



## Evaluation of the Availability and Utilization of Facilities for Implementing Mathematics Component of Nursery Curriculum in Rivers State, Nigeria

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### Abstract

This study evaluated the availability and utilization of facilities for implementing mathematics component of nursery curriculum in Rivers State, Nigeria. The study was conducted using evaluation design. Context, Input, Process, Product, Constraint (CIPPC) Model was used with emphases on Input (human and material resources) and Process (resources interaction). Validated Instruments (Observation scale and questionnaires) with reliability coefficient of 0.81 were used. Multistage sampling procedure involving Simple random sampling and stratified sampling techniques was used to select a sample of 200 teachers from 1,970 Mathematics teachers in 10 Government owned and Government approved private Nursery schools from 10 Local Government Areas in Rivers State. Stratified random sampling technique was used to stratify schools into urban and rural. Two research questions and one null hypotheses guided the study. Frequency count, mean and standard deviation were used to answer research questions while independent sample t-test at 0.05 alpha level of significant was used to test the hypothesis. The results revealed that availability and utilization of instructional and infrastructural facilities were above average. It was recommended among others that Government make more instructional materials/facilities available.

**Keywords:** Evaluation, Availability, Utilization, Mathematics, Nursery.

### Introduction

Mathematics is one of the core subjects in basic and secondary education in Nigeria. Mathematical knowledge and skills are required in everyday life of all citizens irrespective of the individual's state in life. This is why Mathematics is made compulsory for all learners in basic and secondary education in Nigeria. Therefore, the importance of Mathematics can never be overemphasized in Nigeria's education system. Mathematics is all around us as the building block for all our daily activities. The knowledge of Mathematics helps every individual to understand the world through the use of symbols and abstract representation of every natural event (phenomenon). Olajide, Ekwueme and Ndioho (2020) defines Mathematics as the science of counting, measuring and describing shapes of objects. It deals with logical reasoning and quantitative calculation. As a school subject, Mathematics is recognized as the foundation of science and technology needed for national development. This is why Mathematics is compulsory in basic and senior secondary education in Nigeria.

Since Mathematics is a compulsory subject in basic and senior secondary education, it is important to start the implementation of Mathematics curriculum early in the education of children. This is why Nigeria's educational system has the Mathematics component of the Nursery education curriculum as a guide. The nursery level Mathematics is expected to be very simple. The curriculum guidelines for Nigerian nursery schools have the Mathematics components broken down into teaching objectives, programme of activities, teaching methods, teaching aids, assessment procedure, instructional materials and examples of how the school compound should be. The contents are drawn depending on the age of the learners. The objectives for the Mathematics curriculum for 3-year learners include recognizing objects, sorting things, naming primary colours, naming shapes, recognizing number symbols 1-5 and counting numbers 1-10. The curriculum is a teaching curriculum since it is presented in the form that can be implemented easily in the classroom. The teaching curriculum is presented in a table containing topics, objectives, teachers'



activities, learners' activities, methods, resources and suggested evaluation procedure. Given the importance attached to Mathematics education of nursery school children, teachers are encouraged to enrich and try to effectively cover the Mathematics component of the nursery school curriculum. Teachers are encouraged to adapt the Mathematics aspects of the nursery school curriculum to the materials and resources of the immediate environment of the learners. Adequate infrastructural facilities (such as well-equipped classroom, library, table, chairs, generating plant and a lot more) and instructional facilities (such as spindle box. Colour chart, number board and flash card) should be provided. In this way, Mathematics education at the nursery school level would be meaningful to the learners. This will generate and sustain the learners' interest in Mathematics. It is however the case that pupils in Nigeria's basic education, including nursery schools lack interests in Mathematics, are afraid of the subject, hate the subject and perform poorly in the class-based assessment (Akinade, 2015). This poor performances in Mathematics has been attributed to long held stereotypes that Mathematics is difficult and is meant for the brightest pupils. The stereotypes about school Mathematics is responsible for the fear and phobia with which learners regard the subject. Fear or phobia for Mathematics should not start as early as nursery school whose Mathematics curriculum does not permit the use of teaching methods that introduce abstraction into the subject.

If children in nursery schools lack interest and perform poorly in the Mathematics component of the school curriculum, there is need to find out how the teachers are implementing the Mathematics component of the nursery school curriculum. This entails finding out and evaluating the approaches of teaching methods and materials used by the teachers, the consistency and effectiveness of resources from the immediate environment of the learners, the nature of learning activities the teachers adopt, the nature of the outcome assessment process which the teachers use for evaluation and very importantly, the qualification and capacity of the teachers who are implementing the Mathematics components of nursery school curriculum. For curriculum implementation to be effective, the implementers (in this case the nursery school teachers and caregivers) have to be qualified and have the required competences. In this case, one would ask what are the qualifications and competences of nursery school teachers and caregivers in delivering

Mathematics component of the nursery school curriculum? NERDC (2019) sought for the assistance of Universities, Teachers Training Institutions and Colleges of Education in training nursery school teachers with the minimum qualification of Nigeria Certificate in Education (NCE) before being employed. Are the teachers of nursery schools delivering the Mathematics component of the curriculum as planned?

However, some teachers make concerted effort to ensure the implementation of Mathematics component of the curriculum to the best of ability. To examine this, A number of evaluation models have been identified for evaluation of educational programmes and activities. These models are based on the purposes of evaluation, component elements and procedures. Some of these models include Robert Stake's (1969) model cited as in Vikoo (2016), which is a summative evaluation model, Alkin's (1969) model cited as in Vikoo (2016), which is a decision management evaluation model and Daniel Stufflebeam's (1969) model which is a context, input, process and product model (CIPP). Of these models for programmes evaluation, Stufflebeam's CIPP model is considered to be the most appropriate for this study because it is wholistic and comprehensive in nature. It takes cognition of all the parts of the programme/task to be evaluated. It looks at all the components of nursery school Mathematics curriculum whereas, other models just consider only some parts of a programme. For example, Robert Stake's model majorly provides a systemic guidance for user and takes care of the product of the programme. Therefore, it is conducted mainly at the end of the programme without considering what happens at the beginning, process and problem affecting the programme (the constraint). Alkin's model is majorly for decision making without considering other aspects of the programme (examples are admission interview or placement examination). Other models such as Scriven's model and accreditation model majorly consider placement, while Tyler's model is comprehensive but does not consider the problems affecting any programme.

The curriculum evaluation model developed by Stufflebeam takes into account the context, input, process and product (CIPP) aspects of the curriculum. Considering the problems affecting any programme, Daniel Stufflebeam had to modify the CIPP model in 1971 to include the constraints aspects of curriculum evaluation (Akapei 2019). The acronym becomes CIPPC model. The CIPPC is a comprehensive



formative evaluation model focusing on all aspects of the educational programme, namely: Context (C) which includes the objectives of the curriculum, Inputs (I) which includes the human and non-human resources needed for implementation of the curriculum, Process (P) which includes the recommended ways of implementation (teaching and outcomes assessment), Products (P) which include the outcomes or the achievements attained after implementation and, Constraints (C) which include the problems or setbacks experienced in the process of implementation. The systematic and comprehensive nature of Stufflebeam model makes it to be preferred among the other curriculum evaluation models of researchers and evaluators.

In terms of location, the researcher observed that nursery schools are more in urban areas than in rural areas. In a study like this, it is pertinent to find out the influence of location on the implementation of Mathematics component of the nursery school curriculum. The quality of nursery schools is likely to be better in urban areas than in rural areas. The quality comes as a result of competition between the educational providers (proprietors) who will want their schools to be the best. This agrees with Owoeye and Ayara (2011) who observed that learners in urban areas have better academic achievement than their counterparts in the rural areas. This has implications for the effectiveness of implementation of Mathematics components of the nursery school curriculum. As one of the problems confronting the implementation of Mathematics components of nursery school curriculum, the resources and facilities for nursery school education are likely to be more favourable to urban areas than rural areas. This is because with more nursery schools in urban areas the ensuing competition among school supplies will most likely influence the quality, resources and facilities for nursery education. Other problems include lack of quality teachers, availability of approved and stipulated curriculum and a lot more. These curriculum implementation process variables need to be determined by evaluating what the nursery school teachers are doing in their efforts to effectively implement the Mathematics components of the Nursery school curriculum in Rivers State.

Evaluating the implementation of Educational programmes involves comparing what is in practice with the intended implementation processes. Generally, poor performance has been observed in Mathematics among learners. The researcher has also

observed this trend, along with fear for Mathematics. The blame for this has been put on so many variables like teachers' performances, learners' attitude and background, learning facilities, learning environment among others. The main question of this study is: if the instructional and infrastructural facilities are available, can the level of utilization of the facilities in both urban and rural areas affect the implementation of the Mathematics component of nursery school curriculum?

### Research Questions

1. What are the instructional facilities available (Input) for the implementation of Mathematics component of nursery school curriculum in urban and rural areas of Rivers State?
2. What is the extent of utilization of instructional facilities (Process) for effective implementation of Mathematics component of nursery school curriculum in urban and rural areas of Rivers State?

### Hypothesis

There is no significant difference in the mean ratings of urban and rural teachers on the extent of utilization of instructional facilities for the implementation of Mathematics component of nursery school curriculum in Rivers State.

### Methods

The study was conducted using an evaluative research design. Daniel Stufflebeam modified evaluation model otherwise known as the CIPPC model of evaluation was considered good in this study, with focus on input and process components of the model. The study was carried out in Rivers State. The population of the study consisted of all the 1,970 teachers teaching Mathematics in 530 Government owned and Government approved private Nursery schools in Rivers State. The sample size of two hundred (200) nursery school teachers were selected using the simple random sampling technique.

The instruments for data collection were an Instructional Facility Availability Checklist and questionnaire on utilization of available instructional facilities, both developed by the researchers. The instruments were validated by three experts in the Department of Science Education, University of Nigeria Nsukka. The reliability of the questionnaire as determined using Cronbach Alpha is 0.81. Data was collected with the help of one research assistant.

Collected data was analysed using frequency counts, percentage, mean and standard deviation.

### Results

Table 1: Summary of descriptive statistics on the available instructional facilities for the implementation of Mathematics components of nursery school curriculum in Rivers State. (n=80 schools visited)

S/N	Infrastructural Facilities	Available (N)	Available (%)	Not Available (N)	Not Available (%)	Remarks
1	Spindle box	69	86.25	11	13.75	AV
2	Flash cards	77	96.25	3	3.75	AV
3	Number boards	80	100.00	0	0.00	AV
4	Number rods	80	100.00	0	0.00	AV
5	Video/video player	77	96.25	3	3.75	AV
6	Buttons	80	100.00	0	0.00	AV
7	Number charts	80	100.00	0	0.00	AV
8	Pencils	80	100.00	0	0.00	AV
9	Coloured balloons	80	100.00	0	0.00	AV
10	Abacus	80	100.00	0	0.00	AV
11	Books	80	100.00	0	0.00	AV
12	Plastic eggs	80	100.00	0	0.00	AV
13	Pencils cups	80	100.00	0	0.00	AV
14	Erasers	80	100.00	0	0.00	AV
15	Large numbers on coloured cardboard for evaluation	74	92.50	6	7.50	AV
16	Number series	70	87.50	10	12.50	AV
17	Match sticks	80	100.00	0	0.00	AV
18	Sand paper numbers	75	93.75	5	6.25	AV
19	CS 500 pencil	76	95.00	4	5.00	AV
20	Number rhymes charts	77	96.25	3	3.75	AV
21	Coloured balls	80	100.00	0	0.00	AV
22	Cups	80	100.00	0	0.00	AV
23	Coloured pencils/crayons	80	100.00	0	0.00	AV
24	Counting stones	80	100.00	0	0.00	AV
25	Colour charts	80	100.00	0	0.00	AV
26	Colour spool	74	92.50	6	7.50	AV
27	Shapes	80	100.00	0	0.00	AV
28	Cut-out sizes of shapes with cardboard for evaluation	80	100.00	0	0.00	AV
29	Jumbo pencil	80	100.00	0	0.00	AV
30	Drawn shapes on cardboard for evaluation	80	100.00	0	0.00	AV
31	Number posters	80	100.00	0	0.00	AV
32	Ludo	73	91.25	7	8.75	AV
33	Play cards	80	100.00	0	0.00	AV
34	Manipulatives electronic toys	72	90.00	8	10.00	AV

**Key:** AV = Available      NA= Not Available      N = Number of Schools      Bench Mark = 50%

Table 1 shows the summary of descriptive statistics on extent of the available instructional facilities for the implementation of Mathematics components of the nursery school curriculum in Rivers State. It

shows that instructional facilities such as Spindle box, Flash cards, Number boards and Number rods among others were available in the private and public ECE centres in Rivers State.

Table 2: Summary of descriptive statistics on extent of the utilization of instructional facilities for effective implementation of Mathematics components of nursery school curriculum in Rivers State (n=198)

S/N	ITEMS	VHE	HE	LE	VLE	Mean	SD	Re mark
1	I use Spindle box to teach mathematics	55	69	47	27	2.77	1.01	*
2	Pupils enjoy lessons more when Flash cards are used during counting	48	73	42	35	2.68	1.03	*
3	I use Number boards for Pupils to identify numbers	35	33	109	21	2.41	0.90	
4	I use Number rods for counting	62	81	48	7	3.00	0.84	*
5	I use Video/video player to make my lessons interesting	19	67	63	49	2.28	0.95	
6	Buttons are always used for counting	49	61	47	41	2.60	1.08	*
7	Number charts help pupils a lot in identification of numbers	55	73	35	35	2.75	1.05	*
8	Pencils are used for writing numbers	27	41	109	21	2.37	0.85	
9	I use Coloured balloons for counting	81	61	56	0	3.13	0.82	*
10	I use Abacus to explain the place value of numbers	20	80	56	42	2.39	0.93	
11	I make my pupils write in a Book	63	54	40	41	2.70	1.13	*
12	Plastic eggs used to encourage counting	20	101	28	49	2.46	0.97	
13	I use Pencil cups to keep pencils	27	62	95	14	2.52	0.82	*
14	Erasers are used to correct mistakes	40	67	77	14	2.67	0.88	*
15	I use large numbers written on colored cardboard for evaluation	34	101	49	14	2.78	0.81	*
16	Number series make for easy identification of large and small numbers	55	69	48	26	2.77	1.00	*
17	Pupils enjoy counting with Match sticks	48	73	42	35	2.68	1.03	*
18	Sand paper numbers are always pasted on boards for number identification	35	33	109	21	2.41	0.90	
19	CS 500 pencils are used for easy writing	63	80	48	7	3.01	0.84	*
20	Counting is interesting when I use Number rhymes charts	19	67	63	49	2.28	0.95	
21	Pupils use Coloured balls for counting	62	55	41	40	2.70	1.12	*
22	Cups are used in teaching measurement	20	101	28	49	2.46	0.97	
23	It is easier to erase pencils	27	63	93	15	2.52	0.82	*
24	I use counting stones regularly	40	67	77	14	2.67	0.88	*
25	I use colour charts for number identification	34	101	49	14	2.78	0.81	*
26	Colours pool is used when teaching probability	48	61	47	42	2.58	1.08	*
27	Shapes are used during geometry class	55	73	35	35	2.75	1.05	*
28	Cut out sizes of shapes with cardboard are for evaluation when teaching fraction	27	41	109	21	2.37	0.85	
29	Jumbo pencil is used regularly	81	61	56	0	3.13	0.82	*
30	Drawn shapes on cardboard are used for evaluation during geometry class	20	80	56	42	2.39	0.93	

31	Number posters are for identification of numbers	43	71	65	19	2.70	0.92	*
32	I always play Ludo as a counting game	41	69	72	16	2.68	0.89	*
33	I use Play cards as a game that makes for easy identification of numbers	47	70	66	15	2.75	0.90	*
34	I always use Manipulatives electronic toys in the class	42	75	50	31	2.65	0.99	*
<b>Cluster Summary</b>						<b>2.64</b>	<b>0.31</b>	<b>*</b>

**Key: \*High Extent**

The summary of the respondents' utilization of instructional facilities for implementing Mathematics in nursery schools in Rivers State shows an overall grand mean of 2.64 (SD=0.31). Respondents highly indicated using colored balloons and jumbo pencils for counting, both with a mean rating of 3.13 (SD=0.82). Other frequently used materials include CS 500 pencils (mean = 3.01, SD = 0.84), number rods (mean

= 3.00, SD = 0.84), and large numbers written on colored cardboard (mean = 2.78, SD = 0.81). Spindle boxes, number series, number charts, shapes, and play cards were also highly used with mean ratings ranging from 2.75 to 2.77. Various other materials, including flashcards, matchsticks, Ludo, manipulatives, and counting stones, had mean ratings between 2.52 and 2.70, reflecting moderate use.

Table 3: Summary of independent sample t-test on the difference between the mean rating of urban and rural teachers on the extent of utilization of instructional facilities for the implementation of Mathematics component of nursery school curriculum in Rivers State.

Location	N	Mean	SD	SDE	t	df	p-value
Urban	109	2.62	0.36	0.03	-1.092	196	0.276
Rural	89	2.67	0.23	0.02			

Table 3 shows the Summary of independent sample t-test on the difference between the mean rating of urban and rural teachers on the extent of utilization of instructional facilities for the implementation of Mathematics component of nursery school curriculum in Rivers State. It shows that the calculated t-value was -1.092 whereas the degree of freedom was 196 and the p-value was .276. The above result indicated that there is no significant difference between the mean rating of urban and rural teachers on the extent of utilization of instructional facilities for the implementation of Mathematics component of nursery school curriculum in Rivers State. The null hypothesis two was retained at .05 level of significance. This means that nursery school teachers in both urban and rural areas utilizes instructional facilities almost equally.

### Discussion of Findings

The result from Table 1 showed that the instructional facilities such as Spindle box, Flash cards, Number boards and Number rods among others were available in the private and public Early Childhood Education (ECE) centers (nursery school) in Rivers State. This implies that instructional facilities for the implementation of Mathematics components of the

nursery school curriculum in Rivers State was adequate. This finding is in agreement with an earlier observation of Bessong, Ubana, and Udo, (2013) that factors militating the effectiveness of the implementation of educational programmes can be traced to inadequate resources. Gogai and Khanikor (2016) also observed that there is a gap between the facilities proposed in the district's institution of education guideline and their availability. However, the study revealed that even when the instructional facilities are available, some private school owners and school heads lock up some of the facilities for the fear of being rough handled or damaged as was observed in some of the schools visited.

The result from Table 2 showed that the extent of the utilization of instructional facilities for effective implementation of Mathematics components of nursery school curriculum in Rivers State was above average. Specifically, the result showed that the most frequently utilized facilities were jumbo pencil and coloured balloons, these were followed by CS 500 pencil and the least as rated above average was pencil cup. This agrees with Gbamanja (2002) who believe that the success of any science teacher in the process of teaching and learning of any science subject is in the



availability and utilization of instructional materials in the laboratory. When put to statistical test, the result also showed that there is no significant difference between the mean rating of urban and rural teachers on the extent of utilization of instructional facilities for the implementation of Mathematics component of nursery school curriculum in Rivers State. There was no significant difference according to location. However, the available facilities were utilized especially those that were not locked up by the heads of school. Also, the nursery school teachers especially in the rural areas attempted to improvise the unavailable facilities using locally available materials as were observed of the government approved private schools visited in Akuku-toru, Ikwerre, Ahoada West Local Government Areas and others.

### Conclusion

In conclusion, the study indicates that instructional facilities for implementing the Mathematics components of the nursery school curriculum in Rivers State are generally available and utilized effectively by teachers, with a mean utilization score of 2.64. Notably, facilities such as colored balloons and jumbo pencils were frequently employed, reflecting a positive engagement with available resources. Additionally, the analysis revealed no significant difference in the utilization of instructional facilities between urban and rural teachers, suggesting that teachers across different locations are similarly committed to using these resources. However, some facilities remain underutilized due to concerns about damage and inadequate access, emphasizing the need for better resource management.

### Recommendations

1. Schools should ensure that instructional facilities are accessible and not locked away, allowing teachers to utilize all available resources effectively for teaching Mathematics.
2. Regular training programs should be organized for teachers to enhance their skills in utilizing instructional facilities and improvising with locally available materials, especially in rural areas.
3. School management should develop clear policies on the maintenance and usage of instructional facilities to mitigate concerns about damage and encourage their use.

4. Encourage community involvement in supporting schools by providing additional resources or funding for instructional materials, especially in rural areas, to ensure that all teachers have the tools they need to teach effectively.

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