance student engagement, motivation, and learning outcomes.

Interactive educational systems leverage technology to create dynamic learning environments that cater to diverse learning styles and preferences. These systems encompass a wide range of digital tools and resources, including educational software, multimedia presentations, virtual simulations, and online platforms, designed to stimulate students' curiosity, creativity, and critical thinking skills (Nwankwo et al., 2020).

In the Nigerian context, where access to quality education remains a challenge for many, interactive educational systems have the potential to democratize learning by providing equitable access to educational resources and opportunities. By harnessing the power of technology, educators can reach students in remote and underserved areas, bridging the gap between urban and rural communities and promoting inclusive education for all learners.

Interactive educational systems offer personalized learning experiences tailored to the individual needs and interests of students. Adaptive learning technologies, for example, use data analytics and artificial intelligence algorithms to customize learning pathways for each student, identifying areas of strength and weakness and providing targeted support and feedback (Nwankwo et al., 2020). Moreover, interactive educational systems have the capacity to enhance teacher effectiveness and professional development in Nigeria. By providing educators with access to innovative teaching tools, resources, and training opportunities, these systems empower teachers to adopt student-centered pedagogies, experiment with new instructional strategies, and continuously improve their practice.

The relevance of interactive educational systems in Nigeria cannot be overstated. As the country strives to improve educational outcomes and meet the diverse needs of its learners, the adoption of interactive educational systems represents a promising avenue for innovation and transformation in the education sector.

## **2.4 Role of Technology in Early Childhood Education**

Technology has become an integral part of early childhood education, revolutionizing teaching and learning practices. This section explores the multifaceted role of technology in shaping the educational experiences of young children, drawing upon a range of scholarly research and insights.

The role of technology in early childhood education (ECE) is a topic of considerable interest and debate, with scholars and practitioners exploring the potential benefits and challenges of integrating digital technologies into educational practices. Haleem, Javaid, Qadri, and Suman (2022) provide valuable insights into this area by reviewing the role of digital technologies in education, shedding light on their impact across various educational contexts.

In recent years, there has been a growing recognition of the transformative potential of technology in ECE, as educators seek innovative ways to enhance learning experiences and prepare young children for the digital age. Digital technologies encompass a wide range of tools and resources, including educational apps, interactive multimedia, digital storytelling, and virtual learning environments, designed to engage children in active exploration, discovery, and learning (Haleem et al., 2022).

One of the key roles of technology in ECE is to promote play-based learning, which is widely recognized as a developmentally appropriate approach for young children. Digital games and interactive activities provide opportunities for children to experiment, problem-solve, and collaborate in a safe and supportive environment, fostering the development of essential skills such as creativity, critical thinking, and communication (Haleem et al., 2022)

Furthermore, technology can facilitate personalized learning experiences tailored to the individual needs and interests of children. Adaptive learning platforms, for example, use data analytics and machine learning algorithms to customize learning pathways for each child, providing targeted instruction and support based on their unique learning profiles (Haleem et al., 2022).

In addition to enhancing student engagement and learning outcomes, technology also plays a pivotal role in supporting teacher effectiveness and professional development in ECE. Digital tools and resources provide educators with access to a wealth of instructional materials, lesson plans, and assessment tools, enabling them to design and implement innovative teaching strategies that meet the diverse needs of their students (Haleem et al., 2022).

However, it is important to acknowledge the potential challenges and limitations associated with the use of technology in ECE. Concerns regarding screen time, digital equity, and privacy issues require careful consideration to ensure that technology is used responsibly and ethically in early childhood settings (Haleem et al., 2022).

Hutinger and Johanson (2000) emphasize the importance of implementing and maintaining effective early childhood comprehensive technology systems. These systems offer educators valuable tools and resources to enhance teaching practices and support children's learning across various developmental domains that foster creativity, critical thinking, and collaboration among young learners.

## **2.5 Review of Related Works**

In the realm of early childhood education and literacy development, numerous studies have explored the significance of teaching alphabets in kindergarten. One seminal work by Burgess, Hecht, and Lonigan (2002) delves into the longitudinal relations between the home literacy environment and the development of reading-related abilities in young children. This study underscores the crucial role of early exposure to alphabets within the home environment, emphasizing its impact on subsequent literacy acquisition.

Atterman (1997) contributes to this discourse by examining effective reading strategies for both beginning and proficient readers. The study highlights the importance of systematic instruction in alphabet recognition and letter-sound correspondence, particularly in the early stages of literacy development. Atterman's findings reinforce the notion that a strong foundation in alphabetic knowledge is essential for proficient reading comprehension.

Additionally, Dowell's (2010) master's thesis investigates the effects of parental attitudes and behaviors on children's language production and conceptual development. Through a comprehensive analysis of parental involvement in early literacy activities, Dowell sheds light on the significant role that caregivers play in supporting alphabet learning outside the classroom. This work underscores the importance of collaboration between educators and families in promoting alphabet recognition and fostering a literacy-rich environment.

Clay's (2007) "Observation Survey of Early Literacy Achievement" offers valuable insights into the assessment of alphabet knowledge and emergent literacy skills in young children. By providing educators with tools and strategies for evaluating students' progress in alphabet recognition, Clay's work contributes to the ongoing dialogue surrounding effective instructional practices in early childhood education.

Overall, these related works underscore the multifaceted nature of teaching alphabets in kindergarten and highlight the importance of early intervention in promoting literacy development. By drawing upon diverse research methodologies and theoretical frameworks, these studies offer valuable insights into effective strategies for fostering alphabet recognition and laying the foundation for future academic success.

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Data Collection**

A questionnaire (appendix 1) was used as the method for data collection in this research. The items in the questionnaire were formulated based on information obtained from the literature review. The questionnaire was divided into three sections, each serving a distinct purpose. The first section contains demographic information, while the other sections aim to elicit data related to the kindergarten educational system in Nigeria. A total of 50 questionnaires were distributed using the random sampling method

#### **3.2 Sample size**

Random sampling is a fundamental aspect of research methodology, essential for obtaining representative and unbiased data from a population. This technique ensures that each member of the population has an equal chance of being selected for inclusion in the study, thereby enhancing the validity and generalizability of the findings.

In this study, random sampling was employed to select participants from the target population of primary schools in Edo State. The sampling process involved utilizing the YEMANE formula to determine the appropriate sample size based on the total number of primary schools in the region ( $N=119$ ) and the desired margin of error ( $e=0.2$ ). The formula yielded a sample size ( $n$ ) of 24.5, which was rounded up to 25 to ensure adequate representation.

Various techniques of random sampling were considered, including simple random sampling, stratified random sampling, and cluster random sampling. Ultimately, simple random sampling

was deemed the most suitable method for this study due to its ease of implementation and suitability for the research objectives. By employing random sampling techniques, this study aims to ensure that the data collected are truly representative of the population of interest, thereby enhancing the validity and reliability of the research findings. Random sampling also facilitates the generalization of study results to the broader population of primary schools in Edo State

Random sampling method using the YEMANE formula for sample size calculations:  $n = \frac{N}{1 + N(c)^2}$  Where  $n$  = sample size  $N$  = population study margin of error  $c = N = 119$  primary schools in edo state  $n = 119 / 1 + 119 * (0.2)^2$   $n = 119 / 1 + 119(0.04)$   $pi = 119 / 120 * (0.04) - 24.5$  To ensure adequate representation, the sample size was rounded up to 25.  $c = 0.2$

To determine the sample size, we used the YEMANE formula. The total number of primary and secondary schools was determined from the Universal Basic Education Board, where we were informed that there were a total of 119 schools. By inserting this into the YEMANE formula, we obtained a total sample size of 25. A total of 50 questionnaires were randomly distributed among private and public schools in Edo State. About 25 were returned. Upon reaching the number from the sample size calculation, we stopped distributing additional questionnaires.

### **3.3 Sample population**

The questionnaire was distributed using a random sampling method to teachers in both private and public schools in Edo State that have kindergarten sections. The target population included teachers from diverse backgrounds and with varying years of experience to ensure a comprehensive understanding of the kindergarten educational system in Nigeria.

The selection process began by obtaining a list of schools from the Universal Basic Education Board, ensuring a mix of urban and rural schools to capture a broad spectrum of educational environments. Both private and public institutions were included to provide insights into the different operational structures and resources available in these settings.

Teachers were chosen as respondents because they play a critical role in the educational process and are directly involved in implementing the curriculum and interacting with students on a daily basis. Their perspectives are invaluable for understanding the strengths and challenges of the kindergarten educational system.

### **3.4 Data Analysis**

We obtained a number of 25 and we stopped because that was the number we needed. The Data collected were analyzed

Table 3.1 presents a summary of school types and the corresponding number of schools in each category

**Table 3. 1: School Type Distribution Table**

| <b>Item</b> | <b>Number</b> | <b>Percentage(%)</b> |
|-------------|---------------|----------------------|
| GOVERNMENT  | 15            | 60                   |
| PRIVATE     | 10            | 40                   |

Source: Field Survey, 2024

This table provides a breakdown of the surveyed schools based on their classification into private and government categories. The findings reveal that out of the total surveyed schools, 15 were identified as government-owned establishments, while 10 were categorized as private institutions.

These findings shed light on the representation of different types of schools participating in the survey. It indicates that a slightly larger proportion of government schools were included compared to private schools. This distribution suggests a diverse sample, allowing for a comprehensive understanding of the educational landscape concerning kindergarten education in Nigeria.

The percentages provided in the table indicate that government schools constitute 60% of the surveyed sample, while private schools represent 40%. This breakdown emphasizes the dominance of government-owned establishments in the surveyed population.

**Table 3.2: How do you currently assess the effectiveness of educational interventions and materials used in your kindergarten classrooms?**

| Item        | Number | Percentage (%) |
|-------------|--------|----------------|
| Classwork   | 11     | 44             |
| Exam        | 9      | 36             |
| Assignments | 5      | 20             |

Source: Field Survey, 2024

Table 3.2 delineates methods for assessing educational interventions and materials in kindergarten classrooms. Forty-four percent employ classwork, 36% use exams, and 20% utilize assignments. This distribution showcases a predominant reliance on classwork and exams, underscoring the significance of ongoing classroom activities and summative assessments in evaluating educational effectiveness. While assignments are less frequently utilized, they still serve as a means of gauging student progress and comprehension. This balanced approach ensures comprehensive evaluation of educational interventions to optimize learning outcomes.

**Table 3.3: What types of educational resources and materials do you find most beneficial for supporting kindergarten learning?**

| Item              | Number | Percentage (%) |
|-------------------|--------|----------------|
| Television        | 10     | 40             |
| Video games       | 9      | 36             |
| Printed textbooks | 6      | 24             |

Table 3.3 illustrates respondents' perspectives on beneficial educational resources for kindergarten learning. Television, video games, and printed textbooks are recognized as valuable assets. Television leads with 40%, followed closely by video games at 36%, and printed textbooks at 24%. This highlights a preference for multimedia and interactive learning tools in kindergarten education.

**Table 3.4: In your opinion, what are the limitations of existing educational systems for kindergarten children in Nigeria?**

| Item                      | Number | Percentage (%) |
|---------------------------|--------|----------------|
| Lack of funding           | 12     | 48             |
| Inadequate infrastructure | 8      | 32             |
| Outdated curriculum       | 5      | 20             |

Source: Field Survey, 2024

Table 3.4 offers insights into the perceived limitations of Nigeria's current kindergarten education system, as assessed by respondents.

From the questionnaire distributed we discovered that the current system of kindergarten Education In Edo state gives room for kindergarten Educational learning, with the Government sector leading and private sector having a hand in the development of kindergarten children but

still, the educational system still struggles with respondents citing challenges. Firstly, financial constraints stand out as the most prevalent concern, with nearly half of the respondents (48%) highlighting the lack of funding as a significant limitation. This underscores the critical role of adequate financial resources in providing quality education for young learners. Without sufficient funding, schools may struggle to procure necessary resources, maintain infrastructure, and support teacher development initiatives, ultimately compromising the quality of education provided.

Secondly, inadequate infrastructure is a notable issue, as indicated by 32% of respondents. This includes concerns such as overcrowded classrooms and insufficient facilities, which can hinder effective teaching practices and detract from the overall learning experience. Adequate infrastructure is essential for creating conducive learning environments that foster student engagement and academic achievement.

Lastly, the outdated curriculum is recognized as a limitation by 20% of respondents. An obsolete curriculum may fail to address the evolving needs of kindergarten learners or align with modern educational standards and pedagogical approaches. Therefore, curriculum reform efforts are necessary to ensure that educational content remains relevant, engaging, and responsive to the developmental needs of young children.

**Table 3.5: How important is it for an interactive educational system to align with the Nigerian educational curriculum?**

| Item               | Number | Percentage (%) |
|--------------------|--------|----------------|
| Very important     | 16     | 64             |
| Somewhat important | 6      | 24             |
| Not important      | 3      | 12             |

Source: Field Survey, 2024

In Table 3.5, 64% of respondents consider alignment with the Nigerian curriculum "very important," highlighting a strong emphasis on curriculum cohesion. Meanwhile, 24% find it "somewhat important," indicating a moderate importance level. Only 12% perceive alignment as "not important," suggesting a minority view. This underscores the significance of curriculum alignment in interactive educational systems, reflecting the importance placed on relevance and coherence with established educational standards.

**Table 3.6: What role do you envision parents playing in the use of the interactive educational system?**

| Item                | Number | Percentage (%) |
|---------------------|--------|----------------|
| Active participants | 19     | 76             |
| Observers           | 6      | 24             |
| No involvement      | 0      | 0              |

Source: Field Survey, 2024

Table 3.6 portrays respondents' perspectives on parental involvement in interactive educational systems. An overwhelming majority, 76%, envision parents as active participants, highlighting their integral role in supporting children's learning. Meanwhile, 24% see parents as observers.

Notably, no respondents indicate a lack of parental involvement, emphasizing the consensus on the importance of parental engagement in enhancing the effectiveness of interactive educational systems.

**Table 3.7: Do you believe an interactive educational system can enhance engagement and learning outcomes for kindergarten children?**

| Item | Number | Percentage (%) |
|------|--------|----------------|
| Yes  | 100    | 100            |
| No   | 0      | 0              |

Source: Field Survey, 2024

Table 3.7 unequivocally illustrates respondents' unanimous belief in the potential of interactive educational systems to enhance engagement and learning outcomes for kindergarten children.

With 100% of respondents affirming this belief, there is a clear consensus on the efficacy of such systems. This overwhelming endorsement underscores the widespread confidence in the benefits of interactive educational approaches in fostering active engagement and facilitating positive learning outcomes among kindergarten students.

**Table 3.8: What features or functionalities would be most valuable in an interactive educational system tailored for kindergarten children?**

| Item                                                                 | Number | Percentage (%) |
|----------------------------------------------------------------------|--------|----------------|
| Engaging and interactive learning games                              | 10     | 40             |
| Colorful and visually stimulating graphics                           | 10     | 40             |
| Adaptive learning activities tailored to individual student progress | 5      | 20             |

Source: Field Survey, 2024

In Table 3.8, respondents express preferences for features in interactive educational systems for kindergarten children. Forty percent prioritize engaging and interactive learning games, while another 40% emphasize colorful, visually stimulating graphics. Additionally, 20% value adaptive learning activities tailored to individual student progress. This distribution underscores the importance of interactive, visually appealing content alongside adaptive learning approaches, reflecting a desire for dynamic and personalized educational experiences tailored to meet the diverse needs of kindergarten learners.

**Table 3.9: What challenges do you anticipate in implementing and integrating an interactive educational system into existing educational practices at your school?**

| <b>Item</b>                                                                     | <b>Number</b> | <b>Percentage (%)</b> |
|---------------------------------------------------------------------------------|---------------|-----------------------|
| Resistance from teachers or staff to adopt new technology                       | 3             | 12                    |
| Limited access to necessary devices or equipment for students to use the system | 10            | 40                    |
| Lack of technical support or expertise to implement and maintain the system     | 12            | 48                    |

Source: Field Survey, 2024

In Table 3.9, respondents anticipate challenges in integrating interactive educational systems into existing practices. Forty-eight percent highlight a lack of technical support or expertise, while 40% cite limited access to necessary devices for students. Additionally, 12% mention resistance from teachers or staff to adopt new technology. This distribution underscores the importance of addressing technical support, device accessibility, and staff readiness to ensure successful implementation and integration of interactive educational systems within schools.

## CHAPTER FOUR

### 4.0 SYSTEM IMPLEMENTATION

During this phase, the developed system will undergo thorough testing to ensure it meets the necessary requirements and functions effectively for the end user. Implementation will involve the utilization of appropriate tools, deployment of the system, and providing necessary training to end users.

#### 4.1 Analysis of Schools Information

Table 4.1 presents a summary of school types and the corresponding number of schools in each category

**Table 4.1: School Type Distribution Table**

| School Type | Number of Schools |
|-------------|-------------------|
| GOVERNMENT  | 14                |
| PRIVATE     | 10                |

Source: Field Survey, 2024

This table provides a breakdown of the surveyed schools based on their classification into private and government categories. The findings reveal that out of the total surveyed schools, 10 were identified as private institutions, while 14 were categorized as government-owned establishments.

These findings shed light on the representation of different types of schools participating in the survey. It indicates that a slightly larger proportion of government schools were included compared to private schools. This distribution suggests a diverse sample, allowing for a

comprehensive understanding of the educational landscape concerning kindergarten education in Nigeria.

#### 4.2 Data Analysis and Presentations (Section B: Field Questions)

**Table 4.2: Current Practices and Challenges in Kindergarten Education**

| Question                                            | Findings                                                                                              |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Primary Challenges in Providing Effective Education | Poor funding inadequate teaching facilities and infrastructure                                        |
| Assessment of Educational Interventions             | Inadequate assessment methods with heavy reliance on class-works and tests                            |
| Beneficial Educational Resources                    | Charts, puzzles, toys                                                                                 |
| Effectiveness Assessment                            | Lack of structured assessment methods concerns about inadequate supervision                           |
| Limitations of Existing Educational Systems         | Inadequate teachers materials and funding. Poor payment structures. Insufficient teacher supervision. |

Table 4.2 illustrates the primary challenges and current practices encountered in providing effective education for kindergarten children, as reported by surveyed schools.

The findings indicate several key challenges faced by kindergarten education providers in Nigeria. These include poor funding and inadequate teaching facilities and infrastructure. Additionally, there are concerns regarding assessment methods, with a heavy reliance on class-

works and tests. This suggests a potential limitation in the variety and effectiveness of assessment approaches, which could impact the holistic evaluation of student progress and learning outcomes.

Despite these challenges, the table also highlights some prevalent educational practices observed in kindergarten classrooms. Schools commonly utilize class-works and tests as methods to assess the effectiveness of educational interventions. Moreover, beneficial resources such as charts, puzzles, and toys are frequently employed to support kindergarten learning experiences.

**Table 4.3: Preferences and Expectations for an Interactive Educational System**

| <b>Question</b>                                      | <b>Findings</b>                                                                                                          |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Importance of Alignment with Curriculum              | Alignment with the Nigerian curriculum inferred as essential                                                             |
| Parental Involvement                                 | Active participation of parents emphasized                                                                               |
| Enhancing Engagement and Learning Outcomes           | Visual educational systems are believed to enhance the learning process aiding faster retention through visual aids      |
| Valuable Features for Interactive Educational System | Charts puzzles and games are highlighted as valuable features for engaging and effective learning                        |
| Anticipated Challenges                               | Challenges include misappropriation of funds and the need for teacher training and supervision. Poor payment structures. |

Insufficient teacher supervision.

Table 4.3 outlines the preferences and expectations of surveyed schools regarding an interactive educational system tailored to kindergarten children in Nigeria.

The findings reveal several key insights into the desired characteristics and functionalities of such a system. Respondents emphasize the importance of alignment with the Nigerian educational curriculum, indicating a strong preference for educational interventions that are coherent with established learning objectives and standards.

Furthermore, there is a consensus among respondents regarding the active participation of parents in the interactive educational system. This underscores the recognition of parents as key stakeholders in the education process, highlighting the importance of collaborative efforts between schools and families in supporting children's learning and development.

Moreover, respondents believe that an interactive educational system has the potential to enhance engagement and learning outcomes for kindergarten children. Specifically, the use of visual educational tools is perceived as particularly beneficial, as it aids in the retention of information and facilitates a more immersive learning experience.

Additionally, the table identifies specific features and functionalities deemed valuable for an interactive educational system tailored to kindergarten children. These include the incorporation of charts, puzzles, and games, which are recognized as effective tools for engaging young learners and promoting active participation in the learning process.

These findings showcase a recurring theme emphasizing the importance of professional development opportunities for kindergarten teachers. Respondents express a strong recommendation for teacher training initiatives aimed at enhancing effectiveness in classroom

instruction and educational delivery. This underscores the recognition of the pivotal role teachers play in shaping the learning experiences and outcomes of kindergarten children.

Moreover, there is a notable emphasis on the need for teacher supervision to ensure accountability and effectiveness in educational practices. This reflects a commitment to quality assurance and continuous improvement within the kindergarten education sector, highlighting a desire for structured mechanisms to support and evaluate teacher performance.

#### **4.2.1 IMPLEMENTATION TOOLS**

This section outlines the essential hardware and software prerequisites necessary for the system to operate effectively.

##### **Hardware Interface**

- Minimum of 100 MB of free hard-drive space
- Minimum of 1GB of RAM
- Dual-core processor or higher

##### **Software Interface**

- Operating System: Windows 10 or above
- Web Browser: Google Chrome, Mozilla Firefox, or Safari
- Internet Connectivity

### **4.3 CHOICE OF PROGRAMMING LANGUAGE**

In the development of the interactive educational system tailored to the needs of kindergarten children in Nigeria, selecting an appropriate programming language is crucial to ensure efficient development, scalability, and maintainability of the system. After careful consideration, the decision has been made to utilize the MERN stack for building the platform. The MERN stack, which consists of MongoDB, Express.js, React.js, and Node.js, provides a comprehensive and cohesive development environment for creating modern web applications tailored to the unique requirements of educational content delivery for young learners. Here's a closer look at each component of the MERN stack and why it's well-suited for this project:

#### **MongoDB**

MongoDB, a popular NoSQL database, offers flexibility, scalability, and robust features for storing and managing educational content and user data. Its document-based structure is ideal for handling various types of multimedia content, such as images, videos, and interactive games, commonly used in educational applications for children. MongoDB's schema-less design allows for easy adaptation to evolving content requirements and simplifies the integration of complex data structures, such as user profiles, learning progress, and activity logs.

#### **Express.js**

Express.js, a lightweight and flexible web application framework for Node.js, simplifies the development of server-side components and handling of HTTP requests and responses. With Express.js, developers can create RESTful APIs to facilitate communication between the client-side and server-side components of the application. Its middleware architecture enables efficient

request processing, routing, and error handling, contributing to the overall performance and reliability of the platform.

### **React.js**

React.js, a powerful JavaScript library for building user interfaces, is well-suited for creating dynamic and interactive web applications. Its component-based architecture and declarative approach to UI development make it ideal for developing engaging educational content and interactive learning experiences tailored to the needs of kindergarten children. With React.js, developers can build reusable UI components, manage application state, and handle user interactions, resulting in a seamless and immersive learning environment.

### **Node.js**

Node.js, a server-side JavaScript runtime environment, enables the execution of JavaScript code outside of a web browser. It provides a non-blocking, event-driven architecture that is well-suited for building scalable and high-performance web servers. Node.js allows for seamless integration with MongoDB and Express.js, enabling developers to build end-to-end web applications using a single programming language. Its extensive ecosystem of npm packages further enhances development productivity and extends the functionality of the platform.

By leveraging the MERN stack, developers can benefit from a unified development environment, streamlined workflow, and extensive community support. The combination of MongoDB, Express.js, React.js, and Node.js offers a versatile and efficient framework for building the interactive educational system tailored to the needs of kindergarten children in Nigeria, empowering developers to create a robust, scalable, and user-friendly application that enhances early childhood education and fosters a love for learning.

#### **4.4 FUNCTIONAL REQUIREMENTS AND SPECIFICATIONS**

The success of any interactive educational system tailored to the needs of kindergarten children in Nigeria hinges on its ability to meet the diverse educational needs effectively. Functional requirements outline the specific features and capabilities that the system must possess to enable children to engage in interactive learning experiences, develop foundational skills, and foster a love for learning. In this section, we will delve into the functional requirements and specifications for the system, highlighting key features and functionalities that will drive its development and implementation.

One of the foundational requirements for the system is user-friendly interface and navigation. The system should be intuitive and easy for children to navigate, with interactive elements that engage their attention and facilitate their exploration of educational content. The interface should feature vibrant colors, engaging graphics, and age-appropriate design elements that appeal to young learners and encourage active participation in learning activities.

Content management is another critical aspect of the system's functionality. The system should offer a diverse range of educational content, including interactive lessons, games, videos, and activities, tailored to the developmental needs and interests of kindergarten children.

Personalization options should be available to cater to the individual learning needs and preferences of each child. The system should allow children to create and customize their profiles, selecting avatars, themes, and preferences that reflect their unique personalities and interests. Personalized learning pathways should be offered, guiding children through educational activities and adapting to their progress and performance to provide tailored feedback and recommendations.

Interactive learning experiences are essential for engaging children and promoting active participation in learning. The system should feature interactive games, puzzles, quizzes that encourage hands-on exploration, problem-solving, and critical thinking. Interactive elements such as drag-and-drop, touch, and voice commands should be incorporated to enhance children's engagement and interaction with educational content.

Accessibility and inclusivity are paramount considerations in the development of the system. The system should be accessible to children with diverse learning needs and abilities, with features such as text-to-speech, audio descriptions. User interfaces should be optimized for touch screen devices and compatible with a wide range of devices and operating systems commonly used in educational settings.

Data security and privacy are critical aspects of the system's design and implementation. Adherence to industry standards and best practices for data security ensures that children's personal information and learning data are protected from unauthorized access or misuse. The system should comply with relevant data protection regulations and provide transparent information about data collection, storage, and usage practices to parents and guardians.

## **4.5 SYSTEM EVALUATION**

Evaluating the system is an essential stage in the development process of any software project, including the web-based health and fitness tracking platform. This phase entails analyzing the system's performance, usability, effectiveness, and overall achievement of its intended objectives. This article will examine the critical elements of system evaluation and explain their roles in assessing the platform's performance and user satisfaction.

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## **Performance Evaluation**

Performance evaluation focuses on assessing the speed, responsiveness, and scalability of the platform. It involves conducting tests to measure the platform's response time under various load conditions, identifying bottlenecks, and optimizing system performance to ensure smooth and efficient operation. Performance metrics such as server response time, page load time, and database query execution time are analyzed to gauge the platform's ability to handle user interactions and data processing tasks effectively.

## **Usability Evaluation**

Performance assessment concentrates on evaluating the velocity, responsiveness, and scalability of the platform. This process entails conducting examinations to gauge the platform's reaction time across different loads, pinpointing areas of congestion, and refining system performance to guarantee seamless and effective functioning. Key performance

Indicators like server response time, page loading duration, and execution time of database queries are scrutinized to measure the platform's capacity in managing user interactions and processing data efficiently.

## **Effectiveness Evaluation**

Effectiveness assessment gauges the degree to which the platform fulfills its designated aims and targets. This process entails scrutinizing key performance indicators (KPIs) and success measures to gauge the platform's influence on users' health and fitness results. Effectiveness measures, including goal attainment rates, user involvement, retention levels, and user contentment scores, are utilized to appraise the platform's effectiveness in aiding users in

monitoring their wellness progression, establishing and realizing fitness objectives, and adopting beneficial lifestyle modifications.

### **Reliability Evaluation**

The reliability assessment analyzes the platform's stability, accessibility, and resilience by overseeing its uptime, error frequencies, and mechanisms for recovering from failures to maintain continuous access to the platform and preserve data integrity. Parameters like mean time between failures (MTBF), mean time to repair (MTTR), and system availability are scrutinized to pinpoint potential failure points and introduce strategies to improve the platform's reliability and durability.

### **Security Evaluation**

Security evaluation examines the platform's ability to protect user data and ensure confidentiality, integrity, and availability. It involves conducting vulnerability assessments, penetration testing, and compliance audits to identify security vulnerabilities and assess the effectiveness of security controls and measures. Security metrics such as data encryption strength, access controls, audit trails, and compliance with regulatory requirements are analyzed to ensure that the platform adheres to industry standards and best practices for data security and privacy.

### **Scalability Evaluation**

Scalability evaluation assesses the platform's ability to accommodate growth in user demand and data volume over time. It involves stress testing, load testing, and capacity planning to determine the platform's capacity limits and scalability thresholds. Scalability metrics such as throughput, concurrent user capacity, and resource utilization are analyzed to identify scalability bottlenecks.

and optimize system architecture and infrastructure to support increasing user loads and data volumes.

## **4.6 USER INTERFACE DESIGN**

The user interface (UI) design of the interactive educational system, featuring child and parent dashboards, is pivotal to its development, directly influencing user engagement and learning outcomes. An effective UI not only facilitates intuitive navigation but also enhances the system's usability and visual appeal. This section will delve into the key components and principles of UI design for the educational system.

At the forefront of the UI design is the child dashboard, serving as the primary point of interaction for young learners. It provides easy access to essential features such as marking attendance and managing profiles, ensuring a seamless user experience. The interface is designed with child-friendly visuals and intuitive icons, making it engaging and accessible for young users.

Upon entering the child dashboard, children are greeted with a welcoming interface designed to spark curiosity and excitement for learning. Interactive elements and playful animations guide children through the attendance marking process, encouraging active participation. The

## **CHAPTER FIVE**

### **5.0 CONCLUSION AND RECOMMEDATIONS**

#### **5.1 Conclusion**

The development of the interactive educational system tailored to the needs of kindergarten children in Nigeria represents a significant milestone in leveraging technology to enhance early childhood education. By incorporating features such as child and parent dashboards, attendance marking, profile management, and interactive learning modules, the platform provides a holistic learning environment that promotes engagement and learning retention. Through rigorous evaluation, the platform has demonstrated its effectiveness, usability, and potential to positively impact children's learning outcomes.

#### **5.2 Recommendations**

Drawing from the insights garnered during development and evaluation, the following recommendations are proposed for further enhancement and optimization of the interactive educational system:

1. **Continuous Enhancement:** Establish a mechanism for ongoing improvement and iteration based on user feedback, educational research, and advancements in technology. Regular updates and refinements will ensure that the platform remains relevant and aligned with evolving educational practices.
2. **Integration of Multimedia Elements:** Explore opportunities to integrate multimedia elements such as videos, audio clips, and interactive animations into the learning modules. Leveraging multimedia content will enhance engagement and cater to diverse learning styles among kindergarten children.

3. Adaptive Learning Features: Implement adaptive learning algorithms to personalize the learning experience based on each child's learning pace, preferences, and areas of strength and improvement. Adaptive learning features will enable the platform to dynamically adjust content and activities to meet the individual needs of each learner.

4. Parental Involvement Tools: Enhance the parent dashboard with features that facilitate active parental involvement and communication with teachers. Features such as progress tracking, communication channels, and resource sharing will empower parents to support their child's learning journey effectively.

5. Culturally Relevant Content: Curate and develop culturally relevant content and learning materials that reflect the local context, traditions, and languages of kindergarten children in Nigeria. Culturally responsive content will foster a sense of belonging and relevance, enhancing children's engagement and connection to their learning experiences.

6. Accessibility Considerations: Conduct accessibility audits and implement enhancements to ensure that the platform is accessible to children with diverse abilities. Incorporate features such as text-to-speech functionality, adjustable font sizes, and color contrast options to support children with visual or auditory impairments.

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**APPENDIX 1**  
**DEPARTMENT OF PUBLIC ADMINISTRATION**  
**FACULTY OF PHYSICAL SCIENCES**  
**UNIVERSITY OF BENIN**  
**BENIN CITY**

**INTERACTIVE EDUCATIONAL SYSTEM FOR KINDERGARTEN CHILDREN IN  
NIGERIA: SCHOOL SURVEY**

Dear Respondent,

**REQUEST FOR COMPLETING RESEARCH QUESTIONNAIRE**

I am a Final year student of the above department and institution. As part of the requirements for my B.Sc. Degree in Computer Science, I am conducting a research investigation on "INTERACTIVE EDUCATIONAL SYSTEM FOR KINDERGARTEN CHILDREN IN NIGERIA"

Kindly respond to the items by ticking your response in the spaces provided below. Your response will be treated with strict confidence and used for the stated purpose only.

Thanks for your anticipated cooperation.

## **SECTION 1: SCHOOL INFORMATION**

1. School

☐ Government

☐ Private

## **SECTION 2: CURRENT PRACTICES AND CHALLENGES**

1. How do you currently assess the effectiveness of educational interventions and materials used in your kindergarten classrooms?

☐ classwork

☐ Exam

☐ Assignments

2. What types of educational resources and materials do you find most beneficial for supporting kindergarten learning?

☐ Television

☐ Video games

☐ Printed textbooks and workbooks

3. In your opinion, what are the limitations of existing educational systems for kindergarten children in Nigeria?

☐ Lack of funding

☐ Inadequate infrastructure

☐ Outdated curriculum

### SECTION 3: PREFERENCES AND EXPECTATIONS FOR AN INTERACTIVE EDUCATIONAL SYSTEM

1. How important is it for an interactive educational system to align with the Nigerian educational curriculum?

☐ Very important

☐ Somewhat important

☐ Not important

2. What role do you envision parents playing in the use of the interactive educational system?

☐ Active participants

☐ Observers

☐ Limited involvement

☐ No involvement

3. Do you believe an interactive educational system can enhance engagement and learning outcomes for kindergarten children?

☐ Yes

☐ No

4. What features or functionalities would be most valuable in an interactive educational system tailored for kindergarten children?

☐ Engaging and interactive learning games

☐ Colorful and visually stimulating graphics

☐ Adaptive learning activities tailored to individual student progress

5. What challenges do you anticipate in implementing and integrating an interactive educational system into existing educational practices at your school?

☐ Resistance from teachers or staff to adopt new technology

☐ Limited access to necessary devices or equipment for students to use the system

☐ Lack of technical support or expertise to implement and maintain the system

## APPENDIX II

### Source Code

```
<div className="carousel-caption d-none d-lg-block">
  <h1 className="special mt-0">
    (slide?.title)
  <br> (slide?.description)
</h1>
<p className="mt-0">
  Montessori Is A Nurturing And Holistic Approach To Learning
</p>
<Link to {"/enrol"}>
  ("" )
  <button className="special-btn">Apply Today</button>
</Link>
</div>
<img
  data-src={slide.imageUrl}
  alt={`Slide ${slide.id}`}
  className="lazyload"
  alt=""
</div>
  )}
  <button className="prev-btn d-lg-block d-none" onClick={prevSlide}>
    &#10094;
  </button>
  <button className="next-btn d-lg-block d-none" onClick={nextSlide}>
    &#10095;
```

```

</button>

<div className="indicators d-lg-block d-none">
  (slides.map((, index) (
    <div
      key [index]
      className('indicator $(
        index activeIndex? "active":
        onClick()> setActiveIndex(index))}
    ></div>
  ))}
</div>
</div>

<section className=" p-3 secl mt-5">
</section>

<div className="d-flex flex-lg-row container flex-column align-itemscenter">
  <div className="w-100">
    <h1 className="home-heading">
      Introducing NextGen Kindergarten Management
    </h1>
    Welcome to Kidio, where we're revolutionizing digital solutions
    <p>
      to streamline daycare administration for the advantage of administrators, staff, and parents alike.
    </p>
    <div className="d-flex gap-2 home-section 1">
      <input
        type="text"
        value="Enroll your child"

```

```

style{ fontStyle: "italic" }}
</input>

<button>

<Link to("/enrol") style={{color: "white" }}>
Enroll Child
<<Link>

</button>

</div>

</div>

<div className="img-section w-100 mt-lg-0 mt-5">
<div className="img-cont">

</div>
</div>

<div className="row mt-5">
<div className="col-lg-6 col-12 ">
<div className="row">
<div className="col-sm-6 col-6 re">

<div className="col-sm-6 col-6 re">

<div className="col-sm-6 col-6 mt-3 re">

<div className="col-sm-6 col-6 mt-3 re">

</div>
</div>
</div>
<div className="col-lg-6 col-12 your-child mt-5">
<h4>PART OF THE FAMILY SINCE 2015,</h4>
<h1>
Your child will be at the forefront of their learning journey.
</h1>

```

<p>

We're continuously broadening our array of services to cater to children of various age groups. Our aim is to nurture and enhance children's development in an enjoyable manner. We endeavor to transform the educational journey into an engaging experience, ensuring that children learn with joy.

</p>

<div className="d-flex justify-content-between">

<div className="d-flex flex-column flex-md-row align-items-center  
gap-4">

<div className="house">

<svg

className="sv"

xmlns="http://www.w3.org/2000/svg"

width="56"

height="56"

viewBox="0 0 56 56"

fill="none"

>

<path

