

Assessment of Employability Skills among Pre-Service Science Teachers in Public Universities in Oyo State, Nigeria

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Abstract

The study assessed the employability skills of pre-service science teachers in the public universities in Oyo State, Nigeria. The research was undertaken to determine the level of acquisition of employability skills that pre-service science educators had acquired during their course of study in preparation for the workforce in the teaching profession. Four hundred and twenty-five 400-level university science education pre-service science teachers in public regular and affiliated universities in Oyo State, who offered Biology, Chemistry, Computer Science, Integrated Science, Physics, Physical, and Health, and Mathematics Education were the samples for the study. Three null hypotheses were formulated for the study. The descriptive survey research design was employed for the study. Self-constructed instrument: Assessment of Employability Skills among Pre-Service Science Teachers Scale (AESPSTS, $R=.79$) was used for data collection. The employability skills of communication, collaboration and teamwork, technology and digital literacy, adaptability and flexibility, problem-solving and critical thinking and time management and organisation were structured as contents for the scale. The validated and reliable instrument was administered to the pre-science teachers in the second semester of the 2022/23 academic session. The data were analysed using mean, t-test, and analysis of variance. The findings showed that the pre-service science teachers have moderate employability skills in Oyo State, Nigeria. The patterns of acquisition of the employability skills were significantly differentiated by gender ($t=-6.19$, $p<.05$), parental educational status ($t=-6.48$, $p<.05$) and students course of study ($F_{(6,416)}=37.28$, $p<.05$). It was concluded that

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the pre-service science teachers have moderated employability skills. The study recommended a shift into a more pragmatic educational curriculum that integrates targeted gender sensitive and employability skills training for pre-service science teachers.

Keywords: Employability skills, pre-service science teachers, gender, parental educational status, course of study.

Background to the Study

Education is the process of facilitating learning by more knowledgeable persons for the purpose of transmitting knowledge, skills, and character traits through various forms which include formal, non-formal and informal methods. The primary purpose of education is to socialise the young ones into society by instilling in them cultural values and norms and equipping them with the necessary skills to become productive members of society. Educating the young stimulates economic growth and raises awareness of local and global problems which are matters of public concern such as social, economic and environmental issues. Education is important in helping any nation of the world adjust to changes and progress (United Nations, 2013; Gitomer & Bell, 2016).

The educational institutions where people of different ages gain an education are preschool, childcare, primary-elementary schools, secondary-high schools, and universities. The key institutions for teacher education in Nigeria are Colleges of Education, Institutes of Education, Faculties of Education in Universities, National Teachers Institute (NTI), Schools of Education in Polytechnics. The minimum qualification for entry into the teaching profession in Nigeria is the Nigeria Certificate in Education (NCE). The National Policy on Education (2013) articulates the importance of teacher education as no education system can rise above the quality of its teachers. The policy mandates that all teachers in education institutions shall be professionally trained.

The pre-service teachers are students who enrolled in teacher preparation programmes in educational institutions but they are yet to teach independently in their classrooms. They undergo education and training before entering the teaching profession where they are equipped with content knowledge in the field of studies, pedagogical

knowledge and technological knowledge. The pre-service teacher should also acquire reflective practice to model desired behaviours by applying rightful values and adapting their teaching based on students' feedbacks. The acquisition of 21st skills is most for students' preparation for the modern world. The pre-service teachers need to develop skills of critical thinking, communication, collaboration, and technology integration (Alahmad, Stamenkovska, & Gyori, 2021 and Ibrahim, 2023).

Buheji and Buheji (2020) identified employability skills as communication, professionalism, personal development, teamwork, flexibility, ideas and innovations, leadership, etc as crucial factors for assessing an individual employability. United Nations Educational, Scientific and Cultural Organisation, UNESCO (2012) documented critical prerequisites of employability as self-esteem, motivation and aspiration. It is expected of the pre-teachers to have acquired contents knowledge, pedagogical knowledge, practical knowledge and 21st century skills education for them to be adequately educated in the field of education and to be gainfully employed into the workforce. Snead and Freiberg (2019) and Kilic and Saglam (2023) reported that pre-service teachers had difficulties in time management, weak in public speaking, answering questions and effective presentation of lessons that are competences required for effective teaching. Singh (2021) reported that many school students do not currently possess 21 century skills in mathematics, technology and science subjects and lack the ability to apply knowledge to meet the ever-increasing demands of the modern era. Adebayo and Kolawole (2021) found moderate communication and teamwork skills but noted deficiencies in critical thinking and problem-solving. Okeke and Nwafor (2019) found gender difference in skills acquisition with females excelling in communication than males in technical skills. Parental educational status also plays a role; pre-service teachers with literate parents tend to develop stronger employability skills due to greater exposure to educational resources (Aina & Ajayi, 2021). Ojo and Adeyemi (2022) found that students' course of study affects skill development, with disciplines like Computer Science and Mathematics fostering better problem-solving abilities. Sahoo et al., (2022) found that science pre-service teachers had more employability skills than their

counterparts in arts subjects. Employability skills are crucial for pre-service science teachers.

Statement of the Problem

Pre-service teachers acquire employability skills through coursework and work experience. The skills are integrated into the curriculum to prepare students for the 21st century workforce. The researchers were motivated to assess the level of employability the pre-service teachers in science education had acquired during their course of study in preparation for the workforce in teaching profession.

Employability skills such as teamwork, problem-solving, and communication are crucial for education graduates to thrive in the competitive global job market. Research findings had reported alarmingly low employability skills among university graduate students and found that the students had low self-concept, self-control, social and communication skills, low in problem-solving and very low in job-searching skills. The studies on employability skills revealed mixed levels of skills acquisition among pre-service teachers in Nigeria. Limited studies also existed on employability skills acquisition in science education by the pre-service teachers regarding gender, course of study and parental educational background. Hence, this study surveyed the level of employability skills that the pre-service science teacher had acquired on exposure to technological pedagogical content knowledge during the study. The identifiable employability skills of communication, collaboration and teamwork, technology and digital literacy, adaptability and flexibility, problem-solving and critical thinking and time management and organisation, which are crucial for the teaching profession were investigated concerning gender, the parental background of the students and course of study.

Objectives of the study

The objective of the study was to assess the level of acquisition of employability skills of pre-service science teachers in communication, collaboration and teamwork, technology and digital literacy, adaptability and flexibility, problem-solving, critical thinking skills, time management and organisation. Specifically, the

study examined the influence of students' gender, parental educational status and course of study on the levels of acquisition of employability skills.

Hypotheses

The hypotheses formulated are:

- Ho1:** There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on gender;
- Ho2:** There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on parental educational status.
- Ho3:** There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on course of study.

Methodology

Research Design

The research design was a survey method to find out the levels of employability skills of communication, collaboration and teamwork, technology and digital literacy, adaptability and flexibility, problem-solving and critical thinking skills and time management and organisation that the students had acquired in their course of training as pre-service science teachers.

Population and Samples

The population for the study was 400-level science education students in the public universities in Oyo State, Nigeria. This consists of the students in both regular universities and affiliated universities in the state. All the students at 400 levels of education who studied Science Education Courses; Biology Education, Chemistry Education, Computer Science Education, Physics Education, Mathematics Education, Integrated Science Education, and Physical and Health Education were purposively sampled, for easy access and effective management of the samples. It was believed that the students in this level had gained sufficient knowledge of

technological pedagogical content knowledge and skills in education that are necessary for their employability in the workforce. The samples were four hundred and twenty-five (425) comprised one hundred and sixty-six male (166) and two hundred and fifty-nine (259) female pre-service science teachers.

Research Instrument

The research instrument was a researchers-constructed self-assessment instrument titled: Assessment of Employability Skills Among Pre-Service Science Teachers Scale (AESPSTS) had thirty statements in a 4-likert scale of strongly agreed, agreed, disagreed and strongly disagreed with scores 4, 3, 2, and 1, respectively, attached to the employability skills of communication, collaboration and teamwork, technology and digital literacy, adaptability and flexibility, problem-solving and critical thinking skills and time management and organisation. The employability skills of communication assessed how pre-service science teachers clearly explained scientific concepts and procedures, listened and responded to students questions, organised lesson plans, laboratory instructions, and facilitated effective classroom discussions. Skills of collaboration and teamwork assessed how the pre-service teachers worked with other teachers, shared resources and ideas, willingness to take fair share responsibilities, respect the perspectives and expertise of their colleagues and co-teach science lessons with another educator. The technology and digital literacy skills assessed the pre-service science teachers' proficiency in using educational technology tools and software, integrating digital resources and multimedia into science instructions, staying up-to-date on new educational technology trends and applications and teaching students on how to use technology appropriately for science learning.

Adaptability and flexibility skills assessed the pre-service science teachers' open-mindedness to the use of new teaching methods and strategies, adjusted lessons and activities to students' needs and feedback, willing to take on additional responsibilities as needed, handled changes and unexpected situations in the classroom calmly and professionally and actively sought professional growth and development. Problem-solving and critical thinking skills:

assessed the pre-service science teachers ability to analyse scientific problems, formulate hypotheses and design experiments, interpret data, draw logical conclusions and communicate findings effectively, think creatively to adapt activities to the students' needs and to use scientific knowledge to make decisions while the skills of time management and organisation assessed how the pre-service science teachers made effective use of time, completed all planned activities, made what are to be done, prioritized deadlines and importance, clearly organised course materials, made plans, and did not get distracted and procrastinated.

The Assessment of Employability Skills among Pre-Service Science Teachers Scale (AESPSTS) was given to three veteran science educators for face and content validation and to rate the appropriateness of the items. The responses of the veterans were analysed using Scott's Pie (π) with inter-rater score of 0.82. The instrument was also test-retested with twenty samples and had reliability coefficient of 0.79 using Cronbach Alpha.

The validated and reliable instrument was administered to the sampled pre-service science teachers in science education at the second semester of their 400 level to determine their acquired employability skills. Data was analysed using mean, standard deviation, parametric statistics of t-test and analysis of variance.

Results

Table 1: Mean and Standard Deviation Scores of Employability Skills

Employability Skills	Mean	Std.
Communication	2.25	0.94
Collaboration and Teamwork	2.91	0.89
Technology and digital literacy	2.84	0.90
Adaptability and flexibility	2.82	0,92
Problem-solving and critical thinking	2.85	0,89
Time management and organisation	2.78	0,92
Overall skills mean score acquisition	2.74	

From Table 1, the levels of employability skills acquired by pre-service science teachers are collaboration and teamwork (2.91), problem-solving and critical thinking (2.85), technology and digital literacy (2.84), adaptability and flexibility (2.82) and time management and organization skills (2.78) and communication skills (2.25). Overall mean score of 2.74 was the pre-service science teachers' acquired employability skills in public universities in Oyo State, Nigeria.

Hypotheses Testing

H01: There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on gender.

Table 2: T-test Analysis of the levels of employability skills acquired by pre-service science teachers based on gender

Gender	N	Mean	SD	Df	T	Sig.	R
Male	166	79.02	19.60	424	-6.19	.000	*S
Female	259	89.24	14.30				

From Table 2, there is a significant difference in the levels of employability skills acquired by pre-service science teachers based on gender in favour of the female gender ($t = -6.19, p < .05$). Therefore, Ho1 is not accepted.

Ho2: There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on parental educational status.

Table 3: T-test Analysis of the levels of employability skills acquired by pre-service science teachers based on parental educational status

Parental Status	N	Mean	SD	Df	T	Sig.	R
Literate	364	84.29	17.71	424	-6.48	.007	*Sig
Illiterate	61	90.77	13.49				

The finding on Table 3 indicates that there is a significant difference in the levels of employability skills acquired by pre-service science teachers based on parental educational status in favour of the illiterate parents pre-service teachers ($t = -6.48, p < .05$). Therefore, Ho2 is not accepted.

Ho3: There is no significant difference in the levels of employability skills acquired by pre-service science teachers based on course of study.

Table 4.0: Analysis of Variance of the levels of employability skills acquired by pre-service science teachers based on course of study

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	44167.125	6	7361.187	37.283	.000
Within Groups	82135.088	416	197.440		
Total	126302.213	422			

From Table 4.0, there is a significant difference in the levels of employability skills acquired by pre-service science teachers based on course of study ($F_{(6,416)} = 37.28, p < .05$). Therefore, Ho3 is not accepted. To ascertain the direction of the difference, Bonferroni Post hoc test was carried out and presented in Table 4.1.

Table 4.1: Post hoc Analysis of the levels of employability skills acquired by pre-service science teachers based on course of study

Integrated Science	Biology	2.147	2.137	1.000	-4.39	8.68
	Chemistry	4.104	2.423	1.000	-3.30	11.51
	Computer	8.271*	2.391	.013	.96	15.58
	Health Education	2.188	2.597	1.000	-5.75	10.13
	Maths	35.222*	2.650	.000	27.12	43.32
	Physics	11.333*	3.112	.006	1.82	20.85

From Table 4.1, the post hoc test revealed that the pre-service teachers in Integrated science had the highest employability skills, followed by that of Biology education, followed by Health education, by Chemistry education, followed by Computer science, followed by Physics education while the pre-service teachers in Mathematics had the least post hoc employability skills.

Discussion

From the presented results, it was identified that the pre-service science teachers have average mean score of employability skills in Oyo state, Nigeria. This is in agreement with the general opinion that the old curriculum of Basic Minimum Academic Standard (BMAS) is deficient in instilling requisite skills in the Nigeria undergraduates (NUC, 2023) that necessitated the need for the new Core Curriculum and Minimum Academic Standard (CCMAS). This result finds supports in Adebayo and Kolawole (2021), and Adeyemo, Akinyele, and Ajayi (2020) that the Nigerian graduates have just moderate employability skills and there is urgent need for more pragmatic strategies to enhance their employability.

Also, from the results of the study, it was discovered that the female pre-service science teachers have a significant higher employability skill than their male counterparts. This might be because the majority of the female students displayed positive disposition to practical entrepreneurship in the state than their male counterparts. This result corroborated the findings of Okeke and Nwafor (2019), with females excelling in communication skills and other entrepreneurial skills than the male students.

Additionally, the pre-service science teachers from the illiterate parents excelled more than their counterparts from the literate parents in employability skills. This can be explained as many of the less privileged to education are promptly and adequately exposed to menial and cash-generating tasks which engender their better employability skills compared to the pre-service science teachers from the literate home where all the home tasks are customized and catered for by the parent elites denying their wards opportunities to develop employability skills. This result contrasted the findings of Aina and Ajayi (2021) that the students from the literate homes were

easily exposed to educational resources that engender their employability skills.

Moreover, the results of the study affirmed a significant difference in the pre-service science teachers employability skills based on their course of study with the biology and Integrated science education students having the highest employability skills than those in purely analytical courses like computer science, physics and mathematics educational courses. This can be explained in light of the varying opportunities embedded in these courses, the Biology and the Integrated science education students have more ample opportunities to practice their skills proving them to higher employability skills compared to those in Physics and Mathematics that are often abstracts and less entrepreneurial. This result is contrary to the submission of Ojo and Adeyemi (2022) that students with disciplines like Computer Science and Mathematics fostering better employability skills.

Conclusion

From the discussed results of the study, the following are concluded that:

- Pre-service science teachers have moderate employability skills in Oyo State, Nigeria.
- Gender significantly influenced pre-service science teachers' employability skills in Oyo state in favour of the female gender;
- Parental educational status significantly influenced pre-service science teachers' employability skills in Oyo state in favour of the illiterate parents' students and that;
- The course of study significantly influenced pre-service science teachers' employability skills in Oyo state in favour of the less analytical courses than the analytical ones.

Recommendations

To ensure optimum employability skills development among the pre-service science teachers in Oyo state, Nigeria, the following are recommended:

1. Educational institutions should integrate targeted employability skills training into the curriculum for pre-service science teachers. This training should be practical and focus on areas where students currently exhibit moderate skills to elevate their competence and readiness for the job market.
2. Since gender significantly influences employability skills in favour of female students, universities should create programs and initiatives that specifically support male students in acquiring and enhancing their employability skills. This could include mentorship programs, skill-building workshops, and inclusive pedagogical strategies.
3. Given that students from illiterate parental backgrounds exhibit stronger employability skills, institutions should investigate and address the underlying factors. They should provide additional support, guidance, and resources to students from literate parental backgrounds to ensure that they receive equal opportunities to develop their employability skills.
4. The curriculum should be implemented to ensure that all courses of study, including more analytical ones, emphasize the development of employability skills. Courses that are currently less analytical should incorporate more challenging content that fosters critical thinking and problem-solving, while more analytical courses should include practical, real-world applications to enhance employability.
5. Universities should collaborate with parents and communities to raise awareness about the importance of developing employability skills. This could involve workshops or outreach programs that educate parents regardless of their educational status on how they can support their children in acquiring and enhancing these crucial skills throughout their education.

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