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Exploring Artificial Intelligence (AI) Technologies in Enhancing Students' Knowledge on Nutritional Benefits of Fruits and Vegetables

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Abstract: *With the growing concerns about nutritional deficiencies and lifestyle diseases, leveraging AI to promote healthier eating habits is an area of interest. Thus, this study explores AI technology in enhancing students' knowledge on the nutritional benefits of fruits and vegetables consumption. Three research questions guided the study. Descriptive survey research design was adopted. Study population consisted of the entire (5,757) Emmanuel Alayande University of Education students' while sample size of 180 students were selected. Structured questionnaire was used as instrument which was validated by three experts. Descriptive statics mean was used to analysed the data. Study found a high level of knowledge and usage of AI technologies among students, yet they rarely utilize these technologies towards knowledge on the nutritional content of vegetables and fruits. Study concludes that, there is a high level of knowledge and usage of AI technologies among students, but it is not directed towards seeking knowledge on the nutritional benefits of fruits and vegetables. And the main barrier to the utilization of AI technologies in seeking knowledge on fruits and vegetables among students is largely due to low publicity within their curriculum. Thus, it is recommended that knowledge on the benefits of fruits and vegetables should be aligned to curriculum. And extra-curricular activities should include teachings on fruits and vegetables.*

Keywords: artificial intelligence, fruits, vegetables, students,

INTRODUCTION

Artificial intelligence (AI) has emerged as a transformative tool across multiple sectors. In recent years particularly, artificial intelligence (AI) technologies have gained significant attention for their transformative potential across the healthcare, education, and food systems sectors. With the growing concerns about nutritional deficiencies and lifestyle diseases, leveraging AI to promote healthier eating habits has become an emerging area of interest (Esteves et al., 2023). Among the key challenges faced by nutrition experts is the effective communication and integration of nutritional knowledge to foster positive behavior change. In this context, AI technologies can play a pivotal role in addressing these challenges by providing personalized recommendations, promoting dietary awareness, and enhancing

knowledge on the nutritional benefits of common food items, such as fruits. With its ability to analyze data, generate insights, and provide personalized recommendations, AI technologies are reshaping how individuals approach their health and well-being (Esteva et al.2019). One key area where AI can play a pivotal role is in promoting healthy eating habits, particularly in increasing the knowledge of nutritional benefits of fruit consumption.

Fruits and vegetables are an essential component of a balanced diet, offering vital nutrients, antioxidants, and fiber that support overall health and prevent chronic diseases (Slavin& Lloyd, 2012). However, global surveys reveal that many individuals do not meet the recommended daily intake of fruits and vegetables (World Health Organization, 2020). Students, in particular, represent a demographic group that is highly vulnerable to poor dietary habits due to time constraints, limited nutritional knowledge, and lifestyle pressures (Kim et al., 2022). Consequently, there is an urgent need for innovative strategies that can help bridge the gap between nutritional recommendations and actual consumption patterns and this presents an opportunity to explore how AI-driven technologies can address these challenges.

The use of AI in nutrition encompasses tools such as mobile applications, wearable devices, and machine learning algorithms that provide tailored dietary guidance, track eating habits, and encourage behavior change (Kerr et al., 2018). For example, AI-powered apps can suggest fruit-based recipes tailored to an individual's nutritional needs, monitor vitamin intake, and recommend substitutions to diversify consumption patterns (Panganiban et al., 2022).

Despite the growing availability of such technologies, little is known about how students, as key users of emerging technologies, perceive and utilize these tools. Their engagement with AI technologies to enhance benefits of fruits and vegetables consumption may provide valuable insights into both the effectiveness of these tools and the potential barriers to their adoption. This understanding is essential to ensure that AI-based solutions are not only technically feasible but also socially acceptable and accessible to the target population, and addressing this is critical to designing effective interventions and promoting healthier dietary behaviors.

Education is one of the many fields that artificial intelligence technologies are revolutionizing. They are instruments that improve productivity in a variety of human activities. Policymakers have embraced AI technology, and they are being included into international schooling. Therefore, a number of researchers have looked into students' awareness of and use of these tools. Some assert that students are aware of this, while others assert the contrary. Employing a mixed-method approach, Ventura & Lopez's (2024) findings show that students are only dimly aware of AI-powered learning aids and often use them to complete their coursework. Additionally, it demonstrated a direct correlation between students' awareness and usage levels.

In their assessment of students' awareness of AI tools like Chat-GPT at Nnamdi Azikiwe University in Awka, Anambra State, Nnaemeka & Ogunbadejo (2024) found that students have a high degree of awareness and knowledge, and that AI is widely adopted and used for academic and research tasks. The study design used by the researchers was cross-sectional. Similar to this, Kharroubi et al. (2024) report that students are significantly aware of AI techniques, with 97.2% of participants exhibiting a high degree of expertise. This further shown that students in higher education have a solid understanding of AI tools and that students worldwide are using these technologies.

On the other hand, according to Anih & Ukeh's (2024) research from Federal University Otuoke in Bayelsa State, Nigeria, students' general understanding of A I technologies is poor. These investigations by several academics demonstrated that students' understanding of AI technologies may vary depending on the educational institution they attend. Students' awareness or knowledge of AI technologies is influenced by their educational environment. According to Vieriu & Petrea (2025), artificial intelligence (AI) has several advantages, such as better academic results, individualized learning, and increased student engagement. They also noted certain issues like academic dishonesty, concerns to data privacy, a reliance on AI that is too great, and a decline in critical thinking abilities.

Researchers have found several obstacles to the integration and application of AI in the educational system. Prabhakar (2024) asserts that obstacles to the adoption and use of AI in the educational system include a lack of technical knowledge, opposition to change, inadequate infrastructure, worries about data privacy, and restricted access to resources tailored to AI. The study also emphasized the difficulty of integrating AI into traditional education, the concern of job displacement, and the misalignment of AI technologies with curriculum needs. Through a qualitative study, Ahmed et al. (2024) also identified some barriers. They found that incorporating AI into education comes with drawbacks related to user experience, technological and skill limitations, content reliability, privacy and security concerns, and the potential for over-reliance on AI to impede creativity and learning. Other researchers (Jie & Kamrozzaman, 2024; Woodruff et al., 2023) also noted these difficulties, supporting the general consensus among academics regarding the current obstacles to the adoption and integration of AI technology in the educational system. This study aims to explore students' knowledge of using AI technology to enhance the nutritional benefits of fruits consumption.

Statement of Problem

The use of Artificial Intelligence (AI) in education transformation especially in the aspect of food, health and nutrition cannot be overemphasized in the recent time. AI plays prominent role in the progression of health and nutrition. Despite the advancement of importance of artificial intelligence (AI) in nearly all aspect of life such as food, education, nutrition and healthcare, many students still lack the understanding of the potential of AI technology to enhance the nutritional benefits of fruits consumption. The problem of diet- related health issues such as heart disease, obesity and malnutrition among our youths keeps increasing. The call for effective strategies to promote healthy eating habits. Fruits play vital roles in human health. They are known for the provision of essential vitamins, minerals and antioxidants. However, many students do not have adequate knowledge about the nutritional value of fruits consumption and how AI technology can help in making informed dietary choices. Also, there may be misconceptions and limitation to the use of AI into daily nutrition- related issues. This study aims to explore students' knowledge of using AI technology to enhance the nutritional benefits of fruits and vegetable consumption.

Objectives

The main objective of the study was to explore student's knowledge of AI technology in enhancing their knowledge on the nutritional benefits of vegetables and fruits consumption, specifically, the study sought to:

1) to assess students' level of knowledge and use of AI technologies in enhancing the nutritional benefits of fruits and vegetables consumption.
2) to examine the barriers towards the use of AI technologies in enhancing knowledge on the nutritional benefits of fruits and vegetables consumption among the students.

3) to assess most commonly AI platform used by students

Research Questions

1) What is the level of knowledge and use of AI technology among students in enhancing the nutritional benefits of fruits and vegetables consumption?
2) What are the barriers towards the use of AI technology in enhancing knowledge on the nutritional benefits of fruits consumption among the students?
3) What are the commonly used AI platform used by students?

METHODOLOGY

Design and Study Area

Descriptive survey was adopted for this study. The area of the study is Emmanuel Alayande University of Education, Oyo. Emmanuel Alayande University of Education, Oyo is situated within Atiba Local Government Area of Oyo State. The university comprised of five faculties namely, Faculty of Arts Education, Science Education, Specialized Education, Social Sciences Education, and Innovation, Vocational and Engineering Education

Population for the Study

The population for the study consist all students of Emmanuel Alayande University of Education, Oyo State. According to the admission office, the total population is 5,757 students.

Sample and Sampling Techniques

A multi- stage sampling technique was used in the selection of respondents for the study. The five Faculties have various departments, three faculties Science, Arts and Vocational Innovation and Engineering Education were randomly selected. The second stage involves the selection of departments; three departments were purposely selected from each faculty to make a total number of nine departments in the three faculties. Twenty respondents were randomly selected from the nine departments making a total of one hundred and eighty (180) respondents.

Instruments for Data Collection

The instrument for data collection is a questionnaire. The questionnaire consisted of four sections. Section A is on socio demographic characteristics of the respondents, section B is students' level of knowledge and uses of AI technologies in enhancing benefits of fruits and vegetables consumption, while section C is on AI platform used by students while section D in on barriers towards the use of AI technologies in enhancing benefits of fruits and vegetables consumption. The instrument was validated by three experts, one lecturer from Department of Computer Science Education, one from Measurement and Evaluation and one from Department of Home Economics Education, all from the University. A reliability coefficient of 0.70 was obtained using Cronbach Alpha Coefficient indicating high reliability.

Method of Data Collection

A total of 180 questionnaires were administered with the help of two research assistants. All copies of the questionnaire were duly filled and returned.

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Method of Data Analysis

The data was entered into a spreadsheet of the Microsoft Excel and exported to the Statistical Package for Social Sciences (SPSS) to perform descriptive analyses on the various study variables based on the research questions. Descriptive statistics was presented using proportions (%), and chats whenever appropriate.

Data Presentation

(A) Socio-demography of respondents

Items	Frequency (n=180)	Percentage (%)
Gender		
Male	70	38.8
Female	110	61.1
Age		
15-20	93	51.6
21-25	57	31.6
26-30	30	16.6
Religion		
Christianity	72	40.0
Islam	99	55.0
Traditionalist	09	5.0
Level		
100 Level	75	41. 7
200 Level	105	58.3

What is the level of knowledge and use of AI technologies among students in enhancing the nutritional benefits of fruits consumption?

S/N	Items	Frequency (n=180)	Percentage (%)	Mean	SD
1.	Have heard about AI	150	83.3	0.83	0.38
2.	I have no idea about AI	30	16.6	0.17	0.38
3.	I frequently come across about nutritional benefits of fruits and vegetables on AI	20	11.11	0.11	0.31
4.	I have increased my daily consumption of fruits and vegetables because of recommendation I saw on AI	9	5.0	0.05	0.22
5.	AI has made me more knowledgeable about	15	8.3	0.08	0.27

	benefits of fruits and vegetables				
6.	I follow social media accounts that regularly post about fruits and vegetables	10		0.06	0.25
7.	AI is my main source of information for Academic work	140	77.7	0.78	0.42
8.	I primarily use AI for entertainment purposes	140	77.7	0.78	0.42
9.	I use AI to seek knowledge on fruits and vegetables	40	22.2	0.22	0.41
	Grand Mean			**3.08**	

(B) What are the AI platform commonly use by students?

A I platforms mostly used by students

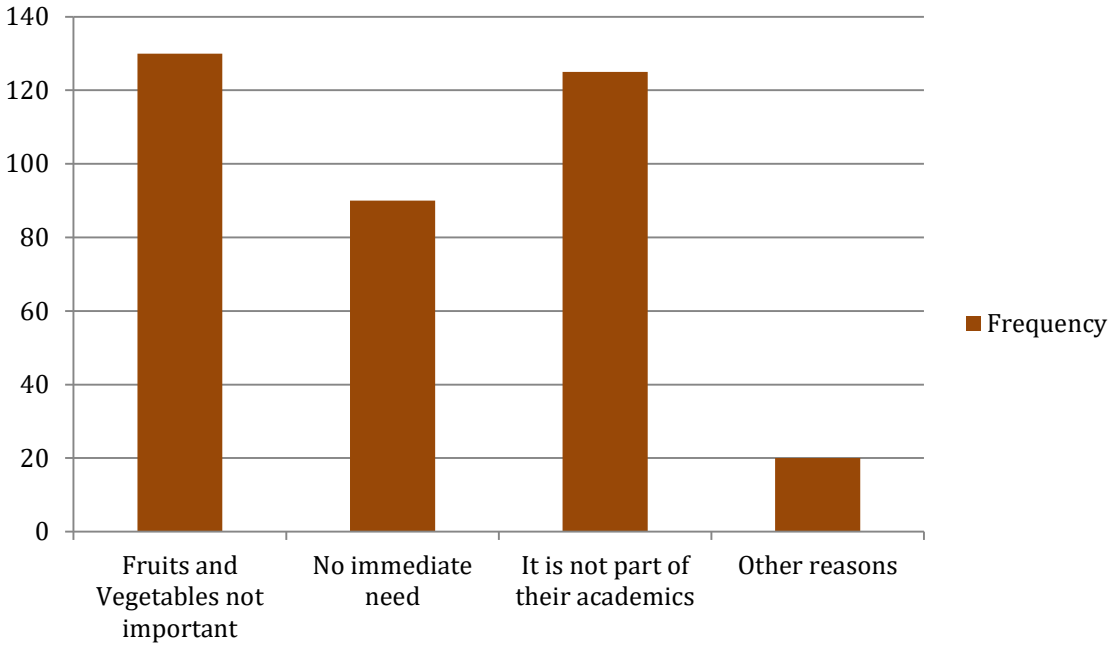
S/N	Platform	Frequency (n=145)	Percentage (%)	Mean	SD
1	Chat GPT	50	34.5	0.34	0,47
2	Meta AI	140	96.5	0.97	0.18
3	Gemini	80	55.1	0.55	0.50
4	Deepseek	40	27.5	0.28	0.45
5	Others	10	6.8	0.07	0.25
	Grand Mean			**2.21**	

As can be seen in Table A, overall awareness of the Artificial Intelligence (AI) is high among students. The number of those who have heard about AI is quite high, as 83.3% (Mean = 0.83) claimed that they have heard about AI technologies. On the other hand, 16.6% (Mean = 0.17) said that they do not know about AI, which implies that a small percentage of people are not aware of the concepts of AI. The communication of students with AI in terms of nutrition was not high. The percentage of those that often encounter information about the nutritional value of fruits and vegetables on AI platforms was only 11.11 (Mean = 0.11). In the same way, 5.0% (Mean = 0.05) were claiming that their daily intake of fruits and vegetables had been increased under the influence of AI-based recommendations, and AI had a little impact on the behavioural changes in their dieting.

Further, the findings indicate that 8.3 percent (Mean = 0.08) thought that the AI has increased their awareness of the benefits of fruits and vegetables, and a minor percentage (Mean = 0.06) is following accounts on the social media that share information about fruits. Conversely, AI is employed more in the academic and entertainment domain with each registering 77.7% (Mean = 0.78). This implies that in spite of the extensive use of AI among students, it is applied in other fields other than nutrition. Few (22.2) only 22.2% (Mean = 0.22) had used AI to search knowledge about fruits and vegetables specifically. The Grand Mean of 3.08 also demonstrates that, on the average, every student supported a little bit over three items related to AI knowledge and utilisation.

Table B yields results that indicate that out of the students who use AI tools on their devices, the most used platform is Meta AI with 96.5% (Mean = 0.97). This shows that the Meta AI can almost be universally accessed by the students, mostly to access academic and entertainment content. The next one is the Gemini with 55.1%(Mean=0.55) implying the moderate use with similar purposes. Also, 34.5% (Mean = 0.34) of the students use ChatGPT, and DeepSeek has 27.5% (Mean =0.28). Other AI platforms were used by a low percentage of the students (6.8%, Mean = 0.07). The Grand Mean of 2.21 on AI platforms means that students use slightly above an average of two AI platforms. This means that there is diversity in the usage of platforms with a great dominance of Meta AI and to a lesser extent, Gemini.

(C) What are the barriers towards the use of AI technologies in enhancing knowledge on the nutritional benefits of fruits consumption among the students?



The above results show that the major barriers towards the use of AI technologies in regards to enhancement of knowledge on fruits and vegetables nutritional benefits among students is that they do not consider knowledge on vegetables and fruits important, and it is not part of their academics. Thus, in summary, it could be considered a low publicity among students on vegetables and fruits.

DISCUSSION

The results of this study establishing a high level of knowledge and usage of AI technologies among students, yet they rarely utilize these technologies towards knowledge on the nutritional content of vegetables and fruits. Rather, students massively use these tools for entertainment purposes and assistance in their assignments. According to the results, 77.7% of students use AI for their academics and for entertainment purposes. And only 22.2% of students who participated in the study have utilized AI tools to seek for knowledge on the nutritional benefits of fruits and vegetables. The foregoing findings corroborates with the revelations of Nnaemeka & Ogunbadejo, (2024) revealed that there is a

high level of awareness and knowledge among students, and, a widespread adoption and utilization of AI for academic and research purposes.

The main barriers why students fail to utilize AI technologies in seeking knowledge on vegetables and fruits according to the results above, they do not consider knowledge on vegetables and fruits important, and it is not part of their academics. Thus, in summary, it could be considered a low publicity within their curriculum among students on the importance of vegetables and fruits. These findings to an extent, compliments the findings of Prabhakar, (2024) which revealed that misalignment of AI tools with curriculum needs is a barrier to the use of AI tools among students.

CONCLUSION

The objective of the study was to explore knowledge of AI technology in enhancing their knowledge on the nutritional benefits of vegetables and fruits consumption among students sampling 180 students from Emmanuel Alayande University of Education, Oyo State concludes that,

1) There is a high level of knowledge and usage of AI technologies among students, yet they rarely utilize these technologies towards knowledge on the nutritional content of vegetables and fruits. Rather, students massively use these tools for entertainment purposes and assistance in other academic purposes such as assignments.

2) The main barriers to the utilization of AI technologies in seeking knowledge on vegetables and fruits among students are, they do not consider knowledge on vegetables and fruits important, and they do not consider it part of their academics which may be as a result of low publicity within their curriculum.

Recommendations

The results and the conclusions made in this study imply a number of recommendations to facilitate the use of AI technologies by students to learn about the nutritional value of fruits and vegetables:

1) Because knowledge of fruits and vegetables is not yet perceived as important or relevant by students in their academic achievement, the university needs to introduce basic nutrition education, such as the health benefits of fruits and vegetables, into general studies courses or other elective modules that pertain to health.
2) Also, the research demonstrates the low publicity and low perceived relevance of vegetables and fruits among students. Awareness campaigns, seminars, workshops, health weeks, and digital sensitization should be done by institutions therefore addressing the need to consume fruit and vegetable products.
3) Given that students are already heavy users of AI to study and entertain themselves, the health promotion units need to liaise with technology or ICT units to create AI enabled content. This might involve edited reminds, suggested AI-driven nutrition solutions, and interactive online health resources to make nutrition-related data more available using platforms already adopted by students.
4) Discussions, challenges and activities focused on the consumption of fruit and vegetables should be incorporated in extra-curricular programmes like student clubs, campus wellness programmes and peer-education groups. The demonstration of the practical relevance through the use of AI applications may also encourage students to go through nutrition contents on their own.

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