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ASSESSMENT OF EARLY CHILDHOOD CARE EDUCATION PRE-SERVICE TEACHERS' SKILLS OF IMPROVISATION AND MANAGEMENT OF INSTRUCTIONAL MATERIALS FOR EFFECTIVE MATHEMATICS INSTRUCTION DURING TEACHING PRACTICE

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Abstract
The study assesses Early Childhood Care Education pre-service teachers' skills of Improvisation and Management of instructional materials for effective mathematics instruction during teaching practice. Based on the purpose of the study, two research questions and two hypotheses were formulated. The population of the study comprised of 1,057 early childhood care education pre-service teachers. Sample used consisted of 235 pre-service teachers for the study. The instrument used for data collection is Assessing Pre-service Teachers' Skills of Improvisation and Management of Instructional Materials (APTSIMIM). The face and content validity were done by three experts, two from measurement and evaluation and one from Mathematics Education. The reliability of the instrument was found to be 0.73. The data collected were analyzed using mean scores and standard deviation for research questions while the hypotheses were tested using t-test at 0.05 level of significant. The result showed that early childhood care education pre-service teachers possessed skills of Improvisation and Management of instructional materials. It was recommended that Teachers–both pre-service and in-service, should be sent to participate in internal and external conferences and workshops on instructional materials production, utilization and management.

Keywords: Assessment, Skill of Improvisation and Management, Instructional materials and Teaching Practice.

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Introduction

Assessment is the term typically used to describe the activities undertaken by a teacher or in this context an assessor to obtain information about the knowledge, skills and attitudes of students or trainees. This activity can involve the collection of formal assessment data that is; the use of objective tests or the use of informal data by involving observation checklists. The assessor typically assigns a grade or mark for work undertaken by students or trainees (Onjewu, 2006). There is need to assess students teachers' skills of improvisation and utilization of instructional materials during teaching practice exercise.

Teaching practice always plays a vital role in the teacher education. Darling-Hammond (2014) portrayed that teacher experience will provide guidance on how pre - service teacher can integrate theoretically based knowledge, which is typically learned in teacher training institution with the experience- based knowledge offered in the practice of teachers. Teaching practice is often a fundamental aspect of every teacher education program regardless of the level of the programme. It is usually a period for pre -service teachers to perform the theory acquired at their teacher training institution and put it into practice (Zailani, 2013). Teaching practice is a vital component of teacher education designed to enable pre- service teachers to acquire experience in the actual teaching and learning environments. This is because teaching practice compels the students' teachers to try out the art of teaching before actually getting into the real world of the teaching profession (Kiggundu and Nayimuli,2009). The term teaching practice represents the range of experiences to which students' teachers are exposed when they work in classrooms and schools (Marais and Meier, 2014). As a result, teaching practice creates a mixture of anticipation, anxiety, excitement and apprehension in the student teachers as they commence their teaching practice (Perry, 2004). One of the reasons for this is due to low level of teacher's production, utilization and management of instructional resources (Odili, 2000 & Olagunju, 2000). Also, Uzuegbu, Mbadiwe & Anulobi (2013) identified that some of these pre-service teachers have demonstrated lack of competency and skills of improvisation of instructional materials for teaching and learning. In line with this, Ige (2000) stated that teaching and learning can be meaningful and effective only if backed up with necessary resources to enrich instruction. It is therefore advocated that the teaching of mathematics concepts should be concretized. Concretization of mathematics concepts means reducing the abstractness of the subject. This calls for use of available standard instructional resources to carry out instruction in mathematics. Abolade and Olumorin (2004) in their study reported that most of the standard instructional materials produced in the factory are scarce. In a situation where the standard instructional materials are not available, as a result of inability of government to provide instructional materials for schools, it becomes imperative that the teacher makes an alternative move to locally produce instructional materials to teach mathematics. This alternative move to produce instructional materials using resources in the local environment is called improvisation.

Improvisation is also the activity of making or doing something that you have not planned, using whatever you find. Thus, improvisation is the ability of teacher to model or provide an alternative to the real thing in a classroom for effective teaching and learning to take place. It simply means the production of alternative to the original. Bajah as cited in Ige (2009) takes it to be the use of substitute equipment where the real one is not available. Mboto, Ndem & Utibe – Abasi (2011) defined improvisation as the act of providing teaching materials from our locality when there is shortage of the standard ones. Improvisation

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therefore is the ability to take existing pieces of materials from our environment and put them together in a new combination for a purpose. Oxford in Asokhia (2009) defined improvisation as the use of what is available as a result of lack of what is actually needed. Improvisation refers to selection or provision of substitute for something not readily available. It is the process by which educational materials can be designed and developed using locally available materials to meet specific instructional needs. That is, when a ready-made instructional material which is relevant in a particular teaching-learning situation is not available, the teacher makes an alternative provision for such an item. The teacher can only produce such alternatives using local resources if he is creative enough. More so, when teachers improvise instructional materials for teaching, teachers develop their potentials. Onwuagboke and Ifegbo (2019) identified the following as merits of improvisation of materials , thus it enhances retention and makes learning permanent, It makes the lesson real and learning more interesting, It enhances creativity on the part of the teacher and learners when they are involved, It is cheaper to get than the real object especially imported ones, It saves money, It is a source of generating funds for the teacher as well as for the school, It enhances high mastery of contents taught on the part of learners. Techniques of improvisation serve as a scion of entrepreneurial skill for students and hence guarantee self-reliance and It inculcates technical skills and practical dexterity on students to use their hands, heads and hearts to introduce and operate new productive processes for technological invention and economic development (Onwuagboke and Ifegbo, 2019).

The mathematics teacher needs basic skills in order to effectively produce instructional materials locally. This acquisition of skill can be made possible through constant practice and observation of the experts. They also must include the knowledge of the basic principles and elements of design. Some of the skills needed in improvisation of instructional materials are cutting, folding, painting, measurement, sorting, assembling and mounting of devices. Usman & Umeano (2006) carried out a study on factors responsible for inability of teachers to improvise instructional materials for teaching mathematics and found out that most mathematics teachers do not possess the required skills needed for the improvisation of instructional materials and that some of the factors responsible for lack of improvisation include non-specialization of teachers in mathematics education, excessive teaching load, no improvisation incentives to teachers and lack of in-service training for acquisition of knowledge and skills required for improvisation. Ivowi (2004) stated that the major problem in education system is lack of maintenance culture. Consequently, facilities that are constructed, equipment and apparatus that are purchased or that are improvised soon give way due to lack of proper maintenance and management.

Management in this study is the use and maintenance of instructional materials by the teachers. Management also refers to the act of directing, supervising and controlling human and material resources in order to achieve instructional goals (Opara and Umeaku, 2006). It may be impossible for the government or the school administrator to supply all the necessary equipment from time to time. Instructional materials need to be preserved so that they may last long, because they get spoiled easily by learners during classroom interaction. They also get lost due to repeated display or frequent retrieval. Hence, there is the need for proper maintenance and management (Ajewole, Oginni and Okedeji, 2006; Adedibu and Olayiwola, 2006, Opara and Umeaku, 2006).

A large body of literature reports that there are gender differences in the improvisation of resources in favour of male students (Halat, 2006; Guven & Kosa, 2008 and

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Yang & Chen, 2010). Some studies show inconsistency in results of male and female students performance in improvisation of instructional materials. Studies by Halpern, Wai, and Saw, (2005), Caplan & Caplan, (2005) show no significant differences in improvisation of resources in mathematics between male and female. Zheng, (2007) and Yang & Chen, (2010) on the other hand indicated sex differences in favour of male. Abubaka, (2012) investigated the attitude of Mathematics students towards the use of instructional materials to enhance academic performance in probability. The researcher used 298 Mathematics students, and he found out that their attitude towards Mathematics was negative while gender and class level did not significantly influence students' attitude of improvisation towards Mathematics. Onasanya & Omsewo (2011), Utibe-Abasi (2015) & Kajuru & Kauru (2010) found no significant difference between male and female in improvisation of instructional materials. The study of Sherry (2010) showed that improvised games improve spatial abilities among preschoolers in mathematics.

Babayemi & Raimi (2014) assessed pre -service teachers' management of resources for effective instruction in basic science. Result showed insignificant difference in the management of resources of male and female pre -service teachers. Oladejo, Olosunde, Ojebisi & Isola (2011) in his investigation into science laboratory management in some selected secondary schools where he found no significant difference in the laboratory management of resources of male and female science teachers. In support of this, Ogunleye in Babayemi & Raimi (2014) carried out an investigation into the availability and extent of use of resources in the teaching of physics and found in significant difference in the extent of management (use) of resources by male and female teachers in practical activities or in demonstration activities.

In the study of Iji, Ogbole & Uka (2014) on the effect of improvised instructional materials on students 'achievement in geometry at the upper basic educational level in Makurdi metropolis, it was found that students who were taught geometry using improvised instructional materials improved upon their mean achievement scores than those students who were taught without improvised instructional materials. Onasanya and Omosewo (2011) carried out a research on the effect of improvised and standard instructional materials on secondary school students 'academic performance in physics in Ilorin and the result showed that there was no significant difference in the posttest scores between the students taught with standard instructional materials and improvised instructional materials.

Statement of the Problem

The use of instructional materials in the teaching of mathematics helps to enrich Learning. The present scenario in the educational system reveals that the poor funding of schools has led to the dearth of instructional materials in schools. The mathematics teachers who are expected to improvise instructional materials to carry out instruction in mathematics do not improvise and as such do not teach mathematics with instructional materials. If mathematics is taught without instructional materials, it then bounces back to teaching mathematics by employing the horrible memorization strategy. There are pre-requisite improvisation skills that teachers need to possess in order to improvise instructional materials. This study therefore sought to investigate whether mathematics teachers possess the required skills needed for improvisation and management of instructional materials.

Purpose of the Study

The main purpose of this study was to:

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i. Assess Early Childhood Care Education pre-service teachers' skills of improvisation of instructional materials used in mathematics classroom during teaching practice exercise.
ii. Assess Early Childhood Care Education pre-service teachers' skills of management of instructional materials used in mathematics classroom during teaching practice exercise.

Research Questions

The two research questions that guided the study are:

1. What are the Early Childhood Care Education pre -service teachers' skills of improvisation of instructional material used in mathematics during teaching practice?

2. What are the Early Childhood Care Education pre -service teachers' skills of management of instructional material used in mathematics during teaching practice?

Hypotheses

Two null hypotheses were formulated and tested at .05 significant level.

Ho_1: There is no significant difference in the mean scores of male and female Early Childhood Care Education pre-service teachers' skills of improvisation of instructional material used in mathematics during teaching practice?

Ho_2: There is no significant difference in the mean scores of male and female Early Childhood Care Education pre-service teachers' management of instructional material used in mathematics during teaching practice?

Methods

This research is a survey research with a descriptive research design. The population of the study involved 1,057 Early Childhood Care Education pre-service teachers who were undergoing their teaching practice exercise in Owerri Educational Zone of Imo State. A sample size of 235 pre-service teachers was used for the study. The instrument used for the collection of the data is structured Questionnaire titled Assessing Pre-service Teachers' Skills of Improvisation and Management of Instructional Materials (APTSIMIM). APTSIIMIM consists of twenty -one statements designed to investigate the skills of improvisation and management of instructional materials. The face and content validity of the instrument were done by two experts in measurement and evaluation and one expert in mathematics education. A Cronbach alpha measure of 0.73 was obtained as the reliability index r. The schools involved were visited by the researchers and the questionnaires were administered. A copy of the instruments was given to each of the pre-service teachers. The instruments were collected on completion. The instrument was administered to the teachers by the researchers with the help of three trained research assistants. The instruments were administered and retrieved on the same day from the teachers. The descriptive statistic of mean and standard deviation was used to answer the research questions while the t-test was used to test the hypotheses at .05 alpha level of significance.

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Results

Research Question 1: What are the pre-service teachers' skills of improvisation of instructional materials during teaching practice?

Table 1: Pre-service teachers' skills of improvisation of instructional materials during teaching practice.

S/N	ITEMS	Mean	SD	Decision
1	A qualified teacher must be good in drawing as a skill of improvisation	3.38	0.8	Accepted
2	Accurate Measurement	2.81	0.89	Accepted
3	Identification and use of pen	2.95	0.90	Accepted
4	Paper or cardboard folding	2.86	1.07	Accepted
5	Moulding with clay	2.88	0.90	Accepted
6	Lettering & Numbering	2.59	1.06	Accepted
7	Colour application	2.46	1.04	Accepted
8	Plotting points	2.37	1.03	Accepted
9	Cutting of paper/wood/meta	2.34	1.00	Accepted
10	Smoothing of wood	2.29	1.02	Accepted
11	Tool identification	3.04	1.34	Accepted
12	Assembling of paper/wood/metal/too	3.00	1.30	Accepted
13	Driving nails	3.02	1.29	Accepted

Results in table 1 shows that all questionnaire items scored above 2.50. This implies that early childhood pre-service teachers agreed that a qualified teacher must be good in drawing, applying color, lettering, measuring, calibrating, imaginativeness, smoothening and sluing, clay or paper molding, tying and folding shapes and cutting and pasting.

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Research Question 2: What are early childhood care education pre-service teachers' skills of management of instructional materials used in mathematics during teaching practice?

Table 2. Mean and standard deviation on management skills of instructional materials

S/N	Question items	Mean	SD	Decision
11	Hard wood geometric solids are kept in appropriate places to prevent breakages.	3.51	0.75	Accepted
12	I can handle compasses and meter scale.	1.85	1.07	Accepted
13	I don't know how to operate microscope.	2.24	1.05	Accepted
14	Reading the level of meter scale and ruler is difficult for me.	2.29	1.03	Accepted
15	The degree of accuracy of meter rule when measuring distances is always my problem.	2.32	2.72	Accepted
16	I apply lubricants to the moving parts of machine devices.	3.01	0.94	Accepted
17	Cleaning mathematics laboratory daily is a waste of time.	1.93	1.08	Accepted
18	Colour application should be handled with great care.	3.35	0.92	Accepted
19	I always clean and safe guard models produced during the teaching practice exercise.	2.89	1.05	Accepted
20	Facilities like calculator, computers, set-squares and ready reckoners are kept safe after teaching and learning.	2.37	1.10	Accepted
21	I notice and take immediate action on any faulty apparatus.	2.97	0.86	Accepted

Results in table 2 shows that all items scored above 2.50. This implies that Early Childhood Care Education pre-service teachers possess the managerial skills of instructional materials used in mathematics during teaching practice.

Hypotheses

H01: There is no significant difference in the mean score of male and female Early Childhood Care Education pre-service teachers' skills of improvisation of instructional material used in mathematics during teaching practice.

Table 3: t-test analysis on gender skills of improvisation of instructional material used in mathematics during teaching practice?

Variable	Gender	N	Mean	SD	df	t-Cal	sig	Decision
Skill of improvisation	Male	105	21.68	7.12		3.15	0.02	Accept Ho
	Female	130	18.61	7.08				

The result of the t-test presented in table 3 shows the calculated t-value of 3.15 is not significant at ($P<0.05$), the null hypothesis is accepted and the researchers conclude that there

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is no significant difference in the mean scores of early childhood care education pre-service teachers' skills of improvisation of instructional materials during teaching practice.

H02: There is no significant difference in the mean score of male and female Early Childhood Care Education pre-service teachers' management of instructional material used in mathematics during teaching practice.

Table 4: t-test analysis on gender management of instructional material used in mathematics during teaching practice.

Variable	Gender	N	Mean	SD	DF	T-cal	sig	Decision
Management of instructional materia**ls**	**Male**	**105**	**17.71**	**4.01**		**2.92**	**1.96**	**Accept Ho**
	Female	**130**	**12.41**	**3.98**				

The result of the t-test presented in table 4 shows the calculated t value of 2.92 is not significant at ($P<0.05$). The null hypothesis is accepted and the researchers conclude that there is no significant difference in the mean scores of management of instructional material used in mathematics during teaching practice.

Discussion

Results obtained indicated that early childhood care education pre-service teachers have possessed skills of improvisation. The t-test result also revealed that no significant difference on gender as regards skills of improvisation. These results are in agreement with the findings of Sherry (2010) which showed that improvised games improve spatial abilities among pre-schoolers in mathematics while Onasanya & Omsewo (2011), Utibe-Abasi (2015) & George & Amadi (2016) found no significant difference between male and female in improvisation of instructional materials.

Also, the study indicated that pre-service teachers have managerial skills. The t-test result obtained shows no significant difference in the management of instructional materials of male and female pre -service teachers. A similar result was obtained by Osagie (1997) in his investigation into science laboratory management in some selected secondary schools in Ibadan North Local Government area of Oyo State where he found no significant difference in the laboratory management of resources of male and female science teachers. In support of this, Ogunleye (2006) carried out an investigation into the availability and extent of use of resources in the teaching of physics and found insignificant difference in the extent of management (use) of resources by male and female teachers in practical activities or in demonstration activities. The result obtained may have been due to the policy statement (FRN, 2004) on teacher education and its implementation in science curriculum to produce those who would be efficient, creative and adequate in their intellectual and professional background for the teaching assignment without gender bias. Both male and female teachers have been exposed to the same curricular courses which might have resulted in the same output on the field of practice. Hence, there is no significant difference in the management of resources of male and female pre-service teachers.

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Conclusion

In conclusion, early childhood care education pre-service teachers' possession of skills of improvisation and managerial competency of instructional materials for effective mathematics instruction during teaching practice.

Recommendations

Based on the findings of this study, the researchers recommend that:

1. Teachers– both pre-service and in-service, should be sent to participate in internal and external conferences and workshops on instructional materials production, utilization and management.

2. Mathematics Laboratory Technologists should only be employed by the government into tertiary institutions to teach pre-service teachers how to management mathematics instructional materials.

3. Modern and model mathematics laboratories should be built in both state and Federal Schools.

4. School Science Inspectors (SSI) should be set up by the government to encourage good laboratory practices and management.

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