

Ismail Ado Funtua, 2015

Volume 1 Issue 1, pp.1252-1260

Year of Publication: 2015

DOI- <https://dx.doi.org/10.20319/pijss.2015.s11.12521260>

This paper can be cited as: Funtua, I. A. (2015). *The Impact of Multigrade Teaching Approach in Teaching Of Basic Science*. *People: International Journal of Social Sciences*, 1(1), 1252-1260.

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## **THE IMPACT OF MULTIGRADE TEACHING APPROACH IN TEACHING OF BASIC SCIENCE**

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### **Abstract**

*A major challenge in the teaching of science at Basic Education (BE) level in Nigeria has been the inadequate number of qualified teachers, coupled with insufficient materials and the overcrowded classroom conditions in cities (Miller 1989). In remote environments, the situation is different, where there are few children in two or more grades with one or two teachers, and usually among them one is an Arabic teacher. This poses a serious challenge in the learning / teaching condition of these kinds of schools. The use of multigrade teaching approach in this situation seems to be a viable option. In this research, six schools were selected from three geopolitical zones in Katsina state, Northern Nigeria. In each zone one school is used as experimental group and another one as control group. Pupils (subjects) were assessed using an achievement test constructed by the researcher based on the concepts taught. The results indicated a significant relationship between the use of multigrade teaching and pupils' academic achievement. While a gender comparison of subjects taught using the multigrade teaching approach and their counterparts taught using the monograde approach revealed a significant difference in their academic achievement. The paper concluded with some recommendations to education stakeholders especially the Local Education Authorities (LEAs), State Universal Basic*

*Education Boards (SUBEBs) and the International development Partners (IDPs) for more support in the retraining of teachers on multigrade teaching approach not only in the teaching of Basic science, but all subjects.*

### **Keywords**

Multigrade, Monograde, Basic Education, Basic Science, Mixed-Age Class, Family-Grouped Class, Double Class, Aptitude Grouping, Make-Shift Schooling

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## **1. Introduction**

Multigrade teaching is pupils' centred classrooms in which pupils learn across two or more grades and are taught by the same teacher for two or more years. According to Aminu (2014) in Birch and Lally (1995), multigrade teaching can be explained in several names in different countries, such as mixed-age class, family-grouped class, double class, aptitude grouping and make-shift schooling. The nature of the multi-grade class is that, the pupils differ in their number, ages, and ability but are taught by one teacher in one classroom. These classrooms are generally referred to as multi-age, multi-grade, and combined classes. It portrays teaching in a single learning space with pupils of different classroom levels. School with multigrade classes are therefore referred to as multigrade schools.

In many countries in the world there are schools in which all classes function as multigrade classes. These schools are called "fully multigrade schools". In some other schools, only some of the classes function as multigrade classes, while others function as monograde classes. These are called "partially multigrade schools". Multigrade teaching refers to teaching pupils who are in different grades in one class by one teacher. This situation usually involves grades close to each other – such as Grades 1 and 2, 3 and 4 – in some countries, such as Pakistan and Australia, it can involve grouping learners in up to six grades (Birch & Lally 1995). Multigrade schools are found in developing and developed countries alike. Today these are part of school systems throughout the world (Little 1995). Multigrade teaching is largely practiced in elementary and primary schools such as Nomadic schools (Little 2005; Brunswic & Valerien 2004 in UNICEF 2013) in mainly rural – but also sometimes in urban – schools. In England in 2000, 25.4% of all classes in primary education, in France, in the same year it was 34%, in Ireland in 2001: 42%. In Norway in 2000: 34%, in Nepal in 1998: almost all primary classes, in

Peru: 23 419 (73%) of all primary schools (Ames 2007 in UNICEF 2013). In India in 1986: 84% of primary schools had three or fewer than three teachers (Little 2001), making multigrade teaching inevitable. In The Netherlands: 53% of primary school teachers teach in multigrade classes. Therefore, multigrade teaching is not a new phenomenon in many countries of the world, whether developed or developing.

Schools that are multigrade can be identified from certain characteristics which are mostly unique to them. UNICEF (2013) identified the following as characteristics common to multigrade schools. These include: they are more commonly found in remote rural communities with low population density, have low enrolments (total numbers of pupils are between 30 and 150). In spite of the low enrolments some of them run full primary schools cycle i.e., from primaries 1-6. Such schools have very few teachers - a minimum of one and a maximum of four teachers. In most cases, one teacher is assigned to more than one class, including those classes without teachers. In most cases multi-grade schools are not easily accessible by both pupils and teachers because of the difficult terrain, with no good roads. This makes teachers transferred to such schools to reject such transfers. Multi-grade schools lack basic facilities – inadequate classrooms and classroom blocks; no staff offices, classroom block are not built to specification, most classrooms are small size often without chalkboards, classrooms furniture are usually grossly inadequate or completely absent; no basic instructional materials. Pupil's drop-out rates are very high in multi-grade school because of the constraints mentioned above. The schools are characterized by poor attendance which can be worst in certain seasons of the year. Poor school attendance and high drop-out rates could also be as a result of poor teaching (or none at all), because most, if not all the teachers, have not been trained to handle multi-grade situation in schools.

Multi-grade schools are amendable to situations. UNICEF (2013) discovered that children irregularly attend classes because they have to accompany their parents to the farm, rearing of cattle or some communal work, or in crisis situations like when natural disasters occur-flooding, drought and complicit which can display people from their locations. There is also the shortage of teaching personnel to attend to all grades of learners particularly in rural settings because of the very difficult physical terrain which hardly attracts qualified teachers. The need for multi-grade approach is also often associated with sparsely populated schools in remote

and semi urban communities. In such schools there may be only one, two or three teachers, etc they offer complete circle of primary education Hopkins and Ellis (1991).

In spite of the daunting challenges facing the multi-grade teacher, there are some benefits accruable to multi-grade schooling. Aminu (2014) identified the following merits for multigrade teaching.

- It is a very cost-effective way of providing education for children in remote rural environment. Cost is saved through the most prudent deployment of personnel, improvisation of instructional resources, and sharing facilities /instructional materials which can be re-used over and over again.
- It promotes individual self-study and independent learning thus enhancing the pupils' self-esteem and self-reliance.
- It encourages flexible learning progression rather than automatic promotion or repetition as is the case with mono-grade teaching/learning situation.
- It leads to high levels of cooperation between different age groups and very positive attitude towards assisting each other. Younger children seem to learn quickly in a multi-grade setting because they are able to 'absorb' knowledge from the older pupil to work harder to stay ahead of their younger classmates as they work together. They also gain self-confidence as they are occasionally given responsibilities to assist younger and slower pupils in the class.
- For a dedicated and enthusiastic teacher, he gradually becomes more aware of the development and learning styles of pupils. He can therefore pace his children's learning more appropriately.

There are challenges that pose typical problems to teachers in multigrade schools. Unless where the teachers have gained some capacity building, the challenges will deter effective learning. These challenges are:

- Handling of different classes simultaneously in a same room
- Preparation of Teaching Learning Materials for all subjects and for all classes
- To pay individual attention to the slow learners
- To act according to the individual differences of the learners
- Implementing Active Based Learning (ABL), Play way method and Learning by

doing method in the classroom.

- Sufficient time preparation is to be made for proper assessment of all students.
- Supervising of activities and assignments in the class
- More attention to the gifted learners

It is in view of the benefits and challenges highlighted above, that this study was conceived. The objectives of the study were as follows.

- to find out the relationship between multigrade teaching approach and pupils' academic achievement in basic science
- to compare the academic achievement in basic science of boys and girls exposed to multigrade teaching approach

### **1.1 Research Questions**

This study sought answers to the following questions:

- Is there any relationship between multigrade teaching approach and pupils' academic achievement in basic science?
- To what extent do boys and girls exposed to multigrade teaching approach differ in their test mean scores in basic science?

### **1.2 Null Hypothesis**

- there is no significant relationship between multigrade teaching approach and pupils' academic achievement in basic science
- there is no significant difference in the test mean scores of basic science for boys and girls exposed to the same multigrade teaching approach

## **2. Methodology**

### **2.1 Research Design**

This study is an experimental – control groups that employed pre-test – post-tests treatment. The experimental and control groups are located at different schools, in which the subjects comprises of boys and girls of mixed ability. Both experimental and control groups were exposed to the same amount of teaching for six weeks. An achievement test was administered to all the groups and scored. The raw marks obtained constituted the data for the study and was subjected to further analysis using t-test

## 2.2 Sample

The total number of girls in the three experiment schools is 78 and all were considered for the research. Similar number of boys was randomly selected from the same school using secret balloting. For the control group, the three schools have girls' population a little higher than the experimental group (83) and 78 were selected using secret ballot and the same number of the research.

## 2.3 Instrumentation

The instrument for data collection was an achievement test on basic science made up of ten multiple choice items, ten true or false and ten fill in the blank spaces. The instrument was validated and has a reliability coefficient of 0.81

## 2.4 Procedure for Data Collection

The test was administered to the research subjects in their respective schools with the assistance of the schools basic science teachers. The results (raw scores) obtained were used for data analysis.

## 3. Results and Discussion

Null Hypothesis One: there is no significant relationship between multigrade teaching approach and pupils' academic achievement in basic science. To test this hypothesis t – test was used and the result is summarised in table one.

**Table 1:** Mean scores of basic science for experimental and control groups

Variable	N	X	SD	df	T
Experimental	156	95.39	24.246	310	-86.630*
Control	156	80.333			

\*Significant  $P < 0.05$

Hypothesis two: there is no significant difference in the test mean scores of basic science for boys and girls exposed to the same multigrade teaching approach. The result is summarised in table two below.

**Table 2:** Mean scores of basic science for boys and girls in the experimental group

Variable	N	X	SD	df	T
Boys (exp)	78	47.718	17.168	154	0.99**
Girls (exp)	78	47.410	16.843		

\*Not significant  $P < 0.05$

Table three indicates a comparison of the mean test scores for boys in the experimental and control groups, the result is as follows.

**Table 3:** Mean scores of basic science for boys in experimental and control groups

Variable	N	X	SD	df	T
Boys (Exp)	78	47.513	7.272	154	-54.096*
Boys (Contr)	78	33.718	9.604		

\*Significant  $P < 0.05$

The analysis for comparing the achievement of girls in the control and experimental groups the results is summarized thus:

**Table 4:** Mean scores of basic science for girls in experimental and control groups

Variable	N	X	SD	df	T
Girls (Exp)	78	46.615	6.037	154	- 6.028*
Girls (Contr)	78	33.718	15.160		

\*Significant  $P < 0.05$

### 3.1 Discussion

The result in table one indicates that the difference is significant and the null hypothesis is rejected. Meaning that monograde teaching has a positive impact on the learning of by children. This happens as a result of transfer of repetitions most especially where the teacher adopts a common subject approach in teaching. This concurs with the views of Berry (1991) in Aminu (2014) that a comparison was made between academic achievement in multigrade schools and monograde schools. The test used for comparison was the promotional examination for entry into high school. The scores are based on percentile rankings. Using school averages over a four year period (1988-1991) the multigrade schools received a composite ranking of 31.75 meaning that, in general, student achievement was in the lowest third of the country's schools. However, there was much variation in achievement scores from individual schools.

Table two a gender comparison in the test mean scores for boys and girls in the experimental group. The P – value indicates that the difference is not significant and the null hypothesis is retained. In table three where a comparison between boys of the control and experimental groups, the findings revealed that the difference is significant. Likewise in table four, which the girls of the experimental and controlled groups were compared; like in table three, the difference is significant.

#### **4. Conclusion**

In the light of the foregoing, it can be concluded that multigrade teaching approach is useful not only in sparsely populated areas with low pupils' enrolment, but could be a useful teaching / learning approach even in densely populated schools due the impact it has on enhancement of the learning opportunities for children as it is practiced even in developed countries. There is the need for these kinds of schools to adopt multigrade teaching strategy as a way of alleviating the problem especially in rural areas. The retraining of teachers on this innovation by education managers (LGEAs, SUBEBs MoEs) and IDPs is therefore desirable.

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