

# Relationship between Art and Design Students' Technical and Managerial Skill Traits and Their Entrepreneurial Skill Traits

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## Abstract

The unavailability of jobs for graduates has become a gross concern in developing countries such as Nigeria, which is not necessarily contingent on graduates from any specific course of study, including art and design education. It is thus evident that proficiency in artistic or creative talent alone is insufficient to guarantee a thriving art and design career and the need to develop the required entrepreneurial propensity. This study, therefore, aims to evaluate the entrepreneurial skills and traits of art and design students in Nigerian higher education institutions (HEIs) as a remedy for stimulating their entrepreneurial tendencies. The hypothesized model of art and design students' entrepreneurial traits was developed based on the theoretical framework developed from the literature as a three-factor construct (Model 1.0) comprising technical/soft skills, managerial skills, and entrepreneurial skills. Data was obtained using a structured Likert scale questionnaire of 36 items adapted from Yilzman & Sunbul's entrepreneurial scale from a sample of 186 art and design students. Data was analysed using descriptive statistics and the covariance-based structural equation modelling (CB-SEM) via the IBM SPSS Statistics 26 and IBM SPSS Amos 26 Graphics software. The model fit results reveal that the goodness-of-fit statistics indexes fell within the acceptable range. The results of the hypotheses testing of the model show that no significant association exists between art and design students' technical and entrepreneurial skill traits. However, there is a significant association between their managerial and entrepreneurial skill traits. The outcome of this research has implications for TVET institutions in the arts and design field further to promote the development of students' inherent entrepreneurial traits to boost their entrepreneurial tendencies.

## 1. Introduction

The word "entrepreneur" was derived from a French 13th-century action word, "entreprendre," which means "to undertake or do something" (Cowdrey, 2012). Entrepreneurship involves creating and exploiting a business opportunity using available resources. Given that economic activities constitute a significant factor in evaluating the development of any society, many countries promote entrepreneurship as a means of driving economic development (Fuller, Spears & Parker, 2010). Entrepreneurship is a stimulant of economic growth, poverty reduction, and sustainable development that can serve as an antidote to massive unemployment and poverty

alleviation strategy (Ezeanyejí & Imoagwu, 2019). Entrepreneurship holds promises to remedy graduates' gross unemployment in developing countries such as Nigeria (Olorundare & Kayode, 2014; Onuma, 2016). Entrepreneurship has been globally accepted as a driver of economic development, a panacea to the increasing unemployment, and a promising poverty alleviation strategy (Ndubuisi-Okolo & Anekwe, 2018).

Vocational and entrepreneurial-related courses, such as those offered in the art and design field, have a vast potential to guarantee job opportunities after graduation (Odewole, Odji & Ario, 2022). It is easy to assume that the graduates of art and design career should not be jobless after graduation due to the many characteristics that the discipline shares with entrepreneurship. However, according to Ogunduyile, Kayode & Ojo (2008), many art and design graduates do not practice in the line of their chosen career after graduation based on some identified reasons. While the specified reasons are pertinent, art and design graduates' lack of or inadequate entrepreneurial skills required to be self-reliant could cause their inability to practice in line with their trained career despite its prospective gain rather than being bent on securing jobs from government or private-owned organizations. According to Anderson (2014), many art and design students often lack the intelligence or experience to translate their original ideas into profitable business opportunities.

Nevertheless, the laxity in being actively involved in entrepreneurship is not the art and design students' fault since, according to Abisuga & Muchie (2021), many universities have failed to consider entrepreneurship as a core subject for art and design students nor pay due attention to motivating them to start a business after graduation. In this regard, there are burdens on higher education to include arts entrepreneurship in the curriculum to position the art and design graduate students for better places in the labour market (Abisuga & Muchie, 2021). It is noteworthy that the Nigerian Universities Commission (NUC) has awakened the need for entrepreneurship inclusion in the newly designed Core Curriculum and Minimum Academic Standards for the Nigerian University System (CCMAS), particularly as touching the art and design field as a domain of the Faculty/School/College of Environmental Studies/Sciences (Rasheed, 2023). This commendable effort is hoped to channel a progressive path for instilling an entrepreneurial mindset into Nigerian tertiary institutions' art and design students. Higher education provides an appropriate avenue for the development of entrepreneurship (Hatt, 2018). Entrepreneurial learning in higher institutions provides avenues to develop students' entrepreneurship mindset (attitudes) and skills (Olorundare & Kayode, 2014).

## 2. Literature Review

### 2.1 Art and Design Programmes in Nigerian Tertiary Institutions

Many programmes that operate on the art and design philosophy exist in Nigeria with different nomenclatures, including art and design, Arts and Industrial Design, Creative Arts, Fine, and Applied Art, Entrepreneurial Arts, Industrial Design, and so on (Odewole & Adelabu, 2017). General art and design courses are offered at the basic levels before students find their way to the higher levels into different areas of specialization, including art education, art history, ceramic design, graphic design, sculpture, or textile design. The duration for art and design programmes varies, with a minimum of three years in the College of Education, two years for an Ordinary National Diploma, two years for a Higher National Diploma in the Polytechnics, and four to five years in the Universities. The philosophy of art and design programmes in Nigeria is premised on stirring up students' creative skills and competencies for meeting societal needs (Adelabu & Fatuyi, 2020).

### 2.2 Entrepreneurial Traits as a Factor of Entrepreneurial Potential

Entrepreneurial mindsets determine individuals' behaviour toward entrepreneurial activities and outcomes (Brandt, 2020). A study of students' entrepreneurial perspectives suggests that some significant traits or attitudes are distinctive of students who intend to become entrepreneurs, including the I-can-create-value attitude (self-efficacy), the I-see-opportunities attitude (opportunity-detection), the I-can-manage-risk attitude (risk-taking), the I-know-what's-important" attitude (ability to focus), and the I-take-action attitude (leadership impact) (Hatt, 2018). Characteristics and traits of entrepreneurs are mainly categorized to include self-confidence, task-result-oriented, risk-taking, leadership, originality, and future-oriented (Windapo, 2018). The more entrepreneurial characteristics and traits individuals possess or can develop, the greater their potential to become entrepreneurs (Windapo, 2018). It has been established that a positive association exists between personality traits and entrepreneurial intention (Udayangani, Jusoh & Chinna, 2019).

### 2.3 Entrepreneurial Skills Development

Entrepreneurship skills development involves consolidating the skills and knowledge of potential and upcoming entrepreneurs by supporting them during their entrepreneurial adventures and enabling them through structured training and institution-based building programmes that will empower them to run and sustain their businesses (Adamu & Yahaya, 2016) effectively and efficiently. A combination of three main categories of skill sets is required for entrepreneurship, including technical/soft skills, managerial skills, and entrepreneurial skills

(Cooney, 2012). The description and the components of the most needed skills for entrepreneurship are presented in Table 1. This study posits that the degree of entrepreneurial skill traits inherent in art and design students can determine their entrepreneurship skills' developmental progress. Therefore, it is pertinent to investigate the interrelatedness of technical and managerial skills with the entrepreneurial skills that art and design students possess. It is imperative to understand art and design students' entrepreneurial traits to assist them in developing the most needed drive toward a successful entrepreneurial journey.

**Table 1** *The most needed skills for entrepreneurship (Cooney, 2012)*

Entrepreneurial Skill Type	Description	Components
Technical/Soft skills (TES)	Essential skills for creating/delivering the business's product or service	Communication, interpersonal relations (leadership, networking, and team playing), environmental observation, coordination, research & development, and specific operation technology skills.
Managerial skills (MNS)	Required skills for day-to-day management and administration of the business	Planning, decision-making, resource management, motivation, marketing, financial/accounting, and negotiating skills.
Entrepreneurial skills (ETS)	Needed skills for recognizing economic opportunities and acting effectively on them	Creativity/innovation, persistence, vision, change orientation (flexibility), opportunity-seeking, and calculated risk-taking skills.

## 2.4 Structural Equation Modelling (SEM)

For over the past three decades, structural equation modelling (SEM) has been recognized as an effective and widely used analysis technique in social and behavioural science, being a general multivariate approach that provides for the means, variances, and covariances of a set of variables regarding a smaller number of parameters connected to a hypothesized model (Ryu, 2011). To determine whether the measures used for assessing the exogenous variables (technical skill traits and managerial skill traits) and the endogenous variable (entrepreneurial skill traits) were good indicators, an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) were conducted to evaluate the coefficients and confirm each construct's factor structure.

The EFA is mainly employed in the early stages of research to test dimensionality and collect information about the interrelationships between variables (Shrestha, 2021). The EFA helps in reducing a large number of factors or variables, estimating multicollinearity among correlated factors, assessing, and detecting unidimensionality of constructs, measuring construct validity of data collected in a survey, evaluating relationships between variables, developing theoretical constructs, and proving proposed theories (Taherdoost, Sahibuddin & Jalaliyoon, 2014). Confirmatory factor analysis (CFA) is a form of SEM concerned with measurement models, that is, the associations between observed measures and latent variables (Brown, 2015).

The Structural Equation Model (SEM) exhibits extensive utility due to its quantitative methodology for testing substantive theories, taking explicit account of measurement error—a prevalent factor across various disciplines (Civelek, 2018). This renders SEM an invaluable instrument for researchers aiming to validate theoretical constructs and investigate intricate relationships within their studies. The SEM is a multivariate statistical analysis technique that amalgamates elements from factor and multiple regression analyses to scrutinize and evaluate the structural connections between observed variables and latent constructs within a provided dataset (Setiawan et al., 2020).

## 2.5 SEM Evaluation Indices

According to Fan et al. (2016), evaluating SEM is centred on the fit indices for the test of a single path coefficient, such as p-value and standard error (S.E.), and the overall model fit, such as chi-square ( $\chi^2$ ) and Root Mean-Square Error of Approximation (RMSEA). Apart from RMSEA, the Comparative fit index (CFI), and the Tucker-Lewis index (TLI), among others, are less affected by sample size than the  $\chi^2$  test (Fan et al., 2016). Several goodness-of-fit indexes were considered in this study to determine the goodness-of-fit. The threshold values for measuring the goodness of fit are presented in Table 2 as obtained from the extant literature.

**Table 2** *The threshold values for measuring the goodness of fit*

Model Fit Indices	Threshold Values	Sources
CMIN/df ( $\chi^2/df$ )	< 5 (acceptable fit)	Wheaton et al. (1977)
	< 3 (good fit)	Tabachnick & Fidell (2007)
Comparative Fit Index (CFI)	> 0.90 (acceptable fit)	Browne & Cudeck (1993)
	> 0.95 (good fit)	Hu & Bentler (1999)
Incremental Fit Index (IFI)	> 0.90 (acceptable fit)	Bollen (1989)
	> 0.95 (good fit)	Tabachnick & Fidell (2007)
Tucker-Lewis index (TLI)	> 0.90 (acceptable fit)	Bentler & Bonett (1980)
	> 0.95 (good fit)	Schumacker & Lomax (2004)
Root Mean-Square Error of Approximation (RMSEA)	$\leq 0.06$ - $0.08$ (acceptable fit)	Meydan et al. (2011)
	$\leq 0.05$ (good fit)	Browne & Cudeck (1993)
Standardized RMR (SRMR)	<0.08 (acceptable fit)	Hu & Bentler (1999)
	<0.05 (good fit)	Byrne (1998); Diamantopoulos & Sigauw (2000)

## 2.6 Theoretical Framework

A theoretical framework is a guiding structure for research, drawing upon a formal theory constructed from a well-established, coherent explanation of specific phenomena and relationships (Grant & Osanloo, 2014; Adom, Hussein, & Adu-Agyem, 2018). The theoretical framework of this study builds on resource-based and human capital theories to understand the relationship between art and design students' technical, and managerial skill traits, and their entrepreneurial skill traits. This understanding is essential for guiding educational programmes, supporting skill development, and facilitating successful entrepreneurial ventures in creative industries.

Early investigations into resource-based theory recognized that entrepreneurship is an integral component of the resource-based framework (Alvarez & Busenitz, 2001). The resource-based entrepreneurship theory relates to an individual entrepreneur's ability to access financial, social, and human resources (Karriker & Mayo, 2021). Entrepreneurs possess unique resources tailored to their strengths, enabling them to identify new opportunities and gather the necessary resources for their ventures (Alvarez & Busenitz, 2001). Resource-based theory suggests that the integration of resources creates a sustainable competitive advantage (Oluwatusin & Owolabi, 2022). The resource-based theory emphasizes that for a resource to contribute to a sustained competitive advantage, it must be valuable, rare, difficult to imitate, and non-substitutable (Edwards, Ketchen & Short, 2014; Utami & Alamanos, 2023). In the context of art and design students, those who can integrate their technical and managerial skills effectively with entrepreneurial traits will likely have a competitive edge that is not easy to imitate. For instance, a student with strong technical skills in digital art and practical managerial skills may be able to start and manage their design studio as their entrepreneurial skills come into play as they navigate the market, identify opportunities, and manage the business side of their artistic pursuits.

Human capital encompasses individuals' collective knowledge, competence, attitude, and character (Kusumawijaya & Astuti, 2022). The human capital theory explicitly concerns an individual's resources originating from education and experience (Karriker & Mayo, 2021). In the context of education and skills development, human capital theory suggests that individuals can be viewed as investments in human capital. This theory emphasizes the role of education and training in enhancing a person's productive capabilities and economic value. In the case of art and design students, their technical and managerial skill traits can be considered components of their human capital, which may contribute to their entrepreneurial skill traits. Researchers have argued that human capital mediates individual value and entrepreneurial intention (Kusumawijaya & Astuti, 2022). Art and design students acquire technical skills through their education and training. This investment in technical skills enhances their human capital, making them more specialized and valuable in the creative industry. Technical skills form the foundation for entrepreneurial ventures in the creative field. For example, a graphic designer's proficiency in software tools or a painter's mastery of specific techniques becomes an asset when starting a business. Art and design students, through their education, may gain managerial knowledge that contributes to their human capital. Entrepreneurial ventures often require effective management of resources, finances, and teams. Students with managerial skills can apply these competencies when establishing and running their creative businesses or working in an organization. Art and design students with technical and managerial skills may feel more confident taking creative risks and introducing innovative solutions to market needs. The human capital invested in technical and managerial skills increases the employability of art and design students. Alternatively, it gives them the foundation to pursue entrepreneurship, where they can create and capture value in the market. Individuals with solid human capital can adapt and innovate to stay competitive as the creative industry evolves.

The resource-based theory highlights the importance of a well-integrated skill set for gaining a sustainable competitive advantage in the creative field. Investing in human capital through education and skill development contributes to the student's ability to create and manage successful ventures in the dynamic and innovative field of art and design. Based on resource-based and human capital theories, the unique combination of technical and managerial skills can help create a profile challenging for competitors to replicate, thereby contributing to innovative and successful entrepreneurial endeavours in the art and design industry. Continued development of technical and managerial skills contributes to the long-term success of entrepreneurial endeavours (Cooney, 2012; Alroaia & Baharun, 2017; Wang et al., 2019). Hence, the study proposes the following hypotheses:

H<sub>A1</sub> There is a significant relationship between art and design students' technical and entrepreneurial skill traits.

H<sub>A2</sub> There is a significant relationship between art and design students' managerial and entrepreneurial skill traits.

### 3. Method

The study employed a survey method to evaluate the entrepreneurial traits of Arts and Design students in Nigerian Tertiary Institutions, including the colleges of education, polytechnics, and universities. The researchers designed a structured questionnaire on Google Forms to gather the data required for this study through an online survey. The survey's hyperlink was shared through social media to allow a random selection of the respondents. Participation in the survey was purely voluntary without any form of coaxes or inducement. The questionnaire used five-point Likert scale questions adapted from Yilzman & Sunbul's entrepreneurial scale (Yilzman & Sunbul, 2009) to determine the respondent's entrepreneurial traits. Table 2 presents the full scope of questions for each of the constructs in this study.

The sample size of 186 was obtained based on the number of respondents who answered the survey within the allotted timeframe. Bentler & Chou (1987) recommended a minimum sample of 150. Hair et al. (2018) suggested a minimum of 5:1 observation-to-variable ratio. Therefore, a sample size of 186, based on 36 hypothesized variables used in this study, is considered tolerable for SEM analysis. The data were analyzed using IBM SPSS Statistics 26 and IBM SPSS Amos 26 Graphics. Structural Equation Modeling (SEM) was used to assess the causal relationships between technical skill traits and managerial skill traits (exogenous factors), coded as TES and MNS, respectively, and entrepreneurship skill traits (endogenous factor), coded as ETS, as inherent in the art and design students. Table 3 shows the full scope of questions for each of the constructs in the study.

**Table 3** *The full scope of questions for each of the constructs*

S/N	Items	Variable
1	TES1	I prefer not to interrupt other people when they are speaking.
2	TES2	When communicating with others, I pay attention to non-verbal signals - body language, facial expressions, and gestures.
3	TES3	It is easy for me to inspire others to do what I want.
4	TES4	I am not afraid of acting as a leader during activities.
5	TES5	I like to be in contact with other people.
6	TES6	I enjoy having many friends.
7	TES7	I can work out good relations with different people.
8	TES8	I can work together with a person or a team.
9	TES9	I like to research and challenge old ideas and practices, finding ways to improve things.
10	TES10	I like searching for appropriate methods and techniques to ensure success in whatever I do.
11	MNS1	I do not get caught by surprise in situations that I could have planned.
12	MNS2	I like to have the activities of my next year always well planned.
13	MNS3	My own decisions are influential in my work.
14	MNS4	I think I can shape my life with my decisions.
15	MNS5	I can improve efficiency by pooling the resources I have.
16	MNS6	I can transform the resources I have efficiently to produce goods/services.
17	MNS7	I am very capable of organizing and executing actions to be successful.
18	MNS8	I have control over the critical factors that influence my success.
19	MNS9	I can easily convince anybody to buy a product/service.
20	MNS10	I can provide sales support.
21	MNS11	I like to have a budget plan for the money I spend. I enjoy tracking and recording my expenses.
22	MNS12	I enjoy saving and investing my money.
23	MNS13	I enjoy building relationships and creating win-win outcomes when dealing with other people.
24	MNS14	I am willing to compromise during a negotiation when necessary to solve problems.

S/N	Items	Variable
25	ETS1	I try to work in new ways that others have not employed before.
26	ETS2	I like working on projects that allow me to try something new.
27	ETS3	I face difficult situations in my daily activities as personal challenges.
28	ETS4	The obstacles I face make me increase my energy to overpass them.
29	ETS5	I can make effective decisions regarding business in the future.
30	ETS6	I like making preparations for the future.
31	ETS7	I am open to changes in my work and studies.
32	ETS8	I have no problem adapting to a new situation and practice.
33	ETS9	I have an excellent ability to detect business opportunities.
34	ETS10	I am interested in knowing the market needs for determining products/services.
35	ETS11	I like to run financial risks for potential benefits.
36	ETS12	I enjoy being exposed to situations that involve some risk.

## 4. Findings and Discussion

### 4. 1 Demographic Characteristics of Respondents

Table 4 shows the respondents' demographic characteristics. The data presented in Table 1 indicated that the samples have a good gender distribution, with 57 (31%) females and 128 (69%) males. The current higher institution of study of the respondents cut across all the three major tertiary institutions in Nigeria, which are the College of Education with 13 (7%), Polytechnic with 28 (15%), and University with 145 (78%), respectively. The respondents' educational level is categorized as follows: 100 Level (OND 1, or Year 1) with 41 (22%), 200 Level (OND 2, or Year 2), with 67 (36%), 300 Level (HND 1 or Year 3) with 41 (22%), 400 Level (HND 2) with 30 (16%), and 500 Level with 7 (4%). The areas of specialization of the respondents are Art Education with 5 (3%), Art History with 2 (0.1%), Ceramics with 15 (9%), General Art/Design with 28 (15%), Graphics with 50 (26.9%), Painting with 45 (24%), Sculpture with 14 (7.5%), and Textiles with 27 (14.5%). With the satisfactory frequency distributions of the demographic characteristics surveyed in the study, it can be inferred that the respondents who participated in the survey adequately represent the target population.

**Table 4** Respondents' demographic characteristics

Respondents' demographic characteristics	Frequency (n=186)	Percentage (%)
Gender		
Female	57	31
Male	128	69
Higher education Institutions		
College of Education	13	7
Polytechnic	28	15
University	145	78
Educational Level		
100 Level (OND 1, or Year 1)	41	22
200 Level (OND 2, or Year 2)	67	36
300 Level (HND 1 or Year 3)	41	22
400 Level (HND 2)	30	16
500 Level	7	4
Area of specialization		
Art Education	5	3
Art History	2	0.1
Ceramics	15	9
General Art/Design	28	15
Graphics	50	26.9
Painting	45	24
Sculpture	14	7.5
Textiles	27	14.5

### 3.1 Data Distribution and Normality

SEM is a multivariate statistical framework used for modelling a complex relationship between directly and indirectly observed (latent) variables (Stein et al., 2012). The Maximum likelihood (ML) method is SEM's most

widely used criterion (Byrne, 2010). ML estimation method assumes multivariate normality (Strydom & Crowther, 2012). Therefore, it was required that the data distribution characteristics were established before starting the model analysis. Many multivariate-normality (MVN) tests exist based on multivariate skewness and kurtosis approaches (Enomoto et al., 2019). A significant type of the multivariate sample measures of skewness and kurtosis and their asymptotic distributions were given by Mardia (Enomoto et al., 2019). Mardia's multivariate kurtosis is intimately associated with the covariance structure analysis within the elliptical distributions class (Yuan et al., 2004). Irrespective of statistical significance, serious problems may exist when univariate skewness is  $\geq 2.0$ , and kurtosis is  $\geq 7.0$  (Watkins, 2018). Data is considered normal if skewness is between -2 to +2 and kurtosis is between -7 to +7 (Hair et al., 2010; Byrne, 2010).

The skewness of normal distribution is usually zero, but if, in any case, skewness is different from zero, the distribution deviates from symmetry (Cain, Zang & Yuan, 2016). Similarly, if kurtosis differs from 0, the distribution deviates from normality in tail mass and shoulder (Cain, Zang & Yuan, 2016). According to Kline (2011), the acceptable ranges for the skewness coefficient are within  $\pm 3$ , while for the kurtosis coefficient, they fall within  $\pm 10$ . Collier (2020) also asserted that a distribution is normally distributed in terms of kurtosis if its range falls within the range of -10 to +10. Table 5 shows the normality test for this study. Therefore, the data distributions in this study were defined as highly kurtotic, which informs the adoption of the ML estimation method of the postulated model.

**Table 5** Normality test

Variable	Skewness				Kurtosis	
	Mean	Std. Dev	Statistic	Std. Error	Statistic	Std. Error
ETS2	4.11	0.853	-0.589	0.178	-0.510	0.355
ETS3	3.83	0.926	-0.270	0.178	-0.671	0.355
ETS5	4.06	0.913	-0.763	0.178	0.006	0.355
ETS7	4.16	0.846	-0.845	0.178	0.435	0.355
ETS8	3.93	0.981	-0.692	0.178	0.110	0.355
MNS2	3.76	0.992	-0.538	0.178	-0.149	0.355
MNS3	4.11	0.784	-0.328	0.178	-0.918	0.355
MNS6	4.13	0.909	-0.957	0.178	0.617	0.355
MNS7	4.13	0.921	-0.847	0.178	0.233	0.355
MNS8	3.87	0.909	-0.527	0.178	-0.047	0.355
MNS10	3.73	0.984	-0.493	0.178	-0.157	0.355
TES1	3.46	1.372	-0.512	0.178	-0.891	0.355
TES3	3.31	1.133	-0.153	0.178	-0.646	0.355
TES4	3.41	1.241	-0.264	0.178	-0.870	0.355
TES7	4.08	0.915	-0.621	0.178	-0.399	0.355
TES8	4.31	0.876	-1.239	0.178	1.064	0.355

### 3.2 Internal Reliability and Construct Validity of the SEM Model

The TES, MNS, and ETS constructs comprised 10, 14, and 12 variables, respectively. The internal consistency was measured by computing Cronbach's alpha to test the instrument's accuracy and reliability. The reliability test shows that Cronbach's Alpha for TES, MNS, and ETS constructs are 0.733, 0.870, and 0.857, respectively. According to Shrestha (2021), Cronbach's alpha value of more than 0.7 is considered acceptable.

The principal components analysis (PCA) method was used for the factor analysis, and extraction of factors was based on Eigenvalues  $> 1$ , using varimax rotation. However, 21 items were deleted due to cross-loading after conducting EFA for each of the three constructs (TES, MNS, and ETS). The deleted variables are: TES2, TES4, TES5, TES6, TES9, TES10, MNS1, MNS4, MNS5, MNS9, MNS11, MNS12, MNS13, MNS14, ETS1, ETS4, ETS6, ETS9, ETS10, ETS11, and ETS12. After deletion, the remaining variables for each construct, all extracted in one component, are TES containing five (5) items (TES1, TES3, TES4, TES7, and TES8), MNS containing six (6) items (MNS2, MNS3, MNS6, MNS7, and MNS8); and ETS containing five (5) items (TES2, ETS3, ETS5, ETS7, and ETS8).

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy for TES, MNS, and ETS constructs are 0.693, 0.785, and 0.753, respectively, and they all had Bartlett's Test of Sphericity of 0.000. According to Shrestha (2021), an average value of the KMO measure of sampling adequacy index between 0.5 and 0.6 is acceptable for sample sizes between 100 and 200. Bartlett's test of Sphericity of value  $< 0.05$  indicates that factor analysis is useful for the data set. After EFA, the remaining variables for the three constructs were further subjected to CFA. The results of the goodness of fit indexes for the CFA are shown in Table 6.  $\chi^2/df$ , NFI, IFI, TLI, CFI, and RMSEA showed a good fit for the TES and ETS constructs. However, for the MNS construct, only RMSEA showed an acceptable fit; others showed a good fit. SEM analysis was then conducted after the CFA.

**Table 6** *The goodness of fit indexes for the CFA*

Construct	Items	X <sup>2</sup> /df	NFI	IFI	TLI	CFI	RMSEA
TES	TES1, TES3, TES4, TES7, TES8	1.423	0.945	0.983	0.964	0.982	0.048
MNS	MNS2, MNS3, MNS6, MNS7, MNS8, MNS6	2.040	0.946	0.972	0.946	0.971	0.075
ETS	ETS2, ETS3, ETS5, ETS7, ETS8	1.299	0.958	0.990	0.980	0.990	0.040

### 3.3 Modification of the SEM Model

While developing the SEM model, little modifications were made to achieve better model fitness. According to Civelek (2018), modifications improve model fit indices. Modifications can be made by placing covariance between two related error terms in the same constructs (Civelek, 2018). Thus, covariance was drawn between e2 and e5, e6 and e9, and e12 and e13, respectively.

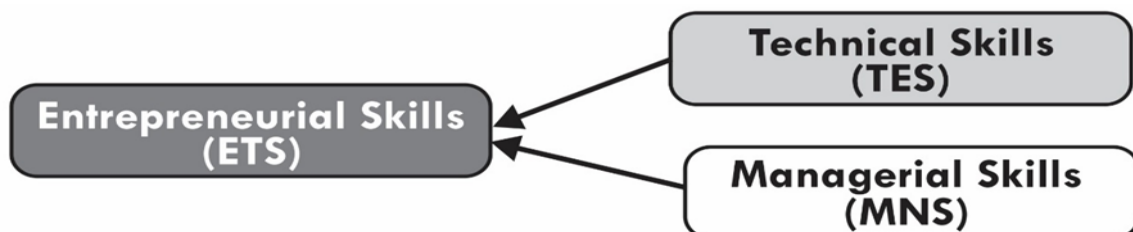
### 3.4 Assessment of the SEM Model

The model fit results in Table 7 reveal that the goodness-of-fit statistics indexes fell within the acceptable range: Chi-square ( $\chi^2/df$ ) = 1.362, CFI = 0.953, IFI = 0.954, TLI = 0.942, SRMR = 0.053, and RMSEA = 0.044. The cut-off index criteria and the parameter estimates were found to be acceptable and statistically significant. The squared multiple correlation ( $R^2$  value) for ETS = 0.704, implying that TES and MNS account for a 70.4% variance in ETS.  $R^2$  statistics describe the variance in the endogenous variable explained by the exogenous variable(s). The measurement result of the  $R^2$  ranges from 0 to 1, with one (1) signifying complete predictive accuracy (Hair et al., 2014; Kline, 2010).  $R^2$  values >0.75, 0.50, and  $\leq$  0.25 are regarded as substantial, moderate, and weak levels of predictive accuracy, respectively (Hair et al., 2014; Henseler et al., 2010). Chin (1998) suggested  $R^2$  values for endogenous latent variables of 0.67, 0.33, and 0.19 as substantial, moderate, and weak, respectively. With  $R^2$  = 0.704 obtained in the SEM model, it could be deduced that the indicator variables significantly predict the latent construct.

**Table 7** *The goodness of fit indexes for the SEM model*

Model Fit Indices	Estimated	Comment
X <sup>2</sup> /df	1.362	Good fit
CFI	0.953	Good fit
IFI	0.954	Good fit
TLI	0.942	Good fit
SRMR	0.053	Acceptable fit
RMSEA	0.044	Good fit

With the results obtained, it can be deduced that the hypothesized model that the art and design students' entrepreneurial skill traits are related to the influence of the technical and managerial skill traits in forecasting the students' overall entrepreneurial potentials, adequately fit the sample data. The conceptualized model, the hypothesized model (model 1.0), and the measurement model (model 2.0) are presented in Figure 1, Figure 2, and Figure 3, respectively.

**Fig. 1** *The conceptualized model*

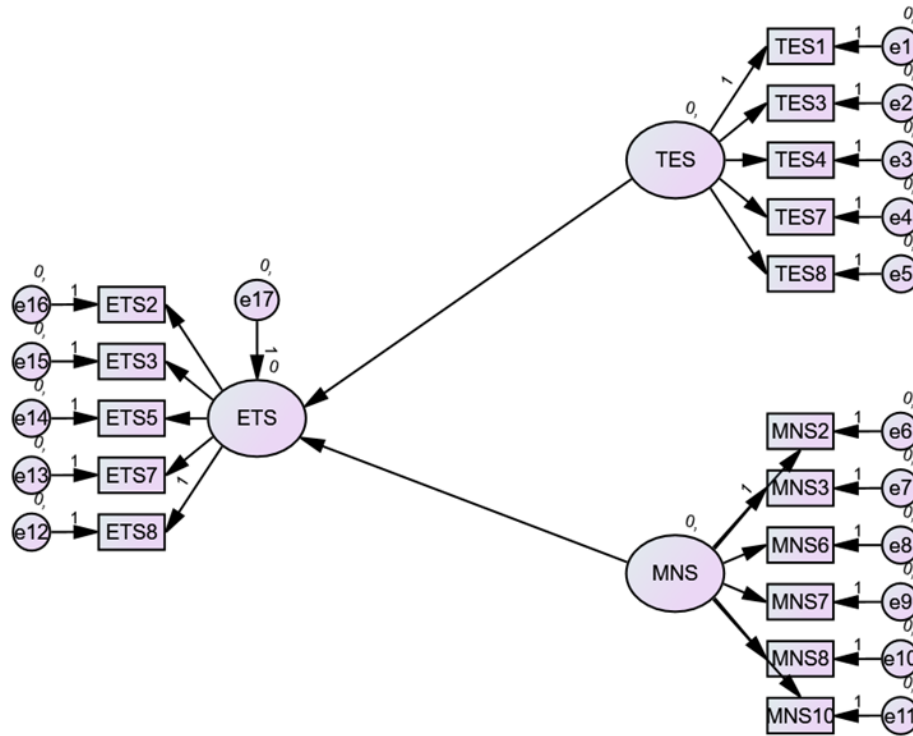


Fig. 2 The hypothesized model (model 1.0)

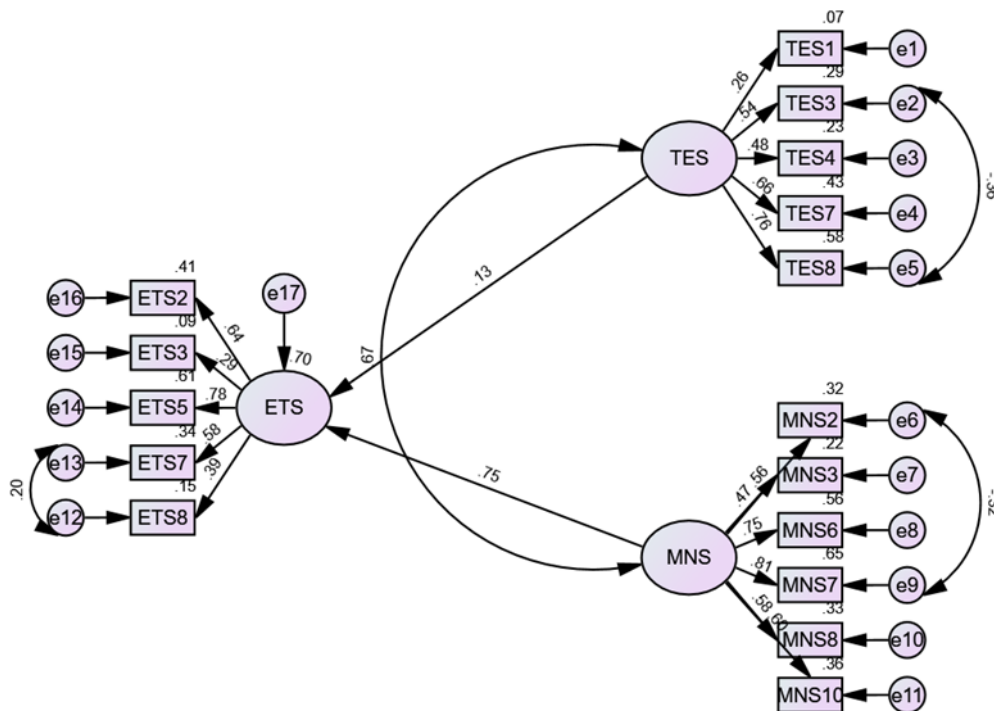


Fig. 3 The measurement model (model 2.0)

### 3.5 Hypotheses Testing Results

The study assessed the association between art and design students' technical skill traits (TES) and managerial skill traits (MNS) with their entrepreneurial skill traits (ETS). A critical ratio (C.R.) greater than 1.96 and a probability level (P-value) less than 0.05 indicate that the findings are statistically significant (Byrne, 2010). As shown in Table 8, the connection of TES with ETS was positive and insignificant (C.R.=1.074,  $p = 0.283$ ); hence,  $H_1$  was not supported. The relationship between MNS and ETS was positive and significant (C.R.=3,740,  $p < 0.001$ ), supporting  $H_2$ .

**Table 8** Hypotheses testing results

Hypothesis	Relationship	Estimate	S.E.	C.R.	P	Standardized	Decision
H <sub>1</sub>	ETS <--- TES	0.135	0.126	1.074	0.283	0.127	Not supported
H <sub>2</sub>	ETS <--- MNS	0.512	0.137	3.740	***	0.749	Supported

Note. \*\*\* denotes  $p < 0.001$

### 3.5.1 Link Between Art and Design Students' Technical and Entrepreneurial Skill Traits

Table 8 shows insignificant regression in the relationship between art and design students' entrepreneurship and technical skill traits since the p-value for hypothesis H<sub>1</sub> is 0.283, therefore, higher than 0.05. H<sub>1</sub>, which states that there is a significant relationship between art and design students' technical and entrepreneurial skill traits, is thus not supported. This implies that art and design students lack sufficient technical skills to match the entrepreneurship requirement. Emphasizing students' development of entrepreneurial competencies is germane (Toscher, 2019). Mastering crucial entrepreneurial skills can significantly impact any entrepreneur's future success (Thom, 2016). Therefore, to ensure adequate promotion of students' entrepreneurship development, art and design pedagogues must focus their teaching and mentoring activities on helping students improve their technical skills. Since the main objective of art and design pedagogy is to assist students in acquiring a wide range of creative skills, it means that art and design students generally have the potential to become entrepreneurs simply by their training that springboards their ability to think creatively, generate ideas, and commercialize their products (Nebessayeva et al., 2018). In other words, art and design pedagogy should engender motivation for entrepreneurship in the students, triggering their drive to succeed in a complex and changing environment (Methuku & Adel, 2021). By so doing, students' training, and learning in entrepreneurship will help them develop or sharpen their inherent entrepreneurship traits.

### 3.5.2 Link Between Art and Design Students' Managerial and Entrepreneurial Skill Traits

Table 8 reveals significant regression in the interaction between art and design students' entrepreneurship and managerial skill traits since the p-value for hypothesis H<sub>2</sub> is zero, therefore, less than 0.05. H<sub>2</sub>, which states that there is a significant relationship between art and design students' managerial and entrepreneurial skill traits, is supported. Managerial skills are highly impactful on the performance and success of entrepreneurs (Zahra, Fakhrisadat & Narges, 2014; Banjo, Falola & Ganiyu, 2017). It is essential to provide crucial teaching infrastructures to strengthen art and design students' intrinsic managerial skills required for entrepreneurship.

The art and design discipline, if properly harnessed, could provide entrepreneurial skills for youths to make them self-reliant (Ijeamaka, 2013). Given that artistic or creative talent alone has proven not enough to guarantee a thriving art and design career, potential and practising artists and designers need to develop entrepreneurial skills and operate as entrepreneurs to meet multi-faceted economic and opportunity-driven challenges successfully (Thom, 2016). Acquiring entrepreneurship knowledge in the art and design disciplines is increasingly required in higher education to prepare students for sustainable careers and provide a research platform for professional development (Toscher, 2019).

## 4. Conclusion and Practical Implications

This study used structural equation modelling to test the hypotheses on the relationship between art and design students' technical and managerial skills traits and their entrepreneurial skill traits. The findings show that no significant relationship exists between art and design students' technical and entrepreneurial skill traits. This suggests that the current curriculum may need to be diversified to include a broader range of skills. This could involve introducing courses focusing on entrepreneurial skills development, such as business planning, marketing, and project management, alongside the technical skills traditionally emphasized in art and design programmes. At the same time, there is a significant relationship between their managerial and entrepreneurial traits. This suggests that there is potential for integrating managerial concepts into the curriculum. Courses or modules covering leadership, organizational behaviour, and strategic management could be included to enhance art and design students' entrepreneurial competencies. Resource-based and human capital frameworks can be adopted to design a curriculum that integrates technical and managerial skills to develop art and design students' entrepreneurial potential. Policymakers in the art and design education domain should recognize the importance of nurturing students' entrepreneurial traits by developing policies that support the integration of managerial concepts into the foundational technical skills in the art and design curricula. This holistic approach can better prepare art and design students for the entrepreneurial challenges and opportunities in the creative industry.

The teaching faculties should adopt teaching methods that can enhance experiential learning opportunities. Incorporating experiential learning opportunities can be beneficial because of the importance of managerial skills for improving art and design students' entrepreneurial competencies. Art and design educators should mentor students toward understanding the importance of honing their technical skills and developing managerial and entrepreneurial competencies. This can help art and design students make informed decisions about their entrepreneurial career paths. Individualized skill development plans can be introduced to art and design students based on their strengths and weaknesses in technical, managerial, and entrepreneurial areas. This personalized approach can better prepare art and design students for the diverse demands of the professional landscape and entrepreneurship. Internships, real-world projects, and collaborations with industry partners can provide art and design students with practical experiences required to develop their managerial and entrepreneurial abilities. Art and design education may benefit from interdisciplinary approaches that combine business, technology, and design elements. Collaborative projects engaging art and design students with other students from different disciplines can foster a practical approach to applying technical and managerial skills in entrepreneurial endeavours. Higher education institutions must adequately support establishing entrepreneurial programmes within art and design schools. This support could include funding for entrepreneurial initiatives, mentorship programmes, and partnerships with industry stakeholders to enhance art and design students' exposure to entrepreneurial practices.

Regarding the results of this study, it is suggested that more emphasis should be placed on integrating entrepreneurship courses into the art and design curricula in tertiary institutions. The scope of the art and design entrepreneurial courses should be extended to strengthen theoretical knowledge and practical training for improving students' technical and managerial skills in a manner that will best stimulate their entrepreneurial skills. The outcome of this research will help the teaching faculties in the arts and design field to encourage their students to harmonize their inherent entrepreneurial traits. To harness the gains of the rapidly evolving fourth and fifth industrial revolutions, educators, curriculum developers, and policymakers should consider the practical implications of this study for addressing the teaching and learning needs in the art and design field alongside entrepreneurial training to position the students for a sustainable career (Naudé, 2017; Kolade & Owoseni, 2022; Odewole, Sobowale & Uzzi, 2023). Further research should consider art and design students' entrepreneurial potentials in connection with pertinent theories and models, such as the theory of planned behaviours and the entrepreneurship intention model.

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## Conflict of Interest

The authors declare no conflict of interest regarding the paper's publication.

## Author Contribution

The authors confirm their contribution to the paper as follows: **study conception and design:** P.O. Odewole; A.A. Adeloye; **data collection:** P.O. Odewole; A.A. Adeloye; **analysis and interpretation of results:** P.O. Odewole; B.E.F. Afolabi; J.O. Oladesu; **draft manuscript preparation:** P.O. Odewole; M.A. Oyinloye, F.O. Uzzi. All authors reviewed the results and approved the final version of the manuscript.

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