

Digital Literacy Skills Application on Education of Learners with Autism Spectrum Disorder: A Computer-Based Cross-Sectional Survey of Language Experts

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Abstract

Background/objective: Autism spectrum disorder (ASD) is a brain developmental disability, characterized by the inability of a person to communicate or interact socially. This study investigated digital literacy skills (DLS) application on education of learners with ASD by language experts. Also, the significant association within demographic variables of the experts were examined.

Methods: It was a computer-based cross-sectional survey, conducted between July 2023 and September, 2023. A total of 104 language experts participated in the study. Data collection was completed through a structured instrument titled "Digital Literacy Skills Application Questionnaire (DLSAQ)" which demonstrated 0.87 reliability index. The IBM SPSS version 22 was used for all data computations and analysis. Using frequency counts, percentage scores and odds ratio statistics, statistical data were analyzed.

Results: The results were deemed significant at $p \leq 0.05$. The study revealed that more than three-quarter 81(78%) of language experts apply DLS on education of learners with ASD. Statistically, no significant difference was observed between DLS application on education of learners with ASD based on age, employment status, institution type, gender, monthly income and educational qualification ($p > .05$) while difference existed on marital status, residence, internet access and ICT competence ($p < .05$) respectively.

Conclusion: Language experts apply DLS on education of learners with ASD. The DLS application by language experts is significantly associated with demographic variables. Therefore, a universal adoption of DLS, acceptance and sustainability in education of learners with ASD is paramount and should be encouraged for quality education, social communication and integration in digital environment.

Keywords: Digital Literacy Skills, Autism Spectrum Disorder, Language Experts, Cross-Sectional Design, Students.

1. Introduction

Autism spectrum disorder (ASD) is a brain developmental disability, characterized by the inability of a person to communicate or interact socially. The condition presents significant physical, social, learning, communication and behavioral challenges [1]. The ASD diagnosis includes several conditions which are assessed separately such as autistic disorder, pervasive developmental disorder not otherwise specified (PDD-NOS), and Asperger syndrome [2].

Literature indicates that environmental, biological and genetics factors can trigger ASD particularly in children [3]. Considering certain peculiarities, the victims of ASD have difficulty pointing at objects in expression of interest, hardly relate with others, nor adjust to routine changes, often avoid eye contact, love staying in isolation, among others [4]. When ASD victims are compared

with their normal counterparts, they are adjudged below average in communication, interaction, behavior and learning [5]. Relevant study indicates that learning, thinking, and problem-solving abilities of learners with ASD ranges from gifted to severe [1].

Unfortunately, ASD has no known cure at present [1-4]. However, through expert-based therapies, supports and encouragements, persons with ASD can learn and communicate effectively in a digital environment [6]. Digital literacy entails the application of various digital skills to access information, improve communication and master them [7]. These skills require: the use of web browsers, search engines, emails, text, wiki, blogs, Photoshop, PowerPoint, video creation/editing software; research and information fluency; problem solving and decision making; digital citizenship; critical thinking; finding

information; online safety and functional skills [7,8]. Other elements of digital literacy embrace cognitive, communicative, creative, and critical dimensions [7,8]. Aside the skills to operate devices, digital literacy incorporate other domains of cognitive, motor, and sociological aspects necessary to improve individuals holistically [8]. Evidences demonstrate the significant impact of digital literacy in improving reasoning, use of information and communication abilities in exploring ideas, and conversations [9-11]. The application of digital literacy skills (DLS) aligns with the goal of education which is to improve national growth and development by providing skilful manpower through program of education, accommodating new knowledge and making new discoveries [12]. In recent times, digital literacy is recommended for educating learners with disabilities such as ASD [13].

Experts consider the degree or severity of ASD in the victims in applying DLS [9,13]. Further evidences show that DLS has been applied using different population cohorts [14,15]. However, studies focusing on DLS application on education of learners with ASD are insufficient especially in recent time where every child has right to education. Therefore, the study investigated digital literacy skills application on education of learners with ASD by language experts. Also, the significant association within demographic variables of the experts were examined. The language experts possess unique skills in applying DLS to improve the learning and communication abilities of learners with ASD in digital environment and thus their use in the present study.

2. Methods

The permission to carry out the study was received from the Ethical Review Committee of the University of Nigeria, Nsukka in accordance with the recommended guidelines [16]. Prior to the study, the participants gave their consent to participate in the study in writing.

It was a computer-based cross-sectional survey, conducted between July 2023 and September, 2023. A total of 104 language experts participated in the survey. The participants were recruited through different digital platforms such as google search

engine, personal email address, text messages, and WhatsApp chats. These platforms are the fastest and easiest medium for dissemination and retrieval of information especially in high institutions.

Data collection was completed through a structured instrument titled “Digital Literacy Skills Application Questionnaire (DLSAQ)” which demonstrated 0.87 reliability index and was adjudged reliable based on experts’ recommendations [10,17]. The DLSAQ was structured by the investigators based on extensive literature search using simple English language. The DLSAQ, which can take maximum of fifteen minutes to complete, has two main parts (A and B). The first part elicited the demographic information of the experts while the second part generated data on DLS application on education of learners with ASD. The status of DLS application was determined using a dichotomous response option of “yes”, and “no”. The responses were structured to reflect either applied or not applied in all the items of part B. The investigators accessed the participants through computer-based digital platforms.

The IBM SPSS version 22 was used for all data computation [18]. Frequency counts, percentage scores, odds ratio statistics were applied in establishing the status of DLS application as well as significant association between DLS application and participants’ demographic variables. The results were deemed statistically significant at $p \leq 0.05$.

3. Results

A total of 104 language experts participated in the study. Of all the participants, less than half (41%) were below 30 years with about 56% of them married. More than three-quarter of the experts (85%) were on permanent appointment with less than one-third (31%) resident in rural area. Only 43% of them work in private institutions. Majority of the experts (54%) were females with slightly above two-third (70%) earning 60,000 naira and above monthly. More than two-third of them (72%) enjoy stable internet access with only one-quarter (25%) having first degree qualification. Approximately two-third (63%) of the experts had professional competency in ICT. (see Table 1 for details).

Demographics	Variables	Frequency	Percentage
Personal age	Below 30 years	43	41%
	30 years plus	61	59%
Marital status	Married	58	56%
	Unmarried	46	44%
Employment status	Permanent	88	85%
	Temporal	16	15%
Residence	Urban location	72	69%
	Rural setting	32	31%
Institution type	Private	45	43%
	Public	59	57%
Gender	Male	48	46%
	Female	56	54%
Monthly income (Ngr)	Below 60,000	31	30%
	60,000 and above	73	70%

Internet Access	Stable	75	72%
	Unstable	29	28%
Edu.Qualification	First degree	26	25%
	Higher degree	78	75%
ICT competence	Professional	66	63%
	Amateur	38	37%
Notes: Edu. =education, n= sample size, ICT=information and communication technology,			

Table 1: Demographic Profile of Language Experts (n=104)

Overall, more than three-quarter 81(78%) of the language experts apply DLS on education of learners with ASD. Specifically, the language experts mostly applied: problem solving and decision making (93%), critical thinking (92%), use of web browsers, search engines, emails, text, wiki, blogs, Photoshop,

PowerPoint, video creation/editing software (90%), research and information fluency (85%), information finding (83%), and online safety skills (81%) respectively. Only digital citizenship (61%) and functional skills (60%) were inadequately applied by the experts. (see Table 2 for details).

S/N	Digital Literacy Skills	Applied f(%)	Not applied f(%)
1	Critical thinking	96(92%)	8(8%)
2	Online safety skills	84(81%)	20(19%)
3	Digital culture	78(75%)	26(25%)
4	Collaboration and creativity	72(69%)	32(31%)
5	Finding information	86(83%)	18(17%)
6	Communication and netiquette	76(73%)	28(27%)
7	Functional skills	62(60%)	42(40%)
8	Use of web browsers, search engines, emails, text, wiki, blogs, Photoshop, PowerPoint, video creation/editing software.	94(90%)	10(10%)
9	Adapting to new technology	73(70%)	31(30%)
10	Research and information fluency	88(85%)	16(15%)
11	Digital citizenship	63(61%)	41(39%)
12	Problem solving and decision making	97(93%)	7(7%)
	Average mean percentage	81(78%)	23(22%)
Keys: f=frequency, %=percentage, n=sample size, ()=bracket sign			

Table 2: Analysis of DLS Applications by Language Experts (n=104)

Statistically, no significant association was observed between DLS application and demographic variables of personal age ($p=0.98>.05$), employment status ($p=0.31>.05$), institution type ($p=0.42>.05$), gender ($p=0.09>.05$), monthly income ($p=0.88>.05$) and educational qualification ($p=0.73>.05$).

However, significant association was reported on marital status ($p=0.04<.05$), residence ($p=0.01<.05$), internet access ($p=0.03<.05$) and ICT competence ($p=0.02<.05$) respectively. (see Table 3 for details).

Demographics	Variables	N	Applied f(%)	Not applied f(%)	Odds	OR	p-v	Rmk
Personal age	Below 30 years	43	31(72%)	12(28%)	2.58	0.33	0.98**	NS
	30 years plus	61	54(89%)	7(11%)	7.71			
Marital status	Married	58	44(76%)	14(24%)	3.14	1.24	0.04*	S
	Unmarried	46	33(72%)	13(28%)	2.54			
Employment status	Permanent	88	76(86%)	12(14%)	6.33	2.11	0.31**	NS
	Temporal	16	12(75%)	4(25%)	3.00			
Residence	Urban location	72	64(89%)	8(11%)	8.00	2.24	0.01*	S
	Rural setting	32	25(78%)	7(22%)	3.57			
Institution type	Private	45	33(73%)	12(27%)	2.75	0.70	0.42**	NS
	Public	59	47(80%)	12(20%)	3.92			
Gender	Male	48	38(79%)	10(21%)	3.80	1.27	0.09**	NS
	Female	56	42(75%)	14(25%)	3.00			
Monthly income (Nga)	Below 60,000	31	22(71%)	9(29%)	2.44	0.30	0.88**	NS
	60,000 and above	73	65(89%)	8(11%)	8.13			
Internet Access	Stable	75	64(85%)	11(15%)	5.82	1.52	0.03*	S
	Unstable	29	23(79%)	6(21%)	3.83			
Edu. Qualification	First degree	26	18(69%)	8(31%)	2.25	0.29	0.73**	NS
	Higher degree	78	69(88%)	9(12%)	7.67			
ICT competence	Professional	66	55(83%)	11(17%)	5.00	1.55	0.02*	S
	Amateur	38	29(76%)	9(24%)	3.22			

Keys: DLS =digital literacy skills, ICT=information and communication technology, OR= odds ratio, n= sample size, %= per cent, P-V=probability value, f=frequency, S*= significant, NS**= not significant, Rmk=remark.

Table 3: Analysis of Association Between DLS Application and Participants' Demographic Variables (n=104).

4. Discussion

This study is the first of its kind to present a cross-section of demographic characteristics on DLS application by language experts on education of learners with ASD. It was found that more than three-quarter (78%) of the participant apply DLS on education of learners with ASD. This finding is quite inspiring as it reflects the global emphasis on the need for proper education of learners regardless of prevailing disability [12]. In line with the finding, Amiri revealed a significant effect of DLS on at risk individuals with low status of economy [14]. Similarly, a significant effect of DLS application was reported in another review [19]. A study at the university level reported a positive effect of DLS application on students [20]. Also, Ozdamar-Keskin et al revealed that DLS application was effective in examining the competences and learning habits of learners in open and distanced categories [21]. In our finding, the high score on problem solving and decision making skills demonstrates the degree of encouragements and supports the learners are enjoying from the experts which could be as viable strategy to equip them with the needed skill to be independent in addressing personal issues and solving critical problems. Perhaps, evidences highlighting adversities of ASD on the victims are already reported [1,2], and thus, justifying the experts' efforts. This is also in accordance with the assumption that learners are digitally literate, pragmatic in reasoning and socially centered [6]. Our finding emphasizes the role of experts in skill applications. For instance, since ASD has no known cure at present, the DLS application becomes viable tool to help the ASD victims to learn concepts and internalize ideas, interact and communicate measurably in social settings, work in a group, solve problems

with minimal assistance or support, make rational decision and be responsible for their actions [22]. Secondly, based on experience and expose, the experts might have seen the need to assist the learners to improve functionality and fill the gaps of inadequacy [5]. Additionally, our finding presents significant implications on education, research and policy. The educational institutions may adopt findings in broadening educational syllabus and curriculum to accommodate different DLS for effective education of learners with ASD. Also, the findings could serve as reference points for academic researchers who may further researches of this kind. Finally, the policy makers may adopt the findings in modifying existing policies or formulating new ones with greater emphasis on the significant effects of DLS application on education of learners with ASD. Statistically, no significant association was observed between DLS application on education of learner with ASD and variables of age, employment status, institution type, gender, monthly income and educational qualification while difference was reported on marital status, residence, internet access and ICT competence respectively. However, previous studies reported similarities in significant associations in their respective reviews [2,3,12,21-23].

Our study reports some limitations and strength. The application of appropriate design, multiple demographic characteristics and study methodology represents the strength of the study. However, the major weakness or limitation of the study lies primarily on the use of only questionnaire for data collection thereby restricting the experts from sharing personal views and experiences regarding the study phenomenon. Considering the profile of the professionals, availing them the unique opportunity

to share quality experiences would have added significant value to the study. Therefore, there is need for further studies in this area of research to explore other dimensions of qualitative approaches to data collection and analysis such as interviews, focus group discussion among others.

5. Conclusion

Language experts apply DLS on education of learners with ASD. The DLS application by language experts is significantly associated with demographic variables. Therefore, a universal adoption of DLS, acceptance and sustainability in education of learners with ASD is paramount and should be encouraged for quality education, social communication and integration in digital environment.

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