

EXPLORING CULTURAL SYNERGIES: INTEGRATING YORUBA LANGUAGE IN MECHANICAL ENGINEERING EDUCATION

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ABSTRACT

This position paper explores the potential synergies between Mechanical Engineering and the Yoruba language, with a focus on integrating Yoruba language and cultural elements into engineering education. The choice of Yoruba language is driven by its rich cultural heritage and its significant presence in West Africa, particularly in Nigeria and Benin. Yoruba is one of the most widely spoken languages in the region, with millions of native speakers. Embracing the Yoruba language in Mechanical Engineering education presents an opportunity to foster cultural inclusion, celebrate indigenous knowledge, and promote a deeper understanding of engineering concepts within the Yoruba cultural context. By exploring a multidisciplinary approach that integrates language and culture into engineering education, this paper seeks to contribute to the advancement of inclusive engineering pedagogy and the development of contextually relevant engineering solutions for Yoruba-speaking communities and beyond.

Keywords: Cultural diversity, Inclusivity, Language integration, Mechanical Engineering education, Yoruba language.

INTRODUCTION

Mechanical Engineering is a discipline that focuses on the design, analysis, and development of mechanical systems and processes. It plays a crucial role in various industries such as automotive, aerospace, energy, manufacturing, and robotics. Mechanical engineers apply principles of physics, mathematics, and materials science to design and create innovative solutions to real-world problems.

In today's globalized world, engineering education has become increasingly interconnected and diverse. With advancements in technology and the growing interconnectedness of economies, mechanical engineers often collaborate across borders and work on projects with international teams. This global nature of engineering highlights the importance of adapting education to diverse cultural contexts.

Traditionally, English has been the predominant medium of instruction in Mechanical Engineering education. English has served as a lingua franca, facilitating communication and knowledge exchange among engineers from different backgrounds. However, relying solely on English as the medium of instruction limits the inclusion and representation of other cultures and languages.

Recognizing the significance of cultural diversity and inclusivity, it is essential for Mechanical Engineering education to evolve and adapt. Integrating diverse cultural perspectives and languages can enhance the educational experience and better prepare students to work in multicultural environments. By integrating languages other than English, such as Yoruba, into Mechanical Engineering education, we can create a more inclusive and culturally sensitive learning environment that fosters a sense of belonging for students from diverse backgrounds.

Importance of Cultural Diversity and Inclusive Education

Cultural diversity in education brings numerous benefits and plays a vital role in shaping the learning environment. Here are some key points to consider:

1. Fostering Creativity, Innovation, and Problem-Solving Skills

Cultural diversity exposes students to different perspectives, experiences, and approaches to problem-solving. By integrating diverse cultural perspectives, education encourages creative thinking, innovative ideas, and novel solutions to complex challenges. Exposure to diverse cultures broadens students' understanding and enables them to think critically, expanding their problem-solving skills.

2. Promoting Cultural Understanding, Respect, and Collaboration

Education plays a significant role in promoting cultural understanding and respect among students from various backgrounds. Exposure to different cultures fosters empathy, tolerance, and appreciation for diversity, reducing stereotypes and biases. In a culturally inclusive learning environment, students learn to collaborate and communicate effectively with individuals from different cultures, leading to enhanced teamwork and cooperation.

3. Addressing Disparities and Promoting Equal Opportunities

Inclusive education helps address disparities by providing equal opportunities for all students, irrespective of their cultural background. It ensures that education is accessible to students from diverse cultures, languages, and socio-economic backgrounds. Inclusivity in education promotes social equity and breaks down barriers, enabling students to reach their full potential and contribute to society.

4. Cultivating Global Citizenship

Cultural diversity in education prepares students to be global citizens who can engage with people from different cultures, values, and perspectives. It nurtures intercultural competence, enabling students to navigate and adapt to diverse global environments. In a world interconnected through trade, technology, and collaboration, cultural diversity in education equips students with the skills to thrive in a multicultural society.

By embracing cultural diversity and promoting inclusivity in education, we create learning environments that celebrate differences, encourage collaboration, and empower students to become well-rounded individuals who can contribute positively to society.

Research objectives

The objective of this position paper is to propose the integration of Yoruba language in Mechanical Engineering education. By advocating for the inclusion of Yoruba language, we aim to foster a more culturally inclusive and enriching learning environment for students in Mechanical Engineering programs.

Rationale for selecting Yoruba language as a specific case study for language integration:

1. **Rich Cultural Heritage:** Yoruba language holds immense cultural significance as one of the widely spoken languages in West Africa, particularly in Nigeria. The Yoruba culture has a rich history of contributions to various fields, including art, music, literature, and science. Integrating Yoruba language in Mechanical Engineering education would provide an opportunity to celebrate and preserve this cultural heritage.
2. **Representation and Inclusivity:** In many educational contexts, language acts as a means of representation and inclusivity. By incorporating Yoruba language in Mechanical Engineering education, we can create a more inclusive learning environment that acknowledges and values the linguistic diversity of students. This representation fosters a sense of belonging and pride among Yoruba students, as well as other students from diverse backgrounds.

Potential benefits of integrating Yoruba language in Mechanical Engineering education:

1. **Enhanced Cultural Awareness:** Integrating Yoruba language in the curriculum exposes students to the linguistic and cultural aspects of the Yoruba community. It promotes cultural awareness, respect, and understanding, enabling students to engage more effectively with Yoruba-speaking communities, both locally and globally.
2. **Improved Learning Outcomes:** Research suggests that incorporating students' native languages in education enhances learning outcomes. Integrating Yoruba language in Mechanical Engineering education can facilitate better comprehension, engagement, and retention of knowledge among Yoruba-speaking students. It can also improve communication and critical thinking skills across cultural boundaries.

3. Leveraging Indigenous Knowledge: Yoruba culture has a rich tradition of indigenous knowledge, including engineering practices and technologies. Integrating Yoruba language in Mechanical Engineering education creates opportunities to incorporate Yoruba terminologies, concepts, and engineering approaches. By leveraging this indigenous knowledge, students can explore diverse perspectives and apply alternative problem-solving methods, potentially leading to innovation and sustainability in engineering practices.

By advocating for the integration of Yoruba language in Mechanical Engineering education, we aim to promote cultural diversity, inclusivity and a broader understanding of engineering within a global context. This integration has the potential to positively impact students, educators and the engineering field as a whole.

LITERATURE REVIEW

In a study by Lorenzo et al. (2008) it is highlighted that local indigenous knowledge is often undervalued and excluded from formal education in post-colonial African contexts. The study emphasizes the need to deconstruct common knowledge and integrate indigenous knowledge in science and technology education. The intervention focused on Computer Science education, using locally dominant language, culturally appropriate metaphors, and multimedia resources to enhance students' confidence and academic performance. This approach aims to empower students by recognizing the value of their own language and indigenous knowledge in problem-solving and academic success.

In a study by Adenegan et al. (2014) the importance of the child's indigenous language in their skill acquisition, language development, and educational attainment is emphasized. Mathematics is a fundamental subject that is compulsory for all students, and this paper explores the use of the Yoruba indigenous language in teaching and learning mathematics in Nigerian primary and post-primary schools. The study discusses ethnomathematics and its relevance to Yoruba language teaching, as well as the Yoruba contextual teaching approach to geometry and basic arithmetic. Additionally, the Yoruba counting system is explored in comparison to other universally structured language counting systems. The paper provides recommendations to promote the use of Yoruba language in Nigerian schools, aiming to enhance student performance and facilitate effective teaching practices in mathematics.

In a study by Nelson et al. (2019) the potential of Afrikaans and IsiXhosa as indigenous languages for communication education in South African universities was explored. The study focused on how these languages were incorporated into journalism training programs at Rhodes and North-West Universities. Employing a mixed-method approach, the researchers examined the approaches and curriculum development, utilizing qualitative content analysis, observation, and interviews. The findings revealed that many communication and engineering trainers believed that using Afrikaans in education contributed to the socio-cultural development of white South Africans. Additionally, the integration of IsiXhosa in journalism education aimed to promote local identities

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and community-based solutions. The study suggested that adopting indigenous languages in communication and engineering education could enhance social integration and multicultural development. In summary, the study emphasized the importance of incorporating Afrikaans and IsiXhosa as mediums of instruction in communication education in South African universities. The findings highlighted the potential benefits of utilizing indigenous languages to promote cultural development and community-based solutions in journalism training programs.

In a study by Malena (2020) the concept of design for humanitarian engineering and global development (HEGD) is explored, which aims to address global economic, social, and health disparities. However, many HEGD solutions fail to be adopted, often due to a lack of cultural fit in design form and function. The study focuses on the consideration and representation of target user culture in the early design stages, particularly in making design requirements. Three main factors influencing the development of design requirements are examined: the designer, the tools or methods used, and the design requirements themselves. The study investigates the frequency of cultural representation in engineering design requirements, the inclusion of cultural information in design methods, and the impact of cultural elements on designer considerations. The findings highlight the need to enhance the integration of cultural information in design requirements to improve the cultural fit and adoption of HEGD solutions.

In a study conducted by Beneroso et al. (2020) the influence of demographic characteristics on the cultural intelligence of chemical engineering students was investigated. This study is the first of its kind in addressing this topic. A total of 108 final-year BEng students from the UK participated in the study and responded to questions related to the four dimensions of cultural intelligence: metacognitive, cognitive, motivational, and behavioral cultural intelligences. The findings revealed that overseas students exhibited a broader understanding of cross-cultural situations, indicating higher cognitive intelligence in cultural intelligence. On the other hand, UK students displayed greater confidence in their abilities to perform and adapt in cross-cultural scenarios, reflecting higher motivational intelligence. Ethnicity also played a significant role in cultural intelligence, with Asian students demonstrating the highest cognitive cultural intelligence but the lowest motivational cultural intelligence. Black minority ethnic (BME) students reported the highest motivational cultural intelligence. The study emphasizes the importance of understanding the relationship between demographic characteristics and the four dimensions of cultural intelligence. This understanding is crucial for developing a more global engineering educational strategy that provides enhanced support to students in effectively navigating decision-making, adaptive and task performance, and adjustment in cross-cultural academic environments. By recognizing and addressing the specific needs and strengths associated with demographic characteristics, engineering education can better prepare students for success in diverse and multicultural settings.

In a study by Maaiké et al. (2021) the importance of Professional Development Programs (PDPs) that consider Teachers' Subject-specific Language Awareness (TSLA) is highlighted. The study emphasizes that all subject teachers, not just in Technical Vocational Education (TVE),
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should employ integrated language teaching that aligns with the nature of the subject matter they teach. TSLA enables teachers to make knowledge understandable for students and teach them how to engage in subject-specific communication practices. The study introduces a model of categories that provides a detailed operationalization of subject-specific language aspects, particularly within the context of TVE. This model has the potential to be applied in other teaching and learning contexts as well. By using this model, the study gained comprehensive insights into the relationship between teachers' practical knowledge and their teaching behavior concerning integrated language teaching. This relationship is crucial for teachers to fulfill their responsibility of enhancing student learning in subject-specific learning environments. Overall, the study underscores the significance of PDPs that consider TSLA and the importance of integrating language teaching across various subject areas to facilitate effective student learning in diverse educational contexts.

In a study by Susan et.al (2021) the authors, who identify as Anishinaabe and Gàidheal, discuss the significance of preserving and revitalizing Indigenous languages, specifically Anishinaabemowin (Ojibwe language) and Gàidhlig (Scottish Gaelic language). Drawing from their personal experiences and perspectives, the authors explore five key areas related to their discussion: (1) the importance of Indigenous languages, (2) the impact of colonization on these languages, (3) the connections between language and the land, including Traditional Ecological Knowledge (TEK), (4) the value of land-based learning and full language immersion, along with the challenges of implementing these approaches for language maintenance and revitalization, and (5) future directions in supporting Indigenous language preservation efforts. The authors provide their insights and reflections in response to these areas, aiming to shed light on the significance of Indigenous languages, particularly in the context of contemporary climate and humanitarian crises.

In a study by Oyebanji et al. (2022) the views and practices of medical students in Nigeria regarding the use of Yorùbá (an indigenous language) in their clinical clerkship were examined. The study involved a cross-sectional survey of 312 medical students in two medical colleges in Ekiti State, Nigeria. The majority of students (70.8%) reported using Yorùbá in their clinical clerkship, despite being educated in English. Only 16.0% of students relied on interpreters, and none had received language training during their medical education. Most students (73.7%) supported the incorporation of indigenous language training in the medical school curriculum, believing it would enhance communication skills. The study recommends the inclusion of indigenous language training in the medical school curriculum in Nigeria to address language barriers in clinical practice.

THE YORUBA LANGUAGE AND CULTURAL SIGNIFICANCE

Yoruba as a widely spoken language in West Africa: Yoruba is a Niger-Congo language that is spoken by over 20 million people, primarily in Nigeria, Benin, and Togo. It is one of the most widely spoken indigenous languages in Africa and holds significant cultural importance within the Yoruba community. The prevalence of Yoruba language speakers highlights the need to recognize and preserve this linguistic and cultural heritage.

Rich cultural heritage and contributions to various fields: The Yoruba culture has a rich and diverse heritage that spans several artistic, intellectual, and practical domains. In the realm of arts, Yoruba people have excelled in various artistic expressions, including sculpture, pottery, textiles, and beadwork. Their traditional music, dance, and oral traditions are also renowned and celebrated.

Yoruba culture has made significant contributions to various fields, including literature, theatre, sculpture, architecture, medicine, and engineering. Notably, Yoruba engineering practices have a long history and are characterized by sophisticated craftsmanship and ingenious problem-solving techniques. The architectural achievements of Yoruba culture, such as the intricate designs of their houses and palaces, showcase their expertise in engineering and construction.

Yoruba language is intricately tied to the cultural and intellectual aspects of the Yoruba community. It is a vehicle for expressing the rich traditions, values, proverbs, and stories that have been passed down through generations. The language serves as a medium for preserving and transmitting cultural knowledge and has been integral to education, literature, and religious practices within the Yoruba society.

Understanding the cultural significance of the Yoruba language is essential for appreciating the depth of Yoruba heritage and the unique contributions that the Yoruba community has made to various fields. By integrating the Yoruba language in Mechanical Engineering education, we can honor and celebrate this cultural heritage while enriching the educational experience for Yoruba-speaking students.

Historical and Contemporary Importance of Yoruba Language in Nigeria

Role of Yoruba language in education and literature: Throughout history, the Yoruba language has played a crucial role in education and the preservation of cultural knowledge within the Yoruba community. Yoruba children were traditionally educated using the medium of their native language, ensuring the transmission of cultural values, wisdom, and knowledge from one generation to the next. Yoruba literature encompasses a rich collection of works, including poetry, proverbs, folktales, and oral traditions, which have been preserved and passed down through the Yoruba language. These literary works not only entertain but also serve as repositories of cultural history, moral lessons, and philosophical insights.

Efforts to preserve and promote Yoruba language and culture: In Nigeria, concerted efforts have been made to preserve and promote the Yoruba language and culture. Yoruba language instruction

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is now part of the formal education system, allowing Yoruba-speaking students to learn and develop proficiency in their native language. Standardized orthography, dictionaries, and educational materials have been developed to support the teaching and learning of Yoruba. These resources contribute to the preservation and continuity of the language and ensure its accessibility to future generations.

Cultural festivals, arts organizations, and community-based programs also play a significant role in revitalizing Yoruba language and cultural practices. These initiatives celebrate Yoruba language, arts, music, dance, and other cultural expressions, fostering a sense of pride and connection among Yoruba-speaking individuals and communities. Such efforts aim to counter the erosion of indigenous languages and cultural traditions, ensuring their survival and continued relevance in the modern world.

By integrating Yoruba language in Mechanical Engineering education, we recognize and affirm the historical and contemporary importance of the Yoruba language in Nigeria. It provides Yoruba-speaking students with an opportunity to engage with their linguistic and cultural roots while pursuing their engineering studies. Additionally, integrating Yoruba language in education supports the ongoing efforts to preserve and promote the Yoruba language and culture, contributing to the empowerment and cultural enrichment of Yoruba-speaking individuals and communities.

BENEFITS OF INTEGRATING YORUBA LANGUAGE IN MECHANICAL ENGINEERING EDUCATION

Enhanced cultural awareness and inclusivity

Promoting multiculturalism and social integration in the classroom

Integrating Yoruba language in Mechanical Engineering education creates an inclusive learning environment that values diverse cultures and perspectives. It encourages interactions and collaborations among students from different cultural backgrounds, fostering multiculturalism and social integration.

Encouraging a sense of belonging and pride among Yoruba students

Incorporating Yoruba language in the curriculum validates the cultural identity of Yoruba students, enhancing their sense of belonging and pride in their heritage. It creates opportunities for Yoruba students to see their language and culture represented and acknowledged in the engineering field, fostering a positive learning experience.

Improved learning outcomes and engagement

Cognitive advantages of bilingual education

Bilingual education, including the integration of Yoruba language, has been associated with cognitive benefits such as improved problem-solving skills, critical thinking, and cognitive flexibility. Yoruba-speaking students can leverage their bilingual abilities to enhance their understanding and application of engineering concepts, resulting in improved learning outcomes.

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Increased student motivation and interest in engineering

Integrating Yoruba language in Mechanical Engineering education can enhance student engagement and motivation. Yoruba-speaking students may feel a stronger connection to their studies when they can apply their language skills to engineering concepts, fostering a deeper interest in the field.

Leveraging indigenous knowledge and innovation

Incorporating Yoruba terminologies and concepts in the engineering curriculum

Integrating Yoruba language allows for the incorporation of Yoruba-specific terminologies and concepts in Mechanical Engineering education. This integration enriches the engineering curriculum by expanding the vocabulary and technical understanding of Yoruba-speaking students, ensuring their cultural perspectives are reflected in the content.

Encouraging the application of indigenous engineering practices

Yoruba culture has a wealth of indigenous engineering knowledge and practices that can be incorporated into Mechanical Engineering education. Integrating Yoruba language can facilitate the exploration and application of indigenous engineering practices, potentially leading to innovative solutions rooted in local knowledge.

By embracing these benefits and opportunities, the integration of Yoruba language in Mechanical Engineering education can contribute to a more culturally inclusive and innovative engineering field, empowering Yoruba-speaking students and fostering a broader appreciation for diverse knowledge systems.

ADDRESSING CHALLENGES AND IMPLEMENTATION STRATEGIES

Potential challenges and concerns

Curriculum design and content integration

Designing a curriculum that integrates Yoruba language in Mechanical Engineering education may require careful planning and collaboration among language experts, engineering educators, and curriculum developers. The challenge lies in identifying appropriate entry points within the existing curriculum to incorporate Yoruba language without compromising the core engineering content. Balancing the integration of Yoruba language with the technical demands of the engineering curriculum may require creativity and flexibility.

Training and resources for educators

Educators who will be responsible for teaching in an integrated Yoruba language environment may require additional training and professional development opportunities. Adequate resources, such as textbooks, teaching materials, and technology, need to be made available to support educators in delivering effective instruction that integrates Yoruba language. Providing ongoing support and mentoring for educators can help address potential challenges and ensure their readiness to implement language integration strategies effectively.

Implementation Strategies

Collaboration with Yoruba language and cultural experts

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Engaging experts in Yoruba language and culture, such as linguists, language teachers, and cultural historians, can provide valuable insights and guidance in curriculum design and content integration. Collaboration between engineering educators and Yoruba language experts can foster interdisciplinary approaches that bridge the gap between language and engineering knowledge.

Professional development for faculty and staff

Offering professional development programs and workshops can equip educators with the necessary skills, knowledge, and pedagogical strategies to integrate Yoruba language effectively.

Training sessions can focus on language-specific teaching methodologies, cultural sensitivity, and strategies for incorporating Yoruba terminologies and concepts into engineering instruction.

Creating supportive learning environments

Establishing a supportive learning environment involves creating spaces where Yoruba-speaking students feel valued, respected, and encouraged to express themselves in their native language.

Encouraging interactions among students from diverse linguistic and cultural backgrounds can promote mutual understanding and appreciation. Providing access to resources, such as bilingual dictionaries, language labs, and cultural artifacts, can further enrich the learning experience.

Addressing challenges and implementing strategies for integrating Yoruba language in Mechanical Engineering education requires a collaborative and systematic approach. By acknowledging potential challenges and investing in appropriate training, resources, and support, educational institutions can create an environment conducive to successful language integration. The implementation of these strategies will help ensure that Yoruba-speaking students can fully engage with their studies and benefit from the inclusion of their cultural and linguistic heritage within their engineering education.

CONCLUSION

In conclusion, the exploration of synergies between Mechanical Engineering and the Yoruba language presents a promising avenue for fostering cultural inclusion and celebrating indigenous knowledge within engineering education. The choice of Yoruba language as the focus of this multidisciplinary approach is justified by its rich cultural heritage and its widespread presence in West Africa, particularly in Nigeria and Benin.

By integrating Yoruba language and cultural elements into engineering curricula, educational institutions can create an inclusive learning environment that empowers Yoruba-speaking students while promoting a deeper understanding of engineering concepts within the Yoruba cultural context. This approach not only enriches the educational experience but also provides students with the opportunity to develop engineering solutions that are contextually relevant and sustainable for Yoruba-speaking communities and beyond.

Through a comprehensive literature review, this position paper has highlighted the importance of cultural diversity in engineering education and the role of language in fostering cultural inclusion. It has also examined the contributions of Yoruba culture to arts, literature, and indigenous knowledge, emphasizing the need to preserve and celebrate this cultural heritage.

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The recommendations presented in this paper, such as policy guidelines, professional development for faculty, and interdisciplinary collaborations, serve as a call to action for educational institutions and engineering accreditation bodies to embrace the integration of Yoruba language in Mechanical Engineering education. By implementing these recommendations, engineering education can take significant strides towards promoting cultural diversity, empowering indigenous communities, and nurturing culturally sensitive and innovative engineering solutions.

In embracing a multidisciplinary approach that integrates Yoruba language and culture, the engineering community can bridge cultural gaps, foster mutual understanding, and advance engineering practices that respect and embrace diverse perspectives. As we move forward, it is essential for educators, researchers, and practitioners to collaborate with Yoruba language experts, cultural scholars, and community representatives to ensure the authenticity, accuracy, and cultural sensitivity of the integration efforts.

Ultimately, the integration of Yoruba language in Mechanical Engineering education goes beyond language proficiency; it represents a profound commitment to celebrating cultural diversity, preserving indigenous knowledge, and nurturing a new generation of culturally responsive engineers who will play a pivotal role in addressing global challenges with contextually relevant and sustainable solutions. By harnessing the power of the Yoruba language and cultural heritage, the engineering community can pave the way for a more inclusive, innovative, and culturally enriching future for all.

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