

1 **ENHANCEMENT OF TECHNOLOGIES IN THE TRAINING OF EARLY
2 CHILDHOOD CARE AND EDUCATIONPRE-SERVICE TEACHERS**

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5 **ABSTRACT**

6 This study explored the place of technologies in the training of Early Childhood Care and
7 Education (ECCE) pre-service teachers for sustainable global educational development. The
8 ECCE lecturers are seen as the primary assets in the development of technological knowledge
9 and skills of ECCE pre-service teachers. This qualitative research study was guided by
10 participatory action research design. Qualitative data were generated using observation which
11 gives researchers first-hand experience and focus group discussions which allowed the
12 researchers to probe further and gain insight into the study. The participants and research site
13 were selected using purposive and convenience sampling. Twenty (20) early childhood education
14 lecturers were purposively selected as sample for the study. Similarly, the study equally
15 recognises and acknowledges the significance of technological innovationto dispel any
16 misconception in the training ECCE pre-service teachers. Recommendations were made to
17 integrate the use of technologies in the training of pre-service teachers,including enhancement of
18 Pedagogical Knowledge (PK) and Technological Pedagogical Knowledge (TPK) of ECCE
19 lecturers through constant and continuous professional development and capacity building
20 programme to facilitate the trainingof pre-service teachers for effective utilisation of
21 availabletechnological resources during teaching and learning of children in the classroom.

22 **Keywords:**Enhancement,training, technologies, pre-service teachers, early childhood care and
23 education

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31 **INTRODUCTION**

32 The early childhood education period is a remarkable stage where basic skills are inculcated and
33 cognitive abilities are developed through meaningful interactions (Okoroafor et al., 2022; Yusuf,
34 Abdulkareem, & Popoola, 2023). This period is so crucial for growth and development as it
35 provides learners with the opportunity to interact with the environment and precipitate in
36 meaningful experiences that will foster sustainable development (Oppong Frimpong,
37 2021). Jacob and Olakunle (2022) reiterate further that education plays a crucial role in the
38 development of any society, adding that early childhood education is a vital period for the holistic
39 development of the learners. This implies that the early childhood education period is a stage of
40 transformation that provides the basis for future development and achievement of learners. From
41 all indications it is clear that early childhood education plays a crucial role in child's
42 development and compensates for differences in children's cognitive abilities before entering
43 into primary schools (Kurent and Avsec, 2023).

44 Meanwhile, it is interesting to note that, the place of technological integration in teaching and
45 learning process for enhancement and sustainability of global educational development cannot be
46 overemphasised. This is because the integration of innovative pedagogical technologies is
47 concerned with the use of twenty first century teaching aids that includes open access to online
48 resources, interactive computer programme which makes teaching and learning process more
49 meaningful and exciting (Tsoli, 2023). Similarly, Sales, Santos, de Castro, and Coelho, (2021)
50 assert that technology in the 21st century plays a crucial role as a tool in helping the pre-service
51 teachers in effective delivery of lesson. Meanwhile, teaching and learning is fun in early
52 childhood education and as they play with technological devices, their literacy and numeracy
53 skills are enhanced for better performance (Rogowsky et al., 2018). Thus, the integration of
54 technologies in the training of pre-service has numerous benefits as it foster creativity, stimulate
55 real teaching scenario and provide personalized learning experiences (Naida, Berezovska,
56 Bulgakova, Kravets & Savchenkova, 2024).

57 Along similar lines, modern scholars believe that emphasizing the use of technologies during the
58 training of pre-service teachers is a way of preparing them to meet the challenges of the nearest
59 future and also to promote effective and quality education for early childhood education learners
60 (Rogowsky, Terwilliger, Young, & Kribbs, (2018).To qualify this argument, in line with the
61 importance of technologies, the Federal Republic of Nigeria also reiterates on the vital roles of
62 technologies in the cognitive and social learning of early childhood care and education
63 (NPE,2004). Moreover, it is interesting to note that, despite continued investment and the
64 agitations for more investment in the educational system, it has been observed that enhancement
65 of technology in the training of pre-service teachers is not well pronounced (Arigbabu, 2024). It
66 is for this reason I concur with Akinrotimi and Olowe (2016) that the policy formulated on the
67 integration technologies in early childhood education sectors also revealed that, there are records
68 of noncompliance due to teacher'sincompetence to effectively utilised available technology
69 during teaching and learning process. However, literature has proven thatthe pre-service are not
70 well exposed to the use of technologies during teaching and learning process which contradict
71 Herro et.al., (2024) assertion that the inculcation of technology in the training of pre-service
72 teacher will empower them and increase their teaching skills in their various classrooms.

73 In Nigeria, the government emphasised on the importance of teachers' education by outlining
74 specific objectives in National policy on education (FRN, 2013). The policy strides to foster a
75 spirit of inquiry and creativity that will promote professional competencies for pre-service
76 teachers. The teacher is the foundation and pillar for sustainable educational development as they
77 constitute the most essential body of personnel within the educational system (Nousheen,
78 Waseem, & Khan, 2020).Urbani, Roshandel, Michaels and Truesdell (2017) assert that pre-
79 service teachers need to be provided with adequate skills on the use of technology during
80 training in order to provide them with confidence to integrate 21st century skills into their
81 teaching.Tusyanah, Oktarina, Kharismaputra, Suryanto, and Andik (2024) followed similar line
82 of argument that pre-service teacher candidates are expected to be well equipped, skillful, and
83 knowledgeable in the application of technologies in teaching and educational practice. This
84 implies that tertiary institutions teachers must be competent in the use of technologies with
85 adequate pedagogical practices for enhancement of skills development to enhance effective
86 training for the pre-service teachers learning. It was observed that most lecturers still struggle

87 with the use of technology which negate the effective training of pre-service teachers in the use
88 of technology.

89 It is pertinent to note that the early childhood education pre-service teachers are those who are
90 training to acquire the skills and abilities required for providing developmentally appropriate
91 nurture, responsive care and educational experiences to young children. Because these set of
92 teachers are still in training, it could be much easy to influence them towards the development of
93 relevant skills and abilities that are required for contributing to the development of educational
94 system.

95 **THEORETICAL RAMEWORK**

96 The term theoretical framework is defined as a pool of interrelated concepts that may be used to
97 direct research with the aim of predicting and explaining the outcomes of research. Technology
98 Pedagogy Content knowledge (TPACK) is the theoretical framework adopted for this study, to
99 comprehensively discuss the interaction and integration of technology pedagogy, and content
100 knowledge. In the same vein,Ait Ali, Meniari, Filali, Morabite, Senhaji, and Khabbache (2023)
101 assertthat TPACK framework is a unique method of Conceptualising categories of knowledges
102 of knowledge required by teachers to achieve in educational practice This is because effective
103 teaching is a function of good mastery of the subject matter. Meanwhile, Mishra and Koehler
104 (2006) further provide a concrete picture on TPACK and categorised it into seven stages which
105 are as follows:

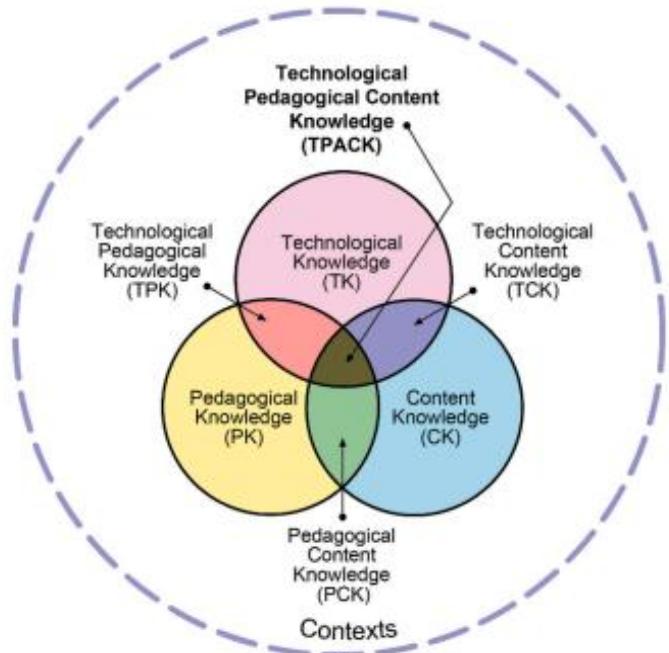
- 106 (i) Content knowledge (CK), which concerns with knowledge of the topic that is
107 intended to be learned or taught.
- 108 (ii) Pedagogical knowledge (PK), which describes knowledge and methods about
109 teaching and learning strategies;
- 110 (iii) Technological Pedagogical Content Knowledge whichis knowledge about standard
111 technologies and operating system. It includes skills and required to operate as
112 particular technology, the ability to learn and adapt to new technology (Koehler et al.,
113 2014; Herring et al., 2016)

114 (iv) Pedagogical Content knowledge (PCK) that responds to the understanding and
115 representation that the teacher makes of the specific teaching content, which includes
116 knowing what teaching approaches fit content for its teachability and learnability;

117 (v) Technological content knowledge (TCK) that corresponds to the understanding and
118 representation that the teacher makes about how a technology can enhance or limit a
119 specific teaching content;

120 (vi) Technological Pedagogical knowledge (TPK) is the knowledge of existence and
121 capabilities of various technologies as they are used in teaching and learning
122 process. This includes understanding and representation that a teacher makes about
123 how a technology influences the strategies used in his pedagogical action. For
124 example, using the abilities to use appropriate technology and strategies that are
125 suitable for a particular developmental of the children for better understanding (Park
126 & Hargis, 2018).

127 (vii) Technological Pedagogical Content knowledge (TPCK) that arises from the
128 integration of PCK, TCK and TPK and it goes beyond the three components, this
129 knowledge corresponds to the understanding and representation that a teacher makes
130 for a good teaching of content with technology. TPACK is the basis for good teaching
131 with the use of technology and how technology will facilitate learning and solve
132 problems confronting learners. This implies that the adoption of TPACK in this study
133 promotes the enhancement of technologies in the training of pre-service teachers in
134 Early Childhood Care and Education.



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136 Figure 1: The TPACK Framework: Koehler and Mishra (2016)

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140 **METODOLOGY**

141 This article emerged from a qualitative study which was conducted in a tertiary institution
 142 precisely a University in Lagos State, Nigeria. This is because qualitative research encourages
 143 critical look into research as it emphasiseson better understanding of the research subjects (Pyo,
 144 Lee, Choi, Jang, & Ock, 2023). The study was rooted in Participatory Action Research (PAR)
 145 and embraced the values of critical paradigm as its worldview. Participatory Action Research is
 146 problem solving oriented and also an approach to research that prioritizes the value of
 147 experimental knowledge (Cornish, Breton, Moreno-Tabarez, Delgado, Rua, de-Graft Aikins, &
 148 Hodgetts, 2023). Snapp, Kerr, Bybee-Finley, Chikowo, Dakishoni, Grabowski, and
 149 Kanyama-Phiri, (2023) assert that PAR builds and expands scientific process which also is
 150 devoted to ensuring that both the researcher and the researched remain as partners throughout the
 151 research process and that participants are gainfully involved in data generation process. The use

152 of PAR is significant to this study as it proposes to bring about a positive change in the training
153 of ECCE pre-service teachers. As such PAR has been proven to be a powerful approach that
154 encourage collaborative engagement in the research process for both a researcher and the
155 participants (Fahlberg ,2023).

156 **SELECTION OF PARTICIPANTS**

157 The participants were selected through purposive and convenient sampling method. The
158 researchers consciously and deliberately selected the research site and ten participants were
159 selected because they were easily accessible and convenient to the researchers. All the
160 participants are beneficial to this study as they were able to share their experiences on the
161 enhancement of technologies in the training of pre-service teachers in early childhood care and
162 education.

163 **DATA GENERATION METHOD**

164 This qualitative article used observation and focus group discussions to generate data. The use of
165 observation method is very vital whenever the researchers want to document actual behaviour
166 and practices that can evoke elicitation of quality active data(Hurst, 2023;) Neo, Lim, Tan and
167 Ong (2022) add that the uniqueness of a focus group discussion goes beyond generating essential
168 and sensitive data - it also enhances the quality of data rooted in collaboration. The data
169 generated are categorised into themes. Braun and Clarke (2021) note that thematic analysis
170 provides for a more accessible form of analysis, and offers insight into how themes are identified
171 in line with research questions, aim and stated objectives. The participants were able to discuss
172 and argue with each other logically to produce in-depth information on enhancement of
173 technologies in the training of pre-service teachers in early childhood education. Similarly, the
174 focus group discussion method enabled participants to critically discuss issues and suggest
175 solutions on how to promote the use of technologies in the training of pre-service teachers. The
176 focus group discussion was divided into four phases as influenced by Participatory Action
177 Research Design. The first phase was planning where the ECCE lecturers as co-researchers and
178 the researchers started by discussing on the enhancement of technologies during training of pre-
179 service teachers. The second phase was action phase, the third phase was observation stage and
180 the last phase was reflection based on all the activities.

181 The generated data were divided into two themes: Theme 1: Inadequate technologies to promote
182 effective technological training of pre-service teachers and Theme 2: Lack of adequate support
183 for lecturers' continuous professional development

184 Trustworthiness of the study was enhanced by a pilot study, which eliminated ambiguities in data
185 generation instrument. To enhance trustworthiness of data, the researchers used member
186 checking of the data from focus group discussions.

187 **Theme 1: Inadequate Technologies to Promote Effective Technological Training of Pre-
188 Service Teachers**

189 This section presented the findings emanating from the data on the enhancement of technologies
190 in the training of preservice teachers in ECCE. The theme one above was the first theme that
191 emerged from the findings of the study which responded to research question that stated that how
192 do ECCE lecturers train pre-service teachers in the use of technologies in terms of Technological
193 Pedagogical Content Knowledge (TPCK)?

194 As the participants brainstormed while engaging in FGDs, their articulations indicated that there
195 are gross lack/inadequate technologies at the institution to train pre-service teachers in the use of
196 technologies in Early Childhood Care and Education They remarked as follows:

197 “Our resource centres or laboratory are not equipped in a way to facilitate the use of
198 Technologies during the training of pre-service teachers. This is because some of the
199 gadget that are available are outdated and not functional to facilitate effective teaching in
200 terms of Technological Pedagogical Content Knowledge.No overhead projector, the
201 desktops are faulty and 98% of the students are without personal laptop.

202 “The environment for training pre-service teachers is not also conducive for effective
203 teaching and learning that will facilitate the use technologies by the lecturers. There are
204 inadequate technologies for the pre-service teachers to practice on their own and few
205 available are not functioning very well for effective utilisation by the students.”

206 . “ The reason for poor integration of technology by lecturers some time is not intentional
207 but as a result of insufficient technology integration in the ECCE curriculum”

208 "It should also be noted that computer programming that will promote the enhancement
209 of technologies in the training of pre-serviceduring teaching are learning process are not
210 available"

211 The findings revealed that the participants will promote enhancement of technologies in
212 thetraining of pre-service teachers when the environment is well conducive for teaching and
213 learning process. This implies provision necessary technological materials to facilitate effective
214 teaching and learning which is also in line with Herro et.al., (2024) assertion that the inculcation
215 of technology in the training of pre-service teacher will empower them and increase their
216 teaching skills in their various classrooms. Tusyanah, Oktarina, Kharismaputra, Suryanto, and
217 Andik (2024) followed similar line of argument that pre-service teacher candidates are expected
218 to be well equipped, skillful, and knowledgeable in the application of technologies in teaching
219 and educational practice.

220 **Theme 2. Lack of Adequate Support for Lecturers' Continuous Professional Development**

221 There were many issues that arose during the focus group discussions. The participants exposed
222 various challenges due to the lack of adequate support for lecturers' continuous professional
223 development. Below are some of the excerpts evidenced from the focus group discussion.

224

225 "Despite the positive impact of Tertiary Education Trust Fund (Tetfund) on sustainable
226 development of educational system in Nigeria. There are no special funds for all lecturers
227 on continuous professional development and where they are available only limited
228 number of staffs could access the funds for regular development on their field."

229 ".....Some lecturers are without Technological Content Knowledge (TCK) whish simply
230 means you cannot train or impact the students on what you don't have or what you do not
231 have the knowledge of the operating system".

232 "There is no special programme for training of lecturers on the use of technologies that
233 will facilitate effective training of pre-service teachers through us. Meanwhile, the use of
234 technology by the lecturers would further increase student interactions, understanding

235 and better academic performance of students during the teaching and learning process,
236 improve their performance during teaching practice and examination.”

237 “It must also be noted that most lecturers were not exposed to the use of technologies
238 during our undergraduate programme that is why, all the lecturers have Content
239 Knowledge (CK) but the technological Knowledge (TK) are lacking with majority of the
240 lecturers, hence, the need for continuous professional development....”

241 The above evidence indicated that most of the lecturers in early childhood care and education
242 supported the fact that students would participate more during teaching and learning when the
243 lecturers are exposed to continuous professional development. It was further revealed by the
244 participants that they struggled to train pre-service in the use of technology due to lack of
245 professional development needed to be proficient. This is in line with Naida, Berezovska,
246 Bulgakova, Kravets & Savchenkova, (2024). That the integration of technologies in the training
247 of pre-service has numerous benefits as it foster creativity, stimulate real teaching scenario and
248 provide personalized learning.

249 **CONCLUDING REMARKS AND RECOMMENDATIONS**

250 Despite many challenges confronting lecturers in the enhancement of technologies in the training
251 ECCE pre-service teachers, the desire to advance the use technologies in the course of training
252 pre-service teachers was evident in their responses during the FGDs. The PAR methodology and
253 critical analysis approach facilitated the understanding of lecturer’s perceptions of the
254 importance of technologies in the training of pre-service teachers. However, in order to invest in
255 high-quality teacher education at the foundational level, the tertiary institution management
256 should make provision for technological gadgets and equip resource centers and classrooms
257 to promote Pedagogical Knowledge (PK) and Technological Pedagogical Knowledge (TPK) of
258 ECCE lecturers through constant and effective continuous professional development.

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