

## COMPETENCY RESKILLING MODEL FOR IMPROVED PERFORMANCE OF TVET AND SCIENCE WORKSHOP MANAGERS IN HIGHER INSTITUTIONS

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**Purpose.** The existence of the workshop attendants in technical and vocational education and training (TVET) is aimed at complementing the job of the lecturers to ensure that well-grounded and employable graduates are produced. Over the years, the complaints about the poor quality of the output have been shifted to the lecturers teaching methods and techniques, workshops and facilities without recourse to the competencies of the workshop attendants. The focus of this study is to develop a model that will boost the technical proficiency of the personnel that is employed to work in the technical workshops and laboratories.

**Results.** The study succeeded in developing a model suitable for reskilling technical and science workshop managers in higher institutions. The model consists of five major constructs and nine sub-constructs. The major constructs are: innovation, automation, professionalism, management and leadership. These are suitable for meeting the complaints of the workshop managers about neglect and equipping them adequately for the job overall performance of the jobs they were employed to perform.

**Scientific novelty.** The sequential exploratory mixed method used increases the depth of the study and makes generalization possible, unlike using a single research method.

**Practical value.** The study has theoretical and practical implications for the body of knowledge in competency studies. Above all, the model identified will help to shape and fit workshop managers adequately for the job they were employed to perform and prevent human capital losses.

**Key words:** competency, reskilling, performance, manager, higher institution.

**Introduction.** The existence of workshops especially, in technical education is to give room for the learners to practice what they have been taught theoretically by the

lecturers thereby, complementing the job of the lecturers. Unfortunately, the information coming from a host of the workshop managers and technicians is that of utter neglect and abandonment by the Authorities of Nigerian HELs. This no doubt, will spell doom for the army of technical and science graduates produced by these institutions yearly. No wonder, some employers regarded these young graduates as unemployable. To ensure that these sets of workers are competent on their job, a sequential exploratory study was conducted among the experts in the workshops and the academics to obtain the observable facts concerning the reskilling competency that would make out tertiary institutions alive again. The findings and results produced five areas of weakness that needed the urgent attention of the Management of Higher Education Institutions in Nigeria. These were products of document analysis and interview protocol.

**Review of the literature.** Economic competency is a fundamental characteristic that affects an individual's way of thinking and behaviour, as well as, facing all situations encountered in life as human beings (Irawan, 2009). The term competency was first used in an article written by Craig Lundberg in 1970 (Parts, Teichmann & Rüttemann, 2013). The term was widely used for personnel and human resources (Buehler et al., 2015). Competency is a distinguishing feature that makes an organization to progress. It serves as a source of competitive advantage and a baseline for achieving success. In Europe, competency is known as "Learned capacity to perform" and vastly spreading and growing in the educational sector. In the United State of America, competency is regarded as any characteristic that is related to superior work performance. Spencer & Spencer (1993) define competency as "an underlying characteristic of an individual that is causally related to criterion-referenced and or superior performance in a job or situation".

In this sense, competency refers to the basic features a person possesses that associate him with superior performance in a task or situation. The five features of competency identified by (Spencer & Spencer, 1993) are motives, traits, self-perception, knowledge, and skills. Motives drive behaviour towards a specific goal. A trait is an element of personality that is relatively throughout the lifespan and across contexts. Self-perception refers to personal attitude. Knowledge is the information that a person has in his range. While skills are the ability to perform mental and physical tasks. The model is relevant to the current study because it emphasizes personnel human development. It is concerned with the skills required for superior performance in a task.

Hazards are a common phenomenon among employees and students in the workplace (Yasim et al., 2018). These are not unconnected with the nature of the work environment such as the presence of hazardous dusty air, poor ventilation and in most cases too hot and cold weather conditions. A workable competence model will bring about improved security and safety management in the school workshops and laboratories (Yasim et al., 2018). Competently trained individuals in higher institutions serve to gain the qualifications necessary to succeed in the labour force. This makes them responsive to changes in the labour market as an essential force in the productive

economy (Shun & Wang, 2020).

Competencies and competency models are today commonly practiced in most organizations. There is a strong business case for competencies at work as they lead to significant human resource development that provides organizations with a competitive edge (Jollands, 2015; Vazirani, 2010).

Wang and Tsai (2014) conducted a study on the employability of hospitality graduates to determine the perception of students and industry in Taiwan. The focus was on the perception of senior hospitality students and industry managers of employability in the industry. The result shows that both senior students and graduates lack confidence in their employability especially, in the areas of professional management skills. Equally Ibrahim and Hasnan (2014) studied the development and application of the competency model in manufacturing operations in Malaysia. Their review highlights the relevance of the competencies model to individual workers' development in an organization. They aver that the competency model helps in scaling up workforce productivity for the achievement of the overall economic competitiveness of a country's economy.

Vathnophas and Thai-ngam (2007) study identifies the competencies required for effective job performance at the General Administrative Sub-Division level in the Thai Department of Agriculture. The method used is the Behavioural Event Interview (BEI) technique (Spencer & Spencer, 1993). Out of the 23 competencies identified by the study, only 9 competencies made the model for the Department of Agriculture in Thailand. This corroborates (Jollands, 2015) that the enormous broad number of employability skills frameworks available does not solve and meet the requirement of graduate unemployment.

The human capital theory has been used by so many employability skills researchers. Some applied the theory of human capital (Bouchard, 2008) to either create a framework for the employability of graduates or use it to give a comparative analysis of theories in the context of graduate employability and its desirability in the school curriculum. Cai (2013) in his study of a framework for understanding employers' perceptions of graduate employability, gave an insight into the requirements of the employers. The study gives an understanding of what the employers think about the estimation of graduates with comparable educational qualifications in the working environment, utilizing understanding from new institutionalism. Cai (2013) divided his framework into exogenous factors, initial signaling effects and the process of both public and private learning. He used the concept to evaluate the effect of graduate employability by foreign educational providers on how to influence employers' beliefs. However, Cai (2013) observed that the positive foresight relationship between educational attainment and the labour market outcomes of human capital theory did not consider such factors as uncertainty in labour market, imperfect knowledge of individuals' qualities, the type of school attended including inadequate knowledge of demand and supply. These are seen as a weakness for human capital theory.

Kim et al. (2015) investigated the antecedents of employees' perceived employability based on self-concept and human capital theory. The study also examined the interactive relationships between self-concepts and voluntary learning behaviour as a means of enhancing human capital. The study which was conducted in Korea consisted of 301 employees of an organization. The findings of the study show that Organizational –Based Self –Esteem (OBESE) and its interaction with voluntary learning behaviour were positively correlated. It further shows that individuals' self-evaluation is determined not only by their abilities and positions but also by their relationships with specific individuals or groups with whom they compared themselves. Kim et al. (2015) argue further that students who believe they are among the most valuable and competent are likely to evaluate themselves as an individual who is capable of attaining high-prestigious occupation. This means that the employee's objective levels of skills, knowledge, and experience for enhancing human capital are substantially related to perceived employability. A strong self-concept in a specific framework may be a strong requirement for perceived employability among other employed individuals (Kim et al., 2015). The study, therefore, is designed to provide answers to the following research questions:

- (i) What are the competencies required for reskilling the workshop managers from the perspective of technical officers and academics?
- (ii) What is the framework for reskilling workshop technicians based on Rasch Analysis Model?

**Materials and methods.** The research design was an exploratory sequential mixed method. The qualitative method involving document analysis and interview protocol was used to determine the constructs and sub-constructs of the competencies required by the workshop technicians. The analysis was done thematically. 8 participants were involved in the study. The sample for this phase of the study was based on theoretical (Berman, 2017; Ivankova, 2014b; Johnson & Onwuegbuzie, 2016). The educational research utilizes interviews and inquiries about the respondent's feelings, attitudes, motivation, experiences of individuals and accomplishments (Anderson, 2010; Ivankova, 2014a).

The open-ended interview was used to elicit a self-report on the competencies of the participants. Personal contacts were employed for the data collection. The Fleiss Kappa calculator was deployed to obtain the experts' agreement on the items in the instrument. The instrument recorded an "Almost Perfect Agreement at 85.83 %". The responses were audio-recorded for transcription. The transcribed information was taken back to the participants for confirmation and authentication. This is to ensure the validity of the data. Table 1 shows the Fleiss Kappa interpretation. The 44 sample size for the quantitative study conformed with the  $\pm 1$  logit item calibration stability of 99 % of Rasch minimum sample size of between 27–61 for best targeting (Aziz, 2011; Linacre, 2002). The item separation of 3.32 and the item reliability of .92 indicates that the sample size was enough and the instrument was capable of measuring what it was designed to measure on repeated application (Creswell, 2013). The Rasch Partial Credit

Model was used to obtain the item that is suitable for inclusion in the competency reskilling model after screening. According to Linacre (2002), only the item with negative values is considered fit. The interpretation of the Rasch Analysis Model is provided in Table 1.

*Table 1*

### Rasch Model Interpretation

Criteria	Statistical Information	Range
Reliability	Item reliability	Value of item reliability >0.8
	Item separation index	Value of separation index >2.0
	Person reliability	Value of person reliability >0.8
	Person separation index	Value of person separation index >2.0
Validity	Item polarity	PTMEA CORR >0.3
	Item fit	MNSQ infit outfit in range of 0.6 – 1.4
	Item dimensionality	Standardized residual variance >40%, Unexplained variance in 1 <sup>st</sup> contrast < 15%, Eigenvalue < 5
	Item calibration	Structure calibration range 1. 4 < SC < 5
	Differential item functioning	Critical t value range +2.0 ≥ t ≥ -2.0 and +0.5 ≥ DIF contrast ≥ -0.5 at 95% confidence level
	Standardized residual correlation	Value of residual correlation < 0.70

Source: Viera & Garrett, 2005; Fleiss Kappa, 1971.

**Results and discussion.** The thematic analysis for the interview protocol is given in Table 2.

*Table 2*

### Interview Findings for Technical Personnel

Examples of responses	Participant	Code	Theme
...new innovations. We need further training...management looked down on technicians. Tools being used are obsolete and hinder students' level of achievement. ...digital age. Time for workshop practice is not enough.	TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8	Digital age	Innovation
...good office accommodation and working environment for technical staff. Absence of modern working tools, machines and equipment. Equip staff with new skills and knowledge about technology. Fund technical education adequately.	TP1 TP2 TP4 TP5 TP6	Obsolete tools	Automation
Troubleshooting was a try by error...exposure to modern equipment. All the staff should enjoy seminars and workshops.	TP1 TP2 TP4 TP5 TP7	Retraining	Professionalism
We shall continue to be relevant...the process is going to be gradual. We shall continue to work with machines and men. We need skills in managing all the resources.	TP1 TP2 TP5	Manage resources	Management
The admin staff is rated more than technical staff...we need equal treatment and exposure like them. Give us good offices...none of us is made to head any committee in the University ...majority of us are University graduates.	TP1 TP2 TP4 TP5 TP8	Leadership position	Leadership

Source: built by the authors.

Thus, from Table 2, which describes the thematic analysis of the participants' responses to this study, we can conclude that there are various proposals to improve

prospects. 8 participants were in the qualitative phase. The coding and themes were generated from the interview protocols with technical personnel.

The summary of the interview analysis with participants is provided in Table 3.

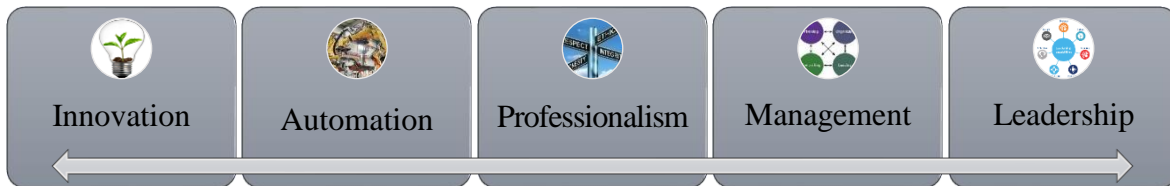
*Table 3*

### Summary of Interview Protocol for Technical Personnel

Constructs	Technicians							
	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8
Innovation	*	*	*	*	*	*	*	*
Automation	*	*		*	*	*		
Professionalism	*	*		*	*		*	
Management	*	*			*			
Leadership	*	*		*	*			*

*Source:* built by the authors.

Thus, from Table 3 we can conclude about the frequency of the participant's contributions to the interview. The code TP1 to TP8 refers to each participant involved in the interview. The majority of the participants participated and contributed to the semi-structured questions for the study. The five major constructs which depict the area of training needs of the workshop personnel emanated from the interview protocol and document analysis are shown in Fig. 1.



**Fig. 1. Initial Competency Reskilling Model for Workshop Managers in TVET and Sciences**

*Source:* built by the authors.

Fig. 1 shows the theme and the initial results of the interview protocols. Because the result is broad and almost immeasurable, there is a need to subject it further analysis which led to the quantitative phase of the study (Table 4).

*Table 4*

### Summary of 20 Measured Item

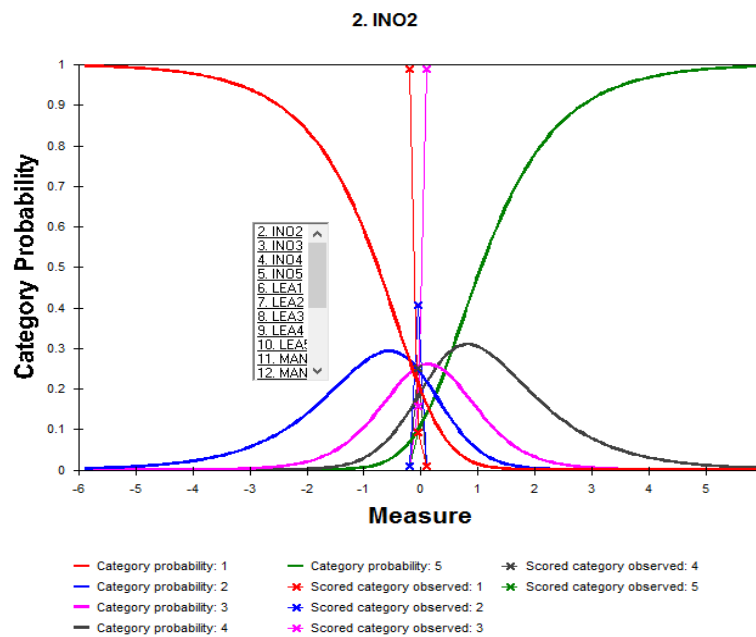
	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	117.2	40.0	.00	.14	1.02	.0	1.02	.0
S.D.	27.4	.0	.50	.02	.21	1.2	.20	1.1
MAX.	176.0	40.0	.96	.19	1.47	1.5	1.43	1.6
MIN.	68.0	40.0	-1.18	.12	.61	-2.5	.62	-2.5
REAL RMSE	.15	TRUE SD	.48	SEPARATION	3.32	ITEM RELIABILITY	.92	
MODEL RMSE	.14	TRUE SD	.48	SEPARATION	3.51	ITEM RELIABILITY	.92	
S.E. OF ITEM MEAN = .12								

DELETED: 5 ITEM  
 UMEAN=.0000 USCALE=1.0000  
 ITEM RAW SCORE-TO-MEASURE CORRELATION = -1.00  
 800 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 2332.77 with 738 d.f. p=.0000  
 Global Root-Mean-Square Residual (excluding extreme scores): 1.1865

*Source:* built by the authors.

The item separation of 3.32 and a reliability of .92 indicates that the 44 sample size for the study is enough and the instrument was capable of measuring what it was designed to measure on repeated application (Aziz, 2011; Linacre, 2002).

The category probability (Fig. 2) according to Linacre (2002) indicates that all items with a value of >1 on the PCM in the Rasch analysis Model are fit for inclusion in the model. This result of the analysis is shown in Table 5.



**Fig. 2. Category Probability of Item Measure**

Source: built by the authors.

Table 5 shows that there are 5 main constructs and 20 sub-constructs left after the screening to remove the in-fits. Out of the 20 sub-constructs, only 9 are good for inclusion in the final model for re-skilling technical and science workshop managers in HEIs. This is shown in Fig. 3.

Table 5

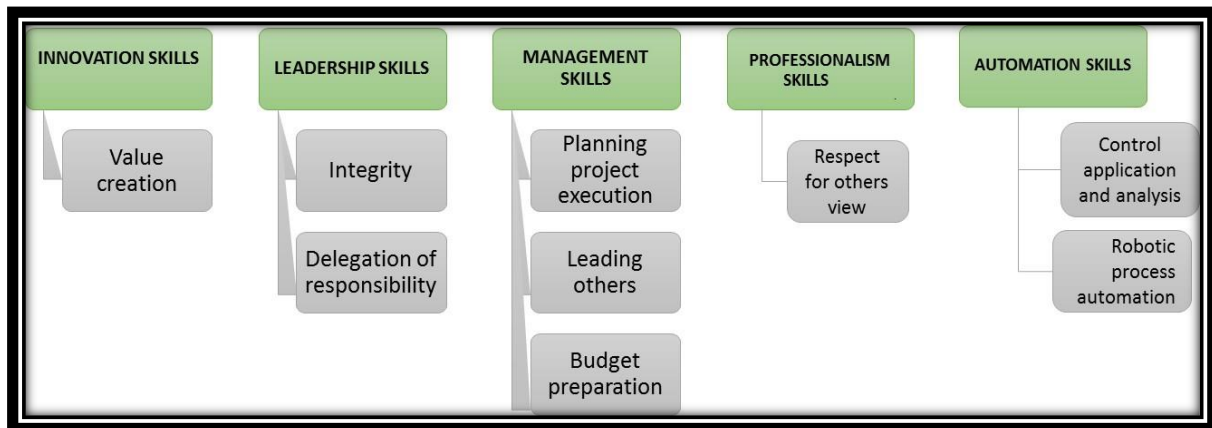
**Results of Partial Credit Model**

<b>Innovative Skills</b>	<b>Model</b>	<b>Leadership Skills</b>	<b>Model</b>
INO2	-.63	LEA1	-.40
INO3	.24	LEA2	-.56
INO4	.57	LEA3	.15
INO5	.18	LEA4	.31
<b>Management Skills</b>	<b>Model</b>	<b>Professionalism Skills</b>	<b>Model</b>
MAN1	-.35	PRO1	.30
MAN2	1.11	PRO3	-.36
MAN3	-.84	<b>Automation Skills</b>	<b>Model</b>
MAN4	-.29	AUT1	.03
MAN5	.07	AUT2	-.69
		AUT3	-.18
		AUT4	.87

Source: built by the authors.

Fig. 3 describes the number of sub-constructs that fits the model for reskilling

technical managers. As shown, value creation is required for innovative skills, integrity and delegation of responsibility are required to acquire leadership skills. Also, budgeting skills, leading others, and planning project execution are required for attaining management skills. For professionalism, the only item that fit the model is respect for others' view. Similarly, control application and analytical skills and robotic processes are required to upgrade the skills of the workshop managers.



**Fig. 3. Competency Reskilling Model for TVET and Science Managers in HEIs**

*Source:* built by the authors.

Findings from literature and interview protocol reveal that innovativeness, leadership skills, management skills, professionalism and automation skills are very crucial for the effective performance of the duties of science and technical managers (P1, P2, P3, P4, P5, P6, P7, P8). This was corroborated by (Shun & Wang, 2020; Yasim et al., 2018) in terms of success in the labour market. However, to avert being subjective, the Rasch measurement model was used to screen and obtain the specific item that fit the model. The sub-constructs obtained are value creation, integrity, delegation of responsibility, planning, leading others, budgeting, respect for others robotic process automation and control application and analysis. These formed the view of (Jollands, 2015) for a narrow and disciplined framework for growing graduate employability. The 21<sup>st</sup> century requires workers to be adequately trained and be competitive to be useful to themselves and benefit others (Köhler et al., 2020; Yasim et al., 2018), P1, P2. The 9 sub-constructs had their mean below the threshold of less than zero. These constructs were, therefore, considered suitable for inclusion in the model for reskilling science and workshop managers in HEIs. These are items with a mean of less than zero. In a bid to ensure that appropriate skills emerge in the development of the model, the Rasch Measurement Model was used for the diagnosis and validation of the constructs to ensure that a valid and useful outcome is achieved. The use of the Rasch Measurement Model produced a reliable scale measuring respondents' perception of the constructs required for the competency reskilling model for workshop managers in higher institutions in Nigeria. A strong collaboration should exist between the HEIs and the employers so that areas of intervention and assistance could be identified for the benefit of the workers, students, employers, and the society at large.



**Conclusions.** It is obvious that the combination of both soft and hard skills is essential for the overall development and functioning in the workshops and laboratories in HEIs. This current study dwelt more on the soft skills aspect which is currently being overlooked in most HEIs especially when it involves workshop managers and attendants. The exploratory sequential mixed method was used for the study. 8 participants were involved in the qualitative phase of the study while the quantitative phase involved 44 respondents from among the workshop's experts and academics. The validity and reliability of the instrument were achieved through subject matter experts from the industry and academics, and the Fleiss Kappa calculator, which gave a reliability of 85.83 %. The purposive sampling technique was used for the qualitative phase. The Rasch Measurement Model was used to analyze the item in the instrument by examining the person and item separation and reliability, dimensionality, and item fit statistics to determine the item that fits the model using the Partial Credit Model. The item in the instrument was recorded with an item separation of 3.32 with a reliability of .92. The study has been able to develop a model for reskilling workshop managers in tertiary institutions and expands the body of knowledge in competency models. The workshop managers are a strong partner with the academics when it comes to the human capital development of the students and contributes a great deal to promoting their employability. Therefore, the model identified in this study will help to shape and fit them adequately for the job they were employed to perform. The management of the HEIs should ensure that these classes of the workforce are exposed to adequate training in the identified five basic constructs that fit the final model. The sequential exploratory mixed method used increases the depth of the study and makes generalization possible, unlike using a single research method. It is recommended that the model should be subjected to discipline study by other researchers.

The data for the study were gathered at the Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti. This might limit the generalization of the results. Therefore, the scope may be expanded to other universities.

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