Development and Validation of Teaching Practice Evaluation Instrument for Assessing Automobile Technology Students' Teaching Skills

By

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ABSTRACT

The study was designed to develop and factorially validate an instrument for measuring teaching practice skills of automobile technology student teachers. Two research questions guided the study. The design of the study was instrumentation. All the automobile technology student-teachers in the Department of Industrial and Technology Education, School of Technology Education, Federal University of Technology, Minna involved in teaching practice in February, 2013 formed the population for the study. No sampling technique was used as all the population formed the sample for the study. The instrument known as ATTPEI (automobile technology teaching practice evaluation instrument) was developed. It was used to collect data for answering the research questions. The instrument was face validated and subjected to factor analysis using rotated component matrix to establish the construct validity. FL (factor loading) range of 0.35 and above (Meredith, 1969) was used for the extraction of the valid items. Internal consistency reliability coefficient of the instrument was established using Kendall's coefficient of concordance. The result of the analysis shows that ATTPEI was valid and reliable. It also shows that there was agreement among the raters. Based on these findings, the implications of the findings were discussed and recommendations made including that teachers in tertiary institutions should use this instrument in assessing automobile technology student-teachers during their teaching practice due to its validity and reliability in assessing teaching practice skills in automobile technology.

Keywords: factorial, validation, teaching practice, evaluation, automobile technology student-teachers, human resources, education and universities

INTRODUCTION

The Federal Government of Nigeria Vision 20-2020 is seen as a pragmatic step take to guide the nation's course towards scientific and technological development thereby making Nigeria one of the best 20 world economies by the year 2020. This cannot be achieved without developing the necessary human resources needed to drive the economics of the nation. It is, therefore, very important that quality teachers should be prepared for this crucial role of human capital development. No wonder teaching as a profession is receiving recognition all over the world. The abilities of teachers are crucial determinants of the quality of education in any nation. Therefore, teachers ought to be sufficiently prepared to meet the modern demands of the teaching and learning processes. Either by design or accident, Nigeria inherited a lop-sided education system which emphasized more of theory, less practical work from the British (Adigun, 1997). So technical and

vocational teacher education had a slow start and developed less quickly than other forms of education in the country.

Technical college graduates and graduates of colleges of education, technology and universities were posted to technical and secondary schools to teach auto-mechanics without prerequisite professional training. Technical school education constitutes a crucial stage in the preparation of manpower for technological and scientific advancement (Idris, 2012). Coupled with unemployment rate in the nation, the technical school products must be guided and equipped with entrepreneurial skills and attitudes needed for self-employment. Auto-mechanics is an important subject that has much influence in enhancing entrepreneurial skills and attitudes.

But the obvious questions to be answered are: Are the methodological skills acquired by the automobile technology teachers enough to successfully implement the national policy on education so as to produce youths that can push this nation forward technological and be self-sustained in life? Is Nigerian automobile technology teachers' preparation able to produce highly personality and skilled teachers needed for effective teaching of auto-mechanics in technical

and secondary schools? Are the automobile technology teacher preparation emphasizing quantity rather than quality and making a living rather than making a life? This latter question is very crucial because many people move into the teaching profession for the sole reason of making a living. Colleges of education and faculties of education in Nigerian Universities should prepare teachers with right attitudes, values, skills, and personalities needed for effective performance in the teaching profession. Since it is obvious that without quality teachers, the goals of the National Policy on Education (FRN, 2004) cannot be achieved and the Vision 20-2020 will not be actualized, then there is the need to look into the evaluation format used to assess automobile technology student-teachers. This will ensure that quality automobile technology teachers will go to the technical schools to teach. It is, therefore, in order to produce quality automobile technology teachers that this paper sought to develop and factorial validates ATTPEI (automobile technology teaching practice evaluation instrument) for assessment of teaching practice skills of automobile technology student-teachers.

STATEMENT OF THE PROBLEM

Teaching practice is an activity which aims at preparing quality teachers. It is very necessary

for prospective teachers to grow in the profession. It provides the opportunity for student-teachers to grow in the profession. Because of these vital role played by the teaching practice in the preparation of quality teachers, it becomes necessary that an appropriate format for the evaluation of automobile technology student-teachers should be developed and validated. The need also arises, because to the researcher's knowledge, there is no evaluation form specifically developed for the automobile technology student-teachers. Most teacher training institutions in Nigeria do not engage in micro-teaching for their students. Some do not video-filmed them and allow the student-teachers to grow through their own evaluation. Considering the importance of teaching practice to the overall teaching career of students and its importance in human capital development, the researchers considered it necessary to develop an instrument that will guide supervisors to assess students' appropriate behaviors and uniformity. This work, therefore, sought to develop and factorially validate an instrument for evaluating teaching practice skills for automobile technology student-teachers in universities in Nigeria.

RESEARCH QUESTIONS

Two research questions guided the study as follows:

(1) What is the construct validity of the instrument ATTPEI developed?

(2) What is the inter-rater reliability coefficient of the instrument ATTPEI?

METHODOLOGY

This study was an instrumentation research design, because it aims at developing and validating an instrument for assessing teaching practice skills of automobile technology student-teachers in Universities in Nigeria. The area of the study is Federal University of Technology, Minna. The choice of this area is because of its proximity to the researchers and for effective control of the raters. The population of the study consisted of five automobile technology student-teachers in the Department of Industrial and Technology Education, School of Technology Education, Federal University of Technology, Minna involved in teaching practice in February, 2013. For the sample and sampling technique, all the student-teachers (as mentioned in the population) were used for the study and so there was no sampling technique adopted.

The instrument for data collection was ATTPEI which was developed by the researchers. The

researchers went through the existing teaching practice forms used in assessing teaching practice in the department and drafted the instrument. The researchers took the instrument to some experienced automobile technology teachers and some measurement and evaluation experts who gave some advice and made some comments on the instrument. Their comments helped to restructure the ATTPEI. The instrument was trial tested on five automobile technology student-teachers in the Department of Industrial and Technology Education, School of Technology Education, Federal University of Technology, Minna doing the teaching practice in April, 2012. Three lecturers from Department of Industrial and Technology Education rated the students using ATTPEI during the teaching practice. The scores of the lecturers were used to establish the validity of the instrument and the inter-rater reliability coefficient of the instrument. The data collected were analyzed based on each research question. Research question 1 was answered using factor analysis while Kendall's coefficient of concordance was used to answer research question 2.

RESULTS

Research Question 1: What is the construct validity of the instrument ATTPEI developed?

Table 1

Summary of Factor Analysis of the Items of ATTPEI and Factor Loadings

		Rotated component matrix[a]		Component			
		1	2	Impure items	Complex items	Total No. of items selected	Total No. of items not settled
Teacher's Personality	Item1	0.499	0.072				
	Item2	0.633	0.230				
	Item3	0.142	0.473	-	-	3	-
	Item4	0.053	0.409				
	Item5	-0.149	0.669				
	Item6	-0.023	0.787				
Preparation	Item7	-0.027	0.666	-	-	6	-
	Item8	0.462	0.330				
	Item9	0.573	0.296				
	Item10	0.075	0.488				
Presentation	Item11	0.542	0.060				
	Item12	0.280	0.695				
	Item13	0.604	0.273				
	Item14	0.625	0.282				
	Item15	0.448	0.292				
	Item16	0.417	0.157				
	Item17	0.818	0.068				
	Item18	0.182	0.338	1	-	11	1
	Item19	0.139	0.403				
	Item20	0.250	0.596				
	Item21	0.370	-0.013				
	Item22	0.757	-0.056				
	Item23	0.527	-0.084				
Class management	Item24	0.505	0.401	-	1	3	1
	Item25	0.615	0.049				
Communication skills	Item26	0.178	0.322				
	Item27	0.276	0.326	2	-	-	2
	Item28	0.141	0.778				
Evaluation	Item29	0.433	0.214	-	-		
Total				3	1	25	4

Note. Extraction method: Principal component analysis; Rotation method: Varimax with Kaiser normalization; [a] Rotated Component Matrix is one of the ways of running factor analysis.

It is important to note that:

(1) FL (factor loading) range used in selection is 0.35 and above (Meredith, 1969);

(2) Items without any FL up to 0.35 is considered factorial impure and not selected;

(3) Any item with FL of 0.35 and above on more than one factor is considered factorial complex and not selected.

Table 1 shows the summary of factor analysis of which rotated component matrix shown in Appendix.

From Table 1, a total of three items were impure, one item was complex, and 25 items were selected. A total of 25 items were selected for having FL of 0.35 and above. Items 18, 26, and 27 were not selected being factorial impure and item 24 was not selected for being factorial complex. Thus, four items were not selected.

Research question 2: What is the inter-rater reliability coefficient of the instrument ATTPEI developed?

Table 2

[a]Kendall's Coefficient of Concordance Showing the Summary of Inter-rater Reliability Coefficient of ATTPEI

(1)

Rank	Mean rank
Item1	19.20
Item 2	18.10
Item 3	15.52
Item 4	13.88
Item 5	13.98
Item 6	14.94
Item 7	10.70
Item 8	12.80
Item 9	9.88
Item 10	13.38
Item 11	15.84
Item 12	12.40
Item 13	15.80
Item 14	15.58
Item 15	11.10
Item 16	16.12
Item 17	20.54
Item 18	12.14
Item 19	14.32
Item 20	13.90
Item 21	12.10
Item 22	15.20
Item 23	16.58
Item 24	15.52
Item 25	14.42
Item 26	17.08
Item 27	18.14
Item 28	16.58
Item 29	19.26

(2)

Test statistics	
N	25
Kendall's W[a]	0.839
Chi-square	97.209
df	28
Asymp. sig.	0.072

Note. [a] Kendall's coefficient of concordance.

From Table 2, the Kendall's coefficient of concordance was 0.839. This is high indicating that there is agreement among the raters, and therefore, the instrument has score reliability.

DISCUSSION

In Table 1, the factorial validity (FLs) of the 25 items of TPEF ranges from 0.35 and above. This is an indication that the 25 items are valid to evaluate teaching practice skills of automobile technology student teachers in tertiary institutions in Nigeria. This is in line with Meredith (1969) who recommended a FL of 0.36 and above as minimum for accepting any item as valid. This, therefore, implies that the items of ATTPEI are adequate and representative of the various

constraints of automobile technology student-teachers in respect to teaching practice skills. The results of this study have shown that ATTPEI has high inter-rater reliability coefficients, and therefore, reliable and can be used to measure teaching practice skills. In Table 2, the overall inter-rater reliability coefficient of all the factors of ATTPEI is 0.839. These values indicate that there is agreement in the scoring pattern of the five different scorers. This implies that teachers can use ATTPEI in scoring teaching practice skills of automobile Technology student-teachers without differences in their scores. In other words, the use of this instrument will help technical teachers score students on the skills acquired and the level of acquisition thereby finding out the extent of attainment of the goals of the teaching and invariably the effectiveness of the technique used.

CONCLUSION

The following conclusions are drawn from the findings of the study:

(1) The 25 items of ATTPEI were found valid for assessing automobile technology student-teachers on teaching practice skills acquisition;

(2) The inter-rater reliability analysis of ATTPEI using Kendall's coefficient of concordance

(w) indicates that ATTPEI has inter-rater reliability index of 0.839 indicating that there is agreement among the raters.

IMPLICATIONS OF THE FINDINGS

The findings of this study showed that the 25 items of ATTPEI are valid constructs with respect to skill acquisition of Automobile Technology student-teachers during the teaching practice. This implies that the instrument has construct validity with respect to teaching practice skills and so can measure the skills exhibited by these students to an appreciable degree. It means that the skills exhibited by automobile technology student-teachers can be identified and scored. The implication to teachers is that when assessing skills exhibited by automobile technology student-teachers, the teachers' choice of assessment instrument should be guided by the ability of the instrument to assess not only the product but the process that is involved in achieving the product, identifying and scoring the skills exhibited by the practicing teachers. This quality inherent to the instrument will help teachers to identify and score the skills exhibited by the student-teachers to an appreciable level of accuracy. The fact that ATTPEI has high inter-rater reliability coefficient implies that they are consistent and reliable in

measuring skills exhibited by automobile technology student-teachers during the teaching practice. This, therefore, implies that teachers can adopt this instrument for uniformity and reliability of their results.

RECOMMENDATIONS

Based on the findings of the study, the followings recommendations were made:

i. Teachers in tertiary institutions should adopt this instrument in assessing automobile technology student-teachers during their teaching practice.

ii. A training workshop could be organized for technical teachers in tertiary institutions on how to use the instrument.

iii. Further studies should be done in other institutions where automobile technology students are trained to develop instrument to assess their teaching practice skills.

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TEACHING PRACTICE EVALUATION INSTRUMENT FOR AUTOMOBILE TECHNOLOGY STUDENTS

Name of student: -------------------------------------

Reg. No.: ---

Programme area: -------------------------------------

Year of study: --

School: --

Subject: --

Class: --

Topic taught: --

Duration: --

Date: ---

Course code: --

SCORING GUIDE

S/N		1	2	3	4	5
1	Preparation					
a	Statement of objectives					
b	Adequacy of the content					
c	Synchronism of specific objectives & evaluation					
2	Presentation					
a	Introduction					
b	Development of lesson					
c	Teaching skills illustrated					
d	Use of chalkboard					
e	Utilization of teaching skills					
f	Effectiveness of teaching skills					
g	Effective organization of chalkboard					
h	Knowledge of the subject matter					
i	Questioning skills					
j	Use of instructional materials					
k	Class participation					
l	Student-teacher interaction					
3	Class management					
a	Class arrangement					
b	Class control					
c	Stimulation and motivation of students' interest					
d	Reinforcement of pupil's responses					
4	Communication skills					
a	Use of appropriate language					
b	Voice clarity					
5	Evaluation					
a	Suitability of assessment					
b	Attainment of stated objectives					
6	Teacher's personality					
a	Appearance					
b	Comportment					

Total score: ---   Supervisor's name: ----------------------------------

Signature student-teacher: ---------------------------   --

Comments: ---   Signature and date: ------------------------------------

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Supervisor's comments: ------------------------------