

REVIEW

## Scrutinizing the benefits of entrepreneurial skills on the motivational level of chemistry students

**Juliana Nkiru Nnoli\***

Department of Science Education, Nnamdi Azikiwe University, Awka, Anambra

**\*Correspondence:**Juliana Nkiru Nnoli,  
jn.nnoli@unizik.edu.ng**Received:** 13 June 2023; **Accepted:** 19 June 2023; **Published:** 04 July 2023

The research examined the advantages of entrepreneurial abilities on the level of motivation among chemistry students. A null hypothesis and five research questions served as the study's frameworks. The target audience was made up of students studying chemistry from 26 secondary schools that are publicly owned in the Otuocha education zone of Anambra State. The study employed a survey design. A sample of 200 SS2 chemistry students was randomly selected without replacement. Data were collected using a structured questionnaire containing items related to the benefits of entrepreneurial skills on the motivation level of chemistry students. The researcher created a four-point rating system for the questionnaire's 25 items. Two measurement and assessment specialists from Nnamdi Azikiwe University, which is located in Awka, approved the device. Utilizing the Cronbach alpha technique, the instrument's internal consistency was assessed, yielding a coefficient of confidence of 0.82. To answer the study questions, the data were evaluated using the standard deviation and mean, and the z-test with a significance threshold of 0.05 was used to test the null hypothesis. The results revealed that the acquisition of entrepreneurial skills improves learning and provides opportunities for skill development among chemistry students, thereby influencing their level of motivation. Female students derived more benefits from entrepreneurial skills than their male counterparts, leading to enhanced motivation in learning chemistry. When it came to the advantages of having entrepreneurial abilities on students' levels of desire to learn chemistry, there was no discernible disparity between male and female students. The identified problems included a lack of materials for acquiring entrepreneurial skills and insufficient funding. In conclusion, the findings suggest that collaborative efforts between the government and educational institutions are necessary to provide the required infrastructure that facilitates the acquisition of entrepreneurial skills.

**Keywords:** scrutinize, entrepreneurial, skills, motivation, chemistry, benefits, level

### Introduction

Every nation aspires to engage its population in activities that promote development and increased income generation. Education serves as a fundamental driver of growth and development, providing individuals with the necessary tools for social and economic advancement. Hence, governments emphasize science education to raise awareness and propel the country toward technological progress (1). In Nigeria, unemployment affects both the educated and uneducated, underscoring the importance of entrepreneurial

development for economies seeking advancement. With the rise in global technological advancements and the increasing unemployment rate in Nigeria, students face added pressure to acquire skills and be productive. Science education, including subfields such as chemistry education and physics education, plays a vital role in teaching and learning science among school children, college students, and the general public (2). Therefore, it is crucial to train students who can apply their knowledge to generate chemical technology, create jobs, and contribute to wealth creation, regardless of gender.

Chemistry education focuses on teaching and learning chemistry, an integral component of STEM education and discipline-based education research (3). Chemistry is essential as it integrates physical, biological, and applied sciences, enabling students to learn the scientific method and develop critical thinking, deductive reasoning, problem-solving, and communication skills. Chemistry also plays a pivotal role in research, with technological applications influencing fields such as biotechnology, material science, and environmental studies (4). As the branch of science concerned with identifying substances, investigating their properties and interactions, and utilizing these processes to create new substances, chemistry provides a foundation for various practical science disciplines such as medicine, agriculture, nursing, and pharmacy. Any country aspiring for technological advancement must prioritize science education, particularly in the teaching and learning of chemistry.

Entrepreneurial skill acquisition is considered the most viable solution for job creation, reducing unemployment, and equipping graduates with the necessary abilities to establish businesses, pursue their goals, and contribute to economic growth and development (5, 6). Basic science skills are crucial for youth, who represent the future leaders of a nation, as they drive the economy forward. Entrepreneurial education redirects young people's ideas toward global business and independence, fostering inventiveness, creativity, and a higher number of entrepreneurs, resulting in sustained national growth and sustainability (7). Entrepreneurship not only fosters skill development but also enhances mental awareness, contributing to poverty reduction through self-reliance. Its role in creating new jobs, reducing unemployment, and stimulating economic growth and development is crucial (8).

Motivation plays a vital role in learning, energizing and directing behavior toward specific goals. It facilitates knowledge acquisition, social development, initiative, persistence, improved performance, and discipline (9). Motivation is the driving force behind sustainable entrepreneurial skills acquisition (10). It represents the desire and willingness to take action toward a goal, arising from internal or external forces that arouse enthusiasm and persistence. Motivation is intrinsic to individuals, fueling the desire for change within oneself or the environment.

The information, values, abilities, and attitudes that new instructors need to increase the motivation of their chemistry students are part of teacher education programs (11). An efficient program that encourages the development of entrepreneurial skills should include classes such as chemical science experimental methods, alloys and metallic substances, ecological and commercial chemistry, fluids and particles, natural and organic goods chemistry, and different practical activities for the synthesizing, evaluation, and evaluation of compounds (12). These skills do not require substantial funding from abroad, as they make use of

available natural and human resources to maximize output and promote sustainable development (13). Practical lessons in chemistry offer numerous opportunities for students to apply their skills and achieve motivation, including the production of items such as soap, air fresheners, disinfectants, and wine (14).

## Statement of the problem

In Nigeria, similar to many developing nations, there is a low level of entrepreneurial skills acquisition. The education system primarily focuses on academic or theoretical education, which prepares students for white-collar jobs and paid employment. This type of education prioritizes certificates and places significant emphasis on content knowledge and passing standardized exams while neglecting the development of practical skills (6). Consequently, graduates from the Nigerian education system lack the necessary competencies required in the job market. This leads to a disconnectivity between the abstract nature of chemistry education and poor academic performance, which can eventually result in high dropout rates. Furthermore, students often perceive the teaching of chemistry theory as challenging, abstract, and difficult, leading to a lack of motivation and a belief that lectures and school as a whole are boring, rendering the content irrelevant (15).

Recognizing the explicit factors, it is important to highlight that poor motivation significantly contributes to high dropout rates in courses. Many youths face unemployment due to a lack of the necessary skills for a productive engagement, resulting in idle hands and minds that can lead to negative behavior within society. Thus, this research studied the advantages of acquiring entrepreneurial skills on the motivational level of chemistry students.

## Purpose of the study

The research ascertained the benefits of entrepreneurial skills on the motivational level of chemistry students. The objectives of the study are designed to scrutinize the following:

1. benefits of entrepreneurial skills in the motivational level of chemistry students;
2. level at which entrepreneurial skills gained by male and female students in chemistry influence their motivational level;
3. level of availability of materials for entrepreneurial capable of improving the motivational level of chemistry students;
4. challenges of entrepreneurial skills acquisition in chemistry lessons;

**TABLE 1** | Influence of entrepreneurial skills acquisition on the motivational level of chemistry students.

S. No.	Items	Male			Female		
		$\bar{X}$	STD	Decision	$\bar{X}$	STD	Decision
1	Entrepreneurial skills acquisition motivates students to develop business ideas, identify business opportunities, and develop risk-taking behavior.	3.30	1.00	Accepted	3.20	0.98	Accepted
2	Entrepreneurial skills acquisition motivates students with the knowledge and skills that will encourage them to build relationships and make money.	3.70	0.46	Accepted	3.60	0.49	Accepted
3	Entrepreneurial skills acquisition motivates problem-solving attitudes and abilities which promotes students' understanding of chemistry concepts.	3.30	0.64	Accepted	3.30	0.64	Accepted
4	Entrepreneurial skills acquisition improves chemistry students' capacity to work effectively in a group and as an individual.	3.30	0.64	Accepted	3.45	0.80	Accepted
5	Entrepreneurial skills acquisition enhances better learning and skill development opportunities among chemistry students which influences their motivational level.	3.45	0.80	Accepted	3.70	0.46	Accepted
6	Entrepreneurial skills acquisition enhances the chances of self-employment among chemistry students	3.30	1.00	Accepted	3.70	0.46	Accepted

5. strategies for improvement of entrepreneurial skills in chemistry lessons for the motivation of students learning chemistry.

## Research questions

1. What are the benefits of entrepreneurial skills on the motivational level of chemistry students?
2. How do the entrepreneurial skills gained by male and female students in chemistry influence their motivational level?
3. What is the level of availability of materials for entrepreneurs capable of improving the motivational level of chemistry students?
4. What are the challenges of entrepreneurial skills acquisition in chemistry lessons?
5. What are the strategies for the improvement of entrepreneurial skills in chemistry lessons for the motivation of students learning chemistry?

## Research hypothesis

The following research hypothesis was formulated to guide the study:

*Ho1: The mean rating scores of students who are male and female do not significantly differ from one another on*

**TABLE 2** | Mean response to the influence of entrepreneurial skills on the motivational level of male and female chemistry students.

S. No.	Gender	N	Mean	SD
1.	MALE	100	3.39	0.76
2.	FEMALE	100	3.49	0.64
	TOTAL	200	4.28	1.38

*the benefits of entrepreneurial skills gained in chemistry on their perceived motivational level.*

## Methods

For the research, a descriptive survey methodology was used. The target audience was made up of students studying chemistry from 26 secondary schools that are publicly owned in the Otuocha education zone of Anambra State. A total of 200 SS2 students studying chemistry were randomly chosen, with no replacements, for the sample. Data collection was conducted using a structured questionnaire that included inquiries regarding the benefits of entrepreneurial skills on the motivational level of chemistry students. The questionnaire comprised 25 items structured on a four-point rating scale, which was developed by the researcher. Two measurement and evaluation specialists assessed this questionnaire and offered their expert opinions in order to guarantee its validity. The final draft of the instrument was created after the researcher made the required adjustments

**TABLE 3 |** Level of availability of materials for entrepreneurial training that are capable of improving the motivational level of chemistry students.

S. No.	Items	$\bar{X}$	STD	Decision
7	Materials for the acquisition of entrepreneurial skills are always available which improves the motivational level of chemistry students.	1.30	0.46	Rejected
8	Materials for entrepreneurial training are supplied at the beginning of every semester which improves students' motivational level.	1.50	1.10	Rejected
9	Materials needed for the acquisition of entrepreneurial skills are not provided in our laboratory.	3.45	0.72	Accepted
10	Our chemistry laboratory is equipped with the materials for entrepreneurship skills acquisition.	1.70	1.00	Rejected
11	Materials for the acquisition of entrepreneurial skills are improvised by students	1.60	0.84	Rejected
12	Basic entrepreneurial skills education materials are donated by NGOs which improves students' self-confidence and enabling skills (hard skills).	1.70	1.00	Rejected
13	The instructor gives the students modules for entrepreneurship training resources, which makes it simpler for them to comprehend the intended learning materials.	1.45	0.66	Rejected

**TABLE 4 |** Mean and standard deviation on the challenges of entrepreneurial skills acquisition in chemistry lessons.

S. No.	Items	$\bar{X}$	STD	Decision
14	Insufficient funding for entrepreneurship education hinders entrepreneurial skills acquisition in chemistry lessons.	3.40	0.90	A
15	Inadequate staff training and retention hinder entrepreneurial skills acquisition in chemistry lessons.	2.50	1.02	A
16	Economic pressure from parents hinders entrepreneurial skills acquisition in chemistry lessons.	3.4	0.68	A
17	Inadequate equipment and technology hinder entrepreneurial skills acquisition in chemistry lessons.	3.25	0.75	A
18	Inadequate infrastructural facilities hinder entrepreneurial skills acquisition in chemistry lessons.	3.00	0.77	A
19	Lack of access to loans hinders entrepreneurial skills acquisition in chemistry lessons.	3.10	1.24	A
20	Inpatient on the part of students hinders entrepreneurial skills acquisition in chemistry lessons.	3.10	0.70	A

A = Accepted.

**TABLE 5 |** Mean and standard deviation of the strategies for improvement of entrepreneurial skills in chemistry lessons for the motivation of students learning chemistry.

S. No.	Items	$\bar{X}$	STD	Decision
21	Modification of the institutions and centers that engage in entrepreneurship education	3.60	0.66	A
22	Establishment of financial institutions to assist graduate entrepreneurs financially	3.65	0.48	A
23	Encouraging chemistry education through the establishment of an entrepreneurship training center in the tertiary institution	3.50	0.67	A
24	Government support to entrepreneurship education through different favorable policies	3.70	0.46	A
25	Collaborative efforts by the government and center to provide needed infrastructural facilities	3.70	0.46	A

A = Accepted.

in response to their comments. Utilizing the Cronbach alpha technique, the instrument's internal consistency was evaluated, and the resulting reliability coefficient was 0.82. After distributing the survey instrument to the respondents, the data were gathered, and the study topic was addressed by employing the standard deviation and mean calculations. A z-test with a significance threshold of 0.05 was also used to assess the null hypothesis. The formula for a z-test statistic, which is used to compare a sample mean to a population mean when the population standard deviation is known, is as follows:

$$z = (\bar{x} - \mu) / (\sigma / \sqrt{n})$$

where

- $z$  is the z-test statistic,
- $\bar{x}$  is the sample mean,
- $\mu$  is the population mean,
- $\sigma$  is the population standard deviation, and
- $n$  is the sample size.

## Results

**Table 1** shows the benefits of entrepreneurial skills acquisition on the motivational level of chemistry students. However, entrepreneurial skills acquisition enhances better learning and skill development opportunities among chemistry students which influence their motivational level.

The data presented in **Table 2** show that entrepreneurial skills influence more female motivational levels in chemistry than males.

**Table 3** shows the level of availability of materials for entrepreneurial training that are capable of improving the motivational level of chemistry students. It is obvious that materials needed for the acquisition of entrepreneurial skills are not provided in the laboratory.

**Table 4** reveals the challenges of entrepreneurial skills acquisition in chemistry lessons. Insufficient funding for entrepreneurship education hinders entrepreneurial skills acquisition in chemistry lessons.

All the items in **Table 5** were accepted, because it produces mean scores above the cut-off point. This shows collaborative efforts by the government and center to provide needed infrastructural facilities.

**Table 6** demonstrates that the computed  $t = 1.006$  and essential  $t = 1.972$  at 0.05 threshold for relevance and at 198 degrees of freedom. We accept the null hypothesis and come to the conclusion that there is no statistically significant distinction between the advantages of entrepreneurial abilities on the levels of motivation of male and female learners in chemistry since the  $t$ -value that was determined (1.006) is smaller than the critical value.

**TABLE 6** | z-Test analysis on the benefits of entrepreneurial skills on the motivational level of male and female chemistry students.

Sex	N	$\bar{x}$	SD	$t$ -cal	$t$ -crit	df	sig.	Dec.
Male	100	3.39	0.76	1.006	1.972	198	0.05	Not Sig.
Female	100	3.49	0.64					

## Discussion

The findings of the study suggested that developing entrepreneurial abilities has a good impact on chemistry students' learning and skill development, which in turn affects their level of motivation. Notably, female students demonstrate a greater influence of entrepreneurial skills on their motivation in chemistry compared to their male counterparts. The findings further revealed a lack of availability of materials required for acquiring entrepreneurial skills within the laboratory setting. Moreover, the insufficiency of funding for entrepreneurship education acts as a hindrance to the acquisition of entrepreneurial skills during chemistry lessons. The study emphasized the importance of collaborative efforts between the government and educational institutions to provide the necessary infrastructure for supporting entrepreneurship education. Additionally, there was not a statistically significant distinction between the learning of entrepreneurial abilities in chemistry lectures between male and female students.

## Discussion

1. It is recommended to recruit qualified and experienced teachers who possess entrepreneurial skills to teach entrepreneurship or vocational subjects in secondary schools.
2. Teachers should undergo training to adopt teaching strategies that promote the acquisition of innovative and entrepreneurial skills.
3. Parents should play an active role in encouraging their children to develop entrepreneurial skills by providing the necessary materials and resources for their classroom experiences.
4. Students should be reoriented to value the practical skills they possess and their ability to think critically. This shift in mindset will reduce their overdependence on the government for employment opportunities.

## Conclusion

This research looked at the effects of developing entrepreneurial skills on students' motivation in the

Otuocha education zone of Anambra State. The findings overwhelmingly support the notion that developing entrepreneurial skills helps chemistry students study more effectively and increase their talents, which in turn affects their motivation. The development of entrepreneurial talents refers to the learning of skills, traits, and knowledge that empower students to be creative and successfully recognize, create, launch, and supervise intimate, community, company, and job possibilities, including self-employment.

Furthermore, the findings highlight the unavailability of necessary materials for acquiring entrepreneurial skills. As a result, inadequate funding for entrepreneurship education acts as a barrier to the acquisition of entrepreneurial skills during chemistry lessons. Nonetheless, the study concludes that collaborative efforts between the government and educational institutions are required to provide the necessary infrastructure and facilities for entrepreneurial training and promote the motivation of students to learn chemistry.

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## References

- Ukpene KJ. Effectiveness of brain-based learning strategy on students' academic achievement, attitude, motivation and knowledge retention in electrochemistry. *J Educ Soc Behav Sci.* (2020) 21:1–13.
- Oriahi SO. Influence of gender difference on students' perceptions of science education: the case of chemistry. *Int J Innov Soc Sci Educ Res.* (2020) 4:13–26.
- Nnoli JN. Teaching chemistry through identification of science process skill involved in the production of perfume using pineapple rind. *J Stem Educ.* (2022) 5:112–20.
- Pérez-Quintanilla D, Sierra I. Occurrence and chemistry of tropane alkaloids in foods, with a focus on sample analysis methods: a review on recent trends and technological advances. *Foods.* (2022) 11:407.
- Okafor CE. The role of vocational and technical education in manpower development and job creation in Nigeria. *J Res Dev.* (2011) 2:152–9.
- Umar HSI, Okafor IJ, Nweke OI. Impact of NYSCS skill acquisition and entrepreneurship development programme on job creation in Abuja, Nigeria. *Eur J Hum Resour Manag Stud.* (2022) 5.
- Landström H, Gabrielsson J, Politis D, Sørheim R, Djupdal K. The social structure of entrepreneurial education as a scientific field. *Acad Manag Learn Educ.* (2022) 21:61–81.
- Oghojafor BE. Entrepreneurship education and elimination Of unemployment among graduates and non-graduates of tertiary institutions In Nigeria. *J Women Emp Stud.* (2021) 1:6–16.
- Kelley EW. LAB theory, HLAB pedagogy, and review of laboratory learning in chemistry during the COVID-19 pandemic. *J Chem Educ.* (2021) 98:2496–517.
- Washington ML, Madden JR, Clevenger MR, Miao C. The power of entrepreneurs and social systems: driving forces for empowerment, mitigating disempowerment, and advancing equity. In: Clevenger MR, Fortunato MW editors. *Entrepreneurial communities and ecosystems.* Oxfordshire, UK: Routledge (2022). p. 100–42.
- Salta K, Koulougliotis D. Domain specificity of motivation: chemistry and physics learning among undergraduate students of three academic majors. *Int J Sci Educ.* (2020) 42:253–70.
- Kempa S. The effect of entrepreneurial orientation on the competitive advantage through strategic entrepreneurship in the cafe business in Ambon. *Int J Bus Stud.* (2020) 2:109–18.
- Nnoli JN. Impacts of improvised organic reagents on senior secondary school students' level of motivation in chemistry. *J Commun Inform Sci.* (2021) 3:1–9.
- Rüschepöhler L, Markic S. Secondary school students' acquisition of science capital in the field of chemistry. *Chem Educ Res Pract.* (2020) 21:220–36.
- Wijnia L. Students' motivation in secondary and post-secondary education. *Educ Psychol.* (2020) 40:913–6.