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Modelling the Integration of Core Competencies among Students of Technical Colleges through Work-Based Learning in North-Western States, Nigeria

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Abstract

One of the concerning issues in Nigeria has been the degree of core competencies that graduates of technical and vocational education possess for employment. The purpose of this study was to ascertain how some critical aspects of work-based learning (academic alignment and employer engagement) affect the core competencies integration among students at technical colleges. The survey research design was utilized in the study. The stratified technique of random selection was used to sample 273 technical instructors from a population of 342 in the sample area, taking into account the complex and heterogeneous community from which the survey was collected. The academic alignment and employer engagement questionnaire (AAEEQ) was the tool developed by the researcher, evaluated by three Technical and Vocational specialists and utilized to gather information from the respondents. Twenty technical and vocational school teachers were given the questionnaire, and the Cronbach Alpha method was used to measure its reliability, which came out to be 0.86. Exploratory Factor Analysis (EFA) was employed to put the items into the required dimensions. Analysis of Moment Structures (AMOS) version 23 was used carry out the confirmatory factor analysis, a critical component of structural equation modeling (SEM) to answer the research questions and the hypothesis that goes along with them at the 0.05 level of significance. The results of the study showed that work-based learning (WBL) academic alignment and employer engagement all significantly improved students' core competencies at technical colleges. Based on the study's outcomes, the government should create a supportive environment

that encourages appropriate work-based learning activities to enhance the integration of core competencies.

Keywords: Core Competencies, Structural Equation Modelling (SEM), Technical Colleges, Work-Based Learning.

INTRODUCTION

The significance of core competencies in boosting the job prospects of graduates cannot be stressed enough. Core competencies are all the abilities that are essential to diverse facets of human activity; they have a significant impact on graduates' job preparation since they are not tied to any one job (Cimatti, 2016). Usually, core competencies work in conjunction with technical skills; they are notably the capacity to perform various tasks or activities. Core competencies are also crucial as they aid graduates in achieving success in their personal and professional spheres, making them essential for anyone seeking employment. Consequently, enhancing the employability of students is attracting considerable interest from a variety of groups within the education sector and beyond (Cimatti, 2016). The process of globalization, along with the transition from an economy dominated by manufacturing and technology to one focused on information and knowledge, has fundamentally altered the competencies required for employment in the 21st century. Simply possessing technical skills upon graduation is insufficient for securing employment and achieving success in the workforce (Pitan & Muller, 2023). Companies face challenges with recent graduates because they often lack core competencies such as problem-solving, collaboration, information and communication technology communication skills, resource management abilities, analytical thinking, and ICT abilities among others (Devkota et al., 2022); therefore, students must acquire both hard and core competencies. In recent times, educational institutions have shifted their emphasis towards teaching methods that promote active student engagement in the learning process to enhance the incorporation of core competencies.

Producing students who are capable of contributing effectively to the workforce upon graduation presents a significant hurdle for technical colleges in Nigeria (J. Itohan Oviawe et al., 2017). Nigerian technical colleges, therefore, are criticized for lacking significant efforts in developing core competencies among their students, leading to a shortage of graduates with work-ready skills (Okolie et al., 2019). It has also been noted (Belchior-Rocha et al., 2022) that these schools prioritize the teaching of technical skills and often underestimate the importance of core competencies. Many experts believe this issue is fueled by the current programme content, which focuses heavily on the understanding of technical skills at the cost of developing core competencies. Moreover, some scholars have criticized educators for adopting traditional teaching approaches that are centered on the teacher rather than the student (Trullàs et al., 2022). Therefore, this has resulted in a well-known worldwide situation where the skills imparted in schools do not always align with the skills required by employers, for complex reasons. Hence, this skills gap is one of the factors influencing the recent growth of work-based learning programmes.

Employability among graduates is correlated with the success of a technical college, industry, and the student. Strong collaborations among these three groups would enhance productive work environments for achieving the required core competencies among graduates. To prepare graduates for the modern workforce, technical colleges should integrate the necessary knowledge and skills. The employability of Nigerian technical college graduates is fast declining, particularly in critical thinking, problem-solving, communication, interpersonal, leadership, and information management (Ogwo, 2023). One of the main objectives of the country's technical institutions is to provide students with the knowledge and abilities they need to become frugally employable or self-reliant (Great & Ezinwa, 2022).

Unfortunately, Nigeria's unemployment rate is increasing annually, and graduates are particularly affected because they lack employable skills. The discrepancy between the skills that students acquire and the capabilities that employers require in the current workforce is one of the main reasons for the high unemployment rate among graduates (Salahuddin et al., 2023). There is no way to argue that the persistent output of graduates with poor employability skills is not the cause of this pattern of unemployment. This necessitates the use of dynamic teaching and learning techniques, such as the WBL approach, which can help students develop the required core competencies.

Work-based learning (WBL) is simply an effort to welcome the community as a source of learning in the classroom. Amish (Amish, 2024) defined WBL as the establishment of a hands-on educational programme to integrate the work environment as a vital element of the curriculum. It is a structurally organized learning system that simultaneously exposes students to work and learning contexts. In other words, it is a term used to describe student learning that is aided by learning strategies and methods that occur in a real-world setting under structured supervision and are geared toward meeting course learning objectives.

These hands-on experiences in professional environments help students develop core competencies for the 21st century, including critical thinking, problem-solving, teamwork, effective communication, and initiative, among others. Such core competencies are crucial for employment; however, they are often overlooked in traditional educational settings due to the restricted time teachers have to cover material beyond the regular curriculum (Martinez, 2022). There is a common belief that the lack of these skills is fueling the increasing demand for work-based learning programmes. Chances are provided to students in WBL to absorb practical information to help close the gap between theoretical and practical knowledge.

Carefully crafted learning experiences are provided to students through the cooperation of workplace and educational institutions via WBL (Amechi, 2022). Recognizing the importance of collaborative modelling of the learning atmosphere to enable learners to acquire pertinent skills, Deschaine & Jankens (2017) outlined a few essential educational tenets and standards that are necessary to succeed in work-based learning, such as academic alignment, employer involvement, and supervision. They further noted that partnerships in work-based learning enhance its value by transforming the prevailing business mindset from viewing learning as an expense to considering

it as an investment. Jackson, Rowbottom, Ferns, and McLaren (Jackson et al., 2017) investigated to understand how employers view Work-Based Learning (WBL), the reasons behind their participation, and the challenges they encounter during the WBL process. This exploration is significant as there is a growing push to enhance WBL, given its considerable benefits in equipping students for their transition into the workforce. The study was carried out by four publicly funded universities in Western Australia, in partnership with the Chamber of Commerce and Industry of Western Australia, with a specific focus on internships for business students. A combination of quantitative and qualitative research techniques was utilized, gathering data through surveys from employers (N = 112) and conversations in focus groups (N = 17). The findings indicate that employers had a limited understanding of the Work-Based Learning programmes provided by the four Business Schools. Even though most firms acknowledged the importance of student internships for their sectors, several obstacles prevented them from taking advantage of work-based learning. Findings revealed that relevant projects and assignments for students, hiring qualified applicants, and worries about the students' performance and capacity to coach or supervise were some of these difficulties. The study makes several recommendations for how to get past these barriers, improving the WBL experience for all parties and guaranteeing its continuous growth in the education industry.

On the other hand, (Jalinus et al., 2023) looked at two programmes that are part of the same school district and give students WBL course credit. The quality of employment possibilities provided to students in these programmes and the connection between curriculum involvement and academic achievement (e.g., effects on academic work, social connections, etc.) were the two main topics of the study. They discovered that students evaluate their work experiences as being quite comparable across programmes because of variations in the sort of work done and some institutional characteristics of these services. Additionally, they discovered that both systems had shortcomings in establishing connections between job and education and that students' work hours have a detrimental effect on some facets of their academic performance (e.g., their capacity to find time to do assignments, their decision to stay in school, etc.). However, the results raise questions about WBL's added value when taking into account the costs of system planning, implementation, and in certain cases, participation. Additionally, although students who work appear to gain financially, there are times when their education suffers as a result; hence, prior studies have questioned whether work enhances students' education (Teo, 2023).

Relating students' work to what they are learning in the classroom can be challenging, but it may help them develop essential skills. There are many advantages of work-based learning (WBL), however, technical institutions frequently lose out on this potentially rich educational opportunity because of poor pedagogical practices (Fawcett, 2020). To maximize these advantages, particularly for students at technical colleges, the basic educational tenets and standards required for successful work-based learning, such as academic alignment and employer engagement (Deschaine & Jankens, 2017), will be explored in this study. These constructs were selected because they provide a sufficient description of the WBL features required to successfully integrate core competencies across technical college students. Furthermore, the measures have been selected

as a fundamental foundation for offering students excellent work-based learning practices, though; they are not all-encompassing.

CONCEPTUAL FRAMEWORK OF THE STUDY

Based on the literature reviewed, the conceptual framework of this study is designed using some selected WBL components academic (alignment and employer engagement) essential for core competencies development. The selection of these constructs is based on their appropriateness for core competencies development among students at technical colleges as identified by (Deschaine & Jankens, 2017). Academic alignment (AAT), which is a second-order construct in this study, has three sub-constructs (first-order constructs); career awareness activities (CAA); career exploration activities (CEA); and career preparation activities (CPA). Employer engagement (EET), is the second independent variable, while core competencies integration (CCM) is the dependent variable of the study.

Academic alignment can be understood as a concept that refers to collaboration where the members share similar academic skills, abilities, and objectives. In a similar vein, Rintala (Rintala, 2020) clarified that academic alignment in work-based learning (WBL) involves a designed collaboration of school and workplace learning to: 1) provide students with mentors and teachers in the workplace; 2) enable students to apply their academic, technical, and job-related skills in real work environments; and 3) equip students with the skills required for highly sought-after jobs. Hermawan and Farozin (Hermawan & Farozin, 2018) state that career awareness, career exploration, and career preparation activities are how these objectives are accomplished. They also asserted that career awareness practices assist students in exploring different professions, comprehending the training and education required for these occupations, and identifying the usual career paths for entering and progressing in the industries. Career awareness activities expose students to a wide range of jobs in the public, private, and nonprofit sectors; Career Exploration activities let students see and talk to workers in the workplace to learn the skills needed for specific careers; while Career Preparation activities integrate academic and career skills learned in the classroom with knowledge and skills from work experiences. When choosing their future courses of study and training, many students find these exercises to be helpful.

Employer engagement is a lively participation of employers to address societal issues of promoting students' entry into the workforce. In other words, (Huddleston, 2020) defined employer engagement as advancement in work-based learning that empowers students by increasing their potential to get employment in the long run with high-quality education and training. In situations where competition and market pressures are high, there's a significant increase in the need for more structured relationships between employers and job applicants, including greater opportunities for work-based learning (Wang & Hussin, 2024). According to (Bell, 2018), this technique through the entire apprenticeship undertaking in work-based learning aligns the employer engagement activities with those across the institution in the following comportments: Perform a thorough evaluation of the learner's previous learning, skills, and experience against the apprenticeship standard to guarantee that the institution does not cover learning outcomes the learner has already

demonstrated; Verify if the learner possesses the essential learning skills to meet the requirements of their traineeship; Arrange any extra learning support necessary to help the learner complete all aspects of their training in work-based learning; Develop a Personal Training Plan (PTP) for each learner to ensure they can meet the preparation requirements and prove competency in their role.

Besides, numerous discussions and supporting research on employer-driven programmes have shown a variety of advantages for recent graduates entering the workforce (Dwyer, 2020). These benefits encompass, among others: the formation of a professional identity; enhanced understanding of the job market; learning early in their careers to find ways to follow their chosen career path; and the development of students' critical thinking skills and confidence in understanding work processes, practices, and realities, and how to improve them.

There is common agreement among various nations worldwide that employer engagement and other forms of work-based learning can aid young individuals in their transition from education to employment and increasingly contribute to the up-skilling and reskilling of learners. This Policy describes the methods employed by these institutions to collaborate with employers, potential apprentices (students), educational institutions, instructors, families, and alumni to emphasize the benefits of experiential learning and to enhance awareness and participation. Recently, employer engagement has been understood in light of the diverse roles that employers play, depending on different strategic frameworks and contexts. For example, employers may act as either 'clients' or 'co-producers' of public employment initiatives (Paul & Berkel, 2014). Employer engagement as a component of work-based learning has been considered as the latter in this study.

Based on the interconnected features of the previously listed factors, the conceptual framework depicted in Figure 1 shows how these elements function harmoniously together to help students at technical colleges to effectively build their core competencies. Therefore, the top of the framework represents the congruent relationship of the independent variables which give rise to the effective elements of core competencies development among students at technical colleges. Besides, the research objectives, research questions, and hypotheses in this investigation were structured according to these aspects.

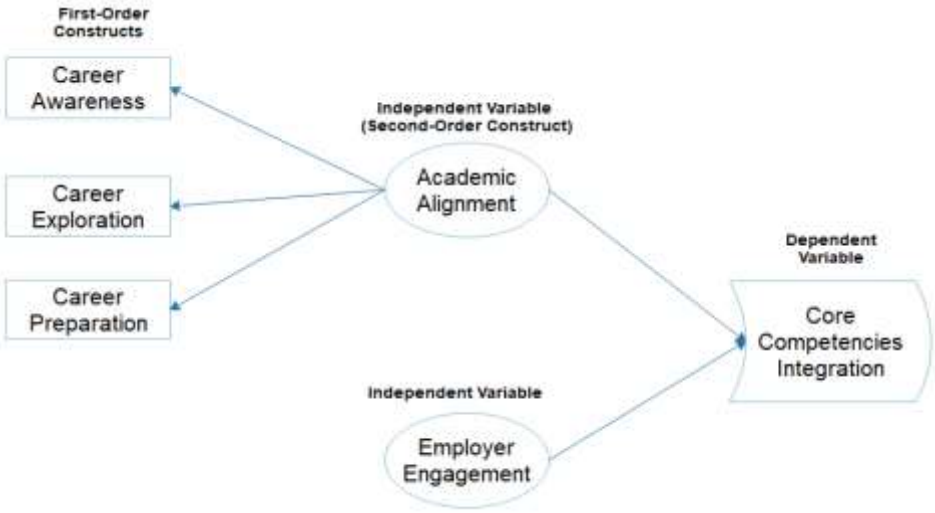

Figure 1: Conceptual Framework Supporting the Study

Therefore, to effectively integrate core competences among students at technical institutions, this study investigates the necessary components of academic alignment and employer participation in work-based learning. The following objectives serve as the inspiration for the study: i) identify work-based learning patterns that can be used to improve the integration of core competencies among technical college students; ii) identify the association between the structural framework's work-based learning constructs; and iii) identify the best work-based learning framework for integrating core competencies among technical college students. The proposed hypotheses listed below describe the expected correlation between the research's independent and dependent variables: i) academic alignment and the integration of core competencies among students at technical colleges are significantly correlated; ii) Employer engagement and the incorporation of core competencies among students at technical colleges are significantly correlated.

METHODOLOGY

The focus group for this study comprised technical educators from technical colleges located in north-western Nigeria. Data gathering from these specified technical colleges took place during the academic term in September 2024. Technical educators were considered suitable respondents for this study due to their extensive experience as instructors who have received thorough training in learning theories, various instructional strategies, and the fundamental principles for applying various teaching methods. Consequently, they possess valuable expertise in identifying and offering meaningful learning experiences for students in practical work settings. In Nigeria, technical educators are also responsible for organizing, supervising, and monitoring students enrolled in Work-Based Learning (WBL) programs. According to the sample size determination table by Sekaran & Bougie (2016), 273 technical instructors from 22 government-run technical colleges made up the research sample.

To choose the 273 participants for the study, a stratified random selection technique had to be used due to the population's diverse features. The advantages of this approach, which provides more accuracy than a basic random sample of the same size, made it worthwhile to employ in this investigation (Sharma, 2017). 268 responses were retained after the completed questionnaires were reviewed and those with missing data and other problems were eliminated, yielding a 98.2 percent response rate. In guiding the research, three objectives were established, and two hypotheses were evaluated at a significance level of 0.05.

Before the 34-item standardized questionnaire was utilized to gather data from respondents, technical and vocational education experts carefully examined it for face and content validity. The three independent variables are: Academic alignment (AAT), which is a second-order construct in this study, has three sub-constructs (first-order constructs): career awareness activities (CAA), which are seven items; career exploration activities (CEA), which are six items; and career preparation activities (CPA), which are eight items. Employer engagement (EET), the second independent variable, contains six items, while core competencies integration (CCM), the dependent variable, has seven. The study used a 5-point Likert-type scale, with 1 being the lowest and 5 representing the highest. The internal accuracy of the questionnaire items was evaluated using Cronbach's method of alpha consistency, which yielded an adequate score of 0.87 (Izah et al., 2024). The rationale behind using a survey study design is that information about the activities required to improve the development of core competencies through the specified essential components of work-based learning among technical college students was gathered via a questionnaire.

The exploratory-factor analysis (EFA) process has been utilized to assess the construct validity of the study's newly created instruments since it is crucial for self-made instruments. Based on the commonality cut-off value (>0.5), the data collected from a sample of 295 technical instructors was adequate to conduct an exploratory-factor analysis (Hair et al., 2019). With a result of 0.90, the Kaiser-Meyer-Olkin (KMO) test showed that the study's sampling was sufficient, while Bartlett's test (Chi-Square =18937.046, $p<0.05$) was ideal for a full variable analysis (Gebremedhin et al., 2022). The Scale was shown to be appropriate for exploratory-factor analysis based on the correlation matrix output ($p<0.05$) (Table 1). The EFA was used in this investigation for two reasons: Plotting the suggested objects into five dimensions was its primary goal. Second, the principal components analysis (PCA), which is less difficult than factor analysis, was used to load each item onto each dimension (J. F. Hair et al., 2019).

Table 1: Exploratory Factor Analysis Output of the WBL Constructs

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
CPA8	.917				
CPA7	.907				
CPA1	.906				
CPA5	.900				
CPA4	.898				
CPA2	.895				
CPA3	.886				
CPA6	.879				
CAA1		.897			
CAA2		.891			
CAA6		.886			
CAA7		.877			
CAA5		.873			
CAA4		.855			
CAA3		.839			
CCM6			.862		
CCM1			.854		
CCM7			.852		
CCM3			.830		
CCM2			.826		
CCM5			.794		
CCM4			.676		
CEA6				.908	
CEA1				.885	
CEA3				.848	
CEA5				.828	
CEA2				.816	
CEA4				.793	
EET3					.878
EET5					.827
EET4					.815
EET6					.774
EET2					.763
EET1					.742

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The structural relationships between the study's constructs were then determined using the multivariate statistical analysis method known as structural equation modeling (SEM), which was

based on Analysis Moment of Structures (AMOS) version 23 (Chan et al., 2007). To determine the Maximum Likelihood Estimation (MLE) from a covariance matrix, AMOS used a number of goodness-of-fit indices. To find a recommended model, a set of goodness-of-fit metrics proposed by J. F. Hair et al. (2019) was used throughout this review. The fit model was assessed using a number of variables, such as relative fit indices and an absolute misfit. The genuine misfit indices were CFI, TLI, and IFI, as well as relative performance indices such as the Tucker-Lewis index and the collective match indexes, as well as the estimated root mean square error (RMSEA) (Babin & Anderson, 2014). The model is considered acceptable if the indices show that: i) the CMIN/df value is between 1 and 5; (ii) the CFI, IFI, and TLI indices are approximately 1.00; and (iii) the RMSEA index of 0.08 or less, which shows a good error and is sufficient (Khine, 2013).

FINDINGS AND RESULTS

Determining the measures of the structures, particularly the measure's unidimensionality, is essential when the objects were in a separate framework prior to the use of SEM (Hair et al., 2012).The results of exploratory factor analysis (using varimax rotation) for the 34 items were collected and included in the report. According to Maskey et al. (2018), components had factor loadings of greater than 0.5, which was regarded as good and statistically significant. The study employed the following basic guidelines to classify significant loadings: ±0.50 = practically meaningful, ±0.40 = important, and ±0.30 = minimum (Babin & Anderson, 2014). The results of the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests also demonstrate that the KMO value of 0.898 is compatible with the expected KMO value of > 0.5, and the Bartlett's test (Chi=18937.046, $p<0.05$) is appropriate for a comprehensive analysis of the variables (Babin & Anderson, 2014). SEM was used to determine the impact of independent variables on the study's dependent variable. It was adopted in this work logically because of its capacity to measure the direct and indirect effects of test variables, model multivariate relationships, provision of a confirmatory methodology for data exploration by defining the association between variables, and its strategies for combining observed and non-observed variables are also included (Sarstedt et al., 2020).

THEORIZED MODEL RELATIONSHIP OF AMONG THE STUDY'S CONSTRUCTS

The measurement model, as different from the structural model, describes an essential step required for efficient data analysis using AMOS. According to Awang et al. (2015a), the measurement model's discriminating validity frequently indicates the validity of the construct. The items in each construct must be tightly related to each other in order to guarantee the constructs' accuracy in this case. In this manner, any superfluous elements in the constructs would be removed or limited for the observed complex variables. The description of the estimate includes some of the most important elements of the requirements for the quality of a fit structure. The pooled CFA approach was employed for this analysis to solve the model identification challenges that researchers encounter in accounting for each unique measurement model during the CFA process (Awang et al. (2015a). In particular, second-order confirmatory factor analysis was used in the study. Awang claims that the connected structures would raise the model's level of independence.

The theoretical original measuring model (pooled CFA model) in Figure 2 defines the study constructs of academic alignment, employer involvement, and integration of core competencies. The following values were obtained from the initial model estimates: Ratio = 3.873, P<.001, CFI =.921, GFI =.842, TLI =.914, RMSEA =.068; Chi-Square = 517. The results showed that the model did not satisfy the goodness of conforming fit requirement. As a result, the model must be enhanced to satisfy the matching feature's needs.

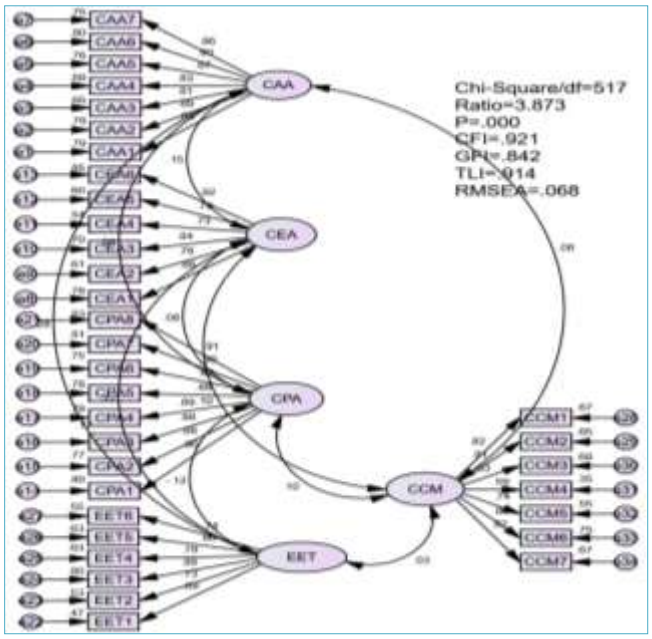

Figure 2: Research Constructs' Theorized Original Measurement Model (Pooled CFA) of Relationship

Based on the model's fit quality, additional adjustments could be made to improve its quality (Figure 2). After that, the model was examined to find variables with modification indexes (MI) greater than 15, factor loading less than 0.5, and error terms less than 25 for improvement procedures (Zalli et al., 2020). All variables had good factor loadings, according to the analysis; nevertheless, some had modification indices greater than 15. In this instance, the model's fitness indices significantly improved after variables CCA, CCA5, CEA, CEA1, CEA5, CCM1, and CCM6 were eliminated one after the other following the principle of deleting problematic variables with values of modification indices above 15 (rerunning the analysis after the deletion of any variable with high MI) (Abdul Hadi et al., 2022). The necessary fitness indices for the model were then attained after items CEA3 and CEA2 were found to have MI values greater than 15 and were set as free parameters. Consequently, the following values are displayed in Figure 3 (Revised Pooled Measurement Model): Since they are adhering to the specified standards, the requirements in Figure 3 satisfy the corresponding fit criterion goodness (chi-squared = 313, ratio = 3.072, P<001, CFI =.953, GFI =.902, TLI =.948, RMSEA =.058). (Hair & Alamer, 2022).

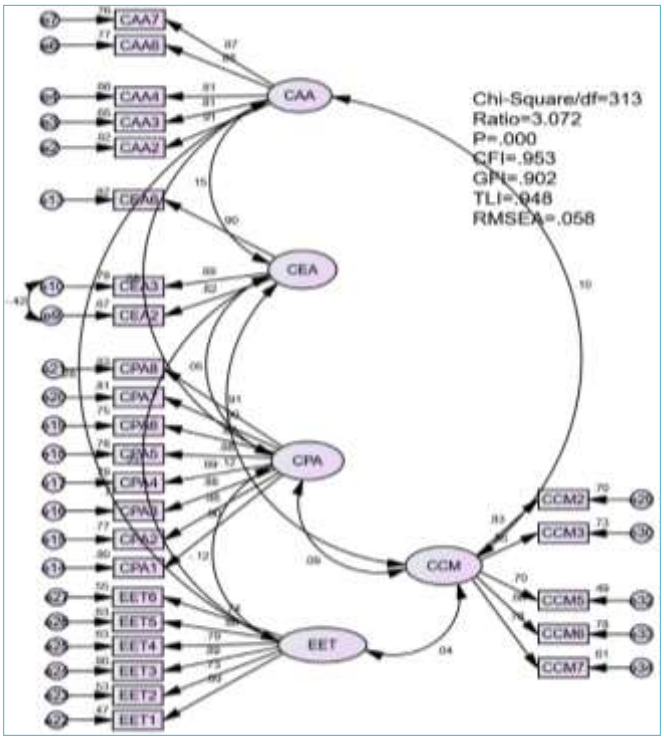

Figure 3: Theorized Relationship among the Research Constructs Revised Measurement Model (Pooled CFA)

The discriminating validity of the latent variables was investigated to address multicollinearity problems. Discriminant validity illustrates how free of redundant indicators the measurement model structures are. Furthermore, if the correlation between independent variables is smaller than 0.85, the model is said to have discriminating validity (Awang et al., 2015b). To attain discriminant validity for research constructs, the AVE values in the diagonal axis of the correlation matrix should be higher than those in the columns and rows (Babin & Anderson, 2014). As shown in Table 2, the discriminating validity of those conceptions has therefore been achieved.

Table 2: Constructs' Discriminant Validity Index Summary

	CCM	EET	CPA	CEA	CAA
CCM	0.354				
EET	0.015	0.381			
CPA	0.048	-0.064	0.784		
CEA	-0.04	0.079	0.027	0.336	
CAA	0.038	0.114	0.047	0.059	0.426

CONVERGENT VALIDITY, AVERAGE VARIANCE EXTRACTED, COMPOSITE RELIABILITY, AND FACTORS LOADING

AVE, the metric that is used to display the cumulative sum of the variance of the measured variable, is the main source of measurement error for latent constructs (Ghulami et al., 2014). Convergent validity, or the degree to which a latent construct explains the variance of its indicators, is measured by this metric. It is calculated as the mean of the squared loadings of each indicator associated with a construct. The CR and AVE of each reflective structure, which were established by closely analyzing the data using exploratory factor analysis (EFA), are shown in Table 2. All reflective structures have an AVE between 0.655 and 0.788, which is far higher than the suggested cutoff of 0.50 (Khuzainey et al., 2020). Additionally, all of the study's reflective variables had CR values between 0.904 and 0.967, which are greater than the recommended threshold of 0.6 (Babin & Anderson, 2014), and suitable for exploratory research.
When two distinct theoretical assessments of the same concept demonstrate a positive relationship, convergent validity is said to have been achieved. The average of the squared loading values for all indicators linked to a particular latent construct, or AVE, must therefore be greater than 0.50 for a latent variable to exhibit convergent validity. Average Variance Extracted (AVE) statistics were used in this study to assess the convergent validity of the scale's items. A construct is considered to have convergent validity if its AVE is 0.5 or more. Interestingly, AVE values for every variable in the study were higher than 0.50; values in Table 3 ranged from 0.655 to 0.788. This implies that convergent validity's objective has been achieved. Furthermore, according to Cheung et al. (2023), this criterion suggests that a latent variable must account for at least half of the variation in its indicators. The measurement model result displayed in Table 3 indicates that the structures at p>0.5) are statistically significant based on their parameter estimations.

Table 3: CFA Results of the Measurement Model for First and Second-order Constructs

Construct	Code	Item	Factor Loading	CR (>0.6)	AVE (> 0.5)
Academic Alignment	AAT	Career Awareness	0.63	0.917	0.787
		Career Exploration	0.57		
		Career Preparation	0.62		
Career Awareness	CAA2	The program is created by teachers and business partners to expand students' understanding by introducing a broad spectrum of jobs and professions.	0.91	0.932	0.73
	CAA3	The program is molded by teachers and business partners to expand students' understanding by introducing a broad spectrum of jobs and professions.	0.81		
	CAA4	The program gives details on various career options, the individuals within them, their roles, and the necessary education and training for these careers.	0.81		
	CAA6	Students get chances to think about what they've learned and start to figure out potential interests for further investigation.	0.88		
	CAA7	Students can all gain from career awareness activities, as long as these activities are customized to fit the specific grade level.	0.87		
Career Exploration	CEA2	These interactions are typically brief, lasting only one time or one day.	0.82	0.904	0.758
	CEA3	Learners actively participate in choosing the activities, tailored to their personal preferences.	0.89		
	CEA6	Learners are provided with chances for in-depth reflection to help in the refinement of their decisions regarding future schooling and vocational training.	0.90		
Career Preparation	CPA1	More in-depth and hands-on experiences at the preparation stage enhance interests developed during career awareness and exploration activities.	0.89	0.967	0.788
	CPA2	Students have one-on-one interactions with professionals in a particular field or sector for an extended duration.	0.88		
	CPA3	Students participate in activities that offer career growth benefits beyond academic achievements.	0.88		
	CPA4	Both students and employers gain from this experience.	0.88		
	CPA5	Employers assess the performance of students.	0.88		
	CPA6	The activities are linked to both academic and career/technical education programs.	0.87		
	CPA7	They are long enough and comprehensive to allow students to acquire specific knowledge and abilities.	0.90		
	CPA8	They are comprehensive enough to allow students to make effective choices about further education and career paths.	0.91		
Employer Engagement	EET1	Surveyed employers agreeing that relationships with educational institutions will lead to clear benefits to their enterprise	0.88	0.919	0.655
	EET2	Surveyed college leaders agreed that relationships with employers lead to clear benefits for educational institutions	0.73		
	EET3	Surveyed employers agreeing with the statement that it is easy to work with colleges – whether engaging directly with the school or college or through a broker	0.89		
	EET4	Surveyed colleges agree with the statement that it is easy to work with employers – whether engaging directly with the employer or through a broker	0.79		
	EET5	Employer Engagement enhances the formation of a professional identity	0.80		
	EET6	Students are helped to learn to find ways to follow their chosen career path through employer engagement	0.74		
Core Competencies Integration	CCM2	Critical thinking skills		0.905	0.657
	CCM3	Communication skills			
	CCM5	Interpersonal skills			
	CCM6	Teamwork skills			
	CCM7	Numerical skills			

SUGGESTED MODEL OF THE EFFECT OF EXOGENOUS VARIABLES ON THE ENDOGENOUS VARIABLE

Structural equation modeling approaches are required to develop the structural framework and elucidate the relationship between the constructs. Figure 4 illustrates the fundamental structural analysis that demonstrates the relationship between the independent variables and the dependent

variable. It displays the model's latent variables' fit measures. However, following the models' validation and reliability, the initial structural model obtained the following metrics: Chi-Square/df=322, Ratio=4.218, P<0.001, CFI=.926, GFI=.867, TLI=.919, and RMSEA=.072. In this case, the model had to be modified because it did not meet the compliance standards established by the results.

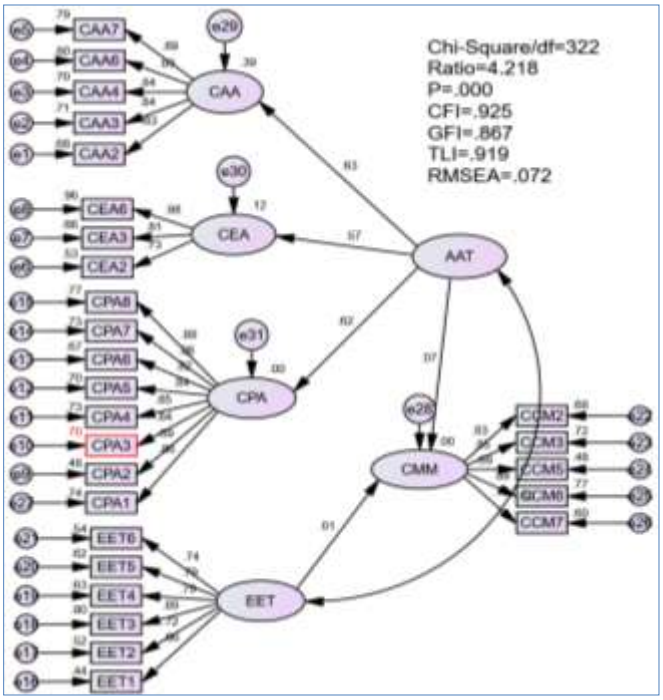

Figure 4: The Impact of Exogenous Variables on the Criterion Variable: An Original Structural Model

Figure 5 illustrates the improved research model. A newly developed scale needs to have a factor loading of at least 0.5 (Awang et al., 2015a). As a result, the framework is modified in accordance with SEM/AMOS guidelines to enhance the fit of the indices. To prevent multicollinearity issues, items with modification indices (MI) higher than 15 have to be excluded. Since item CPA2's MI value was more than 15, it was eliminated from the study. Following the change, the results displayed by the revised framework were as follows: Chi-Square/df=296, Ratio=3.107, P<0.001, CFI=.952, GFI=.903, TLI=.947 and RMSEA=.058.

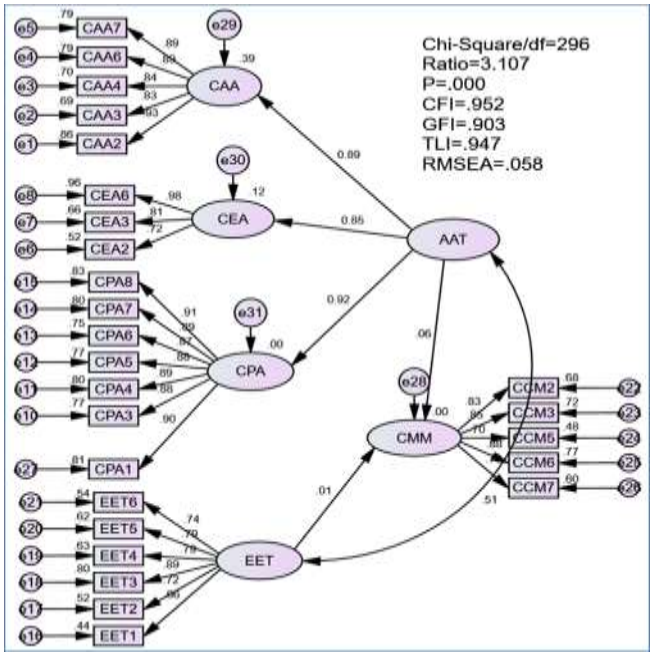

Figure 5: The Modified Structural Model of Impact of Exogenous Variables on the Criterion Variable

HYPOTHESES TESTING

Standardized regression weights were chosen for this study because they provide a simpler description of the relationships between the study's constructs; moreover, these weights are also employed in structural models to test or validate theories (Joseph Hair & Alamer, 2022). The regression coefficients and their significance throughout the structural model are disclosed and displayed in Table 4, which is consistent with the hypotheses presented at the start of this investigation. We used SEM/AMOS version 23 to examine the interactions between the exogenous variables, academic alignment (AAT), employer engagement (EET), and core competencies integration (CCM), the endogenous variable to test the hypotheses. Hair et al. (Jr. Hair et al., 2016) suggested a t-value of 1.96 and a p-value of 0.05 as a general guideline for determining significant connections. The importance of the coefficients along the route from exogenous to endogenous factors was thus evaluated using this criterion.

According to the AMOS ratings in Table 4, which have a p-value less than 0.05 (p=.009), the route analysis results regarding hypothesis one indicate a significant link between Academic Alignment (AAT) and Core Competencies Integration (CCM) among students at technical colleges. This suggests that among technical college students, Academic Alignment (AAT) and Core Competencies Integration (CCM) are significantly positively correlated. As demonstrated by the AMOS ratings in Table 3, the path analysis results for the second hypothesis showed a significant

link between Employer Engagement (EET) and Core Competencies Integration (CCM) among Business Education students, with a p-value less than 0.05 (p=0.001). This shows that among technical college students, emotional support and basic competencies have a strong positive correlation.

Table 4: Standardized regression weights and their significance in the entire path model

			Estimate	S.E.	C.R.	P	Label
CCM	<---	AAT	.097	.037	2.596	0.009	Significant
CCM	<---	EET	0.131	0.065	11.43	0.001	Significant

RESULT AND DISCUSSION

Based on the hypothesis being evaluated, the study established the relationship between the constructs and discovered how WBL activities affect technical college students' integration of core competencies. The findings demonstrated a strong beneficial relationship between the academic alignment components of WBL and students' integration of core competencies at technical institutions. The WBL programme is typically designed by educators and business partners to broaden students' knowledge by presenting a variety of occupations and professions; it allows students to have more in-depth and practical experiences; and it allows students to have direct conversations with professionals in a given field or job sector (Siu Ki Raymond, 2018). Through mentorship from classroom advisors and the workplace, students must be assisted in applying their academic, technical, and employability abilities in a work environment for core competencies to be integrated effectively. This finding is consistent with (Fawcett, 2020) who state that academic alignment in work-based learning (WBL) is the process of coordinating classroom and workplace learning through career awareness, career exploration, and career preparation activities to help students develop employability and work readiness skills and to comprehend how school-based learning is applied to particular careers.

The data analysis showed that the technical teachers' impressions of employer engagement in WBL were strongly positively correlated with the integration of core skills among technical college students. Employer engagement in WBL gives students the chance to obtain practical experience, solve real-world challenges, collaborate with others, and work as a team to integrate essential competencies. Effective employer engagement has a positive impact on the aspirations and achievements of young people. According to (Musset & Mýtna Kureková, 2018) and (Mann et al., 2018), this achievement includes not only qualifications but also the development of attitudes, skills, and knowledge outside the qualification framework. To provide a variety of positive possibilities for the integration of pertinent skills, students require an enabling learning environment that is activity-based and fosters greater partnerships with employers.

Employer participation in WBL programs aims to meet the skills and competencies that students will need upon graduation. This finding is in line with (Jane Itohan Oviawe & Uwameiye, 2020) who claimed that governments have attempted to bridge the gap between the classroom and workplace by encouraging employers to engage in a variety of interactions with schools/colleges

and their students, through work experience, career talks, mock interviews, CV workshops, mentoring, and workplace visits. Additionally, this outcome supports the findings of (Azorín & Fullan, 2022), who asserted that supportive learning environments, tools, and collaborations help students grow as individuals and involve colleagues in their own development and cultural production.

LIMITATIONS

There are risks and challenges associated with conducting research, but researchers need to manage these risks and limitations in a way that is objective and succinct without jeopardizing the efficacy and integrity of the study. However, every study has a specific goal at its core. At technical colleges, the Work-Based Learning (WBL) framework will serve as a guide for integrating students' core competencies. In essence, three important parties must work together to implement WBL experiences: the employer, the student, and the educational institution. However, the study only engaged the educational institutions (technical teachers) that are often in charge of making this collaboration possible. Furthermore, the results may not be applicable to other schools because the study was limited to technical instructors from public technical colleges in the North West region of Nigeria. Other limitations of this research included the voluntary nature of participation.

CONCLUSIONS AND RECOMMENDATIONS

The goal of this study was to develop a work-based learning framework that would improve students' integration of core competencies in Nigerian technical colleges. CFA techniques were employed in the research to examine the data. To make sure the analysis was unidimensional, all unnecessary components were eliminated or restricted during this process. All of the model's constructs had attained convergent validity, internal consistency, and reliability at the study's end. Additionally, considering the correlation values among the constructs of the study, the model has achieved discriminant validity. The most correct structural model was revealed through the clarification and improvement of the nature of the relationships between the components. Based on the investigation through SEM, employer engagement and academic alignment are both essential for technical college students to successfully integrate their core competencies.

Based on these findings, work-based learning proves to be an effective strategy for incorporating core competencies among students in technical colleges. The study's findings will therefore, guide curriculum designers in updating technical college curricula to include the key components of work-based learning identified: academic alignment (which includes career awareness, career exploration, and career preparation) and employer engagement, which are crucial for the successful integration of core skills among students at technical institutions. Based on the study's outcomes: i) the government should establish a conducive atmosphere that promotes suitable work-based learning activities to improve the integration of core competencies; ii) Technical educators should use the WBL-identified components in the execution of the WBL programme at technical colleges to successfully develop core competencies among learners.

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Conflict of Interest

Regarding the paper's publication, the authors affirm that they have no conflicts of interest.

Author Contribution

The following contributions to the work are confirmed by the authors: Concept and design of the study: Authors 1 and 2; data collection: Author 3; analysis and interpretation of results: Authors 1 and 4, Author 5; preparation of the draft manuscript: Author 1, Author 3. The approval to the manuscript's final draft was given by all authors after reviewing the findings.

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