



## **Access to Research Findings from Mathematics Higher Education among Primary School Teachers**

### **Accès aux résultats de recherche de l'enseignement supérieur en Mathématiques chez les enseignants du primaire**

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#### **Abstract**

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*Research is a main source of solutions to national development. Researches in Mathematics education are carried out in higher educational institutions of learning and educational research institutes. Making the end user to have access to research findings is crucial in research processes, of which many researchers do not extend their studies. This paper investigated the sources wherein the primary school Mathematics teachers access research findings. The study sampled 170 primary school Mathematics teachers from two purposively selected Local Government Areas of Ibadan municipalities in Nigeria. ARFQ was a research questionnaire in 2 sections with section A containing bio-data and section B has 10 items on a 3-point scale. The items were for the primary school Mathematics teachers to indicate the degree to which the listed items serve as a source of access to research findings to them. The instrument was validated by using 23 primary school Mathematics teachers outside the study sample, the coefficient of reliability with Cronbach alpha was obtained as  $r = .70$ . A research question was answered and two hypotheses were tested item-by-item with t-test at .05 significant level. The findings showed that female teachers quite very much outnumbered the male teachers in our primary schools. Books, discussions with colleagues and lecture room information are topmost as sources of their access to research findings. There is a significant difference between male and female access to online materials ( $p = .026$ ), conferences and workshops ( $p = .036$ ) as sources of access to research findings in Mathematics education, with females having higher mean scores than males. There is a significant difference between public*

*and private school teachers' access to online materials ( $p=.003$ ), journals and proceedings ( $p=.008$ ) as sources of access to research findings in Mathematics education, with private schools having a greater mean. It was concluded that the teachers did not have access to the best sources of research outlets which are journals, proceedings, conferences and workshops. The study also recommended that journals and proceedings should be directed to primary school libraries.*

**Keywords:** Access, Research findings, Mathematics teaching, Primary School

### **Résumé**

*La recherche est une des principales sources de solutions au développement national. Les recherches en enseignement des mathématiques sont menées dans les établissements d'enseignement supérieur des instituts d'apprentissage et de recherche pédagogique. Faire en sorte que l'utilisateur final ait accès aux résultats de la recherche est crucial dans les processus de recherche, ce qui fait que de nombreux chercheurs ne prolongent pas leurs études. Cet article a étudié les sources dans lesquelles les enseignants de mathématiques du primaire accèdent aux résultats de la recherche. L'étude a échantillonné 170 enseignants de mathématiques du primaire de deux zones de gouvernement local sélectionnées à dessein des municipalités d'Ibadan au Nigéria. Le questionnaire de recherche nommé ARFQ était divisé en 2 sections avec la section A contenant des données biologiques et la section B comprenait 10 éléments sur une échelle de 3 points. Il s'agissait pour les professeurs de mathématiques du primaire d'indiquer dans quelle mesure les éléments énumérés leur servaient de source d'accès aux résultats de la recherche. L'instrument a été validé en utilisant 23 professeurs de mathématiques du primaire en dehors de l'échantillon de l'étude, le coefficient de fiabilité avec Cronbach alpha a été obtenu comme  $r = 0,70$ . Une question de recherche a été répondue et deux hypothèses ont été testées élément par élément avec un test t à un niveau significatif de 0,05. Les résultats ont montré que les enseignantes étaient bien plus nombreuses que les hommes dans nos écoles primaires. Les livres, les discussions avec des collègues et les informations sur les salles de conférence sont les principales sources d'accès aux résultats de la recherche. Il existe une différence significative entre l'accès des hommes et des femmes aux documents en ligne ( $p = 0,026$ ), aux*

*conférences et aux ateliers ( $p = 0,036$ ) en tant que sources d'accès aux résultats de la recherche dans l'enseignement des mathématiques, les femmes ayant des scores moyens plus élevés que ceux des hommes. Il existe une différence significative entre l'accès des enseignants des écoles publiques et privées aux matériels en ligne ( $p = .003$ ), aux revues et aux actes ( $p = .008$ ) en tant que sources d'accès aux résultats de la recherche dans l'enseignement des mathématiques, les écoles privées ayant une moyenne plus élevée. Il a été conclu que les enseignants n'avaient pas accès aux meilleures sources de sources de recherche que sont les revues, les actes, les conférences et les ateliers. L'étude a également recommandé que les revues et les actes soient dirigés vers les bibliothèques des écoles primaires.*

**Mots-Cle's:** Acce's, Re'sultats de recherche, Enseignement des Mathe'matiques, Ecole Primaire

### **Introduction**

The instructional strategies used by teachers are very important to learners' achievement. Many research reports gave evidences that teaching methods and strategies serve as major determinant of learners' achievement (Ganyaupfu, 2013), attitude (Adegbola, 2019), interest (Jalbani, 2014) and disposition (Ko & Bakkum, 2014) towards a subject. According to researchers like Abimbade and Afolabi (2012), Intel Corporation (2007), the conventional or lecture method is commonly used by many classroom teachers. This does not exclude Mathematics, in spite of its abstraction. This teaching method has reflected in poor performance, Mathematics anxiety (Yenilmez, Girginer & Uzun, 2007) and negative attitude of learners (Hirsh, 2010; Tok, Bahtiyar & Karalok, 2015). As a result, these researchers among others have focused on finding a method that will yield a higher variance in learners' achievement. Many recently discovered teaching methods and strategies studied by Abimbade and Afolabi (2012) have been reported by other researchers like Atieno (2014), Okoro (2019) as being able to yield higher mean gain in achievement more than the lecture method. It is the findings of these researches among others that are being used to improve Mathematics instruction at all levels of education in recent times.

Research outcomes are the products of higher education. A higher

education has been defined by Augustyn, Bauer, Duignan, Eldridge, Gregersen, McKenna, Melissa Petruzzello, Rafferty, Ray, Rogers, Tikkanen, Wallenfeldt, Zeidan, and Zelazko (2016) as an education which takes place at the post secondary school level. World Declaration on Higher Education which was adopted by the World Conference on Higher Education in 1998, considered higher education as "all types of studies, trainings or training for research at the post-secondary level, provided by universities or other educational establishments that are approved as institutions of higher education by the competent state authorities" (Baron von Liebig, Dewey, J; Nightingale, F; Boas, F; Baronet, W and Brown, W; (n.d). This definition has been taken as basic in use by the UNESCO, UNDP and the World Bank

The fore going presupposes that educational training at the Diploma level, Teacher Training Colleges, Colleges of Education, Polytechnics and Universities are higher education. The results of researches in the higher education is to better the lots of human life in all areas. Educational research in educational institution has as one of its objectives to improve the learning outcomes of the learners, though; not limited to this. Other areas of research output in tertiary institution include policy making or improving the existing policies. The research may also bother on teachers, learners, school environment, school management and instructional materials. The ultimate purpose in research is problem solving (Afolabi, 2019a) and not a study for its sake or for pleasure. Defining such purpose in research has become necessary in the light of limited resources to carry it out.

Research endeavour in Mathematics education according to Afolabi (2019a) have covered many areas such as; teaching methods and strategies, instructional materials, social media, school culture and leadership, Mathematics textbooks, assessment in Mathematics, teacher and student factors and learning outcomes in Mathematics. A serious concern is what happened to the research findings. Most of the research findings are not meant for the researchers themselves. Rather, for some other stakeholders in the field of education like teachers, parent and government. Getting the information on research findings to these stakeholders especially the classroom teachers is a cardinal issue in research.

It is important to identify variables that can affect access to research findings. These may include school type, gender (as in most educational research), school location, school infrastructures, teachers' interest and leadership. The access to research findings by the primary school Mathematics teachers can be affected by the school type. According to Afolabi (2019b), the public secondary school Mathematics teachers have more organizational barriers which differ significantly with the private school Mathematics teachers in the implementation of research findings. This is an indication that the school type may also have effect on access to research findings by the primary school Mathematics teachers. Another important variable that may affect the access to research findings are; school location, teachers' gender. Gender in Mathematics education is an important variable that cannot be underplayed.

Masele and Twelve (2018) emphasised that information is an instrument that can enhance or impede progress in Mathematics education. Such information could be positive as enabler of progress or negative as those that can demoralize any of the stakeholders. All stakeholders need positive information to promote Mathematics education and to make an informed decision. Masele and Twelve (2018) in their study on Tanzania education concluded that up till date, there has been no standardised and systematic organized process of disseminating information on Mathematics education. This observation is true for most developing nations of the world, Nigeria inclusive. It might be right here to say that all researchers should conclude their works on identifying the end user of their research findings and also map out how they have planned to disseminate the same to the end users.

The unfortunate incident in research these days is that many have not found how to disseminate their product or research findings to the end users. Southwell (2010) identified some of the channels of dissemination of research output which include journals, conference proceedings, books, Open Education Resources (OER), interaction with peer group, social media broadcast, lecture rooms, conferences, news broadcast, internet, seminars and workshops (Afolabi, 2019a). Unpublished thesis, dissertations and projects could also be a channel of research outlet which can also be a source of access to research findings for stakeholders in Mathematics education. Most of these resources are

not made available to teachers' reach. The focal point in this research is to identify which sources the primary school Mathematics teachers have access to research findings from higher education.

### **Statement of the Problem**

Many researches have been carried out in our higher educational institutions. There is no follow up on researchers through government agencies or stakeholders in education to ensure that research outcomes are properly disseminated and implemented to the users to whom it is meant. It is on this premise that this study considered an investigation on the sources of access to the research findings which the primary school Mathematics teacher have access. This is in order to know from which avenue they get access to research findings, and in order to determine how best the research findings can be disseminated to them.

### **Research questions**

1) What are the major sources of primary school Mathematics teachers' access to the research findings from higher Mathematics education?

### **Research Hypotheses**

1) Gender does not significantly influence access to research findings by primary school Mathematics teachers.

2) School type does not significantly influence primary school Mathematics teachers' access to research findings.

### **Methodology**

The study made use of descriptive survey. The population comprises all primary school teachers in Ibadan metropolis. The 170 primary school teachers who teach Mathematics were purposively selected from twenty (20) randomly selected primary schools (public and private) from Ibadan North and Akinyele Local Government Areas of Ibadan Metropolis. Access to Research Findings Questionnaire (ARFQ) was used for data collection. Section A of the instrument was the teachers' bio-data while section B has 10 items

Section B solicited information on sources of information from which the teachers were able to access these research findings. This section has 10 different means of dissemination of research findings in Mathematics

education of which the teachers might have got access to the research reports. It was meant for the Mathematics teachers to indicate the extent to which each of the sources of dissemination of research report serves as source of information to them. The items are on a 3-point scale rated as 2, 1 and 0 for 'Mostly', 'Rarely' and 'None'. The instrument was trial-tested and validated. Data collected from 23 non-participants in the research were used to find the reliability of the instrument to be  $r = 0.70$  for section B. The data was analysed with descriptive statistics and inferential statistics (independent t-test).

### Findings and Discussions

There were 168 Mathematics teachers which comprised thirty six (36) males and 132 females who successfully filled and returned the questionnaire. This is equivalent to 21.3% and 78.1% respectively. The very high figure on the side of the females is a reflection of gender distribution of teachers generally in our primary schools. In many cases, female teachers in the primary schools are often far greater than the male teachers be it public or private school. The spread of the respondents among the schools are 59 from the public and 98 from private schools.

**Research Question 1:** What are the sources of primary school teachers' access to the research findings from higher Mathematics education?

**Table 1: Descriptive Report on the Major Sources of Primary School Teachers' Access to the Research Findings from Higher Mathematics Education**

S/N	Items	Mostly (%)	Rarely (%)	None (%)	Mean	Std.Dev	Rank	Decision
1	Online materials	50 (29.6)	69 (40.8)	45 (26.6)	1.03	.763	8	Accept
2	Open Education Resources	69 (40.8)	63 (37.3)	34 (30.1)	1.21	.761	5	Accept
3	Books	125 (74.0)	30 (17.8)	10 (5.9)	1.70	.578	1	Accept

4	Journals and Proceedings	60 (35.5)	66 (39.1)	41 (24.3)	1.11	.772	7	Accept
5	From my lecture room	100 (59.2)	49 (29.0)	17 (10.1)	1.50	.676	3	Accept
6	Discussions with colleagues	110 (65.1)	33 (19.5)	23 (13.6)	1.52	.728	2	Accept
7	Newspapers and periodicals	41 (24.3)	77 (45.6)	47 (27.8)	.96	.732	9	Not accept
8	News broadcast	39 (23.1)	82 (48.5)	46 (27.2)	.96	.714	9	Not accept
9	Social media broadcast	54 (32.0)	80 (47.3)	32 (18.9)	1.13	.710	6	Accept
10	Conferences and workshops	74 (43.8)	67 (39.6)	26 (15.4)	1.29	.721	4	Accept

Table 1 above is the presentation of result on the descriptive analysis of the data that captured the various sources of access of research findings from higher education by the Mathematics teachers. There are ten items which serve as the various sources of access. The scale has been rated on a 3-point as 0, 1 and 2 respectively for the sources where they had 'none' access, 'rarely' have access and 'mostly' have access. A mean greater than or equal to 1 is taken as 'accept' meaning a worthwhile source of access to information and a mean less than 1 is considered 'not accept' as a worthwhile source of access to research findings. The highest source of access to dissemination of research findings is books with mean 1.70. It shows that for the Mathematics teachers, books are accepted as major sources of discovery of research findings. This is in line with the report of Fan, Zhu and Miao (2013) that textbook still remain the major source of learning tool for students. that the teachers share ideas and rob minds on the issue of research in teaching. The mean of source from lecture room is 1.50. This is the third ranking accepted source of access. The



knowledge Discussion with colleagues ranked second with mean 1.52. A high ranking of this source is an indication on research findings from the lecture room is high, this is an indication that the education level of the teachers are high as to have access to research findings through this means. Of the 139 who indicated their highest qualification, 57 (33.8%) had at least a bachelor degree while 41(24.3%) had at least bachelor degree specifically in Mathematics education. The next accepted source of access to research findings by the Mathematics teachers is conferences and workshops (mean 1.29). Some teachers have access to association workshops during conferences such as Mathematical Association of Nigeria (MAN) and Science Teachers' Association of Nigeria (STAN). In these conferences, researchers are able to read their papers and report findings and during workshops, special training on new methods in teaching some concepts is brought to light. Open Education Resources (OER) with mean =1.21 ranked fifth as accepted source of access to research findings. OER are online educational materials of any forms. These may be TESSA materials, ERIC, online journals or any other online educational materials which has open access. Other accepted sources of access to research findings by the Mathematics teachers are social media broadcast (1.13), Journals and proceedings (mean=1.11), online materials (mean=1.03). Newspapers and periodicals (0.96) and News broadcast also have mean =0.96. These are the two that were rated lowest as source of access to research findings. In the real sense these two are not major channels of dissemination of research outputs from tertiary education in Mathematics.

The major outlet of research reports in academia are the journals and proceedings. Incidentally, the teachers' access to this is ranked as number 7. This is rather an unfortunate incidence if the major sources of the research reports and findings are not accessible to the end-users (primary school teachers). It is an indication that the minor sources of outlets in research are what the primary school Mathematics teachers have access to. It is an eye opener that calls for action by the stakeholders in Mathematics education (government inclusive) to formulate policies and procedures for research dissemination to the primary school Mathematics teachers.

**H<sub>01</sub>:** Gender does not significantly influence access to research findings by primary school Mathematics teachers.

**Table 2: Gender and Access to Research Findings by Primary School Mathematics Teachers**

s/n	Items	Gender	N	Mean	Std Dev	Std Error	t	df	Sig.
1	Online Materials	M	35	.77	.731	.124	-2.242	161	.026
		F	128	1.09	.758	.133			
2	Open Education Resources	M	35	1.17	.785	.133	-3.302	136	.763
		F	130	1.22	.757	.066			
3	Books	M	35	1.77	.547	.092	.878	162	.381
		F	129	1.67	.588	.052			
4	Journals and proceedings	M	35	1.11	.718	.121	.050	164	.960
		F	131	1.11	.787	.069			
5	From my lecture room	M	35	1.51	.742	.126	.170	163	.865
		F	130	1.49	.662	.058			
6	Discussion with colleagues	M	35	1.43	.739	.125	-8.46	163	.399
		F	130	1.55	.727	.064			
7	Newspapers and periodicals	M	35	1.00	.686	.116	.322	162	.741
		F	129	.95	.749	.066			
8	News broadcast	M	35	.91	.658	.111	-4.04	164	.687
		F	131	.97	.733	.064			
9	Social media broadcast	M	34	1.09	.688	.115	-3.60	163	.720
		F	131	1.14	.721	.063			
10	Conferences and workshops	M	35	1.06	.802	.136	-2.110	164	.036
		F	131	1.34	.688	.060			

Research has shown that gender is a principal factor that can influence research outcomes. The result of data analysed to test hypothesis 1 is shown in table 2 above. Independent t-test was used to carry out item by item analysis of the data. This is in order to discover which of the source of the access has significant variation between male and female respondents. It is only in two items that male and female teachers differed significantly in their claimed sources of access to research findings. These are items 1 and 10. The result in item 1 shows that there is no significant difference between male and female teachers' access to research findings through online materials. The mean scores for the female Mathematics teachers (1.09) is greater than that of male (mean=0.77). Meaning that the female access research findings through online materials more than the males. With this magnitude, there is significant difference in male and female access to research findings through online materials,  $t=-2.242$ ;  $p=.026<.05$ . Similarly, in item 10 female teachers (mean=1.34) access research findings through conferences and workshops more than the male teachers (mean=1.06);  $t=-2.110$ ;  $p=.036<.05$ . In item 4 the male and female teachers had equal mean of 1.11, showing that statistically, no significant variation in access to research findings via journals and proceedings. It may not be too far from saying that they both have equal access through journals and proceedings. The descriptive result above has shown a very low ranking of this source. In items 3, 5 and 7, male teachers had greater mean than the female counterpart. However, the differences are not statistically significant. On the other hand, in items 2, 6, 8 and 9, the females had mean scores which are greater than the males. Although there are differences in favour of the female teachers, the mean differences are not statistically significant in all these items.

**H<sub>0</sub>,:** School type does not significantly influence primary school Mathematics teachers' access to research findings.

**Table 3: School Type and Primary School Mathematics Teachers' Access to Research Findings**

	Items	Sch. Type	N	Mean	Std. Dev	Std. Error	t	df	Sig (2 tailed)
1	Online materials	Pub	59	0.80	.738	.096	-3.301	161	.003
		Pri	104	1.16	.752	.074			
2	Open Education Resources	Pub	60	1.15	.799	.103	-1.714	163	.476
		Pri	105	1.24	.741	.072			
3	Books	Pub	60	1.67	.572	.074	-1.476	162	.634
		Pri	104	1.71	.586	.057			
4	Journals and Proceedings	Pub	60	0.90	.838	.108	-2.669	164	.008
		Pri	106	1.23	.708	.069			
5	From my lecture room	Pub	60	1.40	.741	.096	-1.421	108.008	.158
		Pri	105	1.56	.634	.062			
6	Discussions with colleagues	Pub	60	1.48	.748	.097	-1.584	163	.560
		Pri	105	1.55	.720	.070			
7	Newspapers and periodicals	Pub	60	0.88	.846	.109	-1.995	100.751	.322
		Pri	104	1.01	.661	.065			
8	News broadcast	Pub	60	0.85	.709	.092	-1.464	164	.145
		Pri	106	1.02	.717	.070			
9	Social media broadcast	Pub	60	1.10	.817	.105	-1.426	101.477	.671
		Pri	105	1.15	.647	.063			
10	Conferences and workshops	Pub	60	1.28	.739	.095	-0.78	164	.938
		Pri	106	1.29	.717	.070			

Table 3 is a presentation of the item by item analysis of hypothesis 2. In all cases, the numbers of teachers from private schools in the sample are more than those from public schools. The outcome was based on the willingness of the teachers to take part in the study in addition with availability of public school teachers as at the time of data collection. Industrial actions and related issues are wielding public school teachers occasionally. This may likely could have responsible for the mean scores of private school teachers been greater than those from public schools.

Only items 1 and 4 made statistical significant difference between school types and source of access to research findings. Item 1 shows that there is significant difference between public and private school teachers' source of access to research findings through online materials;  $t=-.301$ ;  $p=.003 < .05$ . It implies that the greater mean score of the private school Mathematics teacher is not due to chance. Item 4 also shows that there is significant difference between public and private school teachers' source of access to research findings through journals and proceedings;  $t=-2.669$ ;  $p=.008 < .05$ . It is worth noted that journals and proceedings are genuine and authentic source of access to research findings. It might further be necessary to find out how the private school teachers have more access to journals and proceedings.

For all other items, the mean for other sources of access to research findings are greater for the private schools than for the public schools. However, the differences are not statistically significant. This may not be strange to know that administrators of private schools may have free hand to operate where and when necessary rather than public school teachers who operates under bureaucracy.

### **Summary**

There are many female teachers in the primary schools more than the males. Be it public or private school. The major source of access to research findings by the Primary school Mathematics teachers are; books, discussions with colleagues, from lecture rooms, conferences and workshops, Open and Education Resources, social media broadcast, journals and proceedings and online materials. Newspapers and periodicals with news broadcast are the two least sources of access to research findings from higher education to the primary school

Mathematics teachers. Male and female teachers' sources of access to research findings are statistically not significant in eight cases while there are statistical significances between male and female sources of access to online materials, conferences and workshops.

### **Conclusion and Recommendations**

The teachers have no access to journals and proceedings which are major outlets for research findings and publications. If their major sources are books and discussions with colleagues we need to understand how weak these sources are. Saying that books, discussions with colleagues are their main sources of access to research findings, it is not far from the fact that they are scavenging for these information which they could have got. Books are not major channel of research publication. This shows that they do not have access to the proper source of material for research reports.

There is a need to redirect materials that have research publications (especially journals and proceedings) to the primary school teachers. Their libraries should be equipped with journals and proceedings. It is necessary to have these but it is sufficient to sensitize them on the need to explore these materials in order to implement in their classroom encounter.

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