



Science: The Key to Unlocking a Sustainable Future

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Abstract

In today's globally interconnected and rapidly evolving world, science and technology literacy is essential for individuals to thrive professionally and in everyday life. Science drives innovation and provides sustainable solutions to global challenges. However, despite its significance, many young people are drifting away from studying science, even as their engagement with modern technology increases. This study examined the scientific background knowledge of young people and their interaction with contemporary technology. A survey design of the ex-post facto type was used, as the variables were not manipulated. The target population comprised students in higher institutions across two educational districts in Lagos State, from which 1,250 participants were randomly selected. Data were gathered using a validated and highly reliable ($r = 0.98$) adapted questionnaire measuring science knowledge and technology use. Descriptive statistics (frequencies, percentages, means and standard deviations) were used for analysis. Results revealed an average science background knowledge score of 52.07% and a weighted mean technology engagement score of 3.22. The study recommends that national policy should prioritise science education to promote lifelong learning and support the development of a knowledge-driven, globally connected society.

Keywords: Background Knowledge, Future, Science, Sustainability, Technology

Introduction

A strong grounding in science is essential for a sustainable future. Scientific knowledge offers crucial insights into natural processes, enabling better resource management, disaster prediction, and environmental protection. Moreover, scientific understanding drives technological development, which is vital for addressing global issues such as climate change, food security and health challenges. Advances in renewable energy, clean water technologies, and sustainable agriculture all stem from scientific research. Beyond practical applications, science fosters an understanding of the impacts of human activity on ecological systems. This awareness is crucial for designing strategies to preserve biodiversity and rehabilitate degraded ecosystems. Consequently, science education plays a pivotal role in cultivating critical thinking, problem-solving and creative skills competencies that are indispensable in addressing the multidimensional challenges of the 21st century. Encouraging curiosity and innovation among young people is, therefore, key to nurturing a generation capable of driving sustainable progress and societal transformation.



Sustainability, in its broadest sense, involves meeting present needs without compromising the ability of future generations to meet theirs. It demands a balance between economic growth, social well-being, and environmental protection. Thus, cultivating scientific literacy is not only about acquiring knowledge but also about empowering individuals to contribute meaningfully to long-term societal goals. The relationship between science and sustainability is both foundational and dynamic, as scientific knowledge equips individuals and societies with the tools to make informed, forward-thinking decisions. Science helps decode the complexities of environmental systems, enabling more accurate forecasting of natural disasters, better resource management, and innovations in areas such as renewable energy, waste reduction, and climate resilience (United Nations, 2022). Moreover, the integration of science into sustainability education empowers citizens to critically evaluate environmental challenges and adopt responsible practices (National Aeronautics and Space Administration, NASA, 2021). Without a strong scientific foundation, efforts toward sustainability risk being uninformed or short-sighted, thereby threatening the well-being of future generations.

Critical role of science background knowledge across various domains

1. Environmental sustainability and climate change mitigation: Scientific understanding of climate systems, greenhouse gases, and ecological interactions is essential for creating effective climate change mitigation strategies (Intergovernmental Panel on Climate Change (IPCC), 2021; Pachauri & Meyer, 2014). Such knowledge empowers policymakers, researchers, and citizens to make informed decisions about reducing carbon footprints, adopting renewable energy, and conserving resources.

2. Public health and medical advancements: A solid foundation in biological sciences, chemistry, and epidemiology is critical for managing emerging diseases, developing treatments, and improving public health (World Health Organisation, WHO, 2021; Fauci & Lane, 2005). Science education equips healthcare professionals and researchers with the knowledge to understand disease mechanisms, develop vaccines, and implement evidence-based practices.

3. Technological innovation and economic growth: Disciplines such as computer science, engineering, and materials science drive technological progress, boosting economic development and enhancing quality of life (Mokyr, 2018; European Commission, 2015). Science knowledge enables entrepreneurs and innovators to create new technologies, from renewable energy systems to advanced computing solutions.

4. Food security and sustainable agriculture: Understanding plant biology, soil science, and farming practices is vital for ensuring food security and promoting sustainable agriculture (Food and Agriculture Organization of the United Nations (FAO), 2019; Tilman et al., 2011; Godfray et al., 2010). Scientific knowledge helps farmers and policymakers develop resilient crops, adopt eco-friendly methods, and optimize production while minimizing environmental damage.

5. Education and scientific literacy: Promoting scientific literacy from an early age fosters critical thinking, problem-solving, and curiosity (National Research Council, NRC, 2012; Lederman, 2007). It empowers individuals to evaluate information, make informed decisions, and contribute meaningfully to society.

Science Literacy in Sustaining the Future

The facts above have shown that the role of science education in sustaining the future and develop evidence-based strategies for promoting sustainability literacy among diverse populations, cannot be underestimated. Science literacy is seen as important in enabling individuals to understand and engage in environmental decision-making processes effectively. National Research Council (2015) stressed that Science education programmes have been designed to focus on developing critical thinking skills and understanding of scientific concepts relevant to sustainability. Valley & Withier (2009) strongly believed that, a solid foundation in basic sciences is essential to free-thinking participation in the world. It is also clear that, this basic scientific preparation is essential to unlocking doors to a wide variety of professional opportunities. More so that, science uses computers with sensors for logging and handling data; mathematics uses Information Technology in modelling; geometry and algebra uses Information Technology in design and technology; computers contribute to the pre-manufacture stages for modern languages; electronic communications give access to foreign broadcasts and other materials (Robert, 2005). This evidently showed that Information Technology have prominent place in the world today.

However, in a world described to be dependent on innovation in science and technology, young people are turning away from science subjects. The reasons are that first and foremost, scientists and engineers are no longer heroes. In olden times, scientists produced progressive knowledge, fought superstition and developed products that improved the quality of life. This image is now stuff of history at least in the more advanced countries. New role models have

come to the fore: football players, film stars and pop artistes receive global publicity and earn fortunes. Sjeberg (2004) explained that a white-coated, hardworking and poorly paid scientist in a laboratory is not a role model for many of today's young people. As a result, students tend to switch to other subjects that are more interesting and less demanding than sciences. Additionally, Zerubabel (2004) opined that, "in a society dominated by consumerism, young people choose to study things like economics and business, which are not so hard and lead to higher paying jobs". Hall-Rose (2004) gave a third reason that: "Young people perceive science as dull, abstract and theoretical" as revealed in falling enrolment in science and technology subject, which is not necessarily an indication of young people's disinterest in these issues. She observed that in many countries, young people are more interested than ever in using new technology. Surprisingly, it is a paradox that the countries that have the most problems recruiting to scientific and technological studies are precisely those where the use of new technologies by young people is the most widespread i.e. cell phones, internet and personal computers. This study therefore attempts to ascertain the level of science background knowledge possessed by Nigerian youths and the extent of their engagement in using new technology.

Research Questions

The following research questions were raised to guide the study:

- (1) What is the level of Nigerian youths' performance in science background test?
- (2) What is the average percentage of science background knowledge possessed by Nigerian youth?
- (3) What is the extent of youths' engagement in using new technology?

Methodology

The study was a survey design of an ex-post facto type, because the variables were not manipulated. The target population comprised all the youths (mainly tertiary school students) in two Education Districts (Education District III and V) of Lagos State. One thousand two hundred and fifty (1,250) participants were randomly selected across Epe and Oto/Awori Local Government Areas of the two districts constituted the sample for the study. The study employed an adapted questionnaire comprising of three sections: Section A consisted profile of respondents in the study; section B was a 10 items questions testing performance in science background knowledge of respondents, in which case, each correct option attracts one mark. Section C comprised of 10 items statements on the extent of youths' engagement in new technology. This was structured on a four-point scale of Frequently, Sometimes, Few Times and Never. The instrument which was validated by three experts in science education has its reliability coefficient of 0.98 using Cronbach alpha. The instrument was administered to a total of 1,250 youths residing in communities within the Epe and Oto/Awori Local Government Areas of Lagos State. This process was facilitated by trained research assistants who ensured proper distribution and collection of the questionnaires. Out of the total questionnaires administered, 1,200 were correctly completed and returned, constituting the valid sample used for data analysis in the study. The data generated were analysed using frequency count, percentages, mean and standard deviation.

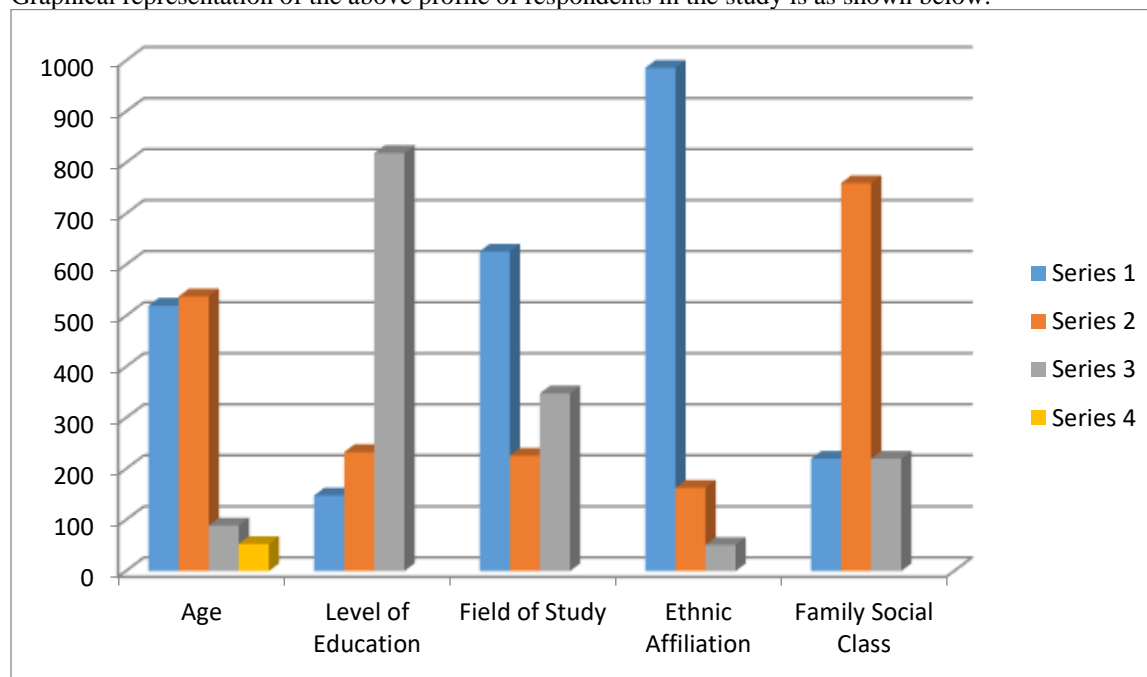
Results

Table 1: Profile of the respondents in the study

S/N	Variables	Frequency count	Percentage
1	Age: 15 – 19years	520	43.33
	20 – 25years	538	44.83
	26 – 30years	89	7.42
	31 – 40years	53	4.42
2	Level of Education: Basic Education	148	12.33
	Secondary Education	233	19.42
	Tertiary Education	819	68.25
3	Field of Study: Sciences	626	52.17
	Vocational	226	18.83
	Humanities	348	29.00
4	Ethnic affiliation: Yoruba	986	82.17
	Igbo	163	13.58
	Hausa	51	4.25
5	Family Social Class: Low	220	18.33
	Medium	760	63.34
	High	220	18.33

Table 1 revealed that 43.33% of respondents are in the age bracket 15 – 19 years, 44.83% are in the age bracket 20 – 25 years, 7.42% are in the age bracket 26 – 30 years and the remaining 4.42% are in the age bracket 31 – 40 years. 12.33% are pursuing Basic education, 19.42% pursuing Secondary education and a greater number – 68.25% pursuing tertiary education. 52.17% are running programme in the sciences, 18.83% are running programme in vocational field and 29.00% are running programme in the Humanities. 82.17% are from Yoruba ethnic group, 13.58% are from Igbo Ethnic group and the remaining 4.25% are from Hausa Ethnic group. 18.33% of the respondents are from low family social class, 63.34% are from medium family social class and the remaining 18.33% are from high social class.

Graphical representation of the above profile of respondents in the study is as shown below:



Research Question 1: What is the level of Nigerian youths’ performance in science background test?

Table 2: Mean and standard deviation of Nigerian youths’ performance in science background test

	N	Minimum	Maximum	Mean	Std. deviation
Achievement in Science Background Test	1200	1.00	10.00	5.34	2.08
Valid N	1200				

Table 2 shows Mean and Standard deviation of Nigerian youths’ performance score in Science Background Test. It shows the mean score as 5.34 out of 10marks obtainable with standard deviation 2.08. This reveals that Nigerian youth’s performance score in Science Background Test on the average of 53.4%, indicates that the Nigerian youths’ performance in science background test is on the average.

Research Question 2: What is the percentage of science background knowledge possessed by Nigerian youths?

Table 3: Percentage of science background knowledge possessed by Nigerian youths

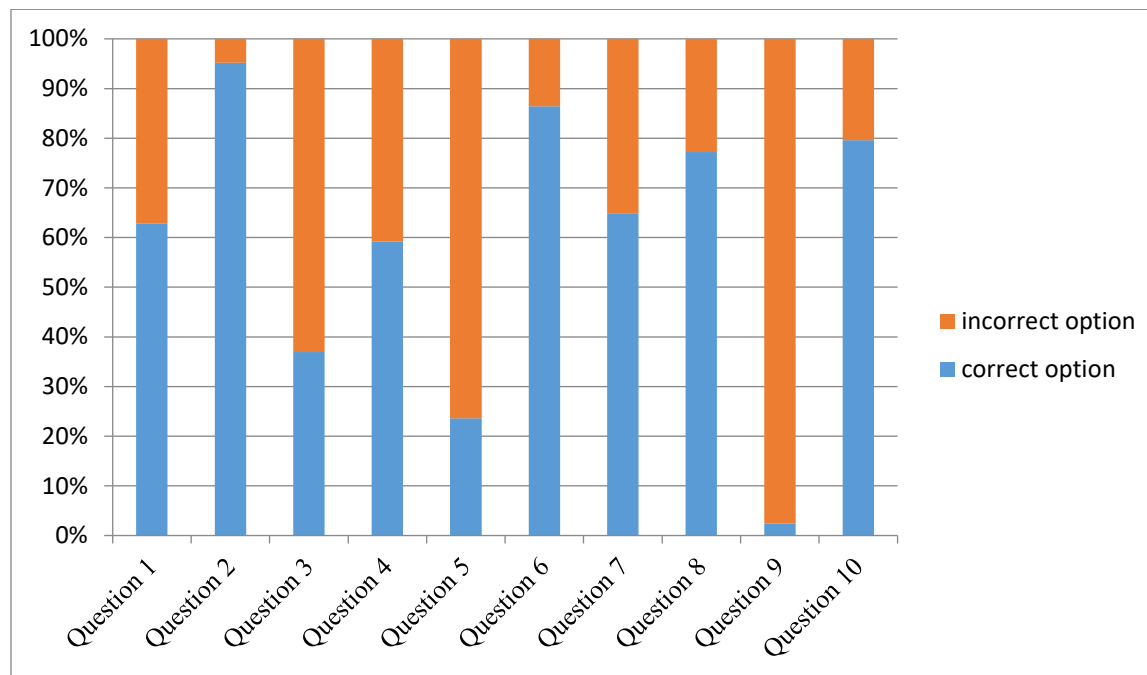
S/N	Questions	Option A	Option B	Option C	Option D	Percentage of Correct option
1	What is the primary greenhouse gas responsible for global warming?	250 (20.83)	676 (56.33)	170 (14.17)	104 (8.67)	56.33
2	Which of the following renewable energy sources is derived from sunlight?	69 (5.75)	180 (15.00)	913 (76.08)	38 (3.17)	76.08
3	What is the main driver of biodiversity loss worldwide?	476 (39.67)	373 (31.08)	326 (27.17)	25 (2.08)	39.67
4	Which of the following is NOT a major component of the water cycle?	201 (16.75)	175 (14.58)	730 (60.83)	94 (7.83)	60.83
5	What is the main purpose of the scientific method?	285 (23.75)	377 (31.42)	314 (26.17)	224 (18.67)	18.67
6	What is the scientific name for humans?	124 (10.33)	218 (18.17)	831 (69.25)	27 (2.25)	69.25
7	Which is the second planet from the Sun?	102 (8.50)	151 (12.58)	789 (65.75)	158 (13.17)	65.75
8	What transformative effects has the digital age brought to communication?	151 (12.58)	246 (20.50)	769 (64.08)	34 (2.83)	64.08
9	Which chemical burns the flesh?	898 (74.83)	101 (8.42)	142 (11.83)	59 (4.92)	4.92
10	What is the thin layer of gases surrounding the Earth that sustains life called?	80 (6.67)	128 (10.67)	211 (17.58)	781 (65.08)	65.08
Average Percentage of Science Background Knowledge						52.07%

Key: Correct options are in bold print

Table 3 presents percentage of science background knowledge possessed by the 1,200 respondents in the study. The 10 questions employed measure the level of science background knowledge possessed by the youths. 676 respondents representing 56.33% got question 1 correctly; 913 respondents representing 76.08% got question 2 correctly; 476 respondents representing 39.67% got question 3 correctly; 730 respondents representing 60.83% got question 4 correctly; 224 respondents representing 18.67% got question 5 correctly; 831 respondents representing 69.25% got question 6 correctly; 789 respondents representing 65.75% got question 7 correctly; 769 respondents representing 64.08% got question 8 correctly; a mere 59 respondents representing 4.92% got question 9 correctly and 781

respondents representing 65.08% got question 10 correctly. The average percentage of 52.07% revealed the percentage of Science background knowledge possessed by an average Nigerian youth.

Graphical representation is as shown below:



Research Question 3: What is the extent of youths’ engagement in using new technology?

Table 4: Frequency, percentage, mean and standard deviation of extent of youth engagement in new technology

S/N	Statement	Frequently	Sometimes	Few times	Never	Mean	S.D.	Remark
1	How often do you retrieve/obtain information online?	807 (67.25)	305 (25.41)	58 (4.83)	30 (2.50)	3.57	0.35	Frequently
2	How often do you engage in Drill and Practice of program in your study?	518 (43.17)	564 (47.00)	95 (7.92)	23 (1.92)	3.31	0.09	Sometimes
3	How often do you engage in Tutorial program in your study?	634 (52.83)	384 (32.00)	138 (11.50)	44 (3.67)	3.34	0.12	Sometimes
4	How often do you watch Simulation to assist in your study?	427 (35.58)	523 (43.58)	193 (16.08)	57 (4.75)	3.10	0.12	Sometimes

5	How frequently do you communicate family and friends online?	762 (63.50)	267 (22.25)	161 (13.42)	10 (0.83)	3.48	0.26	Frequently
6	How frequently do you get entertained/entertain others via internet?	506 (42.17)	468 (39.00)	186 (15.50)	40 (3.33)	3.20	0.02	Sometimes
7	How frequently do you follow religious/cultural events online?	472 (39.33)	448 (37.33)	250 (20.83)	30 (2.50)	3.14	0.08	Sometimes
8	How frequently do you engage in online marketing/shopping?	340 (28.33)	425 (35.42)	317 (26.42)	118 (9.83)	2.82	0.40	Sometimes
9	How frequently do you receive/send money online/via Automated Teller Machine?	511 (42.58)	446 (37.17)	220 (18.33)	23 (1.92)	3.20	0.02	Sometimes
10	How frequently do you request reservation/booking online?	471 (39.25)	351 (29.25)	269 (22.42)	109 (9.08)	2.99	0.23	Sometimes
	Weighted Average	3.22						

Table 4 reveals the extent of youth engagement in new technology. It shows that youths only frequently retrieve/obtain information ($\bar{x} = 3.57$). They sometimes engage in drill and practice of program in their study ($\bar{x} = 3.31$), engage in Tutorial program in their study ($\bar{x} = 3.34$), communicate family and friends ($\bar{x} = 3.48$) online, watch Simulation to assist in their study ($\bar{x} = 3.10$), get entertained/entertain others via internet ($\bar{x} = 3.20$), follow religious/cultural events online ($\bar{x} = 3.14$), engage in online marketing/shopping ($\bar{x} = 2.82$), receive/send money online/via Automated Teller Machine ($\bar{x} = 3.20$) and request reservation/made booking online ($\bar{x} = 2.99$). Weighted average value of 3.22 ascertained that youths sometimes engaged in using new technology.

Discussion

This study aimed evaluates the extent of science background knowledge among Nigerian youths and assess their level of engagement with modern technology. Results indicated that the average performance in the science background test was 5.34 out of 10, translating to approximately 53.4%, which classifies as an average score. Despite many respondents being enrolled in science-related programs, their knowledge level was only moderately satisfactory. In terms of technology use, the findings revealed a weighted average score of 3.22, suggesting that youths engage with technology occasionally, but not consistently or at an advanced level. One possible explanation is that the study focused specifically on educational and creative uses of technology, which may not align with how youths commonly use digital tools. More so, use of digital technology in education is yet to be fully-entrenched in the nation educational system. These results align with Hall-Rose's (2004) observation that, while young people are increasingly enthusiastic about using new technologies, they may lack the foundational scientific knowledge needed to fully understand or maximize their use. Diallo (2004) similarly emphasized the importance of basic scientific and technological understanding to make sense of global issues such as environmental pollution, health crises, and resource shortages. Ayodele, Balogun & Ogunwale (2008) further established a positive link between a person's science background and

their use of information and communication technologies, particularly among pre-service teachers. In a broader context, each era is defined by its prevailing innovations. The digital age is distinguished by scientific and technological breakthroughs such as computers, the internet, mobile communication, and electronic banking. These developments have significantly reshaped global connectivity and daily life in Nigeria, signalling the nation's progress in ICT integration. According to the National Research Council (2021), scientific literacy is vital not only for professionals in science, technology, engineering, and mathematics (STEM) fields but also for the general public. A well-informed populace is essential for democratic participation, sustainable development, and workforce readiness. Despite this, science education still lacks the national prominence and equitable distribution it requires across all educational levels.

Conclusion

This study has empirically established that young people science background knowledge is inadequate and that they sometimes engaged in the use of new technology. Science background has been seen to play a vital role in sustaining the future in addressing global challenges such as climate change, food security, and healthcare. It also helps to understand the impacts of human activities on the environment and biodiversity. Hence, it is essential for all to be scientifically literate. With the globe facing never-before-seen issues, background knowledge in science becomes essential to ensuring the future. A solid foundation in scientific concepts is essential for everything from technological developments and economic progress to environmental sustainability and public health. Through giving priority to science education, encouraging scientific literacy, and cultivating a culture of curiosity and inquiry, people, groups, and countries may be equipped to address difficult issues and clear the path for a prosperous and sustainable future.

Recommendations

- 1. Strengthen science education in schools:** Young people should be supported in building foundational science knowledge and acquiring the critical thinking and problem-solving skills needed to address sustainable development challenges. Educational institutions must adopt innovative methods to make science learning engaging and relevant.
- 2. Implement science-focused National policies:** National education policies should prioritize science learning to foster a generation of lifelong learners who can contribute meaningfully to the development of a knowledge-based and technologically advanced society.
- 3. Promote community-based science engagement:** Community organizations and NGOs should design outreach and engagement programs—such as workshops, fairs, and science clubs—that make science accessible to learners of all ages and backgrounds, particularly in underserved areas.
- 4. Encourage industry-education collaboration:** Industries should collaborate with educational institutions to promote STEM learning through mentorship, internships, research partnerships, and scholarships. These collaborations can help bridge the gap between classroom knowledge and real-world applications.
- 5. Adopt sustainable business practices:** Organizations should lead by example by implementing eco-friendly technologies and practices. This not only conserves natural resources but also signals a broader commitment to social responsibility and environmental stewardship.

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