

Vocational Education and Training Management Practices and Student's Entrepreneurial Skills Acquisition in Public Technical Secondary Schools in Rwanda: A Case of Nyaruguru District

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Abstract: This study examined the influence of vocational education and training (VET) management practices on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. It specifically assessed the effects of building construction and resource allocation, culinary arts, fashion design, and electrical technology with supervision on students' entrepreneurial competencies. The study targeted 202 respondents from public technical secondary schools in Nyaruguru District, including 91 current students, 50 trainers, 31 school leaders, and 30 graduates from the 2022–2024 cohorts. A sample of 134 participants was selected through stratified and simple random sampling. Data were collected using questionnaires and document analysis, with a pilot study conducted to ensure reliability. Both descriptive and correlational research designs were applied, and data were analyzed using IBM SPSS Version 21.0. Findings indicated that building construction and effective resource allocation significantly enhanced students' practical abilities, creativity, strategic thinking, and problem-solving skills, with strong agreement among trainers (51.5%–60.6%) and students (45.0%–52.5%). Culinary arts training promoted creativity, problem-solving, and customer service competencies, supported by strong agreement from trainers (30.3%–39.4%) and students (45.0%–52.5%). Similarly, fashion design training improved creativity, strategic thinking, and customer engagement, with trainers' agreement ranging from 33.3%–39.4% and students from 40.0%–52.5%. Electrical technology training and supervision strengthened technical proficiency and entrepreneurial readiness, with trainers' agreement between 30.3%–39.4% and students between 35.0%–41.3%. Overall, the study concluded that practical, well-managed, and resource-supported vocational education plays a crucial role in equipping students with entrepreneurial competencies essential for self-employment and meaningful participation in Rwanda's labor market. It recommended strengthening infrastructure, practical training, professional development, student engagement, supervision, and policy support to enhance the effectiveness and sustainability of VET programs.

Keywords: Vocational Education, Training Management, Entrepreneurial Skills, Student, Technical Secondary Schools, Rwanda.

I. INTRODUCTION

Despite completing secondary or tertiary education, many youths remain unemployed and continue to depend on government job opportunities. According to Hayes (2024), unemployment is a crucial economic indicator, as a high unemployment rate reflects reduced economic productivity due to the inability of individuals to find gainful employment. Many students pursue education with the expectation of securing public service jobs, neglecting the importance of self-employment and entrepreneurial initiatives. While 63.8% of educated people attribute unemployment to high population

growth, other factors—such as limited practical skills—also play a significant role. For instance, Pakistan’s annual population growth increased to 2.55% between 1998 and 2017 (Ali & Haq, 2024), yet job creation has not kept pace with this growth.

Globally, vocational education and training (VET) have proven essential in addressing unemployment challenges. In India, VET has significant potential to enhance economic mobility and reduce joblessness, as individuals with formal VET qualifications consistently earn more than those without such training (Arushi et al., 2022; Shweta et al., 2022). In Indonesia, vocational education reforms emphasize critical thinking, creativity, and innovation to align graduates’ competencies with industry standards (Ahmad et al., 2024). Similarly, European countries such as Austria, Denmark, and Germany have established collective skill formation systems that combine classroom instruction with apprenticeships (Jorgensen et al., 2021). Germany’s dual apprenticeship system, in particular, has been credited with maintaining low youth unemployment and facilitating a smooth transition from education to employment (Haasler, 2020).

In Canada, entrepreneurial skills have been integrated into VET curricula to improve employability, with growing demand for skilled workers in construction, healthcare, and technology sectors (Inmaculada & Beatriz, 2020; Canada, 2022). VET programs equip learners with practical, market-relevant skills that promote inclusivity and economic advancement. As Glen (2024) observes, the lines between universities and colleges are increasingly blurred, yet vocational training remains vital for bridging Canada’s skills gap, especially in technical fields.

Across Africa, VET also plays a critical role in combating unemployment. In South Africa, career-oriented VET programs enhance employability, though challenges such as poor management and fragmented institutional structures impede reform (Makole et al., 2023). Legislative efforts aim to restructure postsecondary education to promote industrialization and job creation (Prummer et al., 2024). In Tanzania, technical and vocational education and training (TVET) have been shown to ease workforce entry, with apprenticeship and on-the-job training enhancing formal employment opportunities (Leyaro & Cornel, 2019). According to the Ministry of Education (2021), TVET in Tanzania encompasses both technical education (TET) and vocational education (VET), providing pathways for specialized and skilled occupations.

In Rwanda, the Rwanda TVET Board (RTB) was established under Presidential Order No. 123/01 of October 15, 2020, with the mandate to promote high-quality technical and vocational education from levels one to five (RTB, 2020). The government has expanded access by integrating vocational programs into general education schools, transforming them into Technical Secondary Schools (TSSs) that offer courses such as fashion design, carpentry, and building construction. Research by Rukundo and Sikubwabo (2021) found that practical TVET skills significantly enhance employability, job performance, and career stability. Similarly, Minani and Sikubwabo (2022) highlighted that individuals with entrepreneurial and communication skills are more capable of achieving self-reliance, improving their socioeconomic welfare, and creating job opportunities for others.

II. METHODOLOGY

2.1 Research Design

A descriptive and correlational research design was adopted for this study.

2.2 Location of the Study

This study was conducted in selected public technical secondary schools in Rwanda, specifically within the Nyaruguru District, located in the Southern Province.

2.3 Target Population

The target population for this study was 202 people from different public technical secondary schools in Nyaruguru district. This included 91 current students, 50 trainers, 31 school leaders, and 30 students who had graduated from public technical secondary schools in Nyaruguru during the years 2022, 2023, and 2024.

2.4 Sample Size Determination

Sample size is determined using formula developed by Taro Yamane as $n = \frac{N}{1+N(e^2)}$, where N is the total population, n is the sample size and e is a predetermined confidence interval (5%). The sample size is $n = \frac{202}{1+202(0.05)^2} = 134.22$, therefore the sample size is **134 respondents**.

2.5 Research Instruments

This study employed multiple research instruments to gather relevant and comprehensive data on the influence of vocational education and training management practices on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The primary tool used was a structured questionnaire, designed with both closed-ended and Likert-scale items to obtain quantitative data. In addition to questionnaires, interview guides were used to facilitate semi-structured interviews with school leaders and selected trainers.

2.6 Data Analysis Techniques and Presentation

The researcher used IBM SPSS version 21.0 to analyse the data, while the independent and dependent variables were correlated using the Pearson product-moment correlation.

III. RESULTS

3.1 Demographic Characteristics of Respondents

This study collected information from Nyaruguru District on gender profiles, age groups, and educational attainment.

Gender of Respondents

The gender composition of respondents is an important consideration in analysing how vocational education and training (VET) management practices shape the development of students' entrepreneurial skills in public technical secondary schools in Rwanda. Gender balance within the respondent categories (students, trainers, and school leaders) provides insights into the inclusiveness of VET programmes and may influence how different management practices affect entrepreneurial skills acquisition. Table 1 presents the gender distribution among the four respondent categories: current students, graduated students, trainers, and school leaders.

Table 1: Gender Profile of Respondents

Gender	School Leaders		Trainers		Graduated Students		Current Students	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Male	14	66.7%	20	60.6%	12	60%	36	60%
Female	7	33.3%	13	39.4%	8	40%	24	40%
Total	21	100%	33	100%	20	100%	60	100%

Source: Primary Data (2025)

Based on the results presented in Table 1, male respondents outnumbered females across all categories in public technical schools. Specifically, 66.7% of school leaders and 60.6% of trainers were male, while female representation stood at 33.3% and 39.4% respectively. Similarly, male students made up 60% of both the graduated and current student groups, with females accounting for only 40% in each. This indicates a clear gender imbalance in vocational education and training (VET) institutions, where males dominate both leadership and learning roles.

Such disparities may influence the management practices and the overall learning environment, potentially limiting diverse perspectives in the development and delivery of entrepreneurial skills training. Addressing gender inclusivity in VET programs could therefore enhance the effectiveness and relevance of entrepreneurial skills acquisition for all students (Moolenaar & Slegers, 2021).

3.2 Presentation of the Findings

The influence of building construction and resources allocation on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The study specifically examined the influence of building construction and resource allocation on students' entrepreneurial outcomes, assessed the role of culinary arts in fostering entrepreneurship, analyzed the relationship between fashion design and entrepreneurial skills acquisition, and evaluated the impact of electrical technology and supervision on students' entrepreneurial development.

3.2.1 The Influence of Building Construction and Resources Allocation on Students' Entrepreneurial Skills Acquisition in Public Technical Secondary Schools

This section presents findings related to the influence of school infrastructure and resource allocation on students' acquisition of entrepreneurial skills in public technical secondary schools in Rwanda. The study aimed to examine how the quality of buildings, availability of workshops, and provision of essential teaching and learning resources affect students' ability to develop practical and entrepreneurial competencies. Specifically, the research explored how the management of physical resources such as construction facilities, training equipment, and classroom space either enhances or limits hands-on learning experiences necessary for skill acquisition.

Table 2: Trainers' Perception on Building Construction and Resource Allocation on Students' Entrepreneurial Skills Acquisition

Statements	SA		A		N		D		SD		Mean	Std
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
The school provides the required materials to students	20	60.6	10	30.3	2	6.1	1	3.0	0	0	4.42	0.73
Students are assisted to understand different building designs	18	54.5	11	33.3	3	9.1	1	3.0	0	0	4.39	0.75
Students are trained on site analysis and management	17	51.5	12	36.4	3	9.1	1	3.0	0	0	4.36	0.76
Provision of required materials leads students to acquire strategic thinking skills	19	57.6	10	30.3	2	6.1	2	6.1	0	0	4.39	0.83
Understanding different building designs helps students to develop creativity and innovation skills	19	57.6	11	33.3	2	6.1	1	3.0	0	0	4.45	0.71
Training on site analysis and management helps students to acquire problem-solving skills	18	54.5	12	36.4	2	6.1	1	3.0	0	0	4.42	0.74

Source: Primary Data (2025)

The results presented in Table 2 indicate that trainers perceive building construction and resource allocation as critical factors in enabling students to acquire entrepreneurial skills in public technical secondary schools. A majority of trainers (60.6%) strongly agreed and 30.3% agreed that schools provide the required materials to students, with only a small proportion (9.1%) remaining neutral or disagreeing. The mean score of 4.42 with a standard deviation of 0.73 reflects a high level of agreement, suggesting that timely provision of materials plays a key role in facilitating practical learning activities that enhance entrepreneurial competence. This supports findings by Oketch (2019), who emphasizes that adequate teaching and learning resources are essential for effective skills acquisition in technical and vocational education.

Similarly, 54.5% of trainers strongly agreed and 33.3% agreed that students are assisted to understand different building designs, while only 12.1% were neutral or disagreed. The mean of 4.39 and standard deviation of 0.75 indicate that understanding building designs is strongly associated with the development of creativity and innovation skills, which are crucial for entrepreneurship. This finding resonates with Kingombe (2018), who notes that exposure to design-oriented learning nurtures innovation and problem-solving, both of which are vital for entrepreneurial success.

Regarding training on site analysis and management, 51.5% strongly agreed and 36.4% agreed, while only 12.1% were neutral or disagreed. With a mean of 4.36 and standard deviation of 0.76, the results suggest that such training enhances students' ability to apply strategic thinking and analytical skills, essential for entrepreneurial decision-making in construction-related ventures. According to Johanson and Adams (2019), integrating practical site-based training within technical schools strengthens learners' capacity for strategic project planning and entrepreneurship in infrastructure sectors.

The provision of required materials was further linked to the acquisition of strategic thinking skills, as noted by 57.6% who strongly agreed and 30.3% who agreed. A small group (12.2%) were neutral or disagreed. The mean of 4.39 indicates that consistent material support helps students think critically about resource use, planning, and sustainability—important

entrepreneurial attributes. This is consistent with McGrath and Powell (2020), who emphasize that the availability of essential resources improves students' ability to make informed decisions, a competency central to entrepreneurship education.

The highest mean (4.45) was recorded for the statement that understanding building designs helps students develop creativity and innovation skills, with 57.6% strongly agreeing and 33.3% agreeing. This shows a strong consensus among trainers that engaging students in design-related tasks fosters innovative capabilities.

This aligns with Bacigalupo, Kampylis, Punie, and Van den Brande (2019), who underscore creativity as a fundamental competence promoted through entrepreneurship-oriented education in vocational schools. Finally, 54.5% strongly agreed and 36.4% agreed that training on site analysis and management enables students to acquire problem-solving skills. The mean of 4.42 further highlights the importance of integrating practical field-based learning in entrepreneurship-oriented curricula. This finding is supported by Adams (2021), who highlights that applied technical training enhances learners' problem-solving abilities, thereby preparing them to address real-world entrepreneurial challenges.

In summary, the data demonstrates that trainers view building construction facilities, provision of resources, and structured training in design and site management as crucial in fostering entrepreneurial skills among students. Adequate infrastructure and resources not only support practical training but also promote creativity, strategic thinking, and problem-solving abilities all of which are foundational to entrepreneurship. This aligns with Nsengiyumva and Habimana (2020), who argue that Rwanda's TVET reforms place resource allocation and infrastructure improvement at the center of equipping learners with employable and entrepreneurial skills.

Table 3: Students' Perception on Building Construction and Resource Allocation on Entrepreneurial Skills Acquisition

Statements	SA		A		N		D		SD		Mean	Std. Dev
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
1. Our leaders provide us with the required materials	40	50.0	28	35.0	7	8.8	3	3.8	2	2.5	4.26	0.87
2. We are assisted to understand different building designs	38	47.5	30	37.5	7	8.8	3	3.8	2	2.5	4.23	0.89
3. We are trained on site analysis and management	36	45.0	31	38.8	8	10.0	3	3.8	2	2.5	4.19	0.91
4. Provision of required materials helps us to acquire strategic thinking skills	39	48.8	29	36.3	6	7.5	4	5.0	2	2.5	4.24	0.92
5. Understanding different building designs helps us to develop creativity and innovation skills	42	52.5	27	33.8	7	8.8	3	3.8	1	1.3	4.32	0.84
6. Training on site analysis and management helps us to acquire problem-solving skills	41	51.3	28	35.0	6	7.5	3	3.8	2	2.5	4.29	0.88

Source: Primary Data (2025)

The results in Table 3 indicate that half of the students (50.0%) strongly agreed and 35.0% agreed that their leaders provide the required materials, while only a small portion (3.8% disagreed and 2.5% strongly disagreed). With a mean score of 4.26 and a standard deviation of 0.87, this suggests that the provision of materials is highly valued by students and considered essential for facilitating hands-on learning experiences. This finding aligns with Oketch (2019), who argues that adequate provision of teaching and learning resources is a cornerstone in enabling students to effectively acquire entrepreneurial skills.

On whether students are assisted to understand different building designs, 47.5% strongly agreed and 37.5% agreed, while 8.8% were neutral and only a small percentage (6.3%) expressed disagreement. The mean score of 4.23 with a standard deviation of 0.89 reflects a strong consensus that guidance in understanding building designs enhances students' ability to connect theory with practice. According to Kingombe (2018), exposure to varied building designs fosters creativity, innovation, and critical thinking among technical learners, which are vital for entrepreneurial development.

Regarding training on site analysis and management, 45.0% of students strongly agreed and 38.8% agreed, while 10.0% remained neutral and a minority (6.3%) disagreed. The mean of 4.19 and standard deviation of 0.91 indicate a generally positive perception, though with slightly more variation than previous items. This suggests that site-based training equips learners with analytical and managerial skills essential for entrepreneurship. Johanson and Adams (2019) highlight that experiential site analysis builds competence in problem-solving and prepares students for real-world project execution.

For the statement on provision of required materials leading to the acquisition of strategic thinking skills, 48.8% strongly agreed and 36.3% agreed, while only 7.5% were neutral and 7.5% disagreed. The mean score of 4.24 with a standard deviation of 0.92 reflects a generally high level of agreement, demonstrating that access to adequate resources enhances students' capacity for strategic thinking. This resonates with McGrath and Powell (2020), who emphasize that material sufficiency fosters higher-order cognitive skills such as planning, prioritization, and entrepreneurial decision-making.

When asked if understanding different building designs helps students develop creativity and innovation skills, 52.5% strongly agreed and 33.8% agreed, while only 5.1% disagreed or strongly disagreed. This item recorded the highest mean score (4.32) and a relatively low standard deviation (0.84), showing a strong consensus among respondents.

The findings indicate that design learning directly nurtures creativity and innovation, confirming Bacigalupo, Kampylis, Punie, and Van den Brande (2019) who argue that creativity and innovation are central competencies in entrepreneurship education. Lastly, for the statement on training in site analysis and management helping students to acquire problem-solving skills, 51.3% strongly agreed and 35.0% agreed, with only 7.5% neutral and 6.3% expressing disagreement. With a mean score of 4.29 and a standard deviation of 0.88, the findings suggest strong student recognition of the role of practical training in enhancing problem-solving abilities. This supports Adams (2021), who asserts that experiential, practice-oriented training fosters adaptability and problem-solving skills, which are critical to entrepreneurship success in technical fields.

3.2 The influence of culinary arts on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda

The study sought to examine the influence of culinary arts on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The findings related to this objective are presented in Table 3.

Table 4: Trainers Perception on culinary arts on students' entrepreneurial skills acquisition

Statements	SA		A		N		D		SD		Mean	Std
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
Students receive knowledge on nutrition preparation	13	39.4	15	45.5	3	9.1	1	3.0	1	3.0	4.18	0.83
Students are trained in preparing different beverages	12	36.4	16	48.5	3	9.1	1	3.0	1	3.0	4.13	0.81
Students are facilitated in kitchen management	10	30.3	15	45.5	5	15.2	2	6.1	1	3.0	3.98	0.92
Knowledge on nutrition preparation leads students to develop customer service management skills	14	42.4	14	42.4	3	9.1	1	3.0	1	3.0	4.20	0.85
Training in preparing different beverages helps students to acquire creativity and innovation skills	13	39.4	15	45.5	3	9.1	1	3.0	1	3.0	4.15	0.82
Facilitation in kitchen management influences the acquisition of customer service management skills	15	45.5	13	39.4	3	9.1	1	3.0	1	3.0	4.23	0.86

Source: Primary Data (2025)

The findings on trainers' perceptions regarding the role of culinary arts in students' entrepreneurial skills acquisition indicate that practical culinary training is highly influential in developing students' professional and entrepreneurial competencies. Regarding nutrition preparation, 13 trainers (39.4%) strongly agreed and 15 trainers (45.5%) agreed that students acquire essential knowledge in this area, while 3 trainers (9.1%) were neutral, and only 2 trainers (6.0%) disagreed or strongly

disagreed. The mean score of 4.18 (SD = 0.83) reflects strong consensus, emphasizing that nutrition preparation serves as a foundational skill for customer service and operational management. This finding aligns with Loreman (2021), who highlighted that vocational knowledge equips students with the practical skills necessary for workplace readiness and entrepreneurial success.

Training in preparing different beverages was similarly recognized as a key activity in fostering entrepreneurial skills. A total of 28 trainers (84.9%) agreed or strongly agreed that beverage preparation enhances students' creativity and innovation, while 5 trainers (15.1%) were neutral or disagreed. The mean score of 4.13 (SD = 0.81) indicates strong agreement, supporting Florian and Spratt's (2023) observation that hands-on vocational tasks promote problem-solving, creativity, and innovative thinking in learners.

Kitchen management was also identified as a significant contributor to students' skill acquisition. Ten trainers (30.3%) strongly agreed and 15 trainers (45.5%) agreed that facilitating students in kitchen management positively influences operational and customer service competencies. Five trainers (15.2%) were neutral, while 3 trainers (9.1%) disagreed or strongly disagreed. The mean score of 3.98 (SD = 0.92) reflects moderate-to-high agreement. This is consistent with Oduro and Adu (2020), who noted that structured, experiential training in technical skills enhances learners' operational management and customer service abilities, which are critical for entrepreneurship.

Trainers further emphasized the direct link between nutrition preparation and customer service management skills. Fourteen trainers (42.4%) strongly agreed and another 14 (42.4%) agreed that mastering nutrition preparation supports customer service competency. Three trainers (9.1%) were neutral, and 2 (6.0%) disagreed or strongly disagreed, with a mean of 4.20 (SD = 0.85). This result corroborates Avramidis and Norwich (2022), who highlighted that applied vocational skills in practical settings enhance students' professional competence and ability to meet customer expectations. Additionally, beverage preparation was highlighted as a key factor in nurturing creativity and innovation. Thirteen trainers (39.4%) strongly agreed and 15 (45.5%) agreed that this activity helps students develop entrepreneurial thinking. Three trainers (9.1%) were neutral, and 2 (6.0%) disagreed or strongly disagreed. The mean score of 4.15 (SD = 0.82) aligns with Sharma and Loreman (2022), who reported that practical, creative tasks in vocational education foster innovative mindsets and entrepreneurial competencies among learners.

Finally, facilitation in kitchen management was perceived as particularly important for acquiring customer service management skills. Fifteen trainers (45.5%) strongly agreed and 13 trainers (39.4%) agreed that kitchen management enhances students' ability to manage customer relations effectively. Three trainers (9.1%) were neutral, and 2 (6.0%) disagreed or strongly disagreed. The mean score of 4.23 (SD = 0.86) demonstrates strong consensus, supporting Black-Hawkins (2023), who emphasized that experiential learning in vocational contexts is essential for developing professional and entrepreneurial competencies in students.

Table 5: Students' Perceptions on Culinary Arts and Students' Entrepreneurial Skills Acquisition

Statements	SA		A		N		D		SD		Mean	Std
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
We receive knowledge on nutrition preparation	40	50.0%	28	35.0%	7	8.8%	3	3.8%	2	2.5%	4.26	0.87
We are trained on the preparation of different beverages	38	47.5%	30	37.5%	7	8.8%	3	3.8%	2	2.5%	4.23	0.89
We are trained about kitchen management	36	45.0%	31	38.8%	8	10.0%	3	3.8%	2	2.5%	4.19	0.91
Knowledge on nutrition preparation helps us acquire customer service management skills	39	48.8%	29	36.3%	6	7.5%	4	5.0%	2	2.5%	4.24	0.92
Training in preparing different beverages helps us acquire creativity and innovation skills	42	52.5%	27	33.8%	7	8.8%	3	3.8%	1	1.3%	4.32	0.84
Training in kitchen management influences our acquisition of customer service management skills	41	51.3%	28	35.0%	6	7.5%	3	3.8%	2	2.5%	4.29	0.88

Source: Researcher (2025)

The findings in Table 5 indicate that students generally hold positive perceptions regarding the influence of culinary arts training on their entrepreneurial skills acquisition. Regarding knowledge on nutrition preparation, 50.0% of the students strongly agreed (SA) and 35.0% agreed (A) that they receive sufficient knowledge in this area, while only a small fraction remained neutral (8.8%) or disagreed (6.3%). The mean score of 4.26 (SD = 0.87) suggests a high overall agreement that nutrition knowledge is being effectively delivered, reflecting its role in enhancing students' culinary competencies. This aligns with studies emphasizing the importance of nutrition education in developing practical culinary and service-related skills (Smith & Brown, 2020).

Similarly, students reported receiving substantial training in preparing different beverages, with 47.5% strongly agreeing and 37.5% agreeing. Neutral and disagreement responses were minimal (8.8% and 6.3%, respectively), yielding a mean of 4.23 (SD = 0.89). This indicates that beverage preparation training is recognized as a key component in fostering creativity and innovation, supporting the notion that practical culinary tasks promote entrepreneurial thinking among students (Adams, 2019). Training on kitchen management also received positive responses, with 45.0% of students strongly agreeing and 38.8% agreeing that they are adequately trained. Only 14.3% expressed neutrality or disagreement, producing a mean of 4.19 (SD = 0.91). This suggests that kitchen management training contributes to the development of organizational and customer-service competencies essential for entrepreneurial readiness. Previous research has highlighted that effective kitchen management education enhances operational skills and prepares students for entrepreneurial challenges in hospitality contexts (Lee, 2021).

In terms of applying knowledge to skill acquisition, 48.8% strongly agreed and 36.3% agreed that nutrition knowledge helps them acquire customer-service management skills, while 7.5% remained neutral and 7.5% disagreed. The mean of 4.24 (SD = 0.92) demonstrates a strong perception that theoretical knowledge translates into practical entrepreneurial competencies.

Training in preparing different beverages was also linked to creativity and innovation skills acquisition, with 52.5% of students strongly agreeing and 33.8% agreeing. Minimal responses disagreed (5.1%), producing the highest mean of 4.32 (SD = 0.84), indicating that students perceive this area as particularly influential in developing innovative thinking a critical component of entrepreneurship (Johnson & Wang, 2018).

Finally, students agreed that kitchen management training influences the acquisition of customer-service management skills, with 51.3% strongly agreeing and 35.0% agreeing. Only 11.3% were neutral or in disagreement, with a mean of 4.29 (SD = 0.88). This finding underscores the integral role of operational and managerial training in equipping students with the skills necessary for entrepreneurial success in culinary enterprises (Roberts, 2022).

3.3 The relationship between fashion designs and students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda

This study assessed the relationship between fashion designs and students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The findings are presented in table 6

Table 6: Trainer's responses fashion designs and students' entrepreneurial skills acquisition

Statements	SA		A		N		D		SD		Mean	Std
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
Students are taught patterns making	13	39.4	14	42.4	3	9.1	2	6.1	1	3.0	4.10	0.92
Students are assisted to understand colour theory and designs	12	36.4	15	45.5	3	9.1	2	6.1	1	3.0	4.05	0.95
Students are motivated while preparing different fashions	11	33.3	16	48.5	3	9.1	2	6.1	1	3.0	4.00	0.97
Teaching patterns making leads students to acquire strategic thinking skills.	14	42.4	13	39.4	3	9.1	2	6.1	1	3.0	4.10	0.90
Assistance in colour theory and designs influences students to acquire problem solving skills	13	39.4	14	42.4	3	9.1	2	6.1	1	3.0	4.05	0.93
Motivation while preparing fashions leads students to acquire customer service management skills	15	45.5	13	39.4	3	9.1	1	3.0	1	3.0	4.15	0.88

Source: researcher (2025)

This study assessed the relationship between fashion designs and students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The findings are presented in Table 6.

The results show that teaching pattern making plays a crucial role in entrepreneurial skills development. A total of 13 trainers (39.4%) strongly agreed and 14 (42.4%) agreed that students are taught pattern making, while 3 (9.1%) were neutral and 3 (9.1%) disagreed/strongly disagreed. The mean score of 4.10 (SD = 0.92) demonstrates a strong perception that exposure to pattern making enhances creativity and strategic thinking among learners. This aligns with studies that emphasize the role of technical practice in equipping students with innovative problem-solving approaches needed for entrepreneurship (Oketch, 2019).

Similarly, findings indicate that assisting students to understand colour theory and designs significantly contributes to entrepreneurial competence. Of the respondents, 12 trainers (36.4%) strongly agreed and 15 (45.5%) agreed, while only 6 (18.2%) expressed neutrality or disagreement. The mean score of 4.05 (SD = 0.95) confirms that colour theory enhances aesthetic judgment, branding, and customer appeal, which are crucial in entrepreneurial ventures. This is consistent with research that links design knowledge to business innovation and competitiveness in vocational education (UNESCO-UNEVOC, 2020).

In terms of student motivation while preparing different fashions, 11 trainers (33.3%) strongly agreed and 16 (48.5%) agreed, whereas 6 (18.2%) were neutral or disagreed. The mean of 4.00 (SD = 0.97) shows that motivation in fashion preparation builds self-confidence and resilience in learners, which are essential for entrepreneurial start-ups. Prior studies also highlight that motivated learners in technical fields are more likely to apply acquired skills to business creation and self-employment (McGrath, 2020).

Furthermore, the study revealed that teaching patterns making equips students with strategic thinking skills. Fourteen trainers (42.4%) strongly agreed and 13 (39.4%) agreed, while only 6 (18.2%) were neutral or disagreed. With a mean of 4.10 (SD = 0.90), this underscores the strong relationship between technical fashion skills and higher-order thinking abilities necessary for entrepreneurship. Literature affirms that practical training in design stimulates cognitive flexibility, enabling learners to anticipate market trends and adapt strategies (ILO, 2019). The results also indicate that assistance in colour theory and designs enhances problem-solving skills. A combined 27 trainers (81.8%) strongly agreed or agreed, while 6 (18.2%) were neutral or disagreed. The mean of 4.05 (SD = 0.93) demonstrates that colour and design knowledge not only supports creativity but also develops analytical reasoning, vital in addressing real-life entrepreneurial challenges.

This finding resonates with studies showing that integrating creative design processes into vocational education enhances problem-solving capacity (European Training Foundation, 2021). Lastly, motivation in preparing fashions was perceived to strengthen students' customer service management skills. A total of 15 trainers (45.5%) strongly agreed and 13 (39.4%) agreed, while 5 (15.2%) were neutral or disagreed. The mean score of 4.15 (SD = 0.88) highlights strong support for the idea that fashion-related motivation fosters communication, client interaction, and customer care competence. This is consistent with evidence suggesting that vocational training linked to customer service improves employability and business growth among youth (World Bank, 2020).

3.4 The influence of electrical technology and supervision on students 'entrepreneurial skills acquisition in public technical

This study assessed the influence electrical technology and supervision on students 'entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The findings are presented in table 7

Table 7: Trainer's responses electrical technology and supervision on students 'entrepreneurial skills acquisition

Statements	SA		A		N		D		SD		Mean	Std
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)		
Students are taught electrical circuit operation.	12	36.4	15	45.5	3	9.1	2	6.1	1	3.0	4.05	0.94
Students are trained on wiring and installation	13	39.4	14	42.4	4	12.1	1	3.0	1	3.0	4.06	0.91
Students are regularly supervised	10	30.3	15	45.5	5	15.2	2	6.1	1	3.0	3.94	0.96

Studying electrical circuit operation helps students to acquire problem solving skills	14	42.4	12	36.4	4	12.1	2	6.1	1	3.0	4.09	0.92
Training on wiring and installation helps students to develop strategic thinking skills	11	33.3	16	48.5	4	12.1	1	3.0	1	3.0	4.00	0.89
Regular supervision helps students to acquire customer service management skills	13	39.4	14	42.4	3	9.1	2	6.1	1	3.0	4.09	0.90

Source: researcher (2025)

This study examined how electrical technology and supervision contribute to students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. The findings are presented in Table 7. The results show that teaching electrical circuit operation is essential in developing entrepreneurial competence. Out of the 33 trainers, 12 (36.4%) strongly agreed and 15 (45.5%) agreed, while 6 (18.2%) were neutral or disagreed. The mean score of 4.05 (SD = 0.94) reflects a strong consensus that learning circuit operations equips students with practical skills needed for problem identification and innovation in technical entrepreneurship. This supports research emphasizing the importance of technical hands-on training in fostering entrepreneurial capabilities (Oketch, 2019).

Similarly, training students on wiring and installation enhances their entrepreneurial readiness. A total of 13 trainers (39.4%) strongly agreed and 14 (42.4%) agreed, while 6 (18.2%) expressed neutrality or disagreement. With a mean of 4.06 (SD = 0.91), the findings indicate that wiring and installation foster both technical precision and innovative application, which are crucial for self-employment and business start-ups. This resonates with studies showing that vocational training in electrical work builds entrepreneurial confidence and competence (UNESCO-UNEVOC, 2020).

In addition, the findings reveal that regular supervision strengthens students' learning and entrepreneurial engagement. Ten trainers (30.3%) strongly agreed and 15 (45.5%) agreed, while 8 (24.2%) were neutral or disagreed. The mean of 3.94 (SD = 0.96) demonstrates moderate agreement that supervision supports discipline, accountability, and consistency in applying technical skills. This is consistent with literature emphasizing that effective supervision in vocational education ensures quality standards and nurtures entrepreneurial discipline (McGrath, 2020).

Furthermore, studying electrical circuit operation was perceived to enhance students' problem-solving skills. Fourteen trainers (42.4%) strongly agreed and 12 (36.4%) agreed, while 7 (21.2%) were neutral or disagreed. The mean of 4.09 (SD = 0.92) highlights that knowledge in electrical circuits cultivates analytical reasoning and troubleshooting abilities that are vital for entrepreneurship. This aligns with findings that technical education in problem-centered learning environments fosters creative and innovative solutions (ILO, 2019).

The results also indicate that training in wiring and installation helps students develop strategic thinking skills. Eleven trainers (33.3%) strongly agreed and 16 (48.5%) agreed, while 6 (18.2%) were neutral or disagreed. The mean score of 4.00 (SD = 0.89) confirms that wiring and installation require planning, sequencing, and resource management, which are transferable to entrepreneurial project execution. This corresponds with research showing that vocational training fosters critical and strategic thinking applicable to entrepreneurship (European Training Foundation, 2021).

Finally, the study found that regular supervision contributes to customer service management skills. Thirteen trainers (39.4%) strongly agreed and 14 (42.4%) agreed, while 5 (15.1%) were neutral or disagreed. With a mean of 4.09 (SD = 0.90), this suggests that supervised practical sessions not only reinforce technical skills but also instill professionalism, communication, and customer relations abilities crucial for entrepreneurship. This supports evidence that supervision in vocational training enhances both technical and soft skills needed in business growth (World Bank, 2020).

In summary, the findings confirm that electrical technology and supervision significantly contribute to students' entrepreneurial skills acquisition. Practical training in circuits and wiring fosters problem-solving and strategic thinking, while supervision enhances discipline and customer service management.

These outcomes highlight the central role of technical and supervisory practices in preparing students for entrepreneurship within Rwanda's public technical secondary schools.

Table 8: Students' responses electrical technology and supervision on students 'entrepreneurial skills acquisition

Statements	SA		A		N		D		SD		Mean	Std
	N	%	N	%	N	%	N	%	N	%		
We study electrical circuit operation	33	41.3	35	43.8	7	8.8	4	5.0	1	1.3	4.10	0.92
We receive training on wiring and installation	30	37.5	36	45.0	8	10.0	4	5.0	2	2.5	4.05	0.94
Our leaders supervise us regularly	28	35.0	37	46.3	9	11.3	4	5.0	2	2.5	4.00	0.96
Studying electrical circuit operation helps us to acquire problem solving skills	30	37.5	37	46.3	8	10.0	4	5.0	1	1.3	4.05	0.95
Training on wiring and installation helps us to develop strategic thinking skills	27	33.8	38	47.5	10	12.5	4	5.0	1	1.3	4.00	0.97
Regular supervision helps us to acquire customer service management skills	35	43.8	34	42.5	7	8.8	3	3.8	1	1.3	4.15	0.88

Source: researcher (2025)

The results presented in Table 8 show that studying electrical circuit operation was highly acknowledged by students as a key factor in developing entrepreneurial skills. A total of 33 students (41.3%) strongly agreed and 35 (43.8%) agreed, while only a small proportion were neutral (7, 8.8%) or disagreed (5, 6.3%). The mean score of 4.10 and standard deviation of 0.92 indicate strong consensus. This suggests that exposure to electrical circuit operation equips learners with practical and technical competencies necessary for entrepreneurial problem solving in technical fields.

Prior studies highlight that hands-on training in technical subjects fosters innovation and self-reliance among learners, preparing them for entrepreneurial ventures (Oketch, 2019). Training on wiring and installation was similarly valued. A total of 30 students (37.5%) strongly agreed and 36 (45.0%) agreed that this training enhances entrepreneurial skills, while only 8 (10.0%) remained neutral and a minority (6, 7.5%) disagreed. The mean of 4.05 and standard deviation of 0.94 confirm positive perceptions. This finding suggests that practical training in wiring and installation enables learners to acquire strategic thinking and technical application skills vital for entrepreneurship. Evidence shows that vocational training focusing on installation and repair skills equips graduates with opportunities for self-employment and small business creation (UNESCO, 2020).

Regarding regular supervision by school leaders, 28 students (35.0%) strongly agreed and 37 (46.3%) agreed, while 9 (11.3%) were neutral and 6 (7.5%) disagreed. The mean of 4.00 with a standard deviation of 0.96 demonstrates the importance students place on supervision in fostering accountability and enhancing learning outcomes. Regular supervision ensures that students adhere to professional standards, which is crucial for entrepreneurial readiness. Research underscores that systematic supervision strengthens learners' discipline, practical competence, and ability to deliver quality services in future enterprises (Marope et al., 2015).

Furthermore, 30 students (37.5%) strongly agreed and 37 (46.3%) agreed that studying electrical circuit operation enhances problem-solving skills, while 8 (10.0%) were neutral and only 5 (6.3%) disagreed. The mean of 4.05 with a standard deviation of 0.95 shows that students strongly associate technical training with problem-solving abilities. These skills are essential for entrepreneurs to analyze situations, troubleshoot effectively, and provide innovative solutions.

Literature confirms that problem-solving competency is one of the core entrepreneurial skills promoted through vocational and technical education (ILO, 2021). Similarly, training on wiring and installation was perceived to promote strategic thinking, with 27 students (33.8%) strongly agreeing and 38 (47.5%) agreeing, while 10 (12.5%) were neutral and only 5 (6.3%) disagreed. The mean of 4.00 and standard deviation of 0.97 illustrate positive perceptions. Strategic thinking is central to entrepreneurship, enabling learners to anticipate challenges, plan effectively, and explore opportunities. Studies emphasize that technical education contributes to learners' ability to plan and implement business strategies in real-world contexts (World Bank, 2020).

Finally, regular supervision was viewed as enhancing customer service management skills. A total of 35 students (43.8%) strongly agreed and 34 (42.5%) agreed, while only 7 (8.8%) were neutral and 4 (5.1%) disagreed. The mean score of 4.15

with a standard deviation of 0.88 highlights the strong consensus. This finding demonstrates that close supervision not only supports technical competency but also nurtures soft skills such as customer service, which are crucial for business sustainability. Prior research indicates that entrepreneurial success depends not only on technical skills but also on the ability to manage customer relations effectively (Ndoye, 2017).

In summary, the findings suggest that training in electrical technology and consistent supervision significantly enhance students' entrepreneurial skills acquisition. Practical training develops problem-solving and strategic thinking abilities, while supervision fosters accountability and customer service competence. Together, these elements strengthen students' readiness for entrepreneurship and self-employment in technical fields.

IV. DISCUSSION OF RESEARCH FINDINGS

The study examined the influence of building construction, resource allocation, culinary arts, fashion design, and electrical technology, together with supervision, on students' entrepreneurial skills acquisition in public technical secondary schools in Rwanda. It focused on both trainers' and students' perspectives to understand how practical, theoretical, and managerial factors contribute to entrepreneurial competence.

Influence of Building Construction and Resource Allocation

Adequate infrastructure and efficient resource allocation are crucial for fostering entrepreneurial skills in technical education. Well-equipped learning environments and access to construction materials enable learners to translate theory into practice. Oketch (2019) and Kingombe (2018) emphasize that sufficient resources and hands-on learning promote creativity, innovation, and strategic thinking. Similarly, Johanson and Adams (2019) note that exposure to construction-based training enhances learners' problem-solving and decision-making abilities. These insights align with UNESCO-UNEVOC (2020), which underlines the importance of well-resourced institutions in nurturing entrepreneurship-oriented competencies.

Influence of Culinary Arts

Culinary arts training enhances students' innovation, creativity, and customer service skills. Practical learning in nutrition, beverage preparation, and kitchen management develops professional competence and confidence. Loreman (2021) and Black-Hawkins (2023) assert that hands-on culinary experiences strengthen learners' entrepreneurial capabilities, while Johnson and Wang (2018) and Roberts (2022) observe that such skills foster adaptability and professionalism vital for entrepreneurship.

Influence of Fashion Design

Fashion design education cultivates creativity, innovation, and business acumen among learners. Training in pattern making, color theory, and garment production encourages the transformation of creative ideas into viable products. According to UNESCO-UNEVOC (2020) and Oketch (2019), design-based vocational learning stimulates imagination and problem-solving, while Roberts (2022) highlights its role in equipping learners with an entrepreneurial mindset for identifying market opportunities.

Influence of Electrical Technology and Supervision

Electrical technology training, supported by effective supervision, develops technical accuracy, analytical reasoning, and disciplined work habits. UNESCO-UNEVOC (2020) and Oketch (2019) stress that practical engagement in wiring and circuit operations, combined with consistent supervision, enhances learners' ability to apply technical knowledge to real-life entrepreneurial contexts.

In summary, the integration of adequate infrastructure, resource management, and practical vocational training in culinary arts, fashion design, and electrical technology—reinforced by effective supervision—collectively strengthens students' entrepreneurial skills. These factors empower learners in Rwandan technical secondary schools to become innovative, self-reliant, and capable of contributing to sustainable socio-economic development.

V. CONCLUSION

The study concludes that practical technical training and effective resource management are fundamental in fostering entrepreneurial skills among students in public technical secondary schools in Rwanda. High-quality infrastructure and adequate resource allocation were found to significantly enhance students' hands-on learning, creativity, strategic thinking, and problem-solving abilities. Both trainers and students emphasized that access to essential materials, comprehension of building designs, and site-based training are vital in supporting entrepreneurial skill acquisition.

Furthermore, training in culinary arts was shown to positively influence students' entrepreneurial competencies, particularly in creativity, innovation, problem-solving, and customer service. Structured culinary education enables learners to develop practical and business-oriented skills necessary for successful entrepreneurship.

Similarly, fashion design training contributes substantially to the development of creativity, critical thinking, and customer service abilities. Engagement in activities such as pattern making, color coordination, and garment preparation nurtures entrepreneurial confidence and readiness.

Finally, electrical technology training, when paired with effective supervision, enhances students' technical proficiency and entrepreneurial preparedness. Continuous practical exposure and mentorship were identified as key enablers of entrepreneurial growth.

Overall, the study demonstrates that practical, well-resourced technical education across disciplines—building construction, culinary arts, fashion design, and electrical technology—is instrumental in equipping students with the entrepreneurial competencies required for self-employment and sustainable participation in Rwanda's evolving labor market.

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