Special Issue
Journal of General Studies ESUT ISSN: 1115-6767, E-ISSN: 2971-6241 **Vol. 7 No. 1, 2025**

BARRIERS TO IMPLEMENTATION AND UTILIZATION OF ARTIFICIAL INTELLIGENCE FOR COMMUNITY HEALTH EDUCATION IN NKANU WEST LGA ENUGU STATE

Ani, Ifeoma Pamela; Ezeugwu, Joseph Agu; & Nwosuobieogu, Donatus Ikenna
Department of Human Kinetics & Health Education. Faculty of Education, Enugu State University of Science and Technology (ESUT), Agbani, Enugu.
ifeomapamela12@gmail.com obieogudon01@gmail.com +234 8137279065 +234 8038732974

Abstract
Implementing Artificial Intelligence (AI) in community health offers transformative potential for focusing on personalized learning, increased efficiency, and enhanced accessibility in health sectors. Thus, the study was on barriers to implementation and utilization of artificial intelligence for community health education in Nkanu West LGA Enugu State. To achieve this, two purposes of the study, two research questions and two null hypotheses guided the study. Descriptive survey research design was adopted for the study. The area of the study is Nkanu West LGA which consists of ten communities. The population for the study consisted of 70 community health educators. The sample size for this study was 70 respondents there was no determined rule because the population was manageable. Multi-sampling techniques involving the purposive, stratified and proportionate sampling techniques were adopted in the study. Instrument for data collection was structured questionnaire. The data collected were analysed using mean score and standard deviation (SD) to answer research questions while the hypotheses were tested using t-test statistic at .05 level of significance. The findings of the study revealed that the respondent disagreed on the implementation and utilization of artificial intelligence for community health education. Hence, technological barriers to utilization and implementation of AI and its attendant disadvantages existed in community health education in Nkanu West local Government area of Enugu state. The study then recommended among others that government should invest in the utilization and implementation of artificial intelligence (AI) in Nkanu West by subsidizing its cost, providing ethical guidelines, data protection and general accessibility to data and tools that guarantee the utilization and implementation of AI for community health education.

Keywords: Artificial Intelligence, Barriers, Community Health Education, Implementation, Utilization.

Introduction
Artificial Intelligence has emerged as a transformative force capable of addressing many of the pressing barriers in community health education. Artificial Intelligence (AI) is revolutionizing education by enhancing personalized learning, automating administrative tasks and fostering innovation in community health education (Wang, 2019). Russell and Norvig (2021) reviewed AI to have the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception and decision-making. Artificial intelligence (AI) is a field of computer science and engineering with abilities required by human intelligence. One of the most important usage areas of AI is the community health education.

From the areas of community health education are professionals who work to promote health, prevent diseases and improve the overall well-being of individuals and the communities. The often focus on educating people about healthy behaviours disease prevention and control of chronic conditions with AI smart applications is to effectively promote human healthy living (Wang, 2019). Frank (2023) corroborates this view, maintaining that strengthening health education with AI practices may provide individuals and community health education professionals with more application opportunities that will enable them to carry out follow-up care services and health education in areas like vital signs; blood pressure, pulse, fever monitoring of virtual patients, virtual vascular access and blood drawing**.**

Therefore, AI as a field of computer science software enable**s** machines to perceive the health environment and help healthcare monitoring to achieve delineate goals (Leffer, 2024). It may thus improve the health of individual, the community and the nation through its utilization to develop in people a sense of responsibility for their own health and that of the community (Labadze, Grigolia and Machaidze, 2023). This means that implementation and utilization of AI stand to revolutionize community health education by personalizing learning experiences with adaptive platforms, providing interactive simulations for practical skills, analysing community feedback for better program design and predicting health education trends to effective target interventions (Evans, 2023). In other words, it stands to enhance patient engagement with health information via mobile apps, supports health professionals in decision-making and help in bridging the access gaps for underserved communities by providing scalable health educational resources (Kenneth, 2019).

Since Artificial Intelligence has the ability to complete any task performed by human it then means that community health education need to adapt, implement and utilize a wide range of AI techniques, including search and mathematical optimization, formal logic, artificial neural networks and methods based on statistics, operations research, economics, psychology, linguistics, philosophy, neuroscience, and other fields (Kenneth, 2019). This is what Greenhow (2022) meant when he portrays AI tools; intelligent tutoring systems, adaptive learning platforms and virtual assistants as providing communities with customized learning experiences and urged individuals to possess a strong grasp and use of AI in the field of community health education.

Implementing Artificial Intelligence (AI) in community health education in Nkanu West therefore offers transformative potential for towards focusing on personalized learning, increased efficiency and enhanced accessibility in health sectors (James, 2024). It may drive significant attention of health educators to AI-empowered health education practices; such as virtual Community health education classrooms, smart health education campuses, adaptive health learning and teaching evaluation; thereby revolution the community health education. In this direction, implementation and utilization of AI in community health education in Nkanu West

would tailor learning experiences to individual health needs, automate administrative tasks, provide valuable insights for health educators and ultimately foster a more effective and engaging health education environment (David, 2025).

It would create chances for health professionals to guide individuals in utilizing AI-powered health applications and patient portals to access their health information, track conditions and engage more actively in their care. It would as well create room for AI-driven simulations that may provide hands-on, real-world experience in a controlled environment, allow community members to practice skills and understand complex health scenarios, deliver health education to underserved communities, bridge gaps in access and provide scalable, efficient health solutions (Halper, 2017). Yet, these lofty functions notwithstanding, some barriers constitute hindrances to the implementation and utilization of AI for community health education in Nkanu West local government area of Enugu state. Gertner (2023) concurs that the absence of these barriers enables accessibility of health education, community feedbacks and innovative virtual health contributions that refine community health education and ensure its further relevance and impact on the local community. These barriers are what this study sets to determine in Nkanu West local government area of Enugu state

Statement of the Problem

Technological challenges pose significant barriers to the implementation and utilization of AI for community health education in Nkanu West local government area. Thus, lack of adequate ICT infrastructure**;** including low internet penetration rates and limited access to high-performance computers are presumed to be making it difficult to implement and utilize AI systems for community health education in Nkanu West. The cost of purchasing, maintaining and upgrading high-performance computers is often prohibitively expensive. Lack of policies to direct health development and dissemination in community health is too viewed to be affecting digital health education while the progression of technology frequently outpaces regulatory frameworks in Nkanu West, and thus hinder the adoption of digital health initiatives.

Empirically therefore, the fact that some rural areas may find it difficult to get internet connectivity makes this condition a hindrance to the implementation and utilization of AI-platforms for community health education. This is more so, as poor internet connectivity limits the reach of remote community health education services in Nkanu West. Indeed, the alleged barrier is a limitation to the implementation and utilization of AI for community health education in Nkanu West given the dependence on strong internet connections for advanced computing capabilities necessary for adequate community health education. There are also the problem of financial constraints to the acquisition, installation and maintenance of high-performance installation and maintenance of high-performance computers as well as lack of specialized expertise and digital skills among community health educators in Nkanu

West. All these are envisaged barriers to the implementation and utilization of AI for community health education in Nkanu West, which this study tends to ascertain.

Purpose of the Study

The purpose of the study is to ascertain

1. the technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA
2. the technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA

Research Questions

The following research questions guided the study:

1. What are the technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA
2. What are the technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA

Hypotheses

The following null hypotheses guide the study and were tested at.05 level of significance

Ho_1: There is no significant difference between the mean responses of male and female community health educators on technological barriers to implementation of artificial intelligence in Nkanu West LGA

Ho_2: There is no significant difference between the mean responses of male and female community health educators on technological barriers to utilization of artificial intelligence in Nkanu West LGA

Methods

Descriptive survey research design was adopted. Nworgu (2015) defined descriptive survey research designed as one in which a group of people or items are studied by collecting and analysing data from only a few people or items considered being representative of the entire group. The design was suitable because the study was meant to gather information from part of the population and the findings generalized to the entire population. The area of the study is Nkanu West LGA which consists of ten communities namely: Agbani, Akpasha, Akpugo, Akegbe Ugwu, Amurri, Amodu, Obe, Obioffia, Ozalla and Umueze. The population for the study consisted of 70 community health educators from ten communities in Nkanu West LGA. The sample size for this study was 70 respondents consisting of male and female community health educators. There was no determined rule used the population was manageable. Multi-stage sampling procedure was adopted. The first stage involved the use of purposive sampling technique to sample all the communities in Nkanu West LGA of Enugu State. In addition, stratified random sampling technique was utilized to stratify the communities into urban and rural locations while proportionate random sampling technique was used to sample 35 community health

educators from urban and 35 community health educators from rural locations these gave the total number of 70 respondents. The questionnaires were administered to the respondents and supervised by the researcher with four research assistants, and the completed copies were collected back from the respondents at the spot. This ensured high return rate of 100%.

Mean and standard deviation were used to answer the research questions; while hypotheses were tested using t-test statistics. In rating the computed mean scores, items whose mean scores were 2.5 and above were regarded as agreed (A) while the items that fall below 2.5 were regarded as disagreed (D). The criterion mean of 2.5 obtained by summing up the weighted options (4+3+2+1=10) and diving it by total number of response options (4) as follows; 10/4=2.50. SPSS version 23 was used for t-test statistics which was used to test the null hypotheses at 0.05 level of significance at appropriate degree of freedom. The decision rule for the hypotheses was that, the null hypotheses was not rejected when the t- value is less than the significant table value, but rejected when the t-value is greater than or equal to the significant table value.

Research Question one: What are the technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA?

Table 1: Mean Response Distributions of the Respondents on the technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA

N=70

S/N	ITEMS	SA	A	D	SD	X	SD	DEC.
1.	AI have been adapted to community health education	7	15	19	29	2.0	1.0	D
2.	There is data privacy for implementing AI	4	10	12	44	1.6	0.0	D
3.	AI implementation is secured for CHE	6	21	13	30	2.0	1.0	D
4.	AI is operated automatically	13	12	18	27	2.2	1.0	D
5.	AI is accessible for community health education	8	14	11	37	1.9	0.1	D
6.	Implemented AI supported health decision making	29	19	15	07	3.0	1.2	A
7.	High cost of AI may not affect the implementation	5	9	14	42	1.7	0.0	D
8.	Infrastructural restrictions can not hinder AI implementation	2	11	16	41	1.6	0.0	D
9.	There is dependable electricity for AI implementation	3	7	11	49	1.5	0.0	D
	GRAND MEAN					**1.9**	**0.1**	**D**

Data presented in Table 1 shows that items 1, 2, 3, 4, 5, 7, 8 and 9 had mean responses of 2.0, 1.6, 2.0, 2.2, 1.9, 1.7, 1.6 and 1.5 respectively which are lesser than the cut-off point of 2.5, therefore, indicating disagreed. Contrarily, item 6 had mean response of 3.0 which was higher than cut-off point of 2.5, indicating agreed. The standard deviation ranges from 0.0 – 1.2, implying that the responses are close to each other. The grand mean of 1.9 was lesser than the cut-off point 2.5, hence indicating

disagreed. Therefore, this implying that the respondent disagreed on the implementation of artificial intelligence for community health education hence, technological barriers for AI implementation existing in Nkanu West LGA

Research Question two: What are the technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA?

Table two: Mean Response Distributions of the Respondents on the technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA

N=70

S/N	ITEMS	SA	A	D	SD	X	SD	DEC.
10.	Constant connectivity for AI utilization	11	13	19	27	2.4	0.2	D
11.	effectively utilize AI tools to complete tasks	14	15	12	29	2.2	0.1	D
12.	Integrated technical details for AI utilization	13	12	11	34	2.1	0.0	D
13.	AI can be automatically utilized	19	12	18	21	2.4	0.1	D
14.	AI is accessible for CHE utilization	08	17	15	30	2.0	0.1	D
15.	AI facilitate discussion for CHE	21	14	10	25	2.4	0.2	D
16.	AI is easy to utilized among CHE	26	08	14	22	2.5	1.1	A
17.	AI is not difficult to apply to arguable subject	16	15	16	23	2.3	0.1	D
18.	Dependable electricity for AI utilization	09	21	08	32	2.1	1.0	D
19.	AI is utilized for CHE model development	29	14	10	17	3.1	1.2	A
20.	AI is utilized for decision making	23	20	16	11	2.8	1.2	A
	GRAND MEAN					**2.4**	**1.0**	**D**

Data presented in Table 2 shows that items 10, 11, 12, 13, 14, 15, 17 and 18 had mean responses of 2.4, 2.2, 2.1, 2.4, 2.0, 2.4, 2.3 and 2.1 respectively which are lesser than the cut-off point of 2.5, therefore, indicating disagreed. While items 16, 19 and 20 had mean response of 2.5, 3.1 and 2.8 which are equal and higher than cut-off point of 2.5, indicating agreed. The standard deviation ranges from 0.0 – 1.2, implying that the responses are close to each other. The grand mean of 2.4 was lesser than the cut-off point 2.5, hence indicating disagreed. Therefore, this implies that the respondent disagreed on the utilization of artificial intelligence for community health education hence, technological barriers for AI utilization existed in Nkanu West LGA

Hypothesis 1: There is no significant difference in the mean response of male and female educators on technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA based on location

Table 3: Summary of t-test analysis of mean scores of responses on technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA

LOCATION	N	Mean	Std. Deviation	t	Df	Sig.	Decision
Urban	35	2.23	.49	-7.148	69	.000	NS
Rural	35	1.44	.44				

Table 3 show mean values of 2.23 for urban and 1.44 for rural and corresponding standard deviations of .49 and .44 respectively. Also, the table shows a t-value of -7.148 and a significant value of .000 at 69 degree of freedom. Since significant value of .000 is less than significant levels of 0.05 the null hypothesis of no difference is not rejected. Therefore, there is no significant difference in the mean responses in urban and rural communities for technological barriers to implementation of artificial intelligence for community health education in Nkanu West LGA.

Hypothesis 2: There is no significant difference in the mean response for technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA based on location

Table 4: Summary of t-test analysis of mean scores of responses for technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA

LOCATION	N	Mean	Std. Deviation	t	Df	Sig.	Decision
Urban	35	2.40	.41	-1.127	69	.000	NS
Rural	35	1.14	.36				

Table 4 show mean values of 2.40 for urban and 1.14 for rural and corresponding standard deviations of .41 and .36 respectively. Also the table shows a t-value of -1.127 and a significant value of .000 at 69 degree of freedom. Since significant value of .000 is less than significant levels of 0.05 the null hypothesis of no difference is not rejected. Therefore there is no significant difference in the mean responses in urban and rural communities for technological barriers to utilization of artificial intelligence for community health education in Nkanu West LGA.

Discussion of Findings

One of the findings revealed that the respondents disagreed on the implementation of artificial intelligence for community health education hence technological barriers for AI implementation existed. This was not surprising because James (2024) opined

that implementing Artificial Intelligence (AI) in community health could offer transformative potential for focusing on personalized learning, increased efficiency and enhanced accessibility. David (2015) supported that Artificial Intelligence (AI) implementation in community health education could rapidly grow and gain significant attention from health educators to the community health sectors. In addition, AI-empowered systems, such as virtual classrooms, smart campuses, adaptive learning and teaching evaluation may have the potential to revolutionize the health education sector. AI need to be implemented for a specific tasks, collecting and processing relevant data, selecting appropriate AI models and integrating them into systems. AI systems learn from data and make decisions or predictions to achieve predefined objectives. Further investigations reveal that there was no significant difference in the mean responses in urban and rural communities for technological barriers to implementation of artificial intelligence for community health education. Therefore, implementing AI for community health education may automate tasks like grading, scheduling and report generation; freeing up time for more focused interaction with individuals. This may enhance accessibility to provide real-time translation, speech to text capabilities, and adaptive learning materials, benefiting individuals in the communities.

Another finding indicates that respondents disagreed on the utilization of artificial intelligence for community health education since it has not been implemented hence, technological barriers for AI utilization existed. This was expected because according to Aleander (2021) AI may be utilized to improve the delivery of community health education if implemented because the technologies are made to automate operations that have historically required human labor, evaluate data, and adjust to each learner's unique needs. Additionally, Leffer (2024) states that in facilitating adaptive learning pathways and enhancing information delivery immersive technologies like virtual and augmented reality may promotes lifelong learning. However, rigorous data protection regulations, ethical frameworks, and intensive training are necessary to fully utilize AI in community health education. This synchronizes with further investigations revealing that there was no significant difference in the mean responses in urban and rural communities on technological barriers to utilization of artificial intelligence for community health education. These responses point to the fact that removing the barriers, AI stands to revolutionize community health education by personalizing learning experiences with adaptive platforms, providing interactive simulations for practical skills, analysing community feedback for better program design and predicting health trends to target interventions more effectively.

Conclusions

The study determined the barriers to the implementation and utilization of AI in community health education in Nkanu West local government area of Enugu State.

The study finds that without the existent barriers, community health education in Nkanu West would undergo positive transformation with the application of artificial intelligence**.** This is as AI has potential to solve long-standing issues and get individuals ready for a world that is changing quickly. Thus, AI integration in Nkanu West can become a reality with a dedicated and inclusive approach encompassing the government, health educators, commercial partners and communities Therefore, now is the time for the government of Enugu state to take action since funding AI in community health education in Nkanu West is an investment towards actualizing a healthy and productive society.

Recommendations of the Study

Based on the findings of the study, the researcher recommends that

1. Government should invest in the implementation of artificial intelligence AI in community health education; reduction of its high cost, provision of constant security, accessible data and tools for model development. There should be ethical guidelines and data protection.
2. Government should also facilitate the effective utilization of AI among community health educators for real-world problem solving, creativity, experiential learning and decision making. It is essential to provide gadgets, subsidize the cost of internet access and localize internet contents.

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