
UNIVERSITY MATHEMATICS UNDERGRADUATES' AWARENESS AND USE OF RESOURCE MATERIALS OF THE NATIONAL MATHEMATICAL CENTRE, ABUJA, NIGERIA**¹ Jekayinfa Olatunji Jame; ² Ashiru Tajudeen Motunrayo & ³ Ahmad Yashe****¹National Mathematical Centre, Abuja; ² Emmanuel Alayande College of Education, Oyo & ³ Nuhu Bamalli Polytechnic, Zaria**

ABSTRACT: *The study examined the extent of Awareness and Use of National Mathematical Centre's Resource Materials by the Nigerian University Mathematics Undergraduates. It was a descriptive research of the survey type. The population of the study was the entire Mathematics Undergraduates in Nigeria and a total number of 168 University of Ilorin Mathematics and Mathematics Education undergraduates were selected at random from the departments of Mathematics and science education of the University. Researcher designed questionnaire containing 24 items on Awareness and Use of Resources of National Mathematical Centre, Abuja were administered to the subjects. The data collected was analyzed using frequency count while percentage and Chi-square were used to test the stated hypotheses at 0.05 level of significance. The results showed that less than 50% of undergraduates are aware of the resources of NMC, Abuja and less than 20% of them have ever used the resources. Also, Academic levels of the undergraduates do not affect their awareness of the NMC resource materials as no significant difference was found in the awareness of the undergraduates of the NMC resources based on their academic level. Based on the findings, recommendations were made for the popularization of the resources of the centre for a wide range of access to stakeholders.*

KEYWORDS: University Mathematics, Undergraduates' Awareness, Resource Materials, National Mathematical Centre, Abuja, Nigeria

INTRODUCTION

Mathematics is one of the most important subjects both at the primary and secondary education levels in Nigeria. It is the most central subject to all science subjects like Chemistry, Physics, Biology, Statistics, and Computer Science etc. Odili (2006) defines Mathematics as a body of knowledge, a collection of techniques and methods and the product of human activity for solving problems. Oxford Advanced Learner's Dictionary (2005) defines mathematics as the science of numbers, shapes and space which arithmetic, algebra, trigonometry and geometry are its branches. Mathematics is also the key to almost all human endeavors because of its centrality and connectivity with other fields like science, engineering, industry, technology and arts. This is attested to by the statement that "there is no other subject that has greater application than mathematics (Odogwu, 2002). Other fields and subjects practically depend on it. Adegboye (2003) further observed its usefulness in other fields of study as well as in human race such as arts, social sciences, religious mysticism, commerce, war and pastoral life. Thus, anyone who neglects Mathematics may not be able to go far in the sciences and in fact, some other important things of the world. There is no gain saying then that the importance of mathematics is enormous and cannot be over-blown.

Therefore, the need for every individual to acquire the knowledge of Mathematics has become very obvious. This is because of its relevance to everyday living and in various disciplines. It has been a compulsory subject both at primary and secondary school levels in Nigeria. Its usefulness

in technological development of the nation as well as to mankind further stresses the need for it (Azuka, 2003; Salman, 2003; Imoko, 2004; Uloko and Usman, 2008).

Despite its utility, Mathematics has been one of the subjects which Nigerian students especially at the secondary school level develop dislike for and likewise perform poorly (Odili, 2006). As important as the subject is, the tremendous and persistent failures of Nigerian Students in it has remained a major threat to its learning (Sanni & Ochepea, 2002; Uloko & Imoko, 2007; Abakpa & Agbo-Egwu, 2008). The failure rate was so high that Nigeria was found to occupy the second to the last position when the Senior School Certificate Examination results of eleven English speaking West African countries were compared in Mathematics (Abakpa & Agbo-Egwu, 2008). The continued poor and dwindling performance in Mathematics has been a matter of serious concern to all well-meaning educators and stakeholders such as parents, teachers and government. Students' poor performance in Mathematics over the years has been attributed to the fact that the subject is difficult. In the same view, student's performance in its tests has been observed to vary from person to person and from school to school.

A lot of factors have been attributed to the persistent and continued poor performance of students in mathematics. Aremu and Sokan (2003) submitted that the search for the causes of poor academic performance in Mathematics is unending. Some of the factors identified by them are motivational orientation, self esteem/ self efficacy, emotional problems, study habit, teachers' consultation and poor inter-personal relationships among students.

Chief among the factors affecting the teaching and learning of Mathematics is the use of inappropriate, non- effective teaching methodology. Oludipe (2004) noted that a major defect in our system of education is that science (especially mathematics) is presented dogmatically in most schools as series of disjointed facts and concepts which students find difficult to relate to the real world.

In learning, students are the principal focus and target. What is being taught has to be inculcated into them, and efforts must be made to arouse their interest in the subject matter. If Mathematics is presented in the old conventional manner, it will look abstract to students and this will always adversely affect their interest in and attitude to the subject. To achieve a well meaning activity based learning where students will be able to participate fully in the teaching and learning of Mathematics, effective and well constructed instructional materials are to be employed. In using these materials, students are made to see mathematical shapes, concepts are perceived tangibly, formulae are derived concretely rather than memorized and Mathematics becomes more interesting, tangible and real.

However, secondary school students' poor performance in Mathematics has invariably affected the study of the subject in the institutions of higher learning especially in the universities. Students who have difficulties in the subject at the secondary school level may not be willing to further their learning in the subject at the university level. Choice of Mathematics or Mathematics education by students as a course of study in the University level is very low. Out of Mathematics or Mathematics education undergraduates, only few choose to offer the course willingly. Most of them find themselves studying the subject as a fall-out to their inability to get admitted for their

original courses of choice. This has been a major reason why most of the undergraduate students do not perform well because of lack of interest and their adverse perception about the subject.

The lack of interest, adverse perception and poor attitude of Mathematics Undergraduates which has resulted into their dwindling performance in the subject is a challenge that has to be appropriately addressed. There is an urgent need to stimulate students' interest, re-orientate their perception and positively influence their attitude towards the subject in order to achieve the desired performance in the all-important subject. There is a need for a total shift from the status quo of dogmatically presenting Mathematics as a difficult subject by employing new effective methods. It was in the light of the unacceptable woeful performance in Mathematics, and an attempt to change the course, improve the teaching and learning of the subject, popularize, concretize and endear it to learners that a centre was established. The centre so established was National Mathematical Centre. The National Mathematical Centre was established in 1988 by Nigerian Government out of serious concern on how the teaching and learning of Mathematics will be improved.

The National Mathematical Centre, Abuja has carried out researches and studies which have helped the centre to proffer some solutions to the causes of poor performance in Mathematics. These include the development of Mathematics Laboratory, Mathematics Kits, and various Mathematics textbooks, workbooks for students and teaching modules for teachers, enhanced, well-stocked and up-date Library and many more. This in no measure is a boost to the teaching and learning of Mathematics across all levels of education.

The relevance of National Mathematical Centre to stakeholders like students across all levels of education can be seen in its following mandates:

1. . Enhance collaboration among mathematical scientists especially between young Nigerian scientists, and other advanced scientists from within and outside Nigeria;
2. Stimulate enthusiasm for the physical sciences in young Nigerian students and scholars;
3. Prepare Nigeria for a leading role in the mathematical sciences;
4. Attract good mathematical scientists from all over the world into the service of Nigeria;
5. Provide facilities for scientific conferences and the publication of the proceedings arising there from;
6. Tackle national set goals in the development of mathematical sciences;
7. Conduct series of specialized lectures or courses for the purpose of upgrading postgraduate students in the field of mathematical sciences to a level where they can begin to understand research papers and seminars;
8. Conduct series of research lectures for advanced postgraduate as well as post doctoral and other participants based on a set of pre-assigned research papers, with the objective of generating questions that would be collated, discussed and used to determine new research direction for participants;
9. Conduct seminars, workshops and symposia in such areas as the Academic Board of the Centre may from time to time determine or plan;
10. Perform such other functions that are related to the above objectives and do such other things as are, in the opinion of the Council, necessary and expedient for carrying out the functions of the Centre. (COSMATS,2011).

The vision of the Centre also lends credence to its importance to stakeholders. They are:

1. To develop appropriate initiatives and resources of international standing for the re-awakening and sustaining of interest in the mathematical sciences and their applications
2. To produce specialists and teachers in the Mathematical Sciences at all levels of our educational system. (COSMATS, 2011)
3. To become a world class Centre of excellence for Research and Training in the Mathematical Sciences capable of promoting the development and socio economic impact of mathematical sciences in Nigeria,
4. As well as using Mathematical Sciences to solve important scientific and technological Problems. Considering these mandates and vision, it can be seen that National Mathematical Centre (NMC) has a lot to offer to assist in the training, re-training and equipping of mathematics teachers and students at all levels of education, especially in the degree and post degree levels with the necessary resources needed to achieve quality teaching and learning of the subject.

Purpose of the Study

The main purpose of this study was to assess university Mathematics undergraduates' awareness and use of resource materials in the National Mathematical Centre, Abuja.

Specifically, this study was undertaken to achieve the following:

1. Identify the resource materials in the National Mathematical Centre (NMC) for undergraduate Mathematics to enhance good performance;
2. Find out if University Mathematics Undergraduates are aware of these resource materials in the National Mathematical Centre;
3. Find out the frequency of use of the resource materials of the NMC by the Mathematics Undergraduates who are aware;
4. Find out the influence of Undergraduates' academic level on the level of awareness of the resource materials;
5. Find out the influence of Undergraduates' academic level on the frequency of use of the resource materials;
6. Find out the influence of Undergraduates' area of specialization on the level of awareness of the resource materials;
7. Find out the influence of Undergraduates' area of specialization on the frequency of use of the resource materials;

Research Questions

To give proper focus to this study, answers were provided for the following questions;

1. What are the resource materials in the National Mathematical Centre that are of significance to the teaching and learning of Mathematics?
2. Are Mathematics Undergraduates aware of these resource materials?
3. Do Undergraduates who are aware make use of these resource materials?
4. Does academic level affect undergraduates' level of awareness of the resource materials?
5. Does academic level affect Undergraduates' frequency of use of the resource materials?
6. Does area of specialization affect Undergraduates' awareness of the resource materials?
7. Does area of specialization affect Undergraduates' frequency of use of the resource materials?

Research Hypotheses

The following hypotheses were formulated for testing this study:

1. There is no significant difference between Undergraduates' academic level and awareness of the resource materials in the NMC;
2. There is no significant difference between Undergraduates' academic level and frequency of use of the resource materials in the NMC;
3. There is no significant difference between Undergraduates' area of specialization and awareness of the resource materials in the NMC;
4. There is no significant difference between Undergraduates' area of specialization and use of the resource materials in the NMC.

METHODOLOGY

The population of the study was the entire University Mathematics Undergraduates in Nigeria. University of Ilorin was purposively selected for the study and a sample of 168 Mathematics and Mathematics Education undergraduates was used. The Mathematics undergraduates were categorized into three namely male and female, areas of concentration and academic levels. The instrument for this study was a researcher designed questionnaire and the questionnaire consisted of two parts. Part one was concerned with the students' personal data such as name, gender, area of specialization and academic level. Part two was divided into two sections. The first section contained 14 item questions on the undergraduates' awareness of the National Mathematical Centre's resource materials while the second section contained another 10 item questions which bothered on undergraduates' frequency of use of the materials. The respondents attended to all the items in both sections of the questionnaire.

The questionnaire was validated by Mathematics educators in the Department of Science Education, University of Ilorin, Nigeria. The data collected was analyzed using Chi-square statistics to test the stated hypotheses. Frequency count and percentage was applied to questionnaire items to answer the research questions.

RESULTS

Research Question 1: What are the resource materials in the NMC that are of significance to Education?

Items 5 to 15 in the questionnaire contained the resource materials in the National mathematical Centre which include:

1. Mathematical Sciences library that is well stocked with textbooks, journals, encyclopedia, and relevant scholarly publications;
2. Well equipped Mathematical Sciences laboratory stocked with mathematical figures, symbols, solids and shapes;
3. Mathematics kits
4. Periodic Mathematical conferences;
5. Periodic academic workshops;
6. periodic academic seminars and
7. Mathematics competitions.

Research Question 2: Are University mathematics Undergraduates aware of the NMC resources?

Table 3: Percentage Mathematics Undergraduate Awareness of the NMC Resources

Awareness	Frequency	Percentage
Quite Aware	34	20.3
Aware	44	26.1
Not Aware	90	53.6
Total	168	100

Table 3 above shows that University of Ilorin Mathematics Undergraduates are fairly aware of the resources in the NMC. Only 34 out of 176 undergraduates (20.3%) are quite aware, while 44, that is 26.1 % are aware and 90, that is 53.6 % are not aware of the resources. Therefore, University Mathematics Undergraduates are averagely aware of the NMC resources.

Research Question 3: Do Mathematics Undergraduates who are aware make use of the NMC Resources?

Table 4: Percentage Mathematics Undergraduates Use of the NMC Resources

Use	Frequency	Percentage
Frequently Used (FU)	4	2.4
Occasionally Used (OU)	21	12.5
Never Used (NU)	143	85.1
Total	168	100

Table 4 above shows that the frequency of use of the NMC resources by the Mathematics Undergraduates is very low. Only 4 (2.4%) of the undergraduates frequently use the resources while 21 (12.5%) occasionally use them and a large number, 143 (85.1 %) has never used the resources. Therefore, University Undergraduates who are aware of the NMC resources barely or rarely use them.

Research Question 4: Does academic level affect undergraduates' awareness of the NMC Resources?

Table 5: Percentages of 300 and 400 level Mathematics Undergraduates' Awareness of the NMC Resources

Awareness	Frequency		Percentage	
	300 level	400 level	300 level	400 level
Quite Aware	17	18	21.5	20.2
Aware	25	26	31.7	29.2
Not Aware	37	45	46.8	50.6
Total	79	89	100	100

Tables 5 show that 17 (21.5 %) of 300 level and 18(20.2 %) of 400 level Mathematics Undergraduates are quite aware of the NMC resources, while 25 (31.7 %) of 300 level and 26 (29.2

% of 400 level mathematics undergraduates are aware and 37 (46.8 %) of 300 level and 45 (50.6 %) of 400 level Mathematics Undergraduates are not aware of the NMC resources. This means that the percentage awareness and non-awareness are almost the same. Therefore, academic level does not affect Mathematics Undergraduates' awareness of the NMC resources i.e the level of undergraduates' awareness of the NMC resources is not affected by their academic level.

Research Question 5: Does academic level affect Undergraduates' frequency of use of the NMC resources?

Table 6: Percentages of 300 and 400 level Mathematics undergraduates' use of the NMC resources

Use	Frequency		Percentage	
	300 level	400 level	300 level	400 level
Frequently Used	3	2	3.8	2.2
Occasional Used	11	11	13.9	12.4
Never Used	65	76	82.3	85.4
Total	79	89	100	100

From tables 6, 3 out of 79 (3.8%) 300 level Mathematics undergraduates and 2 out of 89 (2.2%) 400 level undergraduates frequently use the NMC resources while 11 (13.9%) 300 level and 11 (12.4%) 400 level undergraduates occasionally use the NMC resources. Also, 65 (82.3%) 300 level and 76 (85.4%) 400 undergraduates never used the NMC resources. Both 300 and 400 level undergraduates do not equally use the NMC resources.

Research Question 6: does area of specialization of undergraduates affect their level of awareness of the NMC resources?

Table 7: Percentages of Mathematics Major and Mathematics Education Undergraduates' awareness of the NMC resources

Awareness	Frequency		Percentage	
	Major	Education	Major	Education
Quite Aware	23	11	20.9	19.0
Aware	28	16	25.5	27.6
Not Aware	59	31	53.6	53.4
Total	110	58	100	100

Tables 7 shows that 23 out of 110 (20.9%) Mathematics major and 11 out of 58 (19.0%) Mathematics education Undergraduates are quite aware of the NMC resources, while 28 (25.5%) Mathematics major and 16 (27.6%) Mathematics education undergraduates are aware. However, 59 (53.6%) Mathematics major Undergraduates and 31 (53.4%) mathematics education Undergraduates are not aware of the NMC resources.

Research Question 7: Does area of specialization of Undergraduates affect their frequency of use of the NMC resources?

Table 8: Percentage Mathematics Major and Mathematics Education Undergraduates' Use of the NMC Resources

Use	Frequency		Percentage	
	Major	Education	Major	Education
Frequently Used	3	1	2.7	1.7
Occasionally Used	16	5	14.6	8.6
Never Used	91	52	82.7	89.7
Total	110	58	100	100

We can see from table 8 that 3 (2.7%) Mathematics major and 1 (1.7%) Mathematics education undergraduates frequently use the NMC resources while 16 (14.6%) Mathematics major and 5 (8.6%) Mathematics education undergraduates occasionally use the NMC resources. A large 91 (82.7%) Mathematics major and 52 (89.7%) Mathematics education undergraduates indicated they have never put any of the NMC resources to use.

HO₁: There will be no significant difference in the undergraduates' awareness of the resource materials in the NMC based on their academic levels.

Table 9: Chi-square analysis on the effect of academic level on undergraduates' awareness of the NMC resources

Variable	Frequency			Total	X ² Value	Df	Table Value	Remark
	Quite Aware	Aware	Not Aware					
300 Level								Null
Observed	17	25	37	79				Hypothesis was not rejected
Expected	16.5	24	38.5	79	0.23	2	5.99	
400 Level								
Observed	18	26	45	89				
Expected	18.5	27	43.4	88.9				
Total								
Observed	35	51	82	168				
Expected	35	51	81.9	167.9				

As seen in table 9 above, the calculated Chi-square (0.23) was less than the critical value (5.99) at 2 df at 0.05 level of significance. Hence the null hypothesis HO₁ was accepted. This means that there is no significant difference no significant difference in the undergraduates' awareness of the resource materials in the NMC based on their academic levels.

HO₂: There will be no significant difference in the Undergraduates' use of the resource materials in the NMC based on their academic level.

Table 10: Chi-square analysis on the effect of academic level on undergraduates' use of the NMC resources

Variable	Frequency			Total	X ² Value	Df	Table Value	Remark
	Frequently Used	Occasionally Used	Never					
300 Level								Null
Observed	3	11	65	79				
Hypothesis								
Expected	2.35	10.35	66.3	79	0.47	2	5.99	was
not rejected								
400 Level								
Observed	2	11	76	89				
Expected	2.65	11.65	74.7	89				
Total								
Observed	5	22	141	168				
Expected	5	22	142	168				

From table 10 above, the calculated Chi-square was 0.47 which is less than the table value of 5.99 at 2 df at 0.05 level of significance. Hence the null hypothesis, HO₂ was accepted. Therefore, there is no significant difference in the undergraduates' use of the resource materials in the NMC based on their academic level.

HO₃: There will be no significant difference in the undergraduates' awareness of the resource materials in the NMC based on their specialization.

Table 11: Overall Chi-square analysis on the effect of area of specialization on undergraduates' awareness of the NMC resources

Variable	Frequency			Total	X ² Value	Df	Table Value	Remark
	Quite Aware	Aware	Not Aware					
Mathematics								
Major								Null
Observed	23	28	59	110				Hypothesis
Expected	22.3	28.8	58.9	110	0.12	2	5.99	was
not rejected								
Mathematics								
Education								
Observed	11	16	31	58				
Expected	11.7	15.2	31.1	58				
Total								
Observed	35	51	82	168				
Expected	35	51	81.9	167.9				

Table 11 above shows the overall calculated Chi-square value for fifteen items in section B, part 1 of the questionnaire. The total frequency count on responses of Mathematics major undergraduates is 110 with Quite Aware, Aware and Not Aware having 23, 28 and 59 respectively. However, the total frequency count on responses of Mathematics education undergraduates is 58 with Quite aware, Aware and Not Aware having 11, 16 and 31 respectively. The overall calculated Chi-square was shown to be 0.12. As seen, the calculated Chi-square (0.12) was less than the table value (5.99) at 2 df at 0.05 level of significance. Hence the null H_{O3} was accepted. This means that there is no significant difference in the undergraduates' awareness of the resource materials in the NMC based on their specialization.

H_{O4} : There will be no significant difference in the undergraduates' use of resource materials in the NMC based on their area of specialization.

Table 12: Overall Chi-square analysis on the effect of area of specialization on undergraduates' use of the NMC resources

Variable	Frequency			Total	X^2 Value	Df	Table Value
	Frequently Used	Occasionally Used	Never				
Remark							
Mathematics Major							Null
Observed	3	16	91	110			
Hypothesis Expected	2.6	13.75	93.6	109.95	1.45	2	5.99 was not rejected
Mathematics Education							
Observed	1	5	52	58			
Expected	1.4	7.25	49.4	58.05			
Total							
Observed	4	21	143	168			
Expected	4	21	143	168			

From table 12 above, the calculated Chi-square was 1.45 which is less than the table value of 5.99 at 2 df at 0.05 level of significance. Hence the null hypothesis, H_{O4} was accepted. Therefore, there is no significant difference in the undergraduates' use of resource materials in the NMC based on their area of specialization.

SUMMARY OF MAJOR FINDINGS

Answers provided to the research questions raised in this study can be summarized as found below: University Mathematics undergraduate are only averagely aware of the resources in the NMC, Abuja. Less than 50% of the undergraduates are aware of the resources. Mathematics undergraduates do not use the resources available in the NMC. Less than 20% use the resources because over 80% have never used the resources.

Academic levels of the undergraduates do not affect their awareness of the NMC resource materials as no significant difference was found in the awareness of the undergraduates of the NMC resources based on their academic level. Also, there was no significant difference in the undergraduates' use of the resources in the NMC based on their academic levels.

The awareness of Mathematics major and Mathematics education undergraduates are quite the same as there was no significant difference in their awareness of the resources based on their area of specialization. Lastly, there is no significant difference in the undergraduates' use of the NMC resources based on their area of specialization.

RECOMMENDATIONS

Based on the undergraduates' responses and summary of major findings, the following recommendations are given:

There should be a proper publicity and popularization campaign of the NMC by NMC management and the Federal government and its resources so as to make it known to all the stakeholders. Resources of the NMC are also to be made available in virtual form so as to enable a wide range of access to interested undergraduates. This would solve the problem of distance barrier between interested undergraduates and the physical location of the centre.

Lecturers are advised to acquaint and sensitize students/undergraduates on the activities and resources of the NMC. Also, undergraduates are to be more pro-active and be ready to put to use the resources in the centre as most of them that are aware are not putting the resources to use. Finally, Government should endeavor to have state branches of the centre that will be equally equipped with resources to enhance easy accessibility as the location of the centre may be a major barrier to the undergraduates' use of the resource materials.

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