

## **Social Innovation and the Digital Competence of University Graduates in Nigeria**

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**Abstract:** *Digital competence is vital for every graduate to participate successfully and to stay relevant in today's fast-paced digital age, therefore, the development of digital competence is seen as a critical part of university education where students are taught how to use digital skill for day-to-day applications and for active participation in the society. There has been growing interest among researchers across the globe on how to enhance the digital competence of graduates. This study thus investigated the effect of the social innovation dimension on the digital competence of university graduates in Nigeria. The population comprised 36,494 youth corps members deployed to serve in six selected states which represented the six geopolitical zones in Nigeria. Through a multistage sampling technique, 533 out of the study population were sampled for the study. Five hundred and thirty-three copies of a validated questionnaire with Cronbach's alpha reliability coefficient ranging from 0.750 to 0.937 were administered to the sample. Data were analyzed using multiple linear regression. Findings revealed that social innovative dimensions had a positive and significant effect on the digital competence of university graduates in Nigeria (Adj.  $R^2 = 0.264$ ,  $F(4, 510) = 47.181$ ,  $p < 0.05$ ). The findings further showed that digital innovation ( $B = 0.411$ ,  $t = 8.476$ ,  $p = 0.001$ ) had positive and significant effect on the digital competence of university graduates, educational innovation ( $B = 0.085$ ,  $t = 1.226$ ,  $p = 0.221$ ) and agricultural innovation ( $B = 0.024$ ,  $t = 0.721$ ,  $p = 0.471$ ) had positive but insignificant effect on the digital competence of university graduates, while entrepreneurship education ( $B = -0.090$ ,  $t = -1.951$ ,  $p = 0.052$ ) had negative and insignificant effect on the digital competence of university graduates in Nigerian. The study, therefore, recommended that higher institutions should provide appropriate digital tools and facilities through social innovation that will give students access to manage, integrate, evaluate, analyze and synthesize digital resources for personal and professional needs as well as enhance their employability skills and increases job opportunities.*

**Keywords:** *Agricultural innovation, Digital competence, Digital innovation, Educational innovation, Entrepreneurship education, Social innovation.*

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### **I. INTRODUCTION**

In the increasingly digital world, literacy goes beyond the ability to comprehend text, there is need to develop potentials in people especially graduates that will make them utilize, share and create content using information technologies and the internet which would make them competent to contribute successfully to enterprise progress, enhance active participation in the society, create employment and produce a digital transformed society. Institutions, teachers, and instructors are increasingly required to use digital tools as their teaching aids to foster digital competence among students (Yazon, Ang-Manaig, Buama & Tesoro, 2019). The report of the 2019 survey on digital inclusion and skills in the EU revealed that in 2017, 43% of the EU population had an insufficient level of digital skills, while 17% had none at all (Digital Economy and Society Index Report, 2019). Also in Nigeria, studies revealed that, although Nigerian graduates access the internet daily, many of them are still deficient in digital skills required for employment, like web designing skills, use of software packages, information system and the rest (Onwu & Abah, 2019), that there is incompetency among graduates in the use of digital tools to construct new knowledge and analyze digital resources (McGuinness & Fulton, 2019; Muo, 2016). This has constrained them from being able to use digital tools to access and analyze digital resources, construct new knowledge, create media expressions and communicate with others in the context of specific life situations (McGuinness & Fulton, 2019). However, there has been growing interest among researchers across the globe on what could be done to enhance the digital competence of graduates (Al Khateeb, 2017). Social innovation has emerged as a potentially sustainable solution to the multiple economic, educational, social and environmental challenges, youth unemployment, health crises, among others (Kovacova,

2015). This study, therefore, intends to determine the effect of social innovation dimensions on the digital competence of graduates in Nigeria.

## **II. LITERATURE REVIEW**

There is still an ongoing debate regarding the definition of social innovation as a new phenomenon (Matteo, Eleonora, Riccardo & Silvia, 2018). Social innovation means innovation in social relations (Moulaert, MacCallum, Mehmood & Hamdouch, 2013). This implies that social innovation is the innovation that is central to creating appreciable social change in terms of improvements in social needs, structures of governance, greater collective empowerment, and so on. Social innovation is a new response to pressing social demands, which affects the process of social interactions aimed at improving human wellbeing (Vasin, Gamidullaeva & Rostovskaya, 2017). Educational innovation is a new and unique method of seeking knowledge by reaching the students in more effective and exciting ways (Ukpabio & Ekere, 2018). Ugoani and Nwaubani (2014) defined educational innovation as a process of adopting new and creative ideas that are meant to bring effectiveness, efficiency and change to the educational sector. Educational innovation involves looking at issues in different ways and the thinking process that goes into it helps students develop creativity and problem-solving skills, it also deals with how teachers and students explore, research and use the ideas and methods to uncover something new (Schroder & Kruger, 2019). Entrepreneurship education is a dynamic process of teaching students and potential entrepreneurs the essential skills required to build viable enterprises, equipping the trainees with skills needed for taking responsibility and developing initiatives of prospective trainees (Egbefo & Abe 2015). Equally, Akpan and Etor (2013) defined entrepreneurship education as the process of preparing students to acquire a variety of skills that can make them responsible, self-sufficient with potentials that will make them function as the job creator rather than being a job seeker. Similarly, Odumosu, Binuyo, Adefulu & Asikhia (2020) defined entrepreneurship education as the form of education that trains and develops entrepreneurial skills, attitudes and qualities in learners to promote entrepreneurship culture, identify commercial opportunities that will make them create employment for themselves and others.

Digital innovation deals with the use of learning that occurs through computer-mediated opportunities (e-learning) such as using computers or mobile phones, to access information online (McGuinness & Fulton, 2019). Equally, Hamburg, Vladut, and O'Brien (2017) defined digital innovation as a new idea in education that focuses on creating, sharing, and accessing instructional content in digital forms, including online courses, digital libraries, games, and apps. This definition aligned with the definition by Irungu, Mbugua and Muia (2015) that defined digital innovation as any digital tool, technique, product, process, physical equipment, method of doing or making things that help to improve human capability in an organisation. Wherefore, based on the definitions given, it can be inferred that digital innovation is the application of digital devices to develop and design new products, services, techniques and to improve existing products or knowledge to achieve desired tasks in digital environments. Agricultural innovation is any new technique, process, method, practice or product that brings increase production and income to farmers (Singh & Bhowmick, 2015). Ogundari and Bolarinwa (2018) also defined agricultural innovation as a new package given to people especially farmers to improve agricultural productivity of their farm enterprises. The package can come in form of training on agribusiness, benefits given to farmers through the improvement of their soil fertility, conservation of soil nutrients, water and other natural resources, raising yields, improving pest management, decreasing effects of climate change and supporting other agricultural mechanisms. According to Food and Agricultural Organisation of the United Nations (2018), agricultural innovation is the process of bringing new or existing products into use for the first time in a specific context to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contributing to food security and nutrition, sustainable natural resource management and economic development. Therefore, agricultural innovation can be defined as the new method, modern, improved or superior production technique which directly or indirectly improves the quality and quantity of agricultural production.

Al Khateeb (2017) defined digital competence as the ability to collaborate through the internet and social networking tools to retrieve, evaluate, present and exchange information. Digital competence is the ability to use the latest technologies and information to create, manipulate, design, and to self-actualize digital knowledge to create value (Ferrari, 2013). Janssen, Stoyanov, Ferrari, Punie, Pannekeet and Sloep (2013) stated that digital competence is the set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT (Information and Communications Technology) and digital media to perform tasks like problem-solving, communication, information management, collaboration, creation and sharing content and building knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socializing. In the same vein, McGuinness and Fulton (2019) defined digital competency as the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others,

in the context of specific life situations, to enable constructive social action. It can, therefore, be said that digital competence is the ability to critically and effectively use the latest and wide range of digital technologies to communicate, access, evaluate, analyze and manage information and for problem-solving in every area of life.

### **Empirical Review**

Lyons, Zucchetti, Kass-Hanna and Cobo (2019) noted that educational innovation through digital training, internship, and apprenticeship programs, bridges the digital gap, supports and enhances learning, reduces school dropout rates, grade repetition, improves students' performance and better prepare them for employability after graduation. Álvarez-Flores, Núñez-Gómez, and Rodríguez (2017) opined that digital innovation supports and enhances learning, provides students with new ways to practice their skills, and then improves the quality and effectiveness of school systems and supports students for the future career. A study by Prince-Machado, Sepulveda, and Montoya (2016) on educational innovation and digital competencies submitted that educational innovation significantly impacts the digital competency of learners. Moreover, McGuinness and Fulton (2019) provided parallel views with Prince-Machado *et al.* (2016). Their findings affirmed that digital literacy and the use of e-tutorial reinforce classroom learning, allows students to revise concepts and materials covered in face-to-face classes, at their own pace and time. Similarly, Hamid and Khalid (2016) argued that digital innovation improves the digital skills of students and provides new ways of working effectively. The study by Singh and Jaykumar (2019) revealed that digital innovation plays a major role in the development of critical thinking that is highly valued by employers, and it helps in nurturing soft skills which are the pre-requisite and fundamental requirement for recruitment and job success. Likewise, Adegboye (2018) posited that digital innovation helps to develop digital competency among youths and equip them with the necessary skills to be self-reliant. Zaremohzzabieh, Samah, Muhammad, Omar, Bolong and Shaffril (2016) equally observed that digital innovation is a key driver of competitive advantage, enhances labor mobility, improves job-to-skill matching and reduces downtime for new entrants as well as those between jobs.

Divergently, the findings of Gbadegesin, Alabi, and Omodun (2018) discovered that tensions exist between digital innovations and socio-cultural implications of ICT usage among Nigerian students, which places digital innovation at a disadvantage. Wamuyu (2015) argued that digital innovation has a negative impact on the competencies of students. This study further revealed that the purchase and the maintenance of digital devices are expensive and there is a need to constantly update the technology in order to stay abreast of technology standards which could be a great challenge to schools and organisations.

### **Theoretical Framework**

This study is anchored on Schumpeter's innovation theory ascribed to the works of Austrian-American, scholar Joseph Alois Schumpeter (1883 – 1950). He assumed a perfectly competitive economy which is in stationary equilibrium, no profits, no interest rates, no savings, no investments and no involuntary unemployment (Schumpeter, 1947). Joseph Schumpeter is considered as the primary advocate and architect behind social innovation when he coined the phrase 'creative destruction, to emphasize the inherent dynamics of capitalist production and the crucial role of innovation for economic growth (Schubert, 2017). Schumpeter started with the idea of innovation as the combination of the factors of production, the introduction of something entirely new, and he assigned the role to the entrepreneur who he referred to as an innovator (Sledzik, 2013). His work was centered on "creative destruction" and the roles of entrepreneurship, social innovation and technological development on economic development. According to Schumpeter, social innovation is newness of products (products with better quality and utility), or the use of new resources, novel methods or processes of production that will increase productivity and lower cost of production (Howaldt, Kopp & Schwarz, 2015; Schumpeter, 1947). He also underlines the need for accompanying social innovations in the field of business and culture, politics, and social life, to guarantee the economic effects of technological innovations (Howaldt *et al.*, 2015).

## **III. METHODOLOGY**

This study adopted a cross-sectional survey research design. The study population comprised of 25,578 National Youth Service Corps (NYSC) members deployed to serve in six selected states which represented the six geopolitical zones in Nigeria (Abuja, Bauchi, Kaduna, Enugu, Delta and Lagos state). A sample size of 533 participants was obtained from Krejcie and Morgan (1970) table. A multistage sampling technique was used for the selection of six states from the six geopolitical zones in Nigeria, while a snowball sampling technique was adopted for the selection of the respondents. Data for the study were collected using a validated structured self-developed questionnaire with Cronbach's alpha reliability coefficient ranging from 0.750 to 0.937. The data collected was analyzed using multiple regression analysis.

**Model Specification**

$Y = f(X)$

$Y = f(x_1, x_2, x_3, x_4)$

$DC = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \mu_i$  ..... Equ. (1)

$DC = \beta_0 + \beta_1EI + \beta_2EE + \beta_3DI + \beta_4AI + \mu_i$  ..... Equ. (2)

Where: X = Social Innovation, Y = Digital Competence (DC),  $x_1$  = Educational Innovation (EI),  $x_2$  = Entrepreneurship Education (EE),  $x_3$  = Digital Innovation (DI),  $x_4$  = Agricultural Innovation (AI),  $\mu_i$  = error or stochastic term

**IV. DATA ANALYSES**

Before the analysis of data, diagnostic tests were conducted to ensure that the data did not violate important assumptions of regression analysis. These included tests for linearity, normality, homoscedasticity and multicollinearity. Afterward, various analyses were carried out in line with the hypothesis of the study which states that social innovation dimensions have no significant effect on the digital competence of graduates in Nigeria. Data were analyzed using multiple linear regression and the results are contained in Table 1.

**Table 1 Summary of Multiple Regression for the Effect of Social Innovation Dimensions on the Digital Competence of University Graduates in Nigeria**

N	Variables	B	$\beta$	T	Sig	R <sup>2</sup>	Adj. R <sup>2</sup>	F <sub>(4,510)</sub>	F Sig <sup>2</sup>
515	Constant	17.520		17.377	0.001	0.270	0.264	47.181	0.001
	Educational Innovation	0.085	0.074	1.226	0.221				
	Entrepreneurship Education	-0.090	-0.107	-1.951	0.052				
	Digital Innovation	0.411	0.514	8.476	0.001				
	Agricultural Innovation	0.024	0.032	0.721	0.471				
a. Dependent Variable: Digital Competence of University Graduates b. Predictors: (Constant), Agricultural Innovation, Education Innovation, Entrepreneurship Education, Digital Innovation									

Source: Field Survey (2020)

**Interpretation of Findings**

The results from the above Table 1 showed that social innovation dimensions (agricultural innovation, education innovation, entrepreneurship education, digital innovation) had a positive and significant effect on the digital competence of university graduates in Nigeria ( $F(4, 510) = 47.181$ ,  $Adj. R^2 = 0.264$ ,  $t = 17.377$   $p < 0.05$ ). The results further revealed that only digital innovation ( $\beta = 0.514$ ,  $t = 8.476$ ,  $p = 0.001$ ) had positive and significant effect on the digital competence of university graduates. Educational innovation ( $\beta = 0.074$ ,  $t = 1.226$ ,  $p = 0.221$ ) and agricultural innovation ( $\beta = 0.032$ ,  $t = 0.721$ ,  $p = 0.471$ ) had a positive but insignificant effect on the digital competence of university graduates in Nigeria, while entrepreneurship education ( $\beta = -0.107$ ,  $t = -1.951$ ,  $p = 0.052$ ) had a negative and insignificant effect on the digital competence of university graduates in Nigeria. The summary table showed that  $Adj. R^2$  is 0.264. This means that the agricultural innovation, education innovation, entrepreneurship education, digital innovation all accounted for 26.4% variance in the digital competence of Nigerian graduates. The  $p$  value of 0.001 implies that the regression model is significant at the 95% significance level. The remaining unexplained 73.6% variance could be due to other factors that were not considered in this study model.

From the multiple regression results in Table 1, the multiple linear regression model to predict the effect of social innovation dimensions on the digital competence of university graduates in Nigeria is summarized as follows:

$DC = 17.520 + 0.074EI - 0.107EE + 0.514DI + 0.032AI$ ..... Equ. 3

Where:

- DC = Digital Competence
- EI = Educational Innovation
- EE = Entrepreneurship Education
- DI = Digital Innovation
- AI = Agricultural Innovation

## V. DISCUSSION

The effect of social innovation dimensions on the digital competence of university graduates in Nigeria has been systematically determined. The results of the multiple regression analysis were presented in Table 1. The results showed that social innovation dimensions have a positive and significant effect on the digital competence of university graduates in Nigeria. By implication, it means social innovation bridges the digital gap and improves the digital skill of graduates, improves their performance, effectiveness and helps to connect them to new and better jobs. This finding of this study is consistent with that of Lyons *et al.* (2019) who found that social innovation has a positive and significant impact on digital competence of students. Their study further revealed that social innovation bridges the digital gap, supports and enhances learning, reduces school dropout rates, grade repetition, improves student performance and better prepares the students for employment after graduation. The finding of Lyons *et al.* (2019) sustained the finding of Álvarez-Flores *et al.* (2017) conducted in Europe and Latin America, which showed that social innovation enhances learning, improves the quality and effectiveness of school systems, supports the development of skills among students and also provides new ways to practice the skills for better academic performance and future career.

Additionally, the results of this study pointed out that digital innovation has a positive and significant effect on the digital competence of Nigerian graduates. This suggested that digital innovation using ICT devices, access to ICT instructors, access to interactive digital activities and other new and modern methods bridge the digital gap, supports and enhances learning, improves students' performance and better prepares them for employment after graduation. This validates the previous study by McGuinness and Fulton (2019) who found that digital innovation has a positive and a significant influence on digital competence. This provided parallel views with the study by Prince-Machado *et al.* (2016) who affirmed that digital innovation reinforces classroom learning allows students to revise concepts and materials covered in face-to-face classes, at their own pace and time. Similarly, the study conducted in Pakistan by Hamid and Khalid (2016) declared that digital innovation improves the digital skills of students and provides new ways of working effectively. The study by Singh and Jaykumar (2019) upheld the findings of earlier study by Pakistan by Hamid and Khalid (2016) and further revealed that digital innovation plays major role in the development of critical thinking and soft skill which are highly valued by employers and one of the pre-requisite and fundamental requirement for recruitment and job success. Likewise, Adegboye (2018) posited that digital innovation helps to develop digital competency among youths and equip them with the necessary skills to be self-reliant.

However, the results of this study invalidated the findings of Gbadegesin *et al.* (2018) that discovered that tensions exist between digital innovations and socio-cultural implications of ICT usage among Nigerian students, which places digital innovation at a disadvantage. Also, Wamuyu (2015) argued that digital innovation has a negative impact on the competencies of students. The study further revealed that the purchase and the maintenance of digital devices are expensive, and it is important to constantly update the technology in order to stay abreast of technology standards which could be a great challenge to schools and organisations

The results of this study support Schumpeter's projection of the benefit of social innovation as an essential driver of competitiveness, economic change, and economic dynamics, and that the development of essential skills through social innovation will enhance employability and rapid economic development of any country (Sledzik 2013). Equally, the theory asserted that the increasing complication and competitiveness of modern economies cause the necessity for social innovation and that today's knowledge-based economies are dependent by a dynamic technological progress, and the generation of innovation no longer depends on individual personalities but involves the cooperation of many different actors like the social entrepreneurs and the government (Block *et al.*, 2016; Sledzik, 2013).

Concurrently, the results of the multiple linear regression analyses of this study further displayed that educational innovation and agricultural innovation have a positive but insignificant effect on the digital competence of Nigerian graduates, while entrepreneurship education has a negative and insignificant effect on the digital competence of Nigerian graduates. Though several studies have shown that educational innovation, entrepreneurship education, and agricultural innovation have an individual effect on digital competence, like the study by Lyons *et al.* (2019); Prince-Machado *et al.* (2016) revealed that educational innovation has a positive relationship with digital competence. Their studies confirmed that undergraduate students lack digital skills in the areas of communication, safety and problem solving, lack the basic knowledge on how to use digital media and technologies to solve conceptual problems and as such, education system should imbibe digital innovation in order to support and enhance learning, provide students with new ways to practice their skills, and then improve the quality and effectiveness of school systems and support students to prepare for the future. These findings supported the findings of Green (2015); Hamburg and Bucksch (2017) who further argued that digital innovation changes and revolutionizes education.

However, the contrary view in this study could be because the graduates who are the respondents are not adequately exposed to the required social innovation like educational innovation, entrepreneurship education and agricultural innovation to foster digital competences among Nigerian graduates. Therefore, the

insignificance in the results could be due to the challenges of social innovation like the use of irrelevant curriculum, poor teaching methods, inadequate competent lecturers to make the course practical classes, inadequate teaching materials, lack of systematic plans that can address the existing gap in tertiary institutions, inadequate collaboration with experts, inadequate modern equipment, lack of funds and absence of government support, inadequate credit facilities, unstable social and political climate and insufficient provision of funds by the government (Nnaji & Bagudu, 2017; Oleforo, Oko & Akpan (2013); Osakwe, 2015).

## VI. CONCLUSION AND RECOMMENDATIONS

The study concluded that social innovation dimensions had a positive and significant effect on the digital competence of university graduates in Nigeria, which implies that social innovation dimensions enhance learning, bridges the digital gap, and better prepares the students for employment after graduation. The findings further revealed that digital innovation had a positive and significant effect on the digital competence of university graduates, educational innovation and agricultural innovation had a positive but insignificant effect on the digital competence of university graduates in Nigeria, while entrepreneurship education had a negative and insignificant effect on the digital competence of university graduates in Nigeria. Hence, there is a need to improve digital competence among graduates via social innovation for them to participate successfully and to stay relevant in today's fast-paced digital age. In view of the findings and conclusions of the study, it is recommended that:

- i. The school curriculum should be reformed to promote the use of social innovation for the development of essential digital skills to bridge the digital skill gap among Nigerian graduates.
- ii. Institutions should provide appropriate digital tools and facilities through social innovation that will give students access to manage, integrate, evaluate, analyze and synthesize digital resources for personal and professional needs as well as enhance their employability skills and increases job opportunities.
- iii. The university should provide enough ICT devices and instructors and also provide the avenue for students to have easy access to the use of the devices and other digital skills programmes.
- iv. There should be enough partnership and collaboration with government, social entrepreneurs and non-governmental organizations in enhancing the effective use of the latest and wide range of digital technologies for graduates to stay relevant in today's fast-paced digital age.

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