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Measurement Model of Leadership Elements for Integration of Blended Learning into Technology Education Programme

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Abstract— This study was conducted to empirically validate a Leadership Element in Blended Learning Scale (LEBLAS) for the Leadership Element of blended learning for integration into teaching and learning of Automobile Technology Programmes in Nigerian tertiary institutions. A cross-sectional survey design was employed with a sample of 360 technical teacher educators in Nigeria. The developed initial a Leadership Element contained 6 items was administered to the sample. The responses were organized coded and use as data for the analysis. Structural Equation modelling was used to analyses the data using Confirmatory Factor Analysis after varying the data for normality. The results revealed a valid and reliable instrument with 43 items. Findings of the study showed that the measurement model indicated that, LEBLAS satisfied the absolute fit, incremental fit, and parsimonious fit requirement of SEM. The measurement model was able to achieve a Chi-square value with a degree of freedom at p=0.000. The indices used in measuring the absolute fit are: Standardized Root Mean Square Residual (SRMR) and RMSEA having achieved a value. Similarly, the measurement model has achieved a CFI value and TLI value. Therefore, with the satisfaction of all the measurement requirements, the developed LEBLAS validated in this study can be used to assess the Leadership Element of Blended learning implementation in the instructional strategies of Nigerian tertiary institutions' Automobile Technology Programmes.

Keywords: Leadership Element, Blended Learning, Technology Education.

I. INTRODUCTION

The tertiary institutions in Nigeria are faced with the numerous problems ranging from skilled teachers' shortage to changing nature of students which in turn resulted to graduating short skilled or rather unskilled graduates. This problem does more harm to skill acquisition courses like automobile technology. Reporting on this issue [1] pointed to changing nature of knowledge, student demography expectations as well as global competition to be challenges of exponential growth in demand for higher quality education in Nigeria tertiary institutions today. In essence, since the inception of the information age, employees in both developed and developing countries, have become 'knowledge workers'. In their work, knowledge workers apply knowledge of leadership expertise as well as skills, while labor is provided by tools and machines The words "leader" and "leadership" are often used incorrectly to describe people who are actually skilled, in creating, developing, executing and producing sometimes dramatic result on their jobs, and valuable to their organizations for this reason, this article is aimed at exploring the leadership element as a significant areas in the essential elements of blended learning for integration in automobile technology program at tertiary institutions in Nigeria Looking at, leadership as an act of helping self and others to do the right things, an act of setting a direction towards building an inspiring vision to create something new or as an act of mapping out strategy of where and how you need to go as a team or an organization; to meet the changing requirement of the society [2]. leaderships is the process of creating and delivering transformational change Hunt also further stated that conceptions of leadership are integrally linked to various factors, including among others the nature of reality and ontological issue for instance a technology education leader should be able to incorporate in to his leadership styles a Learning Management Systems (LMSs), such as Modular Object-Oriented Dynamic Learning Environment (Moodle), within an Online Learning Environment (OLE), can provide educators an environment to place their online course materials and for students to receive that[3] while interacting with other students/teachers; however, students' interactions, attention and communications are seen as relatively low in the LMSs [4]. Nevertheless, it seems fair to say that Higher Education Institutions (HEIs) are facing the need of constant monitoring of users'. It is against these background, the tertiary education sector has adopted new administrative management approaches by way of inference, it is the process of addressing the issue of how to build leadership capacity to improve teaching and learning, research outcomes leading to academic leadership called distributed blended leadership[2] Against the background of skilled teachers' shortage and changing nature of students which result in graduating short skilled or rather unskilled graduates. This study explores the blended leadership by validating the measurement model to be implemented in addressing the unskilled teacher shortage in our tertiary institutions with a view to indicate the importance of blended leadership elements for integration into Technology Education Programmes in Nigeria.

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a) Purpose of the Study

This study aims at evaluating the measurement model of the leadership elements necessary for integration of blended learning into technology education programme in Nigeria.

II. METHODOLOGY

A. Study Design

This study is descriptive research with a plan data collection and analysis using cross-sectional survey design to validate the measurement model of Leadership Element in Blended Learning Scale.

B. Leadership Element in Blended Learning Scale

The instrument tagged 'Leadership Element in Blended Learning Scale (LEBLAS)' was developed by the researchers following the established procedures in the literature. The scale contained 6 items. Five points (5) Likert's type was adopted throughout the scale. i.e SA= Strongly Agree; A= Agree; M= Moderately agreed; D= Disagree; SD= Strongly Disagree.

C. Participants

The participants were 360 technical teachers and students, drawn from some eight (8) selected tertiary institutions in the north-eastern Nigeria. To be specific, higher institutions of learning selected which comprises 2 universities, 4 colleges of education and 2 polytechnics offer automobile technology education programme.

Table 1: Distribution of the participants

SN	Institution	N	%
1	Modibbo Adama University of Technology, Yola	56	15.6
2	Abubakar Tafawa Balewa University, Bauchi	52	14.4
3	Federal College of Education (Technical), Gombe	40	11.1
4	Federal College of Education (Technical), Potiskum	44	12.2
5	College of Education, Hong	41	11.4
6	College of Education, Zing	45	12.5
7	Abubakar Tatari Ali Polytechnic, Bauchi	45	12.5
8	Adamawa State Polytechnic, Yola	37	10.3
		360	**100**

D. Data Collection

The consent of the respondents was sort by providing them the informed consent form designed. After obtaining the consent of the respondents, the scale was administered to the selected sample by the researchers, the participants' responses were coded, scored and used as data in this study.

E. Data Analysis

The data collected underwent several statistical analyses namely: descriptive, normality test, Confirmatory Factor Analysis (CFA) using SPSS and AMOS softwares. Under the CFA, the measurement models of the eight factors and final pooled measurement model were all assessed using some set of indicators. The two indicators of assessing normality namely Skewness and Kurtosis were used to assess the normality of the data set as recommended by [5]. Therefore, values of both indicators are higher than the stated cut off value and were considered as not normally distributed. Measurement model for the construct was estimated.

III. RESULTS AND DISCUSSIONS

A. Normality Test

Leadership element as a factor in these study was measured using six measuring items on the questionnaire. The items were first subjected to multivariate normality test. The findings in Table 2 shows the result of the multivariate test. Both indicators of multivariate normality have not exceeded their limit. This signifies that, the items are normally distributed. This indicated that the data can be subjected to further multivariate analysis.

B. Initial Measurement Model

In the next stage of the analysis, the data were assessed on a measurement model. The measurement model of leadership element is presented in Figure 1. All items measuring leadership element have achieved the requirement of factor loading.

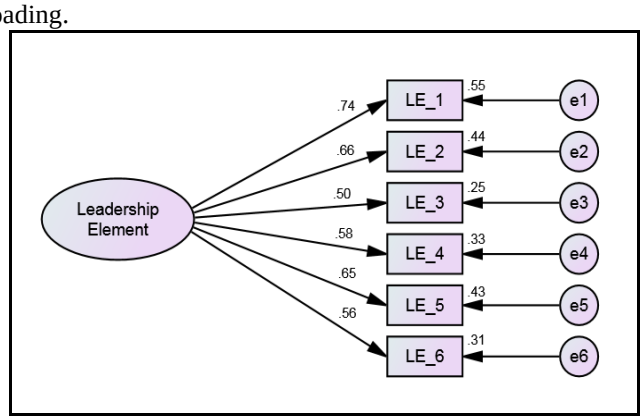

Figure 1: Initial Measurement Model of Leadership Element

However, examination of the modification indices reveals that, there are set of items that have MI values beyond 15 which is the maximum requirement Blon. The modification indices are shown in Table 3.

Table 3: Modification Indices of Model

SN				M.I.	Par-change
1	e4	<-->	e6	38.803	.218
2	e3	<-->	e6	5.785	-.088
3	e3	<-->	e5	30.373	-.151
4	e2	<-->	e6	9.152	-.104
5	e2	<-->	e4	4.498	-.064
6	e2	<-->	e3	62.076	.249
7	e1	<-->	e5	7.989	.062

To address the issue of higher MI values, items with the highest values which are e2 and e3 representing 'ability to sustain improvements in leadership teaching and learning of automobile technology in our tertiary institutions in Nigeria' and 'distributed leadership enhances teaching and learning of automobile technology in our tertiary institutions in Nigeria' respectively were covaried. The model was then re-specified and presented in Figure 2.

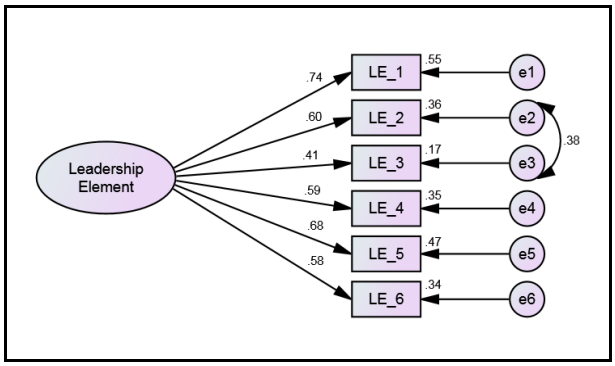

Figure 2: Re-Specified Measurement Model

C. Re-Specified Measurement Model

However, the findings of the re-specified model reveal that, LE_3 representing 'distributed leadership enhances teaching and learning of automobile technology in our tertiary institutions in Nigeria' did not achieve a factor loading of .50. Therefore, LE_3 was deleted and the model was re-specified again. The re-specified model is presented in Figure 3. The five items in the model have achieved the requirement of factor loading.

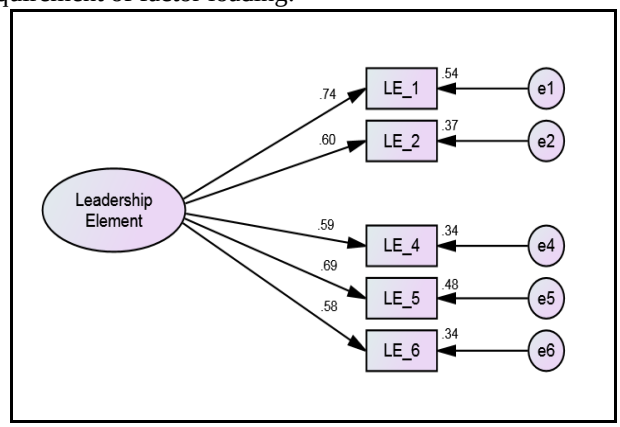

Figure 3: Revised Measurement Model

Modification indices of the model was examined, and a set of parameters namely e4 <--> e6 representing 'leadership training enhances blended teaching and learning of automobile technology in our tertiary institutions in Nigeria' and 'the provision of infrastructural structures enhances blended leadership in our institutions' respectively indicated an MI values of 33.053 as shown in Table 4.

			M.I.	Par Change
e4	<-->	e6	33.053	.199
e4	<-->	e5	5.004	-.057
e2	<-->	e6	4.364	-.074

The third revised model was presented in in Figure 4. The re-specified model has achieved the requirement of factor loading. Similarly, modification indices of the model were assessed and the result reveals that, no set of items having MI values beyond 15. Therefore, the model is considered fit with the data collected.

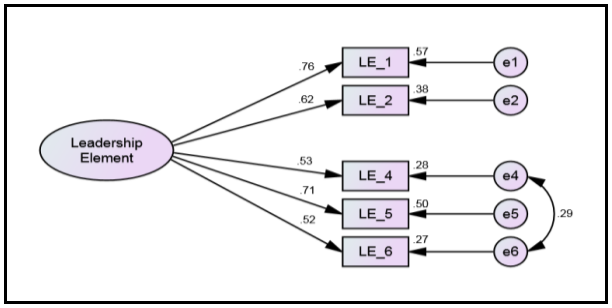

Figure1.3: Second Revised Measurement Model

D. Final Measurement Model

Interestingly, the measurement model of leadership element has a Chi-Square and Degree of Freedom that are not significant at $p < .005$ (95%). Similarly, regression weight of the indicators measuring leadership element have adequately estimated the construct. Distributed blended leadership was fixed to enable estimation of the model. The contribution of leadership improvement, leadership training, leadership process and infrastructural structure in the estimation of leadership element is significantly different from zero, at 95% significance level (see Table 5).

Table 6 presents the squared multiple correlations of the items measuring leadership element. Based on the findings, infrastructural structure was able to explain 27.1% of its variance, leadership process was able to explain 50.3% of its variance, leadership training was able to explain 27.8% of its variance, leadership improvement was able to explain 37.9% of its variance, while distributed blended leadership explains 57.2% of its variance.

Table 6: Squared Multiple Correlation of Items

SN	Components	Estimate
1	Infrastructural structure	0.271
2	Leadership process	0.503
3	Leadership training	0.278
4	Leadership improvement	0.379
5	Distributed blended leadership	0.572

The result implied that factors like distributed leadership process (87%) Infrastructural structure (81%), Leadership training (72%), Leadership improvement (88%), respectively are important key issue that is challenging the development of technology education Programme as indicated by Regression Weights of Items Measuring Leadership Element this because Technology has enabled a growing number of routine jobs-both blue and white collar-to be either "off-shored" or automated. These changes compel us to re-think what kind of education all of our young people will need today to get and to keep a good job. Even though the leadership function is not limited to these but function as mentioned earlier is considered more critical.

Distributed leadership style of leadership in technology education programme has always been one of the challenges in technology training issue First and famous a technology education teacher i.e. a future leader should have a distributed leadership style of administration. He should have ability to

distribute or channelled his ability in to both human and material resources at his disposal. In terms of human resources development, the leader should work towards training people with skills such as Motor skill, Visual skills, Mobility, Endurance & Communication skills, Professional Attitude and Demeanor

Infrastructural Requirement of a technology education leader that Weighted (81%) of the responds implied that greater percentage of the respondent agreed that the technology education leader should be able to determine his infrastructural needs in terms of tools, equipmen014t including buildings to implement the curriculum to later this is further illustrated by the blend between intellectual leadership space and administrative management space professional [6, 7].

IV. CONCLUSIONS

The study was conducted to validate the measurement model of Leadership Element in Blended Learning Scale (LEBLAS) for learning integration into teaching and learning of Technology Education Programmes in Nigerian tertiary institutions. Based on the review of the instrument and empirical assessments, a series of statistical analyses were conducted to established validity and reliability evidences of the scale. The study produced a final measurement model that, LEBLAS satisfied the absolute fit, incremental fit, and parsimonious fit requirement of SEM. The measurement model was able to achieve a required Chi-square value with a degree of freedom. The indices used in measuring the absolute fit were: Standardized Root Mean Square Residual (SRMR) and RMSEA was adequately satisfied. Therefore, with the satisfaction of all the measurement requirements, it can be concluded that, the developed LEBLAS validated in this paper can be used to assess the Leadership Elements of Blended learning implementation in Technology Education Programmes.

Table 2: Multivariate Normality for Leadership Element

SN	Variable	Min	Max	Skew	C.R.	Kurtosis	C.R.
1	Infrastructural structures	1.00	5.00	-1.166	-11.376	.534	2.604
2	Leadership process	1.00	5.00	-1.811	-17.664	4.031	19.664
3	Leadership training	1.00	5.00	-.847	-8.262	.145	.707
4	Distributed leadership	1.00	5.00	-.900	-8.785	.223	1.090
5	Leadership improvement	1.00	5.00	-1.056	-10.297	.574	2.801
6	Distributed blended leadership	1.00	5.00	-1.419	-13.842	2.274	11.092
7	Multivariate					21.85	26.644

Table 6: Regression Weights of Items Measuring Leadership Element

Components			Estimate	S.E.	C.R.	P
Distributed leadership	<---	Leadership Element	1.000			
Leadership improvement	<---	Leadership Element	.884	.072	12.199	***
Leadership training	<---	Leadership Element	.728	.068	10.661	***
Leadership process	<---	Leadership Element	.876	.066	13.322	***
Infrastructural structure	<---	Leadership Element	.810	.077	10.485	***

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