

## **EVALUATING PHYSICS TEACHERS EFFECTIVENESS: A COMPARATIVE STUDY OF URBAN AND RURAL SENIOR SECONDARY SCHOOLS IN AKWA IBOM STATE, NIGERIA**

**John Tom Mkpanang**

Department of Science Education, Faculty of Education,  
University of Uyo, Uyo, AkwaIbom State, NIGERIA.

johnmkpanang@yahoo.com

### **ABSTRACT**

*This paper presents the results of evaluating the level of physics teachers effectiveness in urban and rural senior secondary schools. It also analyzes comparatively, the teaching effectiveness in the two types of educational institutions locations in the state. The population for the study consisted of physics students in all the urban and rural senior secondary schools in the State. A sample of 186 teachers was chosen through purposive sampling technique, with 93 teachers from urban schools and 93 from rural schools. Data were gathered using the Teachers Effectiveness Scale (TES) and the Physics Achievement Test (PAT) after ascertaining the validity and reliability of the instruments. The results of the study revealed that the level of physics teachers effectiveness in urban senior secondary schools is high while that in rural senior secondary schools is low. It also revealed that schools with high level of teacher effectiveness produce high achievement. It was recommended that state wide programmes to sensitize physics teachers in the major areas of teacher effectiveness should be conducted by the Ministry of Education and related agencies.*

**Keywords:** Physics teachers' effectiveness, students' achievements, urban and rural secondary schools

### **INTRODUCTION**

The synergy between Edward Thorndike Laws (of exercise, regency and effect) and the management model of Frederick Taylor affected classroom practices through standardized procedures; standardized times for the accomplishment of results, sequenced actions; and rewards, punishment and method for teaching adherence to these standards. This gave rise to meaningful formal teaching in the classroom setting.

Teaching is clearly seen as the organization of learning for authentic results. Effective teaching which is synonymous with teaching effectiveness can be seen in the teacher personalities, teacher-pupil interaction and teachers' impact on pupils behaviour (Evans, 2006). The teacher therefore occupies the most important part in the educational process (Rao and Kumar, 2004) and is accountable in the educational process (David and Macayamam, 2010). Teachers create impact in the whole educational process and in the lives of students.

According to the National Policy on Education (NERDC, 2008), the teacher plays a pivotal role in the provision of quality education at all levels. The teacher is the most important factor in curriculum delivery since he is responsible for changing the curriculum objectives into reality with his interaction with the students and their programmes. And, the quality of teaching and their behaviour in the classroom becomes the most critical school-based factor contributing to student learning and by extension their achievement (Darling-Hammond and Sykes, 2003; Odimegwu, 2005; Goe, 2007). Effective teachers are therefore desirable in the educational process (Calaguas, 2013) and wherever there is the need to identify particular

strengths and behaviours upon which individual teachers can inspire (Pagani and Seghieri, 2002).

Effective teachers translate the goals set for themselves or which others set for them (Anderson, 2004) in enabling their students attain specific learning objectives as well as broader goals that include solving problems, thinking critically, working collaboratively, and becoming effective citizens (Hunt, 2009). Pachaiyappan and Raj (2014) acknowledges that effective teachers help in the development of basic skills, understanding proper habits, desirable attitudes, value judgment and adequate personal adjustment of students. Effective teacher also lead to best academic performance and optimal all-round development of the students. But students assigned to ineffective teachers have significantly lower achievement and learning than those who are assigned to a sequence of several highly effective teachers (Sanders and Rivers, 1996).

Human capital strategies must be put in place by nations in virtually every sector including education. This means getting the right teachers “in the right places in the right subjects”. Government at various levels within the country has made tremendous effort in that direction. However, the effectiveness of teachers have not been purposively determined.

The National Board for Professional Teaching Standard (NBPTS) has created a reliable, rigorous performance indicators that judges teachers on how they teach and how they analyze their students’ learning, which has proven valuable with compelling evidence (Berry, 2008). However, there is not a generally agreed upon method for evaluating teacher effectiveness because of lack of agreement about what constitutes good or effective teaching and by implication, who an effective teacher is and does (Cruickshank and Haefele, 1990).

Literature has revealed that the evaluation of teacher can be approached from the inputs, processes and output angles. Input or teacher quality measures the teacher background, beliefs, expectations, experience, pedagogical and content knowledge, certification and licensure, and educational attainment. Processes refers to the interaction that occurs in a classroom between teachers and students while output or teacher effectiveness represents the results of classroom processes such as impact on students’ achievement, graduation rates, student behaviour, engagement, attitudes, and social-emotional well-being.

Teacher effectiveness in the narrowest sense refer to the ability of the teacher to improve students’ learning as measured by students’ gain on standardized achievement test. Hassel (2009) contends that the core definition of teachers effectiveness must be students outcomes with teachers behaviours linked in. This is because outcomes measures do not exist for untested grades, subjects and other valued outcomes; do not yield development advice for teachers, do not tell who should specialize or take advanced roles and cannot be used to select new teachers. But Hunt (2009) offers a comprehensive, broad and robust view of teacher effectiveness as the characteristics, competences and behaviours of teachers at all educational levels that enable students to reach desired outcomes. Awasthi and Bihari (2014) observed that teacher effectiveness is the impact that classroom factors such as teaching methods, teaching expectations, classroom organization and the use of classroom resources have on students’ performance. Research also indicates that teacher preparation/knowledge of teaching and learning, subject matter knowledge, experience and the combined set of qualification measured by teacher licensure are all leading factors in teacher effectiveness (Darling-Hammond, 2006). Thus, teacher effectiveness is multi-faceted and a more nuanced definition would be that which includes the varied roles teacher play as well as the varied students outcomes that education stakeholders value.

The dominant teacher effectiveness definition has been criticized for reasons such as the fact that learning requires a combination of circumstances well beyond the actions of a teacher, being driven by measurement innovation (development of new instruments and technologies) (Campbell, Kyriakides, Muijs and Robinson, 2003/2004) equating it with success in producing achievement gain (Hamre and Pianta, 2005). It can be seen from the above researches and analyses that numerous challenges abound in studying teaching and teacher effectiveness. These have been pointedly enumerated by Ko and Sammons (2013) to include the definition challenge, the perspective challenge, the characterization challenge, the measurement challenge and the theorization challenge. But measuring teacher effectiveness could inform a range of human capital systems and decisions, ensure an equitable distribution of effective teachers and provide high-support for educators and principals. According to Berk (2005), the importance of measuring teaching effectiveness for formative and summative decisions must be pursued. Formative decision which involves improving teaching is the evidence needed to improve and shape the quality of teaching while summative decision involving personnel decisions uses the evidence to “sum up” teachers’ overall performance or status to decide about their annual merit pay, promotion and tenure.

Berk (2005) cited twelve potential sources of evidence of teacher effectiveness to include students’ ratings, peer rating, self-evaluation, videos, student interviews, Alumni ratings, employers’ ratings, Administrators ratings, teaching scholarship, teaching awards, learning outcomes and teaching portfolios; owing to the complexity teachers face in working with learners in the 21<sup>st</sup> century such as learning environment, relevant issues, developing effective pedagogies etc. Mckeachie (1997) sees students ratings as the single most valid source of data on teaching effectiveness while Emery, Kramer and Tian (2003) stressed that student ratings is the most influential measure of performance that emphasizes teaching effectiveness. These snippets of information will contribute greatly to this study.

Closely related to the issue of teachers effectiveness in schools is the problem of school communities inequality. In AkwaIbom State, the location of secondary schools are either urban or rural areas. Urban schools are those in major towns or high population areas that people especially parent live and work whereas rural schools are those found in communities with small population. Parent sustain themselves and cater for their children education with the available resources of the land.

Monk (2007) noted the numerous possible characteristics of rural communities to include small size, sparse settlement, distance from population concentration which makes it seriously impoverished. According to Monk, classes are relatively small and teachers tend to report satisfaction with their work environments and relatively few problems with discipline. The differences in urban and rural schools in terms of the resources available to student and teachers have been reported by Jacob (2007), noting the many compensatory state programmes that tend to reduce the size of the disparities. He further noted the enormous challenges facing urban areas in staffing their schools with effective teachers and conclude that urban teachers are less highly qualified than their suburban counterparts with respect to characteristics such as experience, educational background, and teaching certification. Equally, Mulemwa (2006), said there is a drastic difference between the provision of amenities and opportunities available in urban and rural schools. Teachers posted to rural schools are known to seek reposting to urban schools where their aspirations could be met. Harsher learning conditions are obtainable in rural schools compared to urban ones. Mulemwa also reported that the distribution of instructional materials such as textbooks, registers, curriculum, mathematical kits and computers are more favourable in the urban schools than rural schools.

The Australian Council for Educational Research (ACER) (2002) carried out a study on rural and urban differences in education and reported the existence of small differences between the literacy and numeracy performances of rural and urban students in the middle years of their education as well as differences in their choice of subjects. Furthering the urban-rural schools researches, Eppley (2009) stated that what deem a teacher to be highly qualified is a matter that is both complex and highly context-dependent. Eppley declare a consensus about the role of subject matter knowledge to the exclusion of other factors particularly salient in rural schools. Adams (2012) found teachers attributes to be a distinct dimension of school community inequality. He also found that students taught by teachers who have official credentials, high levels of motivation to improve practice, commitment to the profession, and strong interpersonal skills have higher mathematical achievement on average. These mass of research findings is utilized to provide focus for this study, that has immense importance to the teaching and learning process.

### **STATEMENT OF PROBLEM**

The process of evaluating the effectiveness of teachers is said to have changed over time along with the definition of what effective teaching is. Arguments abound that teacher effectiveness is often based on students score on standardized achievement tests, and that standardized test can yield necessary and useful data but do not measure student motivation, intellectual readiness, persistence, creativity on the ability to apply knowledge and work productively with others (Kristof, 2006). This facts creates an uncertain scenario. Moreso, the reported drastic difference between the provision of amenities and opportunities available in urban and rural schools which make some of the qualified teachers seek alternative locations is worrisome and dissatisfying. This study is an attempt at evaluating teacher effectiveness in urban and rural schools taking into consideration the strong positions advanced in literature in terms of domains of measurement and valid source of data. It will also ascertain how physics teacher effectiveness relate to students achievement in the light of the corpus of evidence.

### **PURPOSE OF THE STUDY**

The purpose of the study was to evaluate the effectiveness of physics teachers in urban and rural senior secondary schools. It was also to find out the difference in urban/rural and male/female physics teacher effectiveness in senior secondary schools.

### **RESEARCH QUESTIONS**

The following research questions were raised to find solution to the problem of the study:

1. What is the level of physics teacher effectiveness by student ratings in urban and rural senior secondary schools in AkwaIbom State?
2. What is the level of urban male and rural male physics teacher effectiveness by students ratings in senior secondary schools in AkwaIbom State?
3. What is the level of urban female and rural female physics teacher effectiveness by students ratings in senior secondary schools in AkwaIbom State?

### **RESEARCH HYPOTHESES**

The following null hypotheses were tested at 95% confidence level:

1. There is no significant difference in the level of physics teacher effectiveness by students ratings in urban and rural senior secondary schools in AkwaIbom State.

2. There is no significant difference in the level of urban male and rural male physics teacher effectiveness by students ratings in senior secondary schools in Akwalbom State.
3. There is no significant difference in the level of urban female and rural female physics teacher effectiveness by students ratings in senior secondary schools in Akwalbom State.
4. There is no significant relationship between physics teacher effectiveness and students achievement in physics.

## **RESEARCH METHOD**

This study utilizes a descriptive survey design. Urban and rural secondary schools in the thirty-one (31) local government areas of Akwalbom State of Nigeria were covered by the study. Purposive sampling technique was adopted to select the 186 teachers that constitute the study sample, noting the importance of students ratings in the evaluation of teachers' effectiveness (Mckeachie, 1997; Emery, Kramer and Tian, 2003). The criteria used for the sampling were: six (6) graduate physics teachers (three each from urban and rural secondary schools) within each local government area of the state, graduate physics teacher must be presently teaching senior secondary three (SS III) class where serious preparation in teaching and learning is guaranteed in view of upcoming certificate examination and 186 students to rate their physics teachers as chosen from the sampled schools. A breakdown shows that the subjects of the study consisted of 93 teachers each in both urban and rural secondary schools. Data collection was carried out with the use of two instruments. One was the Teacher Effectiveness Scale (TES) by Pramod Kumar and D. N. Mutha (1999 Revision). It was adopted for use in measuring the physics teachers effectiveness in urban and rural secondary schools. The adoption was based on its availability in English language; its ease of administration, scoring and focus on multiple components of teachers effectiveness. The TES consisted of 69 highly discriminating items in six (6) major areas (and ten (10) sub areas) namely: Academic (Information source, motivation, teaching skills), Professional (co-curricular activities, professional knowledge and classroom management), Social (relationship with pupils, fellow teachers, principals and parents). Emotional (Advisor and Guide), Moral (disciplinarian) and Personality (personality characteristics). The distribution of questions in the major areas was 4, 24, 11, 8, 10 and 12 respectively. The 69 items which were positively worded were given scores of 5,4,3,2, and 1 for "strongly agree", "agree", "undecided", "disagree" and "strongly disagree" respectively. The sum of these values gives the teacher effectiveness score by student rating. The other instrument used for data collection was the Physics Achievement Test (PAT). This was developed by the researcher with fifty (50) multiple choice test items derived from past questions of the West African Senior School Certificate Examination (WASSCE).

The PAT was used to measure students' achievement in physics. The total score of all the correct options chosen by a student was taken as an index of the students' achievement in physics. Using the split-half method of reliability, the co-efficient of reliability of the instrument was calculated to be 0.83. The two instruments were administered to the subjects with instructions that no item should be omitted. Completed instruments were scored as earlier specified and used to generate physics teachers' effectiveness scores as well as scores for students' achievement in physics. The variation in the total rating gives a measure of physics teachers' effectiveness, with 69 to 128 being low, 129 to 188 as high and 189 to 245 rated very high. Mean, standard deviation and t-test of difference between independent

samples as well as Pearson product moment correlation statistic were used to analyze data at 0.05 level of significance.

**RESULTS**

The results of the study are presented in tables based on the research questions and hypotheses that guided the study.

**Research Question 1**

What is the level of physics teacher effectiveness by students ratings in urban and rural senior secondary schools in AkwaIbom State?

**Table 1. Means and standard deviations for physics teacher effectiveness levels in urban and rural schools**

<i>Scale Major Area</i>	<i>Urban</i>		<i>Rural</i>	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Academic	175.62	31.875	83.63	10.236
Professional	188.51	35.124	85.27	9.542
Social	169.43	32.455	83.42	8.125
Emotional	162.36	29.321	77.34	6.994
Moral	163.55	44.968	80.14	9.362
Personality	170.23	30.167	82.56	10.545

A careful look at the result summarized in Table 1 reveals that the urban physics teacher effectiveness are high in all the six major areas measured on the scale. Low teacher effectiveness scores (ie 69 to 128) were also recorded for the rural physics teachers in all the dimensions of academic, professional, social, emotional, moral and personality. The areas of professional, academic and personality topped the list with means and standard deviations of 188.51 and 35.124, 175.62 and 31.875, 170.23 and 30.167 respectively, for the urban physics teachers.

**Research Question 2**

What is the level of urban male and rural male physics teacher effectiveness by students rating in senior secondary schools in AkwaIbom State?

**Table 2. Means and standard deviations of urban male and rural male physics teacher effectiveness levels**

<i>Scale Major Area</i>	<i>Urban</i>		<i>Rural</i>	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Academic	189.65	36.243	87.76	6.326
Professional	192.62	28.435	84.31	7.227
Social	185.34	31.552	85.44	8.561
Emotional	156.77	37.862	88.71	8.421
Moral	180.15	35.145	84.69	10.669
Personality	183.21	35.621	83.11	8.524

As shown in Table 2, urban male physics teachers recorded higher teacher effectiveness scores in five major areas compared to their rural male counterparts that had low teacher effectiveness scores in all the areas measured. In particular, urban male physics teachers showed very high effectiveness in academic and professional areas. This is evident from the mean of 189.65 and 192.62 as well as their standard deviations of 36.243 and 28.435.

### Research Question 3

What is the level of urban female and rural female physics teacher effectiveness by students ratings in senior secondary schools in Akwalbom State?

**Table 3. Means and standard deviations of urban female and rural female physics teacher effectiveness levels**

Scale Major Area	Urban		Rural	
	Mean	SD	Mean	SD
Academic	160.52	21.352	75.29	6.852
Professional	148.38	20.428	80.41	7.675
Social	123.62	24.516	75.48	8.322
Emotional	165.23	25.731	78.25	8.516
Moral	157.41	22.418	82.64	9.468
Personality	152.82	25.367	72.87	7.875

To answer research question 3, reference is made to Table 3 above. Here again, the urban female physics teachers had all their effectiveness scores within the “high” range ie 129 to 188, with mean values a bit lower than those of the urban males in all the scale major areas (see Table 2). Low teacher effectiveness scores less than those of the rural males were also recorded for the rural female physics teachers.

### Research Hypotheses

**H<sub>01</sub>:** There is no significant difference in the level of physics teacher effectiveness by students ratings in urban and rural senior secondary schools in Akwalbom State.

The means obtained on Table 1 are subjected to t-test of difference of independent samples. The result is presented below.

**Table 4. T-test of significance of difference in the mean physics teacher effectiveness level of urban and rural senior secondary schools**

Location of School	N	Mean	Std. Deviation	Df	t	Sig. (2tailed)
Urban	93	171.62	33.985	184	24.543	.000
Rural	93	82.06	9.134			

Result in Table 4 indicates that the t-value of 24.54 is highly significant (df = 184, t = 24.54, P < 05). Therefore the null hypothesis is rejected and concluded that there is significant difference in the level of teacher effectiveness of urban and rural senior secondary school teachers in Akwalbom State.

**H<sub>02</sub>:** There is no significant difference in the level of urban male and rural male physics teacher effectiveness by students ratings in senior secondary schools in Akwalbom State.

Again, t-test of difference between the targeted independent samples using the related means in Table 2 is presented in Table 5.

**Table 5. T-test of significance of difference in the mean urban male and rural male physics teacher effectiveness level in senior secondary schools**

Location -Gender	N	Mean	Std. Deviation	Df	t	Sig. (2-tailed)
Urban males	63	181.29	34.143			
Rural males	52	85.67	8.288	113	19.706	.000

To test hypothesis 2, Table 5 reveals the t-value as 19.706. This is again highly significant and hypothesis 2 is rejected. Therefore, there is significant difference in the level of urban male and rural male physics teacher effectiveness in senior secondary schools in Akwalbom State.

**H<sub>03</sub>:**There is no significant difference in the level of urban female and rural female physics teacher effectiveness by students ratings in senior secondary schools in Akwalbom State.

The means for these two categories shown in Table 3 were again subjected to t-test and the summary of the test presented in the table below.

**Table 6. T-test of significance of difference in the urban female and rural female physics teacher effectiveness level in senior secondary schools**

Location -Gender	N	Mean	Std. Deviation	Df	t	Sig. (2-tailed)
Urban females	30	151.33	23.302			
Rural females	41	77.49	8.118	69	18.831	.000

The above table showed that the exact probability associated with the significance of the urban/rural females due to teacher effectiveness measurement was less than the 0.05 level of significance. The decision therefore was to reject the null hypothesis in favour of the alternative. Therefore it was concluded that there is a significant difference in the level of urban female and rural female physics teacher effectiveness in senior secondary schools in Akwa Ibom State.

**H<sub>04</sub>:**There is no significant relationship between physics teacher effectiveness level and students' achievement in physics.

The results of Pearson product moment correlation analysis carried out is presented to aid the testing of the above hypothesis.

**Table 7. Correlations between physics teacher effectiveness and students' achievement in physics**

		Teacher Effectiveness Score	Physics Achievement Score
Teacher Effectiveness Score	Pearson Correlation	1	.725**
	Sig. (2 tailed)		.000
	N	186	186
Physics Achievement Scores	Pearson Correlation	.725**	1
	Sig. (2 tailed)	.000	
	N	186	186

\*\* Correlation is significant at the 0.01 level (2-tailed)

The table shows there is a positive correlation between physics teacher effectiveness and achievement in physics. This positive correlation coefficient (.725) indicates that there is a statistically significant ( $P < .001$ ) linear relationship between these two variables such that the more effective a physics teacher is, the greater the achievement gains by the students.

## **DISCUSSION**

The study revealed a high level of physics teacher effectiveness in urban schools and low level of physics teacher effectiveness in rural schools. This result is of interest considering the fact that students ratings was used. It shows that the teachers in the urban schools exhibited appropriate teaching skills, good classroom management and motivational strategies. Their personality traits were such that could facilitate students' learning. This is in agreement with Evans (2006) who in his study listed evidence of teaching effectiveness as the teacher personalities and teacher impact on students' behaviour. Physics teachers in urban schools were thus able to help their students think and solve problems as well as work collaboratively. This finding is supported by Hunt (2009). Physics teacher effectiveness in rural schools were however low partly due to harsh learning conditions characterized by inadequate amenities and opportunities to display their subject matter knowledge as well as meet their aspirations. This finding was supported by the work of Jacob (2007) but in disagreement with that of Eppley (2009).

The urban male physics teachers had very high effectiveness scores far greater than their rural counterparts especially in the academic and professional areas. This is because the students' raters acknowledged their effectiveness in helping them develop basic skills, proper habits and desirable attitudes, thereby guaranteeing their all-round development. This finding is in consonance with the study of Pachaiyapan and Raj (2014). Similarly, urban female physics teacher effectiveness were high especially in academic, emotional and moral areas. Thus, by their effective teaching skills, advice and guidance, and disciplinary stance; were able to influence their students with valuable learning outcomes.

The tests of hypotheses 1, 2 and 3 reveal that there is significant difference in the teacher effectiveness levels in urban and rural schools, between urban male and rural male physics teachers, and between urban female and rural female physics teacher. These findings are in line with the work by Adam (2012) who found that students taught by teachers with high levels of motivation, commitment to the profession and strong interpersonal skills are favourable teacher attributes in school community inequality. However, it is contrary to the work by Monk (2007) who concluded that urban teachers are less highly qualified than their suburban counterparts with respect to educational background and teaching certification.

The study also showed that there was a significant relationship between physics teacher effectiveness and students achievement in physics. This means that where physics teacher effectiveness is high, students will show enhanced achievement. It could be deduced from this study that high teacher effectiveness might have made the achievement of students in urban schools to be high. Pachaiyapan and Raj (2014) in their study was in support of this findings, since they concluded that effective teacher apart from helping in adequate personal adjustment of students, also lead to best academic performance.

## **CONCLUSION**

This study revealed that the level of physics teacher effectiveness in the state is high for urban schools only, which is outside the expectations in view of the fact that various roles played by the teacher in the educational system and the various student outcomes which

stakeholders place much premium on are not likely to be attained by rural physics teachers and their students.

## **RECOMMENDATIONS**

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

1. Physics teachers in rural schools should undertake roles that will improve their behaviours and students' outcomes.
2. Principals of rural schools should explore and implement measures aimed at enhancing and shaping the quality of physics teaching in particular and teacher effectiveness in general.
3. Educators should facilitate the identification of strengths and behaviours that would guarantee very high levels of teacher effectiveness.
4. State-wide programmes to sensitize physics teachers in the major areas of teacher effectiveness should be conducted by the Ministry of Education and related agencies.

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