



CREATING A BETTER YORUBA LANGUAGE LEARNING APP: LEVERAGING COLLECTIVE INTELLIGENCE AND EXPERIENCE

Project by:

Ridwan Ibidunni

Supervised by:

Professor Mark Klein

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INTRODUCTION

According to the book "The Wisdom of Crowds" by James Surowiecki, the concept of collective intelligence was initially demonstrated by Francis Galton, a British scientist. Galton's illustration took place at a country fair, where he conducted an experiment involving the weight estimation of a cow. The experiment consisted of 800 guesses, including both experts and non-experts who attempted to estimate the weight of the cow. The remarkable finding was that the collective guesses of the group were able to predict the weight of the cow accurately. This discovery, along with the central idea conveyed in Surowiecki's book, emphasises that groups, under specific conditions, exhibit remarkable intelligence and often surpass the individual intelligence of their smartest members (Surowiecki, 2004).

Collective intelligence extends beyond individual capabilities and can be observed when groups of individuals collaborate, combining their independent intellect to address a shared problem. One compelling illustration of this phenomenon occurred when a diverse team of individuals harnessed their collective intelligence to locate a series of red balloons valued at \$40,000 within a mere nine hours across the entirety of the United States (Pickard et al., 2011). Another noteworthy instance involves a collaborative endeavour in the form of a game, where scientists successfully unveiled the structure of an elusive enzyme that had baffled researchers for over fifteen years, accomplishing this feat in just three weeks (Khatib et al., 2011). These examples underscore the capacity of groups to leverage their combined intelligence, surpassing individual abilities, and achieving remarkable outcomes.

Collective intelligence, as described by Fabuni et al. (2005), empowers human beings to address complex challenges in nature by leveraging independent thinking and knowledge sharing within groups. Language serves as the essential medium through which humans abstract reality, influencing perception and cognition. In the context of Yorùbá, a language belonging to the West Benue-Congo branch of the Niger-Congo language family in Africa, its significance is notable. Yorùbá is spoken not only in Nigeria, where it boasts approximately 30 million speakers, but also in countries such as Togo, the Republic of Benín, Ghana, Sudan, Sierra Leone, and Côte D'Ivoire. Furthermore, Yorùbá has gained prominence beyond the African continent, with a substantial presence in Brazil, Cuba, and Tobago. Within Nigeria itself, Yorùbá holds the status of being one of the country's major languages, with effective speakers constituting around 35% of the nation's total population (Clarke, K. M. 2004). Language, as a collaborative tool of

collective intelligence, plays a vital role not only in preserving knowledge, culture, and traditions but also in facilitating intergenerational transmission (Fabuni, F. A. et al., 2005).

MOTIVATION

The current global phenomena of transnational structural revolutions, driven by globalization, pose a threat to languages, including the Yoruba language, as expressed by (Fabuni et al. 2005). Allowing our language to diminish due to these forces of globalization leads to a shift in thinking, impacting our perception of reality and endangering its existence. Language endangerment, a significant complement to our environment, is a recognized concern, with the Global Language Register (GLR) indicating that less than a third of the world's languages are facing the risk of extinction. This reality is exemplified by the rapid endangerment and eventual demise of numerous languages, with language attrition and language death representing extreme outcomes.

In the Nigerian context, where English has emerged as the dominant language of communication, particularly in educational institutions, there exist significant challenges to the preservation of indigenous languages such as Yoruba. It has become increasingly common to encounter Yoruba households where parents seldom engage in conversation using the language with their children. Furthermore, within schools, the learning and usage of Yoruba are often restricted to dedicated language classes (Omoregbe et al., 2014). To ensure the ongoing existence and accessibility of Yoruba for future generations, it is crucial to explore viable approaches that foster its continuity. Among the potential avenues, mobile devices, particularly mobile phones, emerge as one promising option (Omoregbe et al., 2014).

However, it is important to note that this study is not the first to investigate the possibilities offered by mobile devices for language learning. Numerous impressive mobile applications have already been developed in this field. The following paragraphs discuss some of these noteworthy applications: The 'Learn Yoruba Language' app (Learn Yoruba Language, 2020) is an Android application that offers a comprehensive collection of Yoruba concepts and topics, including dictionary words, adjectives, family terms, numbers, and more. However, it lacks a structured learning approach and relies on AI for pronunciation, making it challenging for users to follow and accurately pronounce words.

Another app that claims to help teach the language is the 'Learn Yoruba by Voice' app (Learn Yoruba by Voice, 2020). This app allows users to input their voice in their respective language, such as English and converts it into Yoruba sentences and words for pronunciation. However, the app faces a significant limitation: it is unable to reproduce the correct tonal sound in Yoruba. Given that Yoruba is a tonal language with different sounds for the same word resulting in different meanings, this limitation hinders effective language learning.

The objective of this research is to harness the potential of collective intelligence in developing a highly structured Yoruba language learning application. This application aims to cater to speakers at all proficiency levels, with a particular focus on ensuring accurate tonal markings and native pronunciation of words.

METHODOLOGY

In developing this app I have leveraged the expertise and collective skills of different experts in their respective fields. To build an advanced Yoruba language learning app, you need an expert in the language, so I got a Linguist expert who specializes in the Yoruba language. Also for an app to be well received by its end user, it must have a good interface (graphics). This propels me to reach out to a specialist in UI/UX design in order to give the app a befitting outlook.

As an Android developer who also doubles as the team coordinator for this project, I begin by modeling the proposed application using Unified Modelling Language (UML). The Unified Modeling Language(UML) is a general-purpose modeling language intended to provide a standard way to visualize the design of a system. A UML Class Diagram has components like Classes and Interfaces which in turn contains attributes and operations. Classes are connected using relationships including Generalization, Association, Composition, Collaboration and Interface Realization (Poozhithara, J. J. et al., 2020).

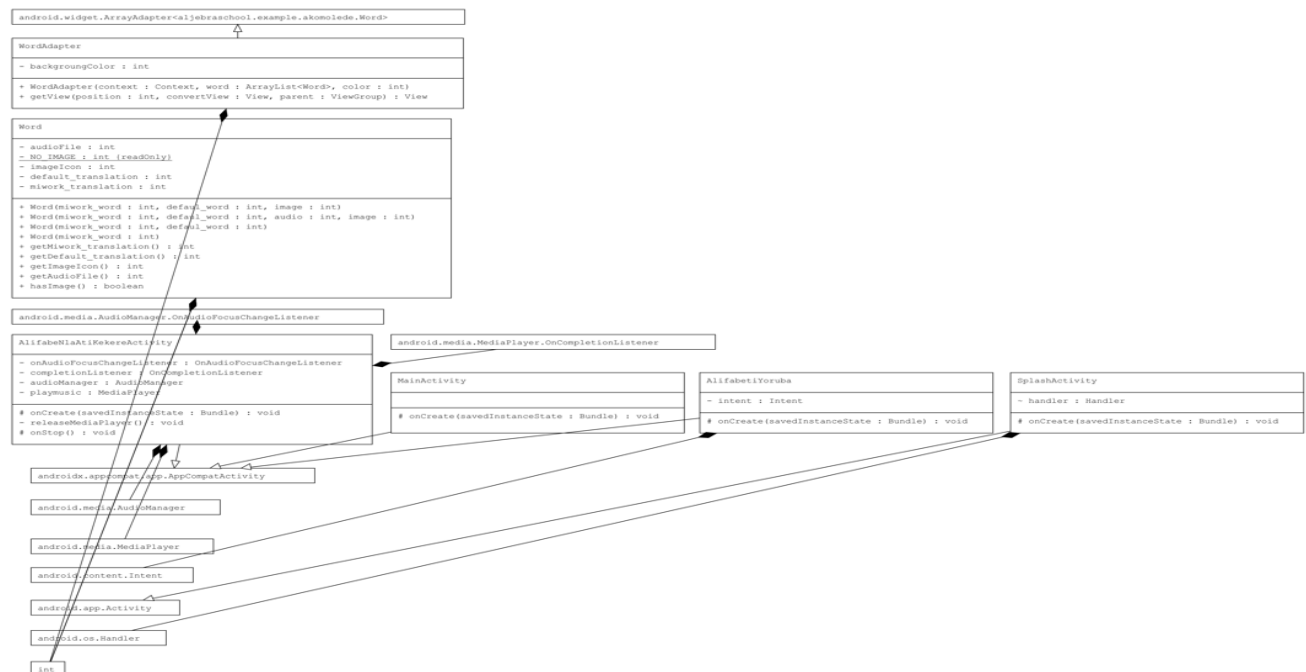
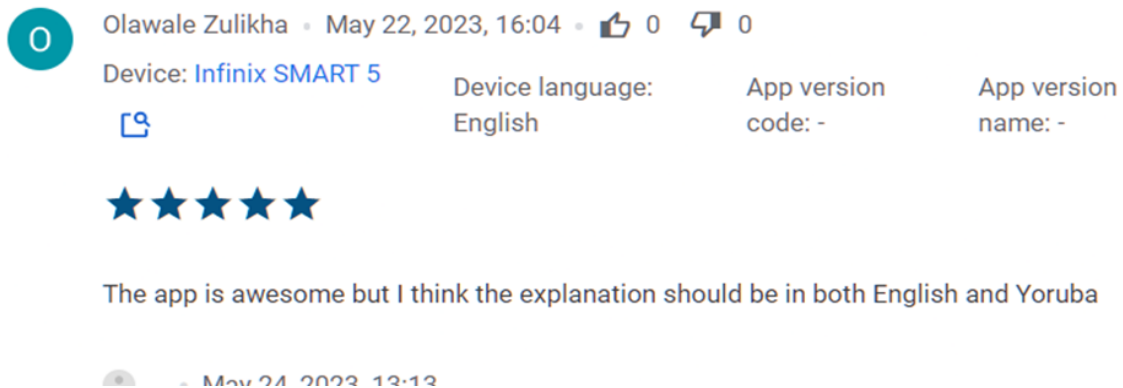


Figure 1: UML diagram of the Akomodele App illustrating class connections

In the above displayed UML diagram of the 'Akomodele App' (Akomodele, 2023), it illustrates the interconnectedness and communication between classes. The diagram demonstrates the association between a custom class called 'Word' and the 'WordAdapter' class, which is responsible for populating the 'ListView' or 'GridView' used in the app. Additionally, it depicts the relationship between the 'WordAdapter' and the "Main" class, which serves as the initial screen presented to users after the "splash screen." This visual representation provides a clear overview of how I envisioned the app's screen layout, enabling effective communication with the UI/UX designer during the implementation phase.

To ensure the app's distinctiveness among its competitors, significant emphasis has been placed on sourcing authentic content from native speakers of the language. Our language expert meticulously designed and structured every aspect of the language content, resulting in a unique aesthetic, accurate pronunciation, and well-organized information within the app. The implementation phase of the app was carried out using the Android Studio, utilizing the Java programming language. The choice of the Android operating system was based on its dominant market share in the mobile industry worldwide.

In the initial phase of the app described earlier, the principles of collective intelligence were incorporated into its design. However, following the guidance of my supervisor, Prof. Mark Klein, we recognized the value of harnessing the collective wisdom of the app's users to enhance future iterations of the design. By soliciting suggestions and feedback from users, we aim to gather valuable data that will contribute to the development of a more robust app. As of May 2023, the app has already garnered over 250 downloads on the Play Store (Akomoledede, 2023), and we have received several suggestions from users on how to improve it further. Some of these suggestions are listed below:





Idris Olaonipekun • May 30, 2023, 07:35 • 0 0

Device: [Redmi Note 11](#)



Device language:
English

App version
code: 1

App version name:
1.0

Android ver



I love the pronunciation of the Yoruba words. Could you make a full dictionary using similar pronunciation?

—



Abdulfatah Ayodeji (Captayod2) • May 22, 2023, 14:04 • 1 0

Device: [Redmi Note 11](#)



Device language:
English

App version
code: 1

App version name:
1.0

Android version: [Android 11 \(SDK 30\)](#)



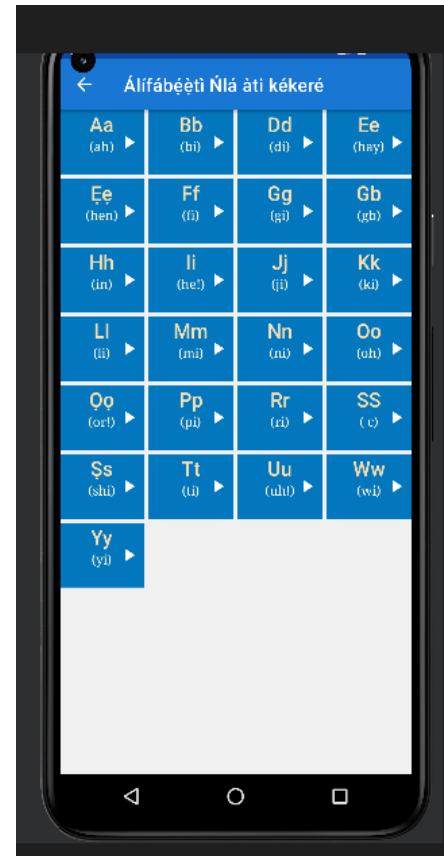
Akomolede app is the best Yoruba language app I'll like to recommend for anyone who is enthusiastic to know how to speak their indigenous Yoruba language most especially for the beginners. I really like the arrangement and mostly the way it speaks while touching it, it enhances fast learning. Try to improve more on the graphics. Thanks.

Figure 2: Illustrations depicting user feedback for app enhancement

APPLICATION USER INTERFACE

The focus on aesthetics, organization, and pronunciation greatly enhances the app's appeal to its users. Here are a few examples of the app interfaces:

The **'Main Screen'** serves as the primary interface for users, appearing right after the 'Splashscreen'. It presents the course layout, allowing users to navigate through the available courses. The number of courses is displayed in both English and Yoruba languages, facilitating easy navigation and interaction.



The **ListView** and **GridView** Layouts are designed to effectively present large lists and multiple contents by recycling them, optimizing app memory usage, and providing a smooth user experience. These layouts are particularly well-suited for displaying extensive lists, such as dictionaries, in a resource-efficient manner. In our language learning app, we extensively utilize long lists of words in various parts of speech, including Nouns, Pronouns, and dictionaries. To ensure optimal performance and prevent lagging or crashing issues, we leverage the powerful display options available in Android.

LESSONS LEARNED AND CONTINUOUS ENHANCEMENT

The development of this application has yielded valuable insights for implementing collective intelligence concepts in future projects of a similar nature. The following presents key lessons learned and enhancements for this project.

1. Insufficient planning, from the app's design phase to its implementation, can significantly affect the overall output of the application. Therefore, it is crucial to engage in thorough planning to align the app with the prospective users' desires before its creation. In future projects of this nature, I will prioritize proper planning by gathering users' opinions through surveys and implementing their suggestions during the app's development process.
2. The development of an application necessitates a substantial allocation of resources, both financial and human. Insufficient funds to acquire additional reviewers for the app, leading to inadequate scrutiny of its content, rendered it vulnerable to unforeseen errors following its launch. In future endeavors, I will take proactive measures to avoid this situation by assembling a dedicated team that shares a common vision and is willing to contribute their expertise, even with limited financial resources, thereby ensuring thorough quality assurance.
3. The absence of thorough testing and comprehensive evaluation prior to app deployment can significantly undermine the overall user perception. To address this in future projects, special attention will be given to testing and debugging the app's visual and audio contents on physical devices, considering the diverse Android versions available on the app store. By ensuring seamless scalability across multiple versions, a greater emphasis will be placed on utilizing as many physical devices as possible during the development and testing phases.
4. In future endeavors involving the creation of similar applications, it is crucial to consider integrating languages that users are already familiar with as alternative options for each topic within the app. By doing so, the application can cater to learners at various proficiency levels without the need for a physical instructor. Emphasizing this aspect

during future updates and app development will enhance accessibility and improve the overall user experience.

LIMITATIONS AND CONCLUSION

Limitations

Every project inevitably comes with its own set of challenges. Here are some of the obstacles faced during the implementation of this project:

1. Finding the Right Native Scholar of Yoruba Language: While I am a Yoruba speaker, achieving accurate and proficient language usage requires the expertise of someone specialized in the language or who grew up speaking it fluently. It took considerable effort and time to find the right candidate to assist with the app.
2. Limited Time Frame: App development involves thorough evaluation, research, and planning. The restricted time frame of this project hindered the opportunity to gather extensive user feedback before and after the app's creation.
3. Resource Constraints for Collective Intelligence: The effectiveness of collective intelligence thrives when there is a diverse pool of contributors. However, due to limitations in resource availability, particularly in finding Yoruba native speakers as content creators, the launch of the app was delayed as content needed to be carefully proofread and implemented, consuming significant time.

These limitations posed challenges in achieving certain aspects of the project, but efforts were made to address them within the given constraints.

Conclusion

This project presented me with a remarkable opportunity to put into practice the theoretical principles of collective intelligence that I acquired during my studies. It allowed me to breathe new life into my native language and contribute meaningfully to our cultural heritage. By actively embracing the tenets of "individual competence," "collaborative perspectives," and iterative filtering (the feedback from users to improve the algorithms). I actively sought out diverse opinions and contributions from a wide range of individuals throughout the app development journey.

Furthermore, this undertaking provided valuable insights into effective team management and the accomplishment of shared objectives within defined time constraints. It proved to be a truly enriching experience that will serve as a constant source of inspiration, propelling me to continue harnessing the collective wisdom of the crowd in all my future endeavors.

Building upon the suggestions and feedback from the app users, our future plans include advancing the capabilities of the native app by incorporating cutting-edge technologies such as large language models and machine learning.

ACKNOWLEDGEMENTS

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Ultimately, I'd like to recognize the positive feedback received from several of the app users and extend my gratitude to them for granting permission to utilize their insights on how to enhance the app in upcoming updates.

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