EXPLORING THE IMPACT OF PLACE, LANGUAGE, AND TECHNOLOGY ON EDUCATION: A FRESH PERSPECTIVE

John Allison[1], Anita Alaere Bala[2], Mabel Allison[3], Paulet Whyte Ogbonda[3]
[1]Port Harcourt Polytechnic, PH.
[2]Covenant University, Otta Ogun.
[3]Bayelsa State College of Health Information Management, Yenagoa.

Abstract

The article highlights the importance of self-assessment mechanisms in policy frameworks, particularly in Nigeria, to improve systemic thinking, critical thinking, and decision-making skills. It emphasizes the need for a continuous adaptive and learning mindset, which is crucial for successful leadership. The article, inspired by Nigeria's entertainment industry, provides actionable insights for policymakers, educators, and education stakeholders adopting empirical approach. It buttresses the call for educational system review, stressed combining of play, place-based teaching, and simulations to make Nigeria's educational system more pragmatic and effective. The study is a follow-up of earlier policy self-assessment mechanisms study is crucial as Nigeria's educational policy failures are a major issue. It uses a mixed-methods analysis, including a cluster method with environmental science students at Captain Elechi Amadi Polytechnic, as a pilot test to propose solutions.

Keywords: language, technology, education, contextual learning, place-based simulation

Introduction

Nigeria's music and entertainment industry has evolved significantly over the years, with local languages playing a pivotal role in shaping creativity, fame, and fortune. The English language was once both unifying and limiting in Nigerian entertainment, stifling creativity and hindering the growth of the nascent movie industry. However, a few Nigerian artists, like Sunny Okosu, Shade Ade, and Chris Okitie, achieved success using simple English lyrics. Inflexion occurred with the emergence of a herd of pidgin and local language artists with the drive of self-emancipation leading to the rise of local music from late 1990s from Ajegule Lagos indigenous dance styles, and home-grown radio stations. The early 2000s saw a linguistic revolution as Nigerian youths boldly embraced Pidgin English, local languages, and place-based experiences.

Today, Nigeria's entertainment industry is the third-largest in the world, fuelled by the power of language and place-based storytelling. Millionaires, Grammy nominations, and global recognition are no longer distant dreams, as the long wait for Western releases has vanished, replaced by a vibrant local scene. New entrants flood the industry daily, leveraging social media platforms like TikTok, Facebook, and YouTube. In educational systems and policy formulation, Nigeria's music and entertainment industry has found its voice, celebrated cultural authenticity and shaped the future of entertainment. The research focuses on demonstrating the significant power of place-based education and local language in transforming the learning environment and productive capacity of Nigerians.

Nigeria's educational system from the colonial era was fashioned not to allow thinking but as robotic humans serving Western industrial interests. Since 1963, when computers first appeared in Nigeria, and 1972, when Peugeot Automobile Nigeria (PAN) and the Technology

Transfer Agreement (TTA) with Automobile Peugeot France (AP) were signed, significant technological achievements have been achieved in Nigeria (Allison et al. 2015). However, the failure despite billions of dollars spent highlights the importance of place-based education, local language in judgment and decision-making, and transforming Nigeria's learning environment.

Methods

Experiment one

A randomised method was used to select eighty students at Captain Elechi Amadi Polytechnic six departments- Transportation, Building Technologies, Architectural Technologies, Surveying, Urban Regional Planning, and Estate Management. The quantitative method compared the effect of pidgin, native language, and students' preparation of quizzes on the perception of assignment, engagement, retention, and performance measured by qualitative method. Randall, L., & Jaynes, J., (2022) investigated "student retention of learning and perceptions of the assignment's contributions to learning." The research intent, the students' rights, and the use of vernacular, "Pidgin" for instructions were discussed. The students were free to prepare their own questions for three quizzes and explain answers in "Pidgin" language. Subjects covered included building services, strength of material, and technical report writing.

Two weeks after class, quizzes are administered to evaluate retention. Emotional, cognitive, and behavioural engagement were explored. For example, decision making and attitude to war based on nuclear simulations using very familiar or native places, willingness to take responsibility for performance outcome, willingness to participate in feedback reviews after test, and proportion of students' performances before and after exploratory method. All these involved both qualitative and quantitative methods. T-test, one sample tests and two sample tests (between Group A and Group B) of significance were performed on observed differences.

Twelve students declined to prepare and submit quiz questions constituting Group-B the baseline group. Group A consisting of 68 students, served as the control group. Seven students dropped for job employment. The quizzes spanned a semester and the results were aggregated and summarised in Tables and Figures. The researchers with checklist carefully observed the students' attitude to war, countenance, perception, sentiments in their voices, and participation in quiz, normal classes, and examinations to access engagement thinking abilities which are crucial to academic success (Maroco et al. 2016; Li et al.2022; Randall &Jaynes 2022), Appendix1. The collected data were manipulated, analysed and tested for significance with findings discussed.

Result-One

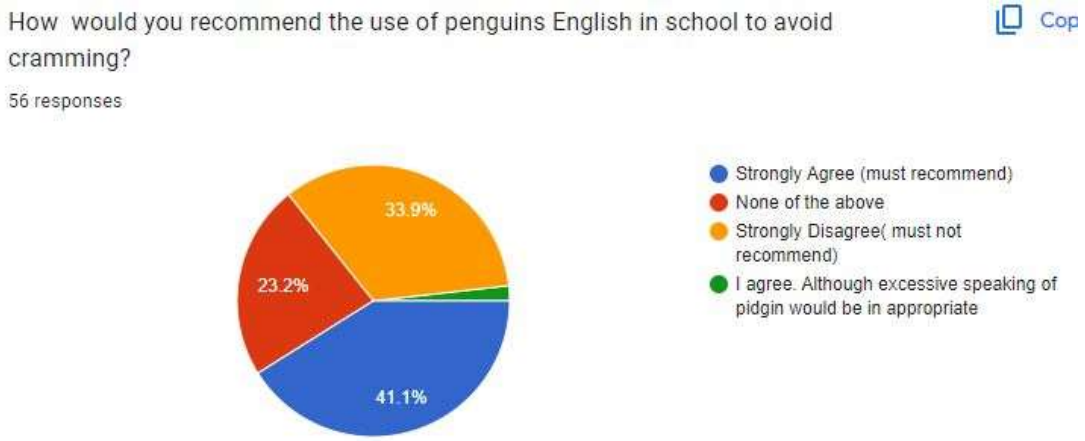

Figure 1. Knowledge Gap

Note. Standard form of teaching discourages use of pidgin qualified as "foul language" (reviewed by Mabel and Paulette 2024). If effective teaching and learning involves effective communication, then listening to students' demand is crucial.

Table 1.
Comparison of Test Conditions: Standard Test vs. Rephrased Test

Test Condition	Description	Observed Outcome
Standard Test (English Only)	Subjects allowed only in standard form; quizzes prepared solely by the lecturer.	Students demonstrated weaknesses in critical thinking skills.
Rephrased Test (English Only)	Subjects allowed only in standard form; quizzes prepared by the lecturer, disallowing pidgin and native languages.	Prohibition of pidgin and native languages for instruction did not enhance critical thinking.
Rephrased Test (Pidgin & Native Language)	Subjects allowed in pidgin and native languages for instruction; students prepared quizzes.	Allowing pidgin and native languages improved critical thinking and accountability among students. Poorly performers openly taking personal responsibility rather than blaming lecturers.

Table 2.
Frequency of Mention in Subject Tests: An Analytical Overview

(In listing examples, Group A seems to be more intuitive in ideas. Their examples relate more to the human body, and they can engage in verbal explanations- fluently creative in pidging - compared to Group B: none fluent & cognitive/robot like explanation.)

Subject Test	Group B (Standard/ Rephrased Tests)	Group A (Rephrased Test)	Remarks
Strength of Materials	Brick, concrete	Brick, Enamel, Bone	Brittle materials
-elastic	Rubber, spring	Rubber, Skin, Muscle	Elastic materials
-tension	Steels, timber, reinforced concrete	Seatbelt, Tendon, Leather	Tough material
-hardness	Granite Rock, Steel, Glass Titanium	Concrete, "Rod", Bone, Teeth, Enamel, Diamond	Hard materials
Design Principle	Emphasis, Contrast, Scale, Rhythm	Harmony, Symmetry, Balance, Movement	-
Note: Standard test focus: comprehension, ability to learn, analytical skills		The fact is that, students equate cramming /reciting as learning, and measure of intelligence. Concern: Students with very high score may not have intuitive understanding of the subject.	
Rephrased test: critical thinking; creativity, ability to learn skills		The fact is that, often examination questions & teaching method seem to ignore these crucial aspects.	

Test Condition: Rephrased Test (pidgin + native language+ sense of place), Table 1, Table2

The subjects test allowed the use of pidgin and native language for instruction with students prepared quizzes. Quiz was administered two weeks after class. Among participating students Group A readily mentioned examples related to the human body (sense of place) in their examples in two similar tests (standard and rephrased standard test), Group A students readily used examples related to the human body explain their understanding of few concepts. In Table 1 and Table 2, for brittle materials they gave examples like "brick", "enamel", and "teeth"; for hardness- "bone", "teeth", "enamel", "diamond" were repeated the most; for tough materials, "tendon", "seatbelts", "tyre" were repeated more; elastic materials had "rubber", "skin", and "muscle", while "design principles" had "symmetry", "movement", and "balance" which are consistent with human system: frontal symmetry, movement, balancing, etc).

In the rephrased standard test, less than 50% of the students scored average pass mark. The same test, but in standard straight forward question, that 80% of both Group A and Group B earlier had scored the average pass mark. However, after allowing pidgin and native language for instruction including allowing the students to prepare their quizzes, in the next standard and rephrased quizzes that followed, Group B showed no improvement with less than 50% scoring average pass mark in the rephrased test. However, Group A showed improvement with 80% crossing the average pass mark in both standard and rephrased test, Table 3, Table 4. This suggests better motivation (Ferlazzo 2013), cognitive and critical thinking abilities, including supports Talsma's (2023) "mind the gap" idea. Nevertheless, how significant are these

observed changes? Are they accidental or statistically significantly related with the exploratory method?

Significance Test

- One sample test: Group B: before and after new method.

In straight forward standard test, 80% of the students scored average pass mark, but the proportion dropped to 58.33% when the questions were rephrased (demanding critical thinking). Where u1 and u2 are the mean proportion of Group B students that scored average pass mark in standard test and rephrased, respectively. Assuming the change is accidental (i.e. no difference before and after rephrased test in Gorup B), then:

Ho: u1 = u2; H1: u1 > u2

$t_{(11)}$ (M= 0.5833, SD= 0.144) = - 5.213, p-value =.000144 (one tailed)

P-value of .000144 is extremely small, meaning the null hypothesis require more evidence to be retained. So, Group B scoring 58.33% instead of 80% recorded in standard test is not accidentally. So, the drop in proportion from 80% to 58.33% is significant. It suggests gap in critical thinking skill among Group B which the rephrased test seek to identify. Next, is 90.16% of Group A having average pass mark in rephrased test, Table 5.

Next, is comparing two samples, Group A and Group B, if the difference in their mean is significant, Table 4, Table 6. The null hypothesis is that there is no difference in the mean proportion of Group A (Ma) and Group B (Mb) that scored the average pass mark in both tests. Assumption is that both samples have the same variance; thus, Sp.

Description	**Group A**	**Group B**	**Remark**
Total Students	68	12	
Agreed to prepare their quiz questions.	68	0	12 declined
Disagree with participating in quizzes.	0	0	None declined
Absent in the exam	7	0	
Total number of participants in the exam	61	12	Exams. Quizzes. At least range
Scored 50–60 (average)	35	5	
Scored 61-70 (above average)	20	2	
Scored 0-49 (failed)	6	5	
For purposes α = 0.05			

Table 3.

Performance **of Group A and Group B Before and After Quizzes**

Table 4.
Performance Comparison: Group A vs. Group B

Group	Performance in Rephrased Test	Change from Standard Test
Group A	At least 80% of students achieved an average pass mark (u2 ≥80%).	30% improvement compared to the proportion in standard test.
Group B	Less than 50% of students achieved an average pass mark (u1< 50%).	30% decline in performance compared to the proportion in standard test.

Table 5.

Comparison of Student Performance Before and After Quizzes Participation

Scores	Group A	Group B	Remarks
Above Average Score	58.82	58.00	Null Hypothesis: The mean proportion of students achieving above-average scores in the rephrased or standard test is less than or equal to 50%.
Proportion Above Average	0.9016	0.5833	
Degrees of Freedom (df)	60	11	
Standard Deviation (SD)	0.064	0.144	
t-Statistic	$t_{(60)}$ = 49.009		p-value = 0.000000 (one-tailed) < 0.05 is highly significant: Group A
		$t_{(11)}$ = 2.004	p-value = 0.0352 (one-tailed) < 0.05 is very significant: Group B

Table 6

Two-Sample T-Test: Group A & Group B.

Score Range	**Group A**	**Group B**	**Hypothesis**	**Remark**
Total count	61	12	H_o: Mb = Ma	Pooled SD Sp = √(na-1) SDa^2 + (nb-1) SDb^2 / (na + nb -2) .0817
50–60 (average)	55	55	H_1: Mb < Ma	
61–70 (above avg.)	65.5	65.5	Delta = 0	
0–49 (failed)	24.5	24.5	$t_{(71)}$ = 12.3378, p-value = .000000(one tailed)	
Mean (M)	55.44	44.04	(Ma 0.9016; Sp .0817) (Ma 0.5833; Sp .0817)	
$t_{(71)}$ = 12.3378 (Ma .9016, Mb .5833, Sp .0817), p-value (one tailed) =.000000				
Decision: Observed differences in performance in tests between Group A and Group B is statistically significant.				

So far, from both one-sample and two-sample t-test, the extremely small p-values (0.000000 and 0.035167) empirically confirmed Group A performed better and this may not be unrelated with the new method. This finding underscores the need to reconsider the use of pidgin and

native languages in addition to students' involvement in curriculum development, gamifying the teaching and assessments method. Also, expanding research beyond standard testing methods to enhance cognitive, emotional and behavioural engagement the learning and teaching process.

1.2.2 Experiment Two

Discussing Strength of Materials, the Russian-Ukraine war was examined to demonstrate strength of materials and the destructive strength of nuclear weapons. After extensive discussion, students' opinions were sampled. Some students believe nuclear war is necessary "for resetting the world clock, allowing Africa to catch up with global technology, and for long-lasting peace". Climate change was also discussed, with 60% of the students familiar with the historical account of both nuclear wars and climate change, but for constructs like "nuclear winter".

In terms of sources of information and how they felt, 90% watched History and Discovery Channels documentary about the Hiroshima and Nagasaki attacks with mixed feelings. Supporting nuclear attack arguing without which the WII would have lasted longer and wasted thousands more lives. Then, using NukeMap to simulate very familiar places under similar nuclear attack using similar bombs dropped in Japan. The purpose was to localise the experience of nuclear attack and evaluate is there will change in opinion, and support for nuclear war.

Fig. 2, and Fig.3 are data visualisation of two nuclear attack in Port Harcourt City Airforce base on a windy day. The different rings and reach were explained: with 20 kiloton nuclear bomb, Umuahia and beyond were not safe, while 50 kilotons rendered even Chibok in far Bauchi State also unsafe. Table 5 and Fig.4 show students' responses after place-based simulation and explanations of each rings' destructive capacity- from complete incineration to obliteration. The result showed significant changes in opinion and support for war; particularly, against nuclear war. In Group A, antiwar changes ranges between 50% and 444% while Group B recorded 50% to 100% changes, Tabel 7.

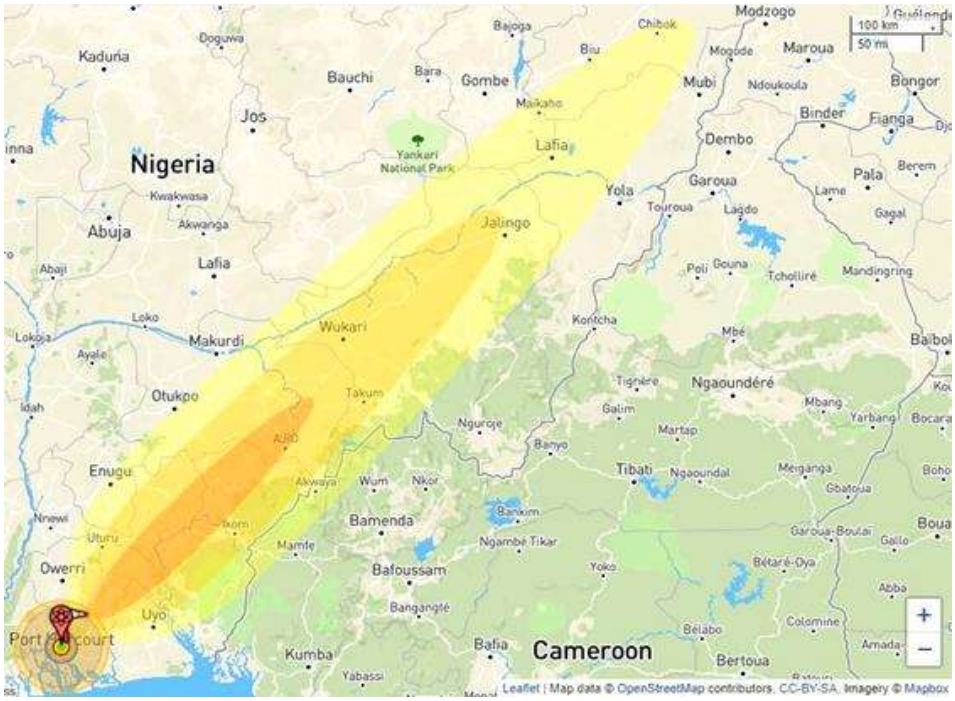

Figure 2. Simulation: 20 kiloton nuclear bomb detonated at Air force base Port Harcourt. *Note.* Equivalent to the "fat boy" atomic bomb dropped at Nagasaki, Japan, in WWII Credit: Allison J. (Nukemap)

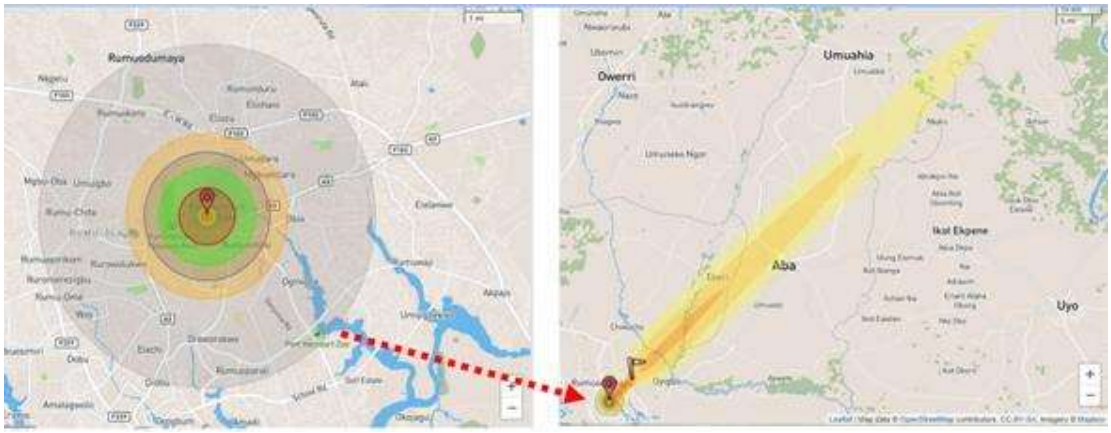

Figure 3. War destroys cities, architects priced creation. Allison J. (NukeMap). *Note.* Today estimated 15000 active warheads exist, globally (ICAN 202).

Table 7.

Attitude towards War: Place-Based Simulation Experiment Outcome.

Attitude Toward War	**Group A (Before)/ proportion**	**Group A (After)/ proportion**	**Group B (Before)/ proportion**	**Group B (After)/ proportion**
Absolutely against any war	9/0.1475	49/0.8032	2/0.1667	3/0.25
Against any war	12/0.1967	0	3/0.25	2/0.1667
Against nuclear war	17/0.2787	0	4/0.333	4/0.333
Support any war	19/0.3115	10/0.1639	2/0.1667	3/0.25
Absolutely support any war + nuclear	4/0.0656	2/0.0328	1/0.0833	0
Total (n)	61	61	12	12
Against war mean proportion.	0.6344	0.8038	0.75	0.75

Assuming means before and after simulation has no difference (i.e. simulation makes no difference in decision making)

Ho: M1 = M2; H1: M1 < M2

Where M1 is the mean proportion of Group against war before exposure to place based simulations of nuclear attack and M2 after exposure.

Group A:

Ho: Mb = Ma; H1: Mb < Ma

t_{60} (Ma = .8038, SD = 0.064) = 20.6723, p-value= .000000. Significant,

H1: Mb < Ma accepted

- Group B

t_{11} (Mb= .75, SD = 0.144) = 0, p-value= 0.5 > 0.05, not significant. Ho: Mb = Ma retained

- Two-Sample Test: Compare Group A and Group B. Ho: Mb = Ma; H1: Mb < Ma

t_{71} (Ma = 0.8038, Mb= 0.7500, Sp = 0.0817) = 2. 0854, p-value= 0.0203 < 0.05.

Statistically Significant. H1: Mb < Ma accepted

So, place-based simulation has positive influence in learning and critical decision making.

Discussion

The study conducted at Captain Elechi Amadi Polytechnic involved 80 students from six departments, grouped into two groups. The first group was instructed in pidgin and native languages, while the second group did not. The researchers observed students' attitudes, perception, sentiments, and participation in quizzes and exams. The results showed that the place-based simulation had a significant positive influence on students' attitudes towards war and critical decision-making. The study supports the effectiveness of place-based education and the use of local languages as channels to enhance critical thinking and decision-making skills. The study supports the need to rethink using pidgin and native languages for instruction, as it allows students to engage more deeply with the material, leading to better retention and understanding.

The study found that students who did not participate in preparing quiz questions had performed better in straight forward questions (that are less demanding of critical thinking ability and judgement) but poorly similar but rephrased questions (Table 3, p.5, p.16.). Education is more than just reading to pass tests; it is about lifelong development and the practical application of knowledge.

Allowing students to prepare their quiz questions fostered:

- Increased motivation and recollections.
- Greater confidence.
- Improved problem-solving skills.
- Improved students sense of ‘responsibility for their performance rather than passing blame.

Western perspectives, often overlook indigenous knowledge and cultural practices, (Garba, 2012:56). The study highlighted the impact of place-based simulation and teaching on the education system in Nigeria. Also, highlighted is the importance of augmented reality (AR) and virtual reality (VR) in teaching and learning, but most importantly the need for a better approach in teaching. Some students doing well in Group A were once written off as “empty head”, “no do well”. Transformation is inevitable with these technologies and local content emphasis tangled with the importance of play which the study supports in developing children's creativity, emotional self-regulation, learning capacity, and problem-solving skills (Anson, 1987; Plumme et al. 2022; Barnabè et al. 2023). The highlighted need for the policy review and implications of standardized testing on student learning, as well as the failure to have robust inter-self-assessment and control mechanisms cannot be overemphasised.

Conclusion and Recommendation

The authors suggest five steps for creating impactful policies in the Nigerian education system: 1) Identify and evaluate risks, 2) Identify specific controls, 3) Assess and rate controls, 4) Action planning, and 5) Monitor RCSA results. The study highlights the importance of students' involvement in curriculum development and the fusion of local languages with music. It emphasizes the need for place-based education and local languages to enhance critical thinking, decision-making skills, and understanding of real-world issues. Expanding research beyond standard tests can improve educational outcomes.

Special Interest: None

Data Availability Statement:

All data supporting the findings and conclusion are available here. However, additional data can be presented upon reasonable need.

Data Availability Statement:

All data supporting the findings and conclusion are available here. However, additional data
Consent of Authors: The authors have reviewed the manuscript and consented for your publication.

References

Akinpelumi, F. (2024). An Overview of Technology Transfer Agreements and its Application in Nigeria. CANDELP https://www.candelp.com/post/technology-transfer-agreement

Allison J. & Allison M. (2023). Perceived Stress Scale and Nuclear Awareness among Nigerian Millennials: Implications for Sustainability. NIESJ.https://doi.org/10.36263/nijest.2023.02.0418

Allison, J., & Alaere Bala, A. (2022). Leveraging on Data Sciences: Review of Architectural Practice and Education in Nigeria. IntechOpen. doi: 10.5772/intechopen.103097

Allison, J., Allison, F.K., West, I., Ichedu, C., & Stephen, T.(2015). Lemon into Lemonade: Revisiting the Niger Delta Creek Refineries: Fundamentals, Technology and Actors. IOSR Journals. https://www.iosrjournals.org/iosr-jestft/papers/vol9-issue6/Version-2/I09624966.pdf

Anson, C. M. (1987). The Classroom and the "Real World" as Contexts: Re-Examining the Goals of Writing Instruction. The Journal of the Midwest Modern Language Association, 20(1), 1–16. https://doi.org/10.2307/1314994

Bailey, A., & Zita, J. (2007). The Reproduction of Whiteness: Race and the Regulation of the Gendered Body. Hypatia, 22(2), vii–xv. http://www.jstor.org/stable/4640058

Barnabè, F., Armenia, S., Nazir, S., & Pompei, A. (2023). Critical Thinking Skills Enhancement through System Dynamics-Based Games: Insights from the Project Management Board Game Project. Systems 2023, 11(11), 554; https://doi.org/10.3390/systems11110554

Biesta, G. (2015). What is Education For? On Good Education, Teacher Judgement, and Educational Professionalism. European Journal of Education, 50(1), 75–87. https://www.jstor.org/stable/26609254

Bushiri, C.P. (2014). The Impact of Working Environment on Employees' Performance: The Case of Institute of Finance Management In Dar Es Salaam Region Theses and Dissertations. https://Core.Ac.Uk/Download/Pdf/33424874.Pdf

Egbi, O.G. & Kasia, B. (2021). Prevalence, Determinants and Perception of Use of Skin lightening Products among Female medical Undergraduate in Nigeria. Skin Health Dis;1(3). Doi: 10.1002/ski2.46

Eliza Pertigkiozoglou (2017). Nicholas Negroponte and Architecture Machine Group MIT. https://eliza-pert.medium.com/1973-a1b835e87d1c

Ferlazzo, L. (2023) Response: High-Stakes Testing & Student Engagement. Education Week. https://www.edweek.org/teaching-learning/opinion-response-high-stakes-testing-student-engagement/2013/04

Garba S.J. (2012). The Impact of Colonialism on Nigerian Education and the Need for E-Learning Technique for Sustainable Development. Journal of Educational and Social

Research, 2(7),
53. https://www.richtmann.org/journal/index.php/jesr/article/view/11968

Griffin, G. B. (1984). Emancipated Spirits: Women's and the Education American Midwest. Change, 16(1), 32–40. http://www.jstor.org/stable/40177490

Ikechukwu, E.C. (2015). Towards A Pragmatic System of Education: A Comparative Study Of Nigeria 6-3-3-4 And Chinese 9-3-4 System. International Journal of Education and Research, 3(5), p.79-88. https://www.ijern.com/journal/2015/May-2015/07.pdf

Issenberg S.B., McGaghie W.C., Hart I.R., Mayer J.W., Felner J.M., Petrusa E.R., Waugh R.A., Brown D.D., Safford R.R., Gessner I.H., Gordon D.L., & Ewy G.A. (1999). Simulation technology for health care professional skills training and assessment. JAMA. Sep 1;282(9):861-6. doi: 10.1001/jama.282.9.861. PMID: 10478693.

Li, S., Kwok, S.W.H, Siu, S.C.N., Chung, J.Y.S., Lam, H. C.Y., Tsang, E.Y.M., Li, K.C., Yeung, J.W.Y. & Lam, S. C. (2022). Development of generic student engagement scale in higher education: An application on healthcare students. Nurs Open. ; 10(3): 1545–1555. doi: 10.1002/nop2.1405.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9912421/

Maroco, J., Maroco, A.L., Campos, J.A.D.B. et al. (2016). University student's engagement: development of the University Student Engagement Inventory (USEI). Psicol. Refl. Crít. 29, 21 (2016). https://doi.org/10.1186/s41155-016-0042-8 . https://prc.springeropen.com/ articles/10.1186/s41155-016-0042-8

Martin, T., (2021). "The effects of collaborative leadership practices on employee satisfaction levels". Theses and Dissertations. 1208. https://digitalcommons.pepperdine.edu/etd/1208

Martinot, S. (2010). A Structural Concept of Race. In The Machinery of Whiteness: Studies in the Structure of Racialization (pp. 85–105). Temple University Press. http://www.jstor.org/ stable/j.ctt14bt4sh.7

Martinot, S. (2010). Front Matter. In The Machinery of Whiteness: Studies in the Structure of Racialization (pp. i–iv). Temple University Press. http://www.jstor.org/stable/j.ctt14bt4sh.1

Nazir, S. (2020). Creativity in Schools: A 21st Century Need. The Pakistan Development Review, 59(2), 311–320. https://www.jstor.org/stable/27184736

O'Neill, G., & Short, A. (2023). Relevant, practical and connected to the real world: what higher education students say engages them in the curriculum. Irish Educational Studies, 1–18. https://doi.org/10.1080/03323315.2023.2221663

Plummer,K.,Kebritchi, M., Leary,H.M.,& Halverson, D.(2022). Enhancing Critical Thinking Skills Through Decision-based Learning. Innovative Higher Education. 47(2).DOI:10.1007/s10755-022-09595-9

Poole, D. (1994). Routine Testing Practices and the Linguistic Construction of Knowledge. Cognition and Instruction, 12(2), 125–150. http://www.jstor.org/stable/3233678

Prus, R. (2011). Examining Community Life "in the Making": Emile Durkheim's "Moral Education." The American Sociologist, 42(1), 56–111. http://www.jstor.org/stable/41485698

Randall, L., & Jaynes, J., (2022). A comparison of three assessment types of student engagement and content knowledge in online instruction. Online Learning, 26(2), 102-123 https://files.eric.ed.gov/fulltext/EJ1347820.pdf

Rogers, F., & Sharapan, H. (1993). play. Elementary School Guidance & Counselling, 28 (1), 5–9. http://www.jstor.org/stable/42869124

Ryan, M. R., & Campa, H. (2000). Application of Learner-Based Teaching Innovations to Enhance Education in Wildlife Conservation. Wildlife Society Bulletin (1973-2006), 28(1), 168–179. http://www.jstor.org/stable/4617300

Samson, A. (2023). Impact of the British colonial rule on the Nigerian Education Policy on Secondary Education. Linkdin. https://www.linkedin.com/pulse/impact-british-colonial-rule-nigerian-education-policy-aigbe-samson-milie/

Shumpert, N. (2018). Summary: "The Danger of a Single Story". Interpolation. https://english.umd.edu/research-innovation/journals/interpolations/fall-2018/summary-danger-single-story

Steenson, M.W. (2022). Architectural Intelligence: How Designers and Architects Created the Digital Landscape. Online: MIT Press. https://mitpress.mit.edu/9780262546782/architectural-intelligence/

Stephens, K. (2022). How can a play-based curriculum foster social and emotional self-regulation skills in early childhood classrooms? (Thesis, Concordia University, St. Paul). Retrieved from https://digitalcommons.csp.edu/teacher-education_masters/80

Talsma B. (2023). 4 simple strategies to help students ace standardized tests. eSchool News. https://www.3plearning.com/blog/20-student-engagement-strategies-captivating-classroom/

Woods, M., Macklin, R., Dawkins, S., & Martin, A. (2019). Mental Illness, Social Suffering and Structural Antagonism in the Labour Process. Work, Employment & Society, 33(6), 948–965. https://www.jstor.org/stable/26970217

Wrzesniewski, A. & Dutton, J.E. (2021). Crafting a Job: Revisioning Employees as Active Crafters of Their Work. Academy of Management Review 26(2):179-201. ResearchGate. DOI:10.2307/259118

Appendix 1

- Straight forward questions: Over 90% students passed

(1) What is building science? Explain the causes of building decay, such as rusting roofs, peeling paint, fading, and algae growth in a bedroom. Additionally, address concerns about tiles pulling out, a damp wardrobe near the toilet, and the living room being excessively hot. Relate these issues to the broader context of climate change.

(2) Define science and its relevance to building: (i) What is science? (ii) Why is building considered a scientific endeavour? (iii) Describe building as both a process and a product.

(3) Design a 2-bedroom flat: Imagine a 2-bedroom flat located at Captain Elechi Amadi Polytechnic. Create a bubble diagram with brief explanations to demonstrate your understanding of building science.

- Rephrased questions demanding critical thinking: Less than 50% of students passed

Strength of Materials

(1) Building Science and Decay: Imagine you're explaining building science to a curious friend. Consider the following issues: rusting roofs, peeling paint and fading, algae, growth in a bedroom, tiles pulling out, a damp wardrobe near the toilet. the living room being excessively hot. now, connect these issues to broader concepts like climate change and strength of materials, how do they relate? what scientific principles are at play here?

(2) Building Science
Reflect on the essence of science: (i) What does science mean to you? (ii)Why building is considered a scientific endeavour? Think about the processes involved, materials used, and the impact on occupants. (iii) Describe building as both a process (how it's constructed) and a product (the final structure).

(3) Designing a 2-Bedroom Flat: Visualize a 2-bedroom flat at Captain Elechi Amadi Polytechnic. (i) Create a bubble diagram that represents the layout and functionality. Consider factors like spatial arrangement, natural lighting, ventilation, and energy efficiency. (ii) Explain your design choices based on building science principles.

After using pidgin, dialect, native examples for instruction: about 80% passed the same rephrased questions.

Pregnant woman does not have their stomach burst while pregnant because the skin is relatively **elastic**; after delivery the stomach returns back to shape. Hair and wrist bands as **elastic materials** seem to be easily forgotten examples. The bone is **brittle**, it breaks without warning. Student remember these contextual and "body-based" examples better. **"Brick**" as brittle and inelastic material seem to be easily forgotten compared to **bone**.