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Digital Literacy Skills and *STEM* Career Path Choice Intentions among Junior Secondary School Girls in North-Central Nigeria

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Abstract--Secondary schools girls' STEM career path choice intentions refers to the girls' willingness to choose subjects comprising science, technology, engineering and mathematics, which would be required for enrolment into their desired courses of study in higher institutions and eventual career placement in STEM professions. The study investigated digital literacy skills as a determinant of STEM career path choice intentions of secondary school girls in North-Central Nigeria. Survey research design was adopted for the study. The population consisted of 5,433 junior secondary school girls from Federal Government Colleges in the geo-political zone. Multi-stage sampling technique was employed for selecting the sample size of 361 girls. Data collection instrument was a validated questionnaire. Descriptive statistics and binary logistics regression were used for data analyses. Findings showed that GSCPCIs at the junior secondary school level is high. It was also revealed that digital literacy skills can greatly influence girl's STEM career path choice intentions as components of digital literacy skills such as photo-visual skills predicted GSCPCIs ($\beta = 1.270$, $p < 0.05$) while ICT skills ($\beta = 0.100$, $p > 0.05$), reproduction skills ($\beta = 0.458$, $p > 0.05$), information skills ($\beta = 0.016$, $p > 0.05$) and real-time thinking skills ($\beta = 0.071$, $p > 0.05$) were positively correlated with STEM career part choice intentions of girls. Therefore, the study recommends that trainings on digital literacy skills should be intensified at the secondary school level, especially, for girls among others.

Keywords/Index terms - Digital Literacy skills, STEM career path choice intentions, Secondary school girls, North-Central Nigeria, Gender gap

1. Introduction

Career path choice intention is the willingness to choose and enrol for subjects in a particular field of study such as humanities or Arts, Social Sciences, Physical Sciences and applied Sciences, which would eventually be required for a desired career or profession. It also refers to students' aspiration or personal anticipation to select a career path that they can pursue and get established in for life. This involves choices that concern training and education for a particular profession. Career path choice intentions begin to grow in adolescents at the early stage of educational life as it forms the basis for a desired profession in the life of an individual. Ekine and Negar (2013) opined that the choice of a

career path is supposed to be made at an early stage of schooling because that is the time attitudes and interests about learning are developed. Therefore, career guidance is necessary to prepare young people for transition from school to work life. Choosing a career path begins with an intention, then a decision on an individual's career preference. Having made a decision, the individual makes requisite subject choices for the future profession which becomes the career path choice.

Secondary schools girls' STEM career path choice intentions are their willingness to choose and enrol for subjects in science, technology, engineering and mathematics, which would eventually be required for their desired career or profession in STEM fields. STEM career path choice intention precedes the actual choice of a career in that area and directly or indirectly affects the student's life, that of the nation in which he/she lives as well as the entire world, and should not be toyed with. The general global development of the future depends basically on STEM professions (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2014). Iroaganachi, Nkiko and Eni (2017) asserted that for a nation to be able to build new industries develop new technologies and produce food for its people is dependent on the scientific knowledge and skills of its citizens. However, there have been concerns since the early 1970s regarding the inequality between male and female enrolment in science subjects (Ekine & Negar, 2013). These concerns have focused continually on the aftermath of the prevailing disparity in universal scientific literacy and in gender equity in the pursuit of STEM. Part of the challenge is that, at the end secondary school, the number of girls with the background and motivation to further their education in STEM is much smaller than that of males (Iroaganachi *et al*, 2017).

Digital Literacy Skills (DLS) have great potentials for moving the educational frontier forward globally today because of availability of various technological devices at the disposal of students at every level. This does not preclude girls' career path choices in STEM professions. Chase and Laufenberg (2011) referred to digital literacy as an 'inherently squishy' term and defined it as ranging from being fluent technologically (ability to use technological tools or ICT literacy) to being able to demonstrate adequate application of information literacy skills such as ablility to locate, extract, evaluate, organize, manage and present information in the digital environments to more complex and broader conceptual frameworks that encapsulates an extensive variety of norms, skills, understandings and practices.

ICT literacy is fundamental to DLS and it refers to a set of user competences and skills that ease active involvement in a society where cultural activities and services are maintained by computer and disseminated on the internet. Individuals can easily become proficient at ICT skills with the perseverance and dexterity that exemplifies the digital natives (youths). When ICT skill is used properly it has the potential to increase comprehension and learning outcomes. Therefore, ICT has become a veritable tool for learning (formal and informal) and there has been advocacies for its usage across all curricula. Potvin and Hasni (2014) reviewed some research on interest, motivation and attitude towards STEM at K-12 levels and discovered that ICT can greatly improve girls' interest, motivation and attitude. However, Wong and Kemp (2018), affirmed that the level of girls' digital literacy is low because they lack what is required for positions in the digital-based fields. As a result they concluded that girls constitute an insignificant population of digital workforce particularly as it relates ICT and technological literacies.

The concept of digital literacy skills supposes also that to be really of digital literate, entail an understanding of oneself in relation to technologies and digital services as well as possessing an awareness of networked structures (Meyers, Ingrid &Small, 2013). The digital literate individual, from this viewpoint, knows when and how to effectively employ electronic resources to resolve information needs i.e. bridging a gap in knowledge or understanding that prompts a search in addition to being able to evaluate digital contents for currency, credibility and relevance. However, there has been a recent inclusion to this perspective which is the ability to create and share knowledge online, in user-generated forums and social network sites (Meyer *et al*, 2013). This would avail secondary school girls the opportunity of acquiring authentic knowledge for wise STEM career path choice intentions.

As a result of the foregoing, it is obvious that digital literacy can assist students in accessing a range of information that are available electronically as well as collaborating with experts and peers, collecting and analyzing performance data, designing products, building products and sharing knowledge. Thus, digital literacy can improve both theoretical and practical as well as formal and informal facets of STEM education and influence the girls' choices. In fact, DL provides a platform for accessing a variety of electronic resources such as information and tools that expedite and increase learning opportunities in STEM education outside and inside the classroom. This prospect that DL provides can certainly go a long way to simprove girls' decisions in STEM career path choice intentions. Also, digital literacy can help girls to make informed decisions having been able to access, retrieve, and consume available information after evaluating, thinking critically and considering the ethical use of information. Suffice to note that digital literacy skills is critical to the girl-child education particularly STEM education for those from North-Central Nigeria.

However, there is a wide gender gap in STEM fields (UNESCO, 2015; Ojokoh Owoseni, Akinsowon & Isinkaye, 2015). This problem of low female representation in STEM fields could only have been predicated on the career path choice intentions of secondary school girls in the past which may have been due to STEM career knowledge at their disposal, culminating in 30% female representation in STEM globally, 17% representation in Africa and 25% in Nigeria. This has become an issue of concern and discourse that is begging for solution globally. Literature have shown that digital literacy skills among students especially at the secondary school level facilitate access to knowledge. Consequently, it is imperative to know if digital literacy skills can affect STEM career path choice intentions and decisions of Unity secondary school girls. Although some studies have been carried out on gender disparity in STEM in Nigerian secondary schools, from the researcher's knowledge, they have not been directed at investigating the relationships between digital literacy skills, and girls' STEM career path choice intentions especially in North-Central Nigerian Unity secondary schools. It is against this background that the study seeks to investigate how digital literacy skills will influence STEM career path choice intentions of girls in North-Central Nigeria.

Consequently, the study will seek to: ascertain STEM career path choice intentions among the secondary school girls in North-Central Nigeria; determine the possession of digital literacy skills among secondary school girls in North-Central Nigeria and find out the influence of digital literacy skills on STEM career path choice intentions of secondary school girls in North-Central Nigeria. As such, it will seek to provide answers to questions

like: what are the STEM career path choice intentions of Unity secondary school girls in North-Central Nigeria? what digital literacy skills do girls in Unity secondary schools in North-Central Nigeria possess? what is the influence of digital literacy skills on STEM career path choice intentions of Unity secondary school girls in North-Central Nigeria? A null hypothesis to be tested for the study at 0.05 level of significance is: digital literacy skills have no significant influence on STEM career path choice intentions of Unity secondary school girls in North-Central Nigeria.

Female students of Unity schools in North-Central Nigeria in Junior Secondary School 2 and 3 were the focus of this study. JSS1 was excluded from the study because they are fresh in secondary school and might not be able to properly place their career interest and competence yet, whereas SSS1 to 3 already have chosen their career paths. Girls in JSS 2 and JSS 3 were chosen for the study since subject choices that determine career path choice intentions are made within these classes. The rationale for choosing Unity schools is that they are established, run by federal government and should serve as model colleges. North-Central Nigeria was chosen for this study because Northern Nigeria where it is located is the most educationally disadvantaged part of the country. North-Central has the highest number of Unity secondary schools in Northern Nigeria which is obviously a better representation of same in the region.

2. Review of Related works

Career decisions and choices can be very complex such that a lot of people require assistance in exploring available alternatives in order to be able to consider the outcomes that are related with different options (Ajufo, 2013; Durosaro & Adebanke, 2012).

Consequently, career path choices have become a global issue of concern to all and sundry, especially students, parents and academics. Choosing a career path begins with a desire and intention to be in a particular profession or professions in an area or field of endeavour. Thus career path choice intention is the willingness of a student to study a set of subjects in order to be qualified to take up a preferred job in the future. Fatoki (2014) pointed out that career path choice intentions are formed way back (either months or years) before the actual behaviour of making choices. In essence the idea of going into a profession must have been conceived and informed by some factors. Wang, Lu, and Millington (2011) noted that several factors impact on students' career path choice intentions and emphasized the need to understand these antecedents so as to avail stakeholders a clear picture of how intentions are formed and what informs same. This was with a view to properly address the problems of assisting students in readiness for career choices. Sawar and Amaz (2013) affirmed that career path choice decisions are not made on standalone basis but are influenced by multiple factors. Lent, Brown and Hackett (1994) in the social cognitive career theory, identified some of the factors to include; interests, self-efficacy, outcome expectations, and choice goals and that these constructs interact with environmental factors to predict the choices people make concerning their academic and vocational choices.

STEM education has the ability to enhance students' comprehension of how things work and boost their usage of technologies as well as introducing them to more engineering studies in precollege education. This is due to the fact that it directly involves the two important subject matters with high priorities on any nation's agenda, (notably innovation and problem solving). STEM education has

huge economic advancement potential for the society; thus, students should be made to learn about engineering thereby developing some of the dexterities and capabilities associated with design processes (Rust, 2010). Additionally Rust (2010) affirmed that STEM education equips students to acquire skills such as complex communication, adaptability, social skills, self-management, non-routine problem solving and systems thinking to compete in the modern economy.

Consequently, any nation that refuses to give attention to the provision of quality STEM education might quickly find itself the dumping ground for the innovations of other countries, coupled with lack of needed human resources to maintain development and compete in the world's economy (Ekine & Negar 2013). Speedy and feasible growth of a nation can only be achieved through scientific research, sound application of STEM knowledge and skills (Ugo & Akpoghol, 2916). Science and technology are part of the seven learning spheres that are foundational to lifelong learning in the life of an individual, as identified by the Brookings Institution's Learning Metrics Task Force (Brookings institute, 2015).

There is a general notion worldwide that STEM education and jobs are for men even though both male and female sexes have same biological capacity to study and succeed in STEM subjects. However, efforts are being made to erase that perception and bridge the gender gap that exists in STEM education and professions (Iroaganachi, Nkiko & Eni, 2017). For instance, in the United States of America, several initiatives are ongoing to address the issue. The Girl Scouts of the United States of America have, as one of their initiatives towards this goal, a programme that affords girls the opportunity to interact with STEM professionals and other college students, allowing them to desire and be able to study and eventually working in STEM fields (ACT, 2017). In Nigeria, the gap is more and has been identified with a number of initiatives in the pipeline which has not been kick-started (Ekine & Negar, 2013). Delaying developmental initiatives in an aspect such as this has serious implication for a country because the situation will not change until something is done and it is like postponing a doomsday as other facets of the economy would be eventually affected.

Digital literacy skills can also go a long way to promote career path choice intentions among girls. Mossberger, Tolbert and McNeal (2011) and (Westley, 2011) in their studies revealed that digital literacy skills are necessary for searching, accessing, creating and communicating knowledge which required for decisions making. One of the ways digital literacy could promote career path choice intentions among the female folk is through parent education in digital technologies. In an evolving digital world where children are susceptible to abuse of digital contents, the first course of action should be for parents to be equipped with digital literacy skills and tools to educate their wards on the acceptable ethical behaviour in the digital environment (Alliance for Women in Media Foundation, 2011). It is believed that through parental influence high perceived usefulness of digital literacy could be instilled easily in children, regardless of the gender than would be otherwise possible. This assertion is based on the notion that children imbibe parental training more and faster than from other persons or sources. It is estimated that digitally active kids spend above ten hours daily on recreational media (Westley, 2011). The author noted further that with electronic devices such as smartphones, tablets and e-learning, the girl-child is at a needing position to be equipped with digital tools to compete favourably both with boys at school, workplace or in an online environment.

Scarcelli and Riva (2016), investigated digital literacy circulation among adolescents and their findings corroborated the stereotypical image of technology as a field dedicated to specific social actors, typically young teenage boys. WookJoon (2018), Wookjoon (2014) found from his studies that there is digital disparity occasioned by the differences in ability to use digital devices as basic human capital while Phuapan, Viriyavejakul and Pimdee (2015), Ozdamar-Keskin, Ozata, and Royle, (2015) Rambousek, Štípek and Procházka (2013) that there is a wide gap between the female and male folks in terms of internet penetration globally. Therefore, Eshet-alkalai (2012), Isman and Canan (2014), Mossberger, Tolbert and McNeal (2011) concluded that girls may not be considered digital citizens as those who access and use the internet regularly and effectively are so regarded. Eneh (2010) studied gender digital divide among secondary school students in Enugu state of Nigeria, assessing and comparing their Information communication technologies and literacy levels. Findings of the study revealed that the level of ICT literacy were poor generally, however, the boys were found to be better than the girls in ICT literacy parameters tested.

Access to the internet, no doubt, will expose girls to a wider world of information and heighten their knowledge-base which in turn, fosters informed decision-making relative to career path choices. However, gaining quality access to the internet and its resources by girls and women is said to be a function of several factors which include location, ethnicity, gender, education, economic buoyancy, age as well as social and cultural values (Milek, Stork & Gillwald, 2011). Any or combination of these factors affect the opportunity for the girl folk to digitally access developmental information (whether at the individual or communal level) and further increases the already widening digital literacy gap that APC (2017) noted would result in uneven capacity and opportunity to access the internet among girls.

The International Telecommunications Union (ITU) (2016) found that women are about 12 per cent less than men who have access to the internet and according to the union, the figure keeps increasing. Without developing digital literacy skills, survival and success in the information environment remains a mirage for the female folk. The absence or lack of digital literacy skills has multifaceted adverse effects on individuals, groups, organisations and nations. The effect of this phenomenon is obviously more on girls in developing countries compared to what obtains in the developed worlds. Studies by Davaki, (2018), World Bank, World Development Report (2016), have established that the STEM sectors are male-dominated, and if urgent steps are not taken in terms of policy formulation and implementation towards bridging the perceived gender inequalities in STEM, more of these girls will remain trapped in traditional family lives lacking digital skills needed to function maximally in a society driven by technology (Telecentre Women, 2012).

3. Research Design

This research work adopted the survey research design. The survey design is considered appropriate for this study since it seeks to gain insight into a phenomenon as a means of providing basic information on the focus of the study. The total population for this study comprised a total of 5,433 junior secondary school girls (JSS2 and JSS3 girls) in all Federal Government Colleges in North-Central Nigeria.

3.1 Sample and Sampling Technique

The multi-stage sampling technique was used to determine the participants for this study. First the simple random sampling technique was used to select three out of the six states of the zone in addition to FCT (Abuja) making four altogether. Total enumeration was used to include all unity schools in the selected states and FCT, giving a total of 3,613 girls. Taro Yamane (1973) sampling formula was then used to determine the 361 sample size and it is as presented below:

$$n = \frac{N}{1 + N \times (e)^2}$$

n = the sample size
N = the population size
e= the acceptable sampling error
***95% confidence level and p = 0.05 are assumed**

Afterwards, the proportionate distribution formula was used to distribute the sample across the schools. To determine the actual respondents, a sample frame was sought (registers of the girls in JSS2 and JSS3 classes in the schools) from each stratum (JSS2 or JSS3) in each school. Identification number was assigned to each name on the sample frame and respondents were systematically selected from each stratum.

3.2 Data Collection

Data collection Instrument was a validated questionnaire. The section of the questionnaire on digital literacy skills was composed of items that include; ICT skills, Photo-Visual skills, Branching skills, Socio-Emotional skills, Information skills, Reproduction skills and Real-Time Thinking skills. All response formats of the items followed the pattern of a four Likert scale ranging from SA –Strongly Agree=4, A-Agree=3, DA-Disagree=2, to SD-Strongly Disagree=1. To elicit information on girls' STEM career path choice intentions, 2 opposite statements with a binary response pattern and was adopted.

3.3 Data Analysis

The data collected were analyzed using descriptive statistics for research questions 1-2 while the hypothesis was tested using binary logistics regression analyses to answer research question 3. The independent variable in Likert scale was re-computed into binary codes (1 and 2) for proper interpretation of the analyses outcomes. Responses under agree and strongly agree were grouped as agree while disagree and strongly disagree were merged as disagree. Thus, all responses on Digital Literacy Skills were agree and disagree. The dependent variable for this hypothesis remained STEM career path choice intensions, that was captured as binary codes (Yes = 1 and No = 2). A 5% Level of significance was observed throughout. The general binary logistic model is depicted as:

$$Y = Log\left(\frac{P}{1-P}\right) = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n \ldots\ldots\ldots\ldots (3)$$

Where Y = Intention to choose STEM career path

$\alpha_0 =$ the intercept, often described as the constant. This is the expected mean value of Y when all Xs=0.

B's = Various coefficient of various independent variables i.e. indicators of environmental factors).

while, X's are selected independent variables related to environmental factors.

4. Results and Discussion

Research question 1: what are the STEM career paths choice intentions of Unity secondary schools girls in North-Central Nigeria?

Table 1- Descriptive statistics showing STEM career path choice intentions of respondents

I intend to choose STEM career path		
	Frequency	**Percent**
No	26	7.2
Yes	335	92.8
Total	361	100.0

Table 1 revealed that majority (92.8%) of the respondents intend to choose STEM career paths. This finding indicates that the respondents perhaps have basic knowledge of some STEM careers which interest them and informed their intentions (Kazi *et al.*, 2017). The secondary school girls' interests in STEM career path may have been informed by several other factors such as self-efficacy and/or outcome expectation and their interaction with digital literacy skills. Sawar and Amaz (2013) confirmed that career path choice intentions are not made in isolation rather they are determined by multiple factors. Lent, Brown, and Hackett (1994) and Bandura (1986) in their theories of social cognitive career theory and social cognitive theory, asserted that career choice intentions are developed by interest that are informed by self-efficacy, outcome expectations, and their interactions with environmental factors to predict academic and vocational choices.

Research question 2: What digital literacy skills do girls in unity secondary schools in North-Central Nigeria possess?

Table 2: Distribution of respondents and the Digital literacy skills that they possess

ITEMS	SA (%)	A (%)	D (%)	SD (%)	Mean	Std.
ICT Skills					**2.97**	
I have ability to use ICT tools such as Computers, Computer software, tablets, iPods and phones to search for information about STEM careers.	167(46.26)	138(38.23)	32(8.86)	24(6.65)	3.24	.87
Socio-Emotional Skills						
I can send and receive messages on different online platforms such as Facebook, twitter, blogs yahoo mail/Gmail chat room etc.	157(43.49)	102(28.25)	70(19.39)	32(8.86)	3.06	.99
I have the ability to contribute to a group assignment or discussion on the internet such as Moodle, Google classroom, hangout, Google meet etc.	125(34.63)	124(34.35)	59(16.34)	53(14.68)	2.89	1.04
Photo-Visual Skills					**2.83**	
I have the ability to understand information on different graphical user interfaces such as Microsoft word, Excel, PowerPoint, Google sheet, android, etc.	146(40.44)	149(41.27)	43(11.91)	23(6.37)	3.16	.87
I understand STEM information that is presented in the form of symbols and icons such as those of Google chrome, Firefox, internet explorer, PDF, on/off, at, share and lock symbols.	59(16.34)	126(34.90)	112(31.02)	64(17.73)	2.50	.97
Real-Time Thinking Skills					**2.69**	
I can put different pieces of information from different sources online together to create new knowledge.	114(31.58)	135(37.40)	63(17.45)	49(13.57)	2.87	1.01
I can carry out different tasks simultaneously online and stay focused as I switch from one to another.	68(18.84)	123(34.07)	96(26.59)	74(20.50)	2.51	1.02
Branching Skills					**2.68**	
I can perform different activities in the digital environment.	123(34.07)	156(43.21)	49(13.57)	33(9.14)	3.02	.92
I have the ability to access needed STEM information across many different search engines and not get “lost” in cyberspace.	57(15.79)	98(27.15)	115(31.86)	91(25.21)	2.34	1.02
Information Skills						
I can evaluate any information I access from various STEM sources for truth, bias and relevance.	52(14.40)	120(33.24)	106(29.36)	83(22.99)	2.39	.99
Reproduction Skills					**2.59**	
I have the ability to re-present information that is text format in chart, graph, and diagrams.	78(21.61)	147(40.72)	95(26.32)	41(11.36)	2.73	.93
I have the ability to create or manufacture something new based on acquired knowledge such as developing database, blog,	69(19.11)	105(29.09)	107(29.64)	80(22.16)	2.45	1.04
		Overall mean			2.76	.49

SA=Strongly Agree, A=Agree, D=Disagree, SD=Strongly Disagree

Decision rule- 1.00-1.75= Strongly Disagree, 1.76-2.50= Disagree, 2.51-3.25= Agree, 3.26-4.00= Strongly Agree (Mohammed, 2016)

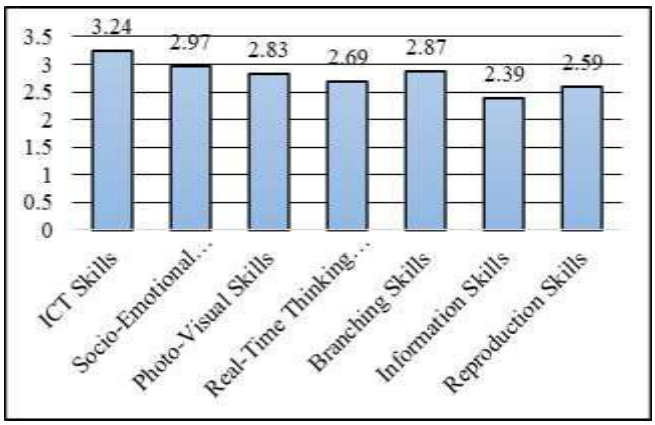

Figure 1: Digital Literacy Skills and GSCPCI

Findings on Table 2 and figure 1 showed that junior secondary school girls possess digital literacy skills based on the overall mean score of (2.76, Std.= .49) on the scale of 4. However, It was revealed that the most prevalent digital literacy skill possessed by the girls is the capability to utilize ICT tools to search for information about STEM careers with a mean score of (3.24, Std.=.87). This implies that the ability to use ICT tools such as Computers, Computer software, tablets, iPods and phones is high among secondary school students such that they are familiar with the tools enough to be able to manipulate same to some extent for maximum benefits. More so, as the result of the girls' *Photo-Visual skills* showed that they have the ability to understand information on different graphical user interfaces such as Microsoft word, Excel, PowerPoint, Google sheet, android with a score of (mean = 3.16, Std.=). From these scores, the researchers ascertain that the girls possess the basic skills (*ICT and Photo-Visual Skills*) required for digital activities and the foundation for development of any aspect of digital literacy skills as recommended by Chase and Laufenberg (2011) which was the emphasis of Wong and Kemp (2018)'s discovery that girls lack the technical capabilities required in the technological environment. These findings are contrary to the result of Eneh (2010) and Scarcelli and Riva (2016)'s studies which revealed that secondary school students' ICT literacy level is low particularly among girls. Nevertheless, the environment, stereotypes, space in time and other factors may have occasioned the findings of Eneh (2010) and Scarcelli and Riva (2016)'s studies.

Although findings revealed that the girls possess ICT and Photo-Visual Skills, the result also showed that they do not possess enough of the major internet search skills which are critical aspect of digital literacy skills and vital to successful performance in the cyberspace (Meyers, Ingrid & Small, 2013). Skills such as: *Branching Skills* (ability to access needed STEM information across many different search engines and not get "lost" in the cyberspace [mean=2.34, Std.=1.02]), *Information Skills* (ability to evaluate any information accessed from various STEM sources for truth, bias and relevance, [mean=2.39, Std.=.99]). *Real-Time Thinking Skills* (like putting different pieces of information from different sources online together to create new knowledge (mean=2.87, Std.= 1.01) and carrying out different tasks simultaneously online and stay focused as one switches from one to another scoring (mean=2.51, Std.=1.02). From these mean scores, it could be ascertained that the girls cannot be efficient learners in the learning milieu that requires the possession of skills to search for and retrieve information and resources the meet desired needs, as well as be able to evaluate and synthesize retrieved information, discuss different ideas and perspectives and share with students to support and solve problems as recommended by (Rambousek, *et al.*, 2013). The possession of *Reproduction Skills*, (ability to re-present information that is in text format in chart, graph, and diagrams. [mean=2.73, Std.=.93] and ability to create or manufacture something new based on acquired knowledge such as developing database, blog [mean=2.45, Std.=1.04]), and *Socio-Economic Skills* (ability to contribute to a group assignment or discussion on the internet such as Moodle, Google classroom, hangout, Google meet [mean=2.89, Std.=1.04]) among the girls is also quite low. Could these findings be due to existing stereotypes that sciences particularly computer and information sciences are meant for boys and not girls? These aspects of the findings are in consonance with the findings from studies by Milek, *et al.* (2011), Phuapan, *et al.* (2015) and Ozdamar-Keskin, *et al.* (2015) Rambousek, *et al.* (2013), which showed that the female folks are more backward in terms of internet penetration globally.

Furthermore, the result revealed that girls have abilities to perform different activities in the digital environment (mean=3.02, Std.=.92)

including sending and receiving messages on different online platforms such as Facebook, twitter, blogs yahoo mail/Gmail chat room (mean=3.06, Std.=.99). This may be mostly limited to social activities thus, agreeing with the finding of Shopova (2014) and Gui and Argentin (2011) that showed that young people are better at social networking, Skype, e-mails, generally surfing the internet and appearing as if they are active gamers and participants in the virtual environment, yet they possess superficial knowledge and competences for effective deployment of new technologies in the learning process. Consequently, there is the need to give girls the opportunity of acquiring internet and other digital skills in order not to deprive them of their digital citizenship as Eshet-Alkalai (2012), Isman and Canan (2014), Mossberger, *et al.* (2011) concluded that girls who are not completely digitally skilled (not very internet savvy) cannot be digital citizens which respondents to this study are supposed to be considering their generation.

Hypothesis: Digital literacy skills have no significant influence on STEM career path choice intentions of unity secondary school girls in North-Central Nigeria.

Table 3: Binary logistic regression illustrating the influence of Digital literacy skills on girls STEM career path choice intentions in unity secondary schools in North-Central Nigeria

Digital literacy skills indices	B	S.E.	Wald	Sig.	Exp(B)	95% CI
ICT Skills						
Have ICT skills (Computers, Computer software),(1)	0.100	0.405	0.061	0.805	1.105	0.499 - 2.444
Disagree (RC)						
Have Photo-Visual Skills(1)	1.270	0.385	10.871	0.001	3.561	1.674 -7.57
Disagree (RC)						
Reproduction Skills	0.458	0.340	1.809	0.179	1.581	0.811 - 3.080
Disagree (RC)						
Branching (Different activities)(1)	-0.182	0.354	0.264	0.607	0.834	0.416 - 1.670
Disagree (RC)						
Information Skills(1)	0.016	0.356	0.002	0.965	1.016	0.560 - 2.040
Disagree (RC)						
Socio-Emotional Skills(1)	-0.243	0.370	0.432	0.511	0.784	0.380 - 1.619
Disagree (RC)						
Real-Time Thinking Skills(1)	0.071	0.363	0.038	0.845	1.074	0.527 - 2.188
Disagree (RC)						
Constant	1.309	0.452	8.399	0.004	3.704	
-2 Log likelihood = 256.966, Cox & Snell R Square = 0.049,,Nagelkerke R Square =0.092						
Source: Fieldwork (2019) NB: Reference category = RC= Disagree (responses)						

The dependent variable as presented in table 3 is girls' STEM career path choice intentions (GSCPCI) while the predictors are: ICT skills, photo-visual skills, reproduction skills, branching skills, information skills, socio-emotional skills, and real-time thinking skills. The result showed that only branching (different activities) and socio-emotional skills are negatively related to girls' intention to choose STEM career path. The regression coefficients are B= -0.182, and -0.243, respectively. More so, the two are not statistically significant (p> 0.05, 95%CI 0.416-1.670) and (p> 0.05, 95%CI: 0.380 - 1.619), respectively. Students that do not possess branching (different activities) and socio-emotional skills are 0.834 and 0.784 times less likely to choose STEM career path respectively, compared to those that disagreed to that question.

Variables that have positive correlations with girls' intention to choose STEM career path include: ICT Skills, photo-visual skills, reproduction skills, information skills, and real-time thinking skills. those that have ICT skills (computers, computer software) would be 1.105 times more likely to choose STEM career path

though not statistically significant (B=0.100, p>0.05, 95%CI: 0.499-2.444). Students who have photo-visual skills (B=1.270, P=0.001; 95%CI: 1.674-7.57) are 3.561 times more likely to choose STEM career path compared to those who do not have same. Similarly, students with reproductive skills are 1.588 more times more likely to choose STEM career path compared to those who do not have it, (B=0.458, P=0.0179; 95%CI: 0.811-3.080). Students that have information skills are 1.016 times more likely to choose STEM career path compared to those that have not (B=0.016, P=0.965; 95%CI: 0.560-2.040). The real-time thinking skill is positively correlated with girls' intention to choose STEM career path among the students that agreed strongly (B= 0.071, p=0.038; 95%CI: 0.527-2.188), and in comparison, with their counterparts.

Findings and analysis presented in Table 3 revealed that photo-visual skills, significantly influenced students' intention to choose STEM career path, implying that junior secondary school girls could intuitively and freely read and comprehend STEM career instructions and messages that are presented in a visual-graphical form as posited by Eshet-Alkalai (2012). This confirms the finding that young persons performed better in a photo-visual test than adults who were in the same category (Eshet-Alkalai, 2012). Contrariwise, ICT skills, reproduction skills, information skills, and real-time thinking skills had no significant influence on secondary 12school girls' intentions to choose STEM career path but they are positively related. The indication of this finding is that to some extent, respondents possess technical skills that are necessary for accessing an array of information that have been stored electronically as agreed by them on table 2. This means that the extent to which the girls possess digital skills is the extent to which they can use same and have impact on their STEM career path choice intentions. Thus, if they possess these skills to a great extent it will be easy to access any information and perform any activity required to make decisions and sustain their intentions.

Branching and socio-emotional skills were negatively related with GSCPCI and did not significantly influence same. This indicates that even though these skills are necessary for meeting the girls' information needs, they do not have it in the required measure at this stage of their lives due to their age and experience as was discovered by Eshet-Alkalai (2012) in a test conduct where adults performed better that adolescents in the skills. This means that junior secondary school girls may not efficiently surf the internet to access required STEM information for application, innovation and creativity. The finding corroborates those of Shopova (2014), Gui and Argentin (2011) and Migunde, *et al.* (2012) who found that majority of the young people who they studied did not really possess the abilities required for employing information technology and the Internet for solving scientific problems, or execute diverse tasks independently or in groups as against their performances when it comes to chatting and interacting with friends. The implication of this is that secondary school girls need to know how to gainfully engage digital skills beyond social interactions. In similar vein, Gee (2012), Phuapan, *et al.* (2015), Ozdamar-Keskin, *et al.* (2015), Abdollahtan, *et al.* (2013) and Westley (2011), averred that basic technical skills are essential capabilities to live in the digital age. The situation presented by this finding could be as a result of the respondents' background and the level of their parents' digital literacy skills (Westley, 2011). Nevertheless, they could be trained and taught about the importance of digital skills by trainers, teachers, friends and peers.

5. Conclusion

The study conclude that secondary school students at the junior level have high intentions to choose STEM career path. Digital literacy skills can and would greatly influence girl's STEM career path choice intentions. Thus, possession photo-visual skills, ICT skills, reproduction skills, branching skills, information skills, and real-time thinking skills holistically is vital for girl's STEM career path choice intentions. Consequently, the study recommends that trainings on digital literacy skills should be intensified at the secondary school level by all stakeholders, among girls specifically. This will enable them acquire more technical and internet skills required for them to survive in this digital era. Also, secondary school management are encouraged to give incentives and or introduce programmes that that will motivate and sustain the students' STEM career intentions such as prizes, awards and recognitions among others. Information literacy should be intensified among

secondary school girls in order to increase their ability to evaluate information in different STEM sources.

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