

Numeracy Corners and Lower Basic Public Primary School Pupils' Twenty-First Century Skills Acquisition: Implications for Achieving Sustainable Development Goals in Lagos State, Nigeria

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Abstract

This study examined numeracy corners and lower basic public primary school pupils' twenty-first century skills acquisition with their implications for achieving Sustainable Development Goals in Lagos State, Nigeria. A descriptive survey research design was used for the study. Simple random sampling technique was used to select 20 lower basic public primary schools and 60 teachers. Two research instruments, titled "Observation Schedule for Availability of Numeracy Corners and Materials" and "Questionnaire on Teachers' Perception of Numeracy Corners and Acquisition of 21st Century Skills", designed by the researchers and validated by research experts were used to collect data for the study. The instruments yielded reliability coefficients of 0.91 and 0.85, respectively. The data was collected by the researchers and some trained research assistants. The data was analysed using descriptive statistics of frequency counts, percentages, mean, and standard deviation. Findings revealed that numeracy corners and materials were not adequately available in the lower basic public primary schools covered. Teachers had positive perceptions on the extent to which numeracy corners promote the acquisition of twenty-first century skills. It is recommended that the federal government of Nigeria, through the Lagos State commissioner for education, should adopt a proactive approach to ensuring that provision is made for numeracy corners at each lower basic public primary school. The corners should be well equipped with learning facilities that would enhance the acquisition of twenty-first century skills.

Keywords: *Numeracy corners; Lower basic public primary school pupils; Twenty-first century skills; Sustainable Development Goals.*

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Background to the Study

The first eight years of a child's life are pivotal for all aspects of learning, growth and development. This premise is the reason the early childhood period needs much to be desired. This is because early childhood education builds the foundation for a successful and promising future for children. Also, early life experiences have a significant impact on how successful children become later in life. Hence, promoting positive experiences for young children early in life is highly imperative. The above point to the fact that early years' activities and experiences serve as bases for the formation of a secure emotional bond, social transformational skills, computational skills, functional skills, and other significant life skills that would help children become successful in their endeavours (Ahmad, 2022). It is pertinent to establish that achieving the 2030 Sustainable Development Goals in any nation depends hugely on the quality of its education. This is due to the fact that without education, there can be no significant national growth. This is why it is critical that children are allowed to participate in all of their milestone activities in order not to miss out on critical skills in their lives (David et al., 2014). Aside from social and emotional skills, there are other skills children are expected to acquire in their early years, such as, cognitive skills, moral skills, physical skills, twenty-first century skills, among others.

It is critical to emphasise at this point that the fundamental skills that young children are expected to acquire during their early years are twenty-first century skills. The term 'twenty-first century skills' is an overarching concept for the knowledge, skills and dispositions that citizens need to be able to contribute to the knowledge society. Hwang (2020) defines twenty-first century skills as the knowledge, skills, and attitudes necessary to be competitive in the twenty-first century workforce, participate appropriately in an increasingly diverse society, use new technologies, and cope with rapidly changing workplaces. These skills are knowledge and expertise that are significant in daily and professional life. They include critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills, digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovation skills, and thinking skills (Aunio et al., 2015). Twenty-first century skills are very important skills to be acquired through children's interaction with materials, particularly numeracy materials.

Acquisition of numeracy skills is highly imperative in the twenty-first century. Numeracy is very pivotal, and it is important to assist young children in developing their mathematical thinking early enough. Numeracy, which can be interchangeably referred to as early year's mathematics, is a foundation-building subject that allows children to invent new ideas and see life from a different perspective. In addition, the numeracy skills of children are highly significant in the expression of mental skills that are necessary for future success. A child's mathematics knowledge at the beginning of kindergarten predicts later academic achievement as well as early reading and attention skills. The importance of numeracy in early childhood can be assessed by the fact that kids who develop a good understanding of math are often confident when it comes to decision-making and environment assimilation (Ahmad, 2022). Numeracy is a skill that involves confidence and the ability to deal with numbers and measurements. Numeracy is the capacity, confidence, and disposition to use mathematics in

our daily lives. Children gain new mathematical understandings through engaging in problem-solving. The mathematical ideas with which young children interact must be relevant and meaningful in the context of their current lives. Spatial sense, structure and pattern, number, measurement, data argumentation, connections, and exploring the world mathematically are the powerful mathematical ideas children need to become numerate (Aubrey & Godfrey, 2003).

To Ahmad (2022), numeracy is measuring, sorting, building, noticing patterns, making comparisons, describing the environment, counting and knowing the names of shapes. Mei-Shiu (2018) adds that early numeracy activities are more than simply serious mathematics games. In fact, it is pertinent to establish that numeracy performs an increasingly important role in enabling and sustaining cultural, social, economic, and technological advancement. Numeracy skills enable logical reasoning, which leads to better comprehension of the world around us. The assertions reveal that education provides individuals with sufficient reasons to choose which learning themes will be preserved and maintained throughout their lives.

Further, numeracy skills provide the basis for a working knowledge of the number system, a set of computational skills, and the desire and capacity to solve number issues in various situations. It is important to emphasise that due to the significance of numeracy skills in children's futures, the availability of numeracy materials in schools is highly imperative. When numeracy materials are available, the children will be able to interact with the materials and acquire significant skills. This is why it is important that provisions are made for numeracy corners in early childhood education learning centres. Learning corners refer to as designated areas within the lower basic classrooms where specific activities are arranged for the children to explore (Nakpodia, 2011). Aside from the provision of numeracy corners in schools, it is pertinent that the corners are adequately equipped with relevant and age-appropriate numeracy materials. The reason for this position is not far-fetched; as the non-availability and inadequacy of the materials would render the corners insignificant. It is in light of the above submission that most researchers' interest was piqued to conduct studies on the issue of numeracy corners and materials to promote the holistic development of children in several ways.

From an empirical point of view, the current researchers painstakingly observed in the literature that there is a dearth of studies on the issue of the availability of numeracy corners and the adequacy of numeracy materials. However, studies have been conducted on numeracy corners generally. Specifically, Okongo et al. (2015) carried out a study in Kenya, which revealed that there were inadequate teaching and learning resources at pre-school centres in the Nyamira North sub-county. This simply implies that the level of availability of learning resources generally is low. Guhl (2019) conducted a study in which it was revealed that early math and numeracy skills significantly impacted the academic achievement of the pupils covered in the study. A study by Mei-Shiu (2018) revealed that early numeracy activities have a significant effect on the mathematics achievement of the respondents covered in the study. Hwang (2020) showed that students who engage in more early numeracy activities at home are more likely to have high mathematics achievement in the fourth grade. Early numeracy

competencies and self-efficacy beliefs positively mediate this relationship. Similarly, the study by Philip and Emah (2022) revealed that pupils taught using differentiated instruction performed significantly better than those taught using conventional teaching methods in numeracy. Furthermore, there was a significant difference in the scores of boys and girls taught using differentiated instruction. There is no significant interaction effect of mode of instruction and gender on the mean numeracy achievement of nursery II students. With respect to twenty-first century skill acquisition, Singh (2021) reported in his study that twenty-first century skills are better promoted through science, technology, engineering, arts, and mathematics education.

Literature search further reveals that there is a huge gap in the literature on the issues relating to numeracy corners and materials. Presently, this position is more evident in Nigeria. This simply implies that more research attention is needed to be directed to the issue of the numeracy skills of children. This notable observation that was conspicuously observed by the researchers and the significance of assisting young children to acquire numeracy skills in the early years piqued the interest of the researcher to quantitatively examine numeracy corners and lower basic public primary school pupils' twenty-first century skills acquisition: implications for achieving Sustainable Development Goals in Lagos State, Nigeria.

Statement of the Problem

Teaching in the twenty-first century demands more creative, innovative and analytic processes in order to adequately prepare lower basic primary school pupils for the future. Thus, deliberate actions must be taken to provide learners with the opportunity to interact with and learn from materials that would prepare them for the twenty-first century. Twenty-first century skills would enable them to become active, creative, committed and proactive in their decision-making. With respect to this study, numeracy skills are substantial, lifelong skills that are highly pivotal in the early years of a child's development. This implies that the learning corners of all early childhood education schools need to be adequately equipped with all relevant numeracy materials that would help children become well equipped with mathematical terminologies. It has been noted that numeracy is measuring, sorting, building, noticing patterns, making comparisons, and describing the environment. However, literature showed that numeracy materials were inadequately available in lower basic primary schools (Okongo et al., 2015; Mei-Shiu, 2018; Guhl, 2019). In spite of the fact that numeracy materials are imperative for developing computational skills and problems solving skills relating to number issues. It further revealed that few studies exist on the issue of numeracy corners and primary school pupils in the twenty-first century. If proactive measures are not advanced to fill the research gaps in the literature left uncovered, there is no doubt that children whose schools are not well equipped with numeracy materials will not be able to learn maximally. It is against this backdrop that the researchers considered it imperative to conduct this study.

Purpose of the Study

The study;

- i. Examines the extent availability of numeracy corners and materials in lower basic public primary schools in Lagos State; and

- ii. Determines the extent to which numeracy corners promote acquisition of twenty-first century skills that pupils need to succeed in the future.

Research Questions

- i. What is the extent of availability of numeracy corners and materials in lower basic public primary schools in Lagos State?
- ii. To what extent do numeracy corners promote acquisition of twenty-first century skills that pupils need to succeed in the future?

Methodology

A descriptive survey design was used for this study. The researchers used a simple random sampling technique to select twenty public primary schools and their respective teachers. The schools were easily accessible, had qualified and experienced preschool teachers, and had been established for over ten years. Specifically, six lower basic public primary teachers were selected from each of the schools. The teachers had at least an NCE certificate, which qualified them to become preschool teachers, and they had been working in those schools for over five years. Two research instruments that were duly screened and scrutinised by research experts in the Departments of Social Sciences Education, Early Childhood Education Cohort, University of Lagos, Yaba, Akoka, Lagos, were used to collect data for the study. The first was an observation schedule. It was titled "Observation Schedule for Availability of Numeracy Corners and Materials (OSANCM)". The instrument was subjected to a reliability test through an inter-rater scale, and a reliability of 0.89 was obtained. Thereafter, the data were collected. It was specifically used to check the availability of numeracy corners and materials in the schools sampled. It contained twenty numeracy materials. The response type used was "not available and available. The second was a questionnaire that was titled "Questionnaire on Teachers' Perception of Numeracy Corners/materials and Acquisition of 21st Century Skills (QTPNCACS)". The instrument was subjected to a reliability test through Cronbach's alpha technique, and a reliability coefficient of 0.91 was obtained. The instrument had eight items. The response type used was the Likert-Scale type of Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA).

The data was collected by the researchers and four trained research assistants. Prior to the data collection phase, there was a written letter to seek the consent of the school heads and the teachers for approval. Thereafter, the researchers and the trained research assistants used the observation schedule to observe the availability of numeracy corners and materials in the schools for a period of two weeks. Afterward, the researcher and the research assistants administered the questionnaire to the teachers. In total, the data collection phase lasted for a period of six weeks. The data were analysed using descriptive statistics of frequency counts, percentages, mean, and standard deviation to answer the research questions asked.

Results

Answers to the Research Questions

Research Question 1: What is the extent of availability of numeracy corners and materials in lower basic public primary schools in Lagos State?

Table 1: *The Extent of Availability of Numeracy Corners and Materials in Lower Basic Public Primary Schools in Lagos State*

| Numeracy Materials | Not Available | | Available | |
|--|---------------|------|-----------|------|
| | Freq. | % | Freq. | % |
| Counters | 6 | 30.0 | 14 | 70.0 |
| Geometry shapes | 6 | 30.0 | 14 | 70.0 |
| Place valued blocks | 17 | 85.0 | 3 | 15.0 |
| Transparent counting chips | 15 | 75.0 | 5 | 25.0 |
| Math playing cards | 7 | 35.0 | 13 | 65.0 |
| Measuring spoons/cups | 18 | 90.0 | 2 | 10.0 |
| Geo-boards | 6 | 30.0 | 14 | 70.0 |
| Pattern blocks | 13 | 65.0 | 7 | 35.0 |
| Ice cube trays | 19 | 95.0 | 1 | 5.0 |
| Triangle flashcards | 16 | 80.0 | 4 | 20.0 |
| 6-sided coloured dice | 19 | 95.0 | 1 | 5.0 |
| Building blocks of different pattern | 7 | 35.0 | 13 | 65.0 |
| Number hunt chart | 4 | 20.0 | 16 | 80.0 |
| Number books | 14 | 70.0 | 6 | 30.0 |
| Number towers | 15 | 75.0 | 5 | 25.0 |
| Rainbow rice number formation | 17 | 85.0 | 3 | 15.0 |
| 2D shapes | 17 | 85.0 | 3 | 15.0 |
| Cubes of different shapes | 15 | 75.0 | 5 | 25.0 |
| Number charts | 1 | 5.0 | 19 | 95.0 |
| Charts showing mathematical operations | 2 | 10.0 | 18 | 90.0 |

Note on Decision: *The decision is based on the level of availability of the materials in the schools covered. Specifically, the percentages of the unavailable materials are more than the available materials. Hence, it is said that the extent of availability of numeracy corners and materials in lower basic public primary schools in Lagos State is low.*

Table 1 shows the extent of availability of numeracy corners and materials in lower basic public primary schools in Lagos State. The table shows that the following numeracy materials are **available**: counters (70%), geometry shapes (70%), math playing cards (65%), geo-boards (70%), building blocks of different pattern (65%), number hunt chart (80%), number charts (95%) and charts showing mathematical operations (90%). However, the table reveals further that the following numeracy materials are **not available**: place valued blocks (85%), transparent counting chips (75%), measuring spoons/cups (90%), pattern blocks (65%), Ice cube trays (95%), number books (70%), number towers (75%), rainbow rice number formation (85%), 2D shapes (85%), and cubes of different shapes (75%). Based on the result from this table, it can be inferred that the extent of availability of numeracy corners and materials in lower basic public primary schools in Lagos State is low. This is because larger percentage of the materials were not available.

Research Question 2: To what extent do numeracy materials promote the acquisition of twenty-first century skills that pupils need to succeed in the future?

Table 2: *Extent to which Numeracy Material Promote the Acquisition of Twenty-first Century Skills that Pupils need to Succeed in the Future*

| Items | SD | D | A | SA | Mean () | Std.D |
|---|-------------|--------------|--------------|--------------|-------------|-------|
| Numeracy skills are very pivotal to the acquisition of twenty-first century skills. | 4 (6.7) | 16 (26.7) | 31 (51.7) | 9 (15.0) | 2.75 | .80 |
| Acquisition of the twenty-first century skills is fast tracked when children are acquainted with relevant numeracy skills | 2 (3.3) | 12 (20.0) | 17 (28.3) | 29 (48.3) | 3.22 | .89 |
| It is a general believe that numeracy skills are the main requirements for the development of twenty-first century skills. | 6 (10.0) | 8 (13.3) | 11 (18.3) | 35 (58.3) | 3.25 | 1.04 |
| Without numeracy skills, acquisition of twenty-first century skills would obviously be difficult. | 0 (0.0) | 22 (36.7) | 22 (36.7) | 16 (26.7) | 2.90 | .80 |
| Numeracy skills are the necessary skills for the acquisition of twenty-first century skills. | 4 (6.7) | 10 (16.7) | 39 (65.0) | 7 (11.7) | 2.82 | .73 |
| Young children's critical thinking, communication, creativity, problem solving are all better developed and promoted when children are exposed to numeracy corners to interact with the learning materials. | 0 (0.0) | 23 (38.3) | 28 (46.7) | 9 (15.0) | 2.77 | .70 |
| Numeracy materials like 6-sided coloured dice and geometric board are very good to enhance creativity and critical thinking skills of children which are core skills of the twenty-first century skills. | 2 (3.3) | 15 (25.0) | 31 (51.7) | 12 (20.0) | 2.88 | .76 |
| Demonstration of computational skill is an evidence of twenty-first learning which is best promoted by mathematical operational charts | 1 (1.7) | 13 (21.7) | 26 (43.3) | 20 (33.3) | 3.08 | .79 |
| Weighted average | | | | | 2.96 | |

N=60

Key: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Decision Value: *Low Extent* = 0.00-2.44, *High Extent* = 2.45-4.00

Note on Decision Value: *Mean values of all the items in the table were added and divided by the number of items in the table. This gave the weighted average value of which 4.00 is the maximum value that can be obtained. The value of the weighted average that is between 0.00 and 2.44 was taken to stand for Low Extent while the one between 2.45 and 4.00 was taken to stand for High Extent.*

Table 2 shows the extent to which numeracy materials promote the acquisition of twenty-first century skills that pupils need to succeed in the future. The table shows that the respondents agreed as follows: numeracy skills are very pivotal to the acquisition of twenty-first century skills ($x = 2.75$), acquisition of the twenty-first century skills is fast tracked when children are acquainted with relevant numeracy skills ($x = 3.22$), it is a general believe that numeracy skills are the main requirements for the development of twenty-first century skills ($x = 3.25$), without numeracy skills, acquisition of twenty-first century skills would obviously be difficult ($x = 2.90$), numeracy skills are the necessary skills for the acquisition of twenty-first century skills ($x = 2.82$), young children's critical thinking, communication, creativity, problem solving are all

better developed and promoted when children are exposed to numeracy corners to interact with the learning materials ($x = 2.77$), numeracy materials like 6-sided coloured dice and geometric board are very good to enhance creativity and critical thinking skills of children which are core skills of the twenty-first century skills ($x = 2.88$) and demonstration of computational skill is an evidence of twenty-first learning which is best promoted by mathematical operational charts ($x = 3.08$). Meanwhile, based on the value of the weighted average (2.96 out of 4.00 maximum value that can be obtained), which falls within the decision value for high extent, it can be inferred that the extent to which numeracy materials promote the acquisition of twenty-first century skills that pupils need to succeed in the future is high.

Discussion

The first finding reveals that the extent of the availability of numeracy corners and materials in lower basic public primary schools in Lagos State is low. The reason responsible for this finding could be that the schools' heads are not convincingly aware of the tremendous impact of numeracy materials on the acquisition of twenty-first century skills by lower basic primary school pupils. This result is consistent with the result of a joint study conducted by Okongo et al. (2015), which revealed that there were inadequate teaching and learning resources at pre-school centres in Nyamira North sub-county. It is imperative to note that numeracy materials are not only pivotal to the acquisition of twenty-first century skills by lower basic primary school pupils, but they also enhance pupils' high academic achievement. This lends credence to the findings of Guhl (2019) and Philip and Emah (2022), whose study revealed that early math and numeracy skills significantly impacted the academic achievement of the pupils covered in his study. Similarly, it also agrees with the finding of Mei-Shiu (2018), who reported that early numeracy activities have a significant effect on the mathematics achievement of the respondents covered in the study. All these results advocate the need to actively engage children in numeracy activities. This position is attests to Hwang's (2020) assertion that learners who engage in more early numeracy activities at home are more likely to have high mathematics achievement in the fourth grade. In the same vein, early numeracy competencies and self-efficacy beliefs positively mediate this relationship.

The second finding showed that the extent to which numeracy materials promote the acquisition of twenty-first century skills that pupils need to succeed in the future as perceived by the teacher is high. This result is in consonance with the finding of Singh (2021), who found that twenty-first century skills are better promoted through science, technology, engineering, arts, and mathematics education. This result is also unconnected to the result of Aunio et al. (2015), who reported that critical thinking, creative thinking, problem-solving, collaboration, communication, as well as concepts such as information and communication technologies numeracy, are better acquired through good knowledge of numeracy. Again, the result is in agreement with the assertion of Aubrey and Godfrey (2003) that spatial sense, structure and pattern, number, measurement, data argumentation, connections, and exploring the world mathematically are the powerful mathematical ideas children need to become numerate.

Conclusion

This study has provided empirical evidence on the fact that numeracy materials are not adequately available in the lower basic public primary schools in Lagos State, despite the fact that good knowledge of numeracy promotes the acquisition of twenty-first century skills that pupils need to succeed in the future. In the light of this fact, it is concluded that the pupils in lower basic public schools would be deprived of the opportunity to acquire twenty-first century skills such as critical thinking, communication, creativity, problem solving, collaboration, technology and digital literacy, self-directed and innovative skills are all core skills of the twenty-first century. Hence, there is an urgent need for proactive steps to ameliorate this issue.

Recommendations

- i. The federal government of Nigeria, through the Lagos State minister for education, should adopt a proactive approach to ensuring that provision is made for numeracy corners at each lower basic public primary school. Thereafter, the numeracy corners should be well equipped with learning facilities that are pivotal to the mastering of numeracy, which would fast-track the acquisition of skills for the twenty-first century.
- ii. Again, the preschool teachers who facilitate learning for young children should endeavour to create feasible times that pupils can visit the numeracy corners to interact with the learning materials in group and learn maximally.

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