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EFFECTS OF IN-SERVICE-TEACHER-DEVELOPMENT-PROGRAMME ON PUPILS' INTEREST IN LOWER BASIC MATHEMATICS IN KATSINA STATE, NIGERIA

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Abstract

This study was carried out to evaluate the effects of in-service-teacher-development-programme on pupils' interest in lower basic mathematics in Katsina state, Nigeria. The study adopted sample cross sectional survey design. The sample for the study was 700 pupils comprising 358 and 342 male and female pupils selected from a population of 45,746 primary five pupils from six Local Government Education Authorities (LGEAs) in Katsina Education Zone – three LGEAs were in the programme (ITDP) involving 361 pupils and the other three were not (Non-ITDP) with 312 pupils. Data collection was accomplished through the use of Primary Mathematics Interest Inventory (PMII). The PMII consisted of 40 items and was adapted from Haun (2016). The instrument was validated by experts and reliability coefficient was computed and found to be 0.78 Mann-Whitney U test was used to analyse the data. Findings showed that pupils from ITDP schools exhibited positive` effect on interest in comparison to their counterparts from Non-ITDP schools and the effect of the intervention was gender neutral on interest within ITDP schools. Based on the findings of the study, it was recommended that Katsina state government need to consider replicating the programme in LGEAs where it was not conducted and professional bodies popularise strategies of the programme through series of workshops and conferences.

Keywords: In-Service-Teacher-Development-Programme, Interest, Basic Arithmetic Operations

Introduction

In most countries primary education has been regarded as the most important as well as the most patronized by people (Lawrence, 2018). As primary education is the pivot of the educational edifice that is expected to provide literacy and enlightenment to citizens as well as the key to the success or failure of the whole system. A careful perusal of the goals of primary education reveals that mathematics is *sine qua non* for the achievement of most of them. Sample cut-off marks for admission into Federal Unity Schools in respect of male and female candidates for the years 2017 and 2018 from the six geo-political zones of Nigeria revealed Katsina state as the least and consistently below the national merit cut-off marks. Similarly, the outcome of a baseline line survey on Teacher Development Needs Assessment (TDNA) of Teacher Development Programme (TDP) phase 1 states (that include Katsina) found vast majority of pupils were considerably

behind curriculum expectations in numeracy. It was no surprise that the same survey revealed that about 8% of teachers had sufficient professional knowledge of mathematics (scored 75% and above) to be considered effective in the classroom when tested on their knowledge of topics covered by class 4 pupils. Though there are several factors that directly affect learning, teacher quality and effectiveness are crucial to learner success. Fortuitously Katsina state was included among phase 1 states of United Kingdom's Department for International Development teacher development programme. The Programme was a six-year (2013–19) funded education programme with a total budget of £34 million (approximately N 15.64 billion) seeking to improve the quality of teaching in primary and junior secondary schools (JSSs) and in Colleges of Education in six states in northern Nigeria, Oxford Policy Management Nigeria (OPMN, 2017). The programme was in two components, namely pre-service and in-service. The objective of the in-service teacher development programme (ITDP) component was to improve the capability of teachers already in service to deliver quality learning to pupils in primary schools in target locations. About 80% of the budget of the programme was dedicated for the in-service-teacher-development component of the programme.

It is often said interest is the mother of attention and once interest is stimulated and sustained attention is guaranteed and learning is assured. In the view of Harackiewicz, Smith and Priniski (2016) interest is a powerful motivational process that energizes learning, guides academic and career development, and is essential to academic success. Also, Alio and Okafor (2018) opined that lack of interest is seen as an inhibiting factor to mathematics achievement among pupils. For mathematics achievement to be awakened in children, they must have interest in the subject.

There seems to be a universal consensus on the utility of mathematics in laying foundation for pupils' level of thinking, skill development, problem solving and facilitation of the learning of other subjects especially sciences such that it has been made a core subject in school curriculum at the primary level in Nigeria and the world over. However, in spite of the important role mathematics plays in the achievement of the goals of primary education, most pupils find the subject difficult either to study or write examination and pass. For instance, sampled cut-off marks for admission into Federal Unity Schools in respect of male and female candidates for the years 2017 and 2018 from the six geo-political zones of Nigeria revealed Katsina state as the least and consistently below the national merit cut-off marks.

Similarly, the outcome of a baseline line survey of TDP phase 1 states (that include Katsina) found vast majority of pupils were considerably behind curriculum expectations in numeracy. Also, Oxford Poverty and Human Development Initiative report (2017) ranked Katsina state the 6th poorest in Nigeria in terms of multidimensional poverty – which measures poverty based on the incidence and intensity of deprivation in education, health and living standard. TDP's operational context included some of the 'poorest' states in Nigeria as Katsina is among states with the highest incidence of income poverty in Nigeria, Nigerian Bureau of Statistics (NBS, 2012). In addition, the Executive Secretary of Universal Basic Education Commission (2017) observed that one of the biggest challenges Nigeria faces is how to ensure that the tuition provided in schools is of good quality to ensure learning outcomes improve significantly as mean score in English, Mathematics, and Life Skills is only 30%-40%. Thus, the chilling blend of pupils' poor performance, teachers' incompetence and poverty rating informed the inclusion of the state in the first phase of the Teacher Development Programme.. Thus, the researchers

were motivated to conduct the study to evaluate the effects of In-service-Teacher-Development-Programme on pupils' interest in basic arithmetic operations among pupils in Katsina State. This was intended to establish whether the conduct of professional development programme had trickled down and filled gaps in learners' interest levels. Objectives of carrying out the study are listed below.

Objectives of the Study

The study was guided by the following objectives:

i. Find out the effect of in-service-teacher-development-programme on pupils' interest in mathematics in Katsina state.
ii. Investigate the gender friendliness of in-service-teacher-development-programme on pupils' interest in mathematics in Katsina state.

Research Questions

The study posed the following questions for answers:,

Are there differences in the interest levels of pupils taught by teachers in ITDP and Non-ITDP schools in Katsina state?
Is there difference in the interest level of male and female pupils whose teachers had in-service-teacher-development-programme in Katsina state?

Null Hypotheses

The following null hypotheses were formulated for testing at $p \leq 0.05$.

$Ho_{1:}$ There is no significant difference between the interest levels in mathematics of pupils taught by teachers in ITDP and Non-ITDP schools in Katsina state.
$Ho_{2:}$ There is no significant difference between the interest levels in mathematics of male and female pupils whose teachers had in-service teacher development programme in Katsina state.

Methodology

The study adopted simple cross sectional survey design and the population of this study consisted of forty five thousand seven hundred and forty six (45,746) primary five pupils from six Local Government Education Authorities (LGEAs) in Katsina Education Zone. Three LGEAs were involved in the programme and the other three were not. Proportional stratified sampling procedure was used to select a sample of 673 pupils with 361 and 312 pupils from ITDP and Non-ITDP schools respectively. In addition 343 and 330 of the sampled pupils were male and female respectively. This study used stratified random sampling technique in which a sample 700 was selected. Primary Mathematics Interest Inventory (PMII) adapted from Laura Haun (2016) was used to determine pupils' interest in mathematics. For the purpose of ensuring validity the instrument was subjected to the scrutiny of experts in mathematics education and psychology. The reliability of PMII was determined by single administration and Cronbach's alpha (1951) was computed and found to be 0.78 sequel to a pilot test.

Results

The results of the study were obtained from research questions answered and hypotheses tested through analysis of 673 out of 700 questionnaires.
Research Question 1: Are there differences in the interest levels of pupils taught by teachers in ITDP and Non- ITDP schools in Katsina state?

Table 1: Summary of Interest Mean Rank Levels for ITDP and Non-ITDP Groups

Group	N	Mean Rank	Sums of Ranks	Mean Rank Diff.
ITDP	361	408.50	147469.50	153.8
Non-ITDP	312	254.27	79331.50	
Total	673	662.77	226801.00	

Source: SPSS Analysis Output

Table 1 shows that pupils in the Non-ITDP group expressed a relatively lower interest mean rank (254.27) in mathematics compared with pupils whose teachers were involved in the in-service-teacher-development-programme (408.50). This development was attributed to the effect of the in-service-teacher-development-programme to which teachers in ITDP group were exposed. To establish if the difference in the mean ranks is statistically significant, the Mann Whitney U test was used to test the first null hypothesis.

Null hypothesis One

There is no significant difference between the interest levels in mathematics of pupils taught by teachers in ITDP and Non-ITDP schools in Katsina state.

To test this hypothesis, summated pupils' interest scores of ITDP and Non-ITDP schools were compared using Mann-Whitney U test statistic. Summary of the results are presented in Table 2

Table 2: Summary of Mann-Whitney U Test on Interest Levels of ITDP and Non-ITDP Groups

Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z-Value	P-Value	Effect Size (d)
ITDP	361	408.50	147469.50	30503.500	-11.644	0.000	0.861
Non-ITDP	312	254.27	79331.50				
Total	673	662.77	177973.00				

Source: SPSS Analysis Output

Table 2 reveals that there was significant difference in interest levels in mathematics between pupils taught by teachers who participated in the in-service-teacher-development-programme compared with those taught by teachers in Non-ITDP schools. The Mann-Whitney U value for the test was 30503.000 with a Z-value of -11.644 and a p-value of 0.000 ($p < 0.05$). Therefore, null hypothesis one was rejected and it was concluded that teachers' participation in in-service-teacher-development-programme significantly improved pupils' interest in mathematics. Moreover, the effect size (d) is 0.86 that indicated large effect size as recommended by Cohen (1988) criteria.

Research Question 2: Is there difference in the interest level of male and female pupils whose teachers had in-service-teacher-development-programme in Katsina state?

Regarding descriptive statistics on interest levels of male and female pupils taught by teachers in ITDP schools, summary of the results are presented in Table 3.

Table 3: Interest Mean Rank Levels Based on Gender in ITDP Group

Group	N	Mean Rank	Sum of Ranks	Mean Rank Diff.
Male	186	182.02	33856.50	2.11
Female	175	179.91	31484.50	
Total	361	361.93	65341.00	

Source: SPSS Analysis Output

Table 3 reveals that male and female pupils whose teachers were exposed to in-service-teacher-development-programme in the ITDP group differed slightly in their interest mean ranks in mathematics. From the table, male and female pupils had 182.02 and 179.91 as mean ranks respectively that differed by 2.11 in favour of male pupils. However, to establish the statistical significance of the difference of the mean ranks, Mann-Whitney U test was used to test the second null hypothesis.

Null Hypothesis Two

There is no significant difference between the interest levels in mathematics of male and female pupils taught by teachers in in-service-teacher-development-programme schools in Katsina state.

The summary of the results are presented in Table 4

Table 4: Summary of Mann-Whitney U Test on Interest Level of Pupils by Gender in ITDP Group

Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z-value	P-value	Effect Size (d)
Male	186	182.02	33856.50	16084.500	-0.224	0.823	0.02
Female	175	179.91	31484.50				
Total	361	361.93	65341.00				

Source: SPSS Analysis Output

Table 4 reveals a P-value (0.823) that is greater than the set P-value (0.05). This suggested that there was no significantly difference in the interest mean ranks of male and female pupils taught by teachers who participated in in-service-teacher-development-programme in Katsina state. The null hypothesis was therefore retained and hence it was concluded that male and female pupils expressed similar interest towards mathematics in ITDP schools.

Discussions

The result of the analysis of data regarding null hypothesis one showed there was significant difference in interest levels between pupils taught by teachers in ITDP schools compared to those in Non-ITDP schools. The positive effect of the programme is in

agreement with Wong and Wong (2019) who in a study on 'The Relationship between Interest and Mathematics Performance in a Technology-Enhanced Learning Context in Malaysia' involving 40 students reported that the students showed more interest in mathematics. Similarly, Onyiyechi (2019) who conducted a study on 'The Effect of Dart Game on Secondary School Students' Interest in Algebra in Enugu Education Zone' reported that that students taught with the game showed more interest in algebra than their counterparts taught with expository method.

Outcome of the second test of null hypothesis showed there was no significant difference between the interest levels of male and female pupils taught by teachers who participated in ITDP. This result is in tandem with the findings of Alio and Okafor (2018) who reported there was no significant difference between the interest levels of male and female pupils taught with mathematical games. However, Oluyemo, Musbahu, Kukwil, Anikweze and Shaluko (2020) in a study on 'Gender Differences in Mathematics Interest and Achievement in Junior Secondary School Students, Niger State, Nigeria' revealed that female students showed more interest in mathematics than their male counterparts.

Conclusion

The outcome of the study indicated that pupils taught by teachers in ITDP schools exhibited positive interest levels compared to their counterparts in Non-ITDP schools. In addition, in-service-teacher-development-programme instilled even effects on gender regarding interest.

Recommendations

Based on the findings of this study, the following recommendations were made:

i. Following the positive effects of ITDP, the Katsina state government needs to institutionalise the programme in all treatment LGEAs and replicate same in control LGEAs.
ii. As competence and experience were factored in selecting ITDP teachers, the state government is required to employ teachers on merit, retain and incentivize them for effective teaching.
iii. Professional bodies like Mathematical Association of Nigeria (MAN) and Mathematics Panel of Science Teachers Association of Nigeria (STAN) ought to promote approaches of ITDP in conferences, workshops and publication in their journals.

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