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AN EVALUATION OF TEACHER PRODUCTIVITY IN SECONDARY SCHOOLS: A CONFIRMATORY FACTOR ANALYSIS APPROACH

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Abstract

The purpose of this study is to examine a comprehensive measure in estimating and evaluating the measure of teacher productivity using a confirmatory factor analysis approach in Kwara State secondary schools, Nigeria. The proposed model explores various factors such as teaching and learning, planning and organizing instruction, classroom control. Three hundred and seventy-nine questionnaires were distributed among secondary school teachers, out of which 331 were completed, valid and returned. The data analysis was done through structural equation modeling (AMOS). the results show a good fit of model with the data.

Keywords: *Productivity, Teacher, Structural Equation Modeling, Secondary schools*

Introduction

Structural Equation Modeling (SEM) is a powerful second generational statistical technique that combines a confirmatory approach to theory, analyze the inter-relationships and path analysis among multiple variables simultaneously. It allows for pictorial modeling of constructs for clearer conceptualization of theories, and also provide a convenient way to describe the latent constructs of an observed variable under study (Awang, 2015; Byrne, 2001; J. F. Hair et al., 2013) Structural Equation Modeling is a technique which uses various types of models to depict relationships among observed variables with the goal of testing a theoretical model hypothesized by a researcher. This allows various theoretical models to be tested in SEM to understand how sets of variables define constructs and how these constructs are related to each other (Schumacker & Lomax, 2004). This approach is widely employed where indicator variables, such as teacher productivity cannot be readily measured and have to be derived from primary data source (questionnaires).

Secondary school as a formal organization is central to the functionality of an individual, community and the society at large. Significant progress in expanding capacity of secondary education have been attained by governments in their

various countries, leading to a substantive growth in secondary education all over the world. This is evident in the 50% global rise recorded in the number of teachers in secondary schools from 20.3m to 30.4million between 1990 and 2009, with the highest growth of 157% observed in Sub-Saharan Africa (UNESCO, 2011). There is no gain saying that teachers contribute mainly to the progress as well as distress and decline in the attainment of goal of our education system (Bowen, Buck, Deck, Mills & Shuls, 2014).

Research on productivity in school according to Sass, Semykina, and Harris (2014) solely rely on the value added models used to evaluate the teacher impact on school, particularly the student performance. That is why productivity in school is viewed in terms of quantity and quality of educational output involving effective teaching and learning, planning and organizing of teaching, guidance and counseling and idea of the school. Shamaki (2015) describes productivity as the assurance of development and progress in a school which is measured in terms of teacher performance in the classroom, what they control and do in the classroom, and the entire teaching effectiveness. However, teacher productivity is represented, it should reflect various elements that can best describe the professional activities, the regular routines and duties performed by the teacher whereby individual from different cultural background and experiences will understand (Hassan, Tymms and Ismail, 2008). Hence, the need to estimate and measure those factors that constitute teacher productivity in recent studies.

Meanwhile, it is obvious that regression model cannot give a comprehensive model to assess various factors relating to teacher productivity, therefore there is need to apply a more comprehensive approach to evaluation of the model. Thereupon, one extensive model could provide a general assessment of teacher productivity with the collection of some factors (teaching and learning, planning and organizing instruction, classroom control) as proposed in this study.

Methodology

The participants in this study were teachers of secondary schools in Kwara State. Random sampling was adopted in selecting three hundred and seventy-nine teachers across secondary schools in the state. The instrument adopted in this study was developed based on extensive literature relating to the aspect to be examined. A total of 379 questionnaires were distributed among teachers in their various classrooms out of which 331 were duly completed and returned, while the remaining 48 were disregarded. The return rate was 87% and is therefore suitable for the analysis. The internal consistency for the instrument was ascertained at cronbach alpha coefficient value of .87. Data were subjected to an exploratory factor analysis as well as a confirmatory factor analysis using SPSS.23 and AMOS 23 respectively.

Results

Several analyses were conducted on the data and all items having a lower factor loading less than .50 were eliminated from the instrument, after which factor analysis with varimax rotation was carried out for all components. 16 items were

grouped into three factors: teaching and learning which comprise of 6 items; planning and organizing of instruction which comprise of 5 items; and classroom control having 5 items. The eigenvalues obtained were greater than 1.00 with three components of productivity accounting for 64.940% of total variance extracted. See Table 1.

Table 1

Evaluation of Teacher Productivity Questionnaire

Rotated Component Matrix^a

Dimensions	Item	Component		
		1	2	3
Teaching and Learning	Item15	.720		
	Item14	.697		
	Item23	.701		
	Item3	.638		
	Item 11	.762		
	Item 5	.776		
Planning and organizing of instruction	Item20		.735	
	Item22		.709	
	Item24		.647	
	Item25		.626	
	Item 13		.719	
Classroom Control	Item7			.745
	Item9			.698
	Item17			.778
	Item18			.672
	Item 16			.703

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser

Normalization.

Assessment and Modification for Overall Model Fit

Teacher productivity was measured with seven scales of instrument developed based on three factors of teaching and learning, instructional planning and classroom control comprising of 16 observed variables. Modification and deletion were conducted for some of the indices with lower factor loading and the results were shown in figure 1. The indices to be examined included χ^2 , χ^2/df - degrees of

freedom ratio, adjusted goodness of fit index (AGFI), goodness of fit index (GFI), root mean square error of approximation (RMSEA), and comparative fit index (CFI) (see table 2). The initial measurement model of teacher productivity showed that the data did not fit the model appropriately with one observed variables (CC7) having factor loadings less than .60. Thus, fit indexes indicated that the model was unacceptable (CMIN = 477.713; $df = 101$; Chisquare/degree of freedom (χ^2/df) = 4.729; goodness of fit index (GFI) = 0.898; adjusted goodness of fit index (AGFI) = 0.822; Tucker-Lewis Index (TLI) = .861, Normed fit index (NFI) = .869, Comparative fit index (CFI) = 0.885; root mean square error of approximation (RMSEA) = 0.092 and there was need for modification. Thus, the need to examine the modification indices to check for redundant items since the only item having loading less than .60 have been expounded. However, in this study, there are two redundant items found in the correlated measurement error of e5 - e6 having a modification index value of 22.49 which is greater than 15.0 and is therefore considered high. Modification index suggested that a correlation of the error terms between e5 and e6 would statistically improve the model fit. The redundant items were correlated and the new measurement model was estimated again (see figure 1). The final model of teacher productivity was developed by correlating error terms e5; and e6 from the initial model. The results yielded a good fit between the model and the data. The chisquare of 122.228 with 53 was statistically significant at $p < 0.005$. Other fitness indexes indicated an acceptable model with good fit ($\chi^2/df = 2.30$, GFI = .912, AGFI = .833, CFI = .93, NFI = .908, TLI = .897, SRMR = .000, RMSEA = .078). This confirmed that the second model was a good fit of the data. The values are in line with the thresholds of Awang, (2015) (see figure 1 and table 2 below)

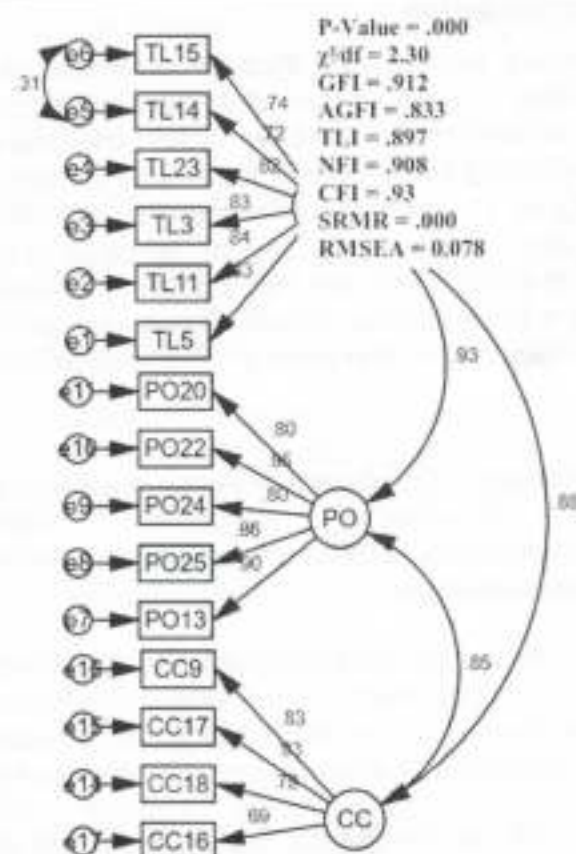


Figure 1: Confirmatory factor analysis and fitness indexes

Table 2

Model fit Indexes and their level of acceptance

Index	Value	Threshold/Level of acceptance
Chi-Square/df (CMIN/df)	2.30	<3 - good, <5 - sometimes permissible
P-Value for the model	.000	>.05 (Not applicable for large sample size >200)
CFI	.930	>.90
GFI	.912	>.90
AGFI	.833	>.80
SRMR	.000	<.09
RMSEA	.078	<.05 Good; .05 - .10 moderate; >.10 bad
NFI	.908	>.90

Source: Awang, (2015); Bagozzi & Yi, (1988); Jöreskog & Sörbom, (1992)

Conclusion and Recommendation

The developed questionnaire was verified through confirmatory factor analysis. The data organized in Table 1 revealed that all items have higher factor loading greater than .50, which allowed the researcher to test the overall fitness of the model. The indices to be examined for overall fitness of the model were within the acceptable range (See figure 1). The data collected was quite fit with the teacher productivity data. In other words, educational administrators, researchers, teachers, students, parents and government may adopt this measure to investigate the productivity of teachers in secondary school. Future research may be carried out on productivity at the lower and higher level of education across the federation.

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