DEVELOPMENT OF IGBO LANGUAGE
E-LEARNING SYSTEM

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ABSTRACT

E-Learning involves using a variety of computer and networking technologies to access training materials. The United Nations report, quoted in one of the Nigerian dailies towards the end of year 2006, says that most of the minor languages in the world would be extinct by the year 2050. African languages are currently suffering from discard by the original speakers of the languages as parents prefer to communicate with their children in English language or other languages rather than in their mother tongues.

Although, there are Web-based language learning systems, this paper presents a standalone Igbo language learning system that enables prospective learners to learn the rudiments of the language at their convenience especially where there is limited or no Internet connectivity in order to arrest the extinction that looms over the language.

Keywords: e-Learning; Igbo Language; Electronic Learning Systems; e-Learning Architecture; e-learning Framework.

INTRODUCTION

Although, there are many definitions of e-learning, one thing that is common to them all is the word 'technology'. It involves a learner using a variety of computer and networking technologies to access training materials. There are different types of learning systems available for e-learning and different tiers of e-learning architecture.

Frameworks and architectures that provide an overall model of the infrastructure required to support e-learning are being developed. Advanced Distributed Learning's Sharable Content Reference Model (ADL's SCORM model) (SCORM 2001) is probably the most important step towards the development of interoperable e-learning systems: it provides a means to overcome the incompatibility issues posed by proprietary implementations through proper standard descriptions of learning content objects and related material and functionalities.

Language is part of culture and there are several languages in the world today. Some are termed major and others minor depending on the number of speakers. A report of the United Nations reported by one of the Nigerian dailies towards the end of year 2006 says that by the year 2050 most of the world's minor languages will be extinct because parents no longer communicate with their children in their mother tongues.

Although there are Web-based learning systems for prospective learners to make use of, standalone systems will benefit communities where there is no Internet connectivity or where it is limited or not reliable. It will also provide the learner the opportunity of learning at his convenience. This paper is a step in the direction of arresting the extinction threat that looms over the Igbo language as it presents a standalone interactive Igbo language learning system.

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In developing the system, a study was made of two existing Web-based systems analysed based on certain criteria and the system developed based on the experiences gathered from the two to provide opportunities for the younger generations who will be mostly affected to learn the language.

ARRANGEMENT OF THE PAPER
OBJECTIVES OF THE RESEARCH

The main objective of the work is the development of a standalone e-learning system for Igbo language in order to provide opportunities for the younger generations to learn the language in order to arrest the threat of extinction that looms over it.

METHODOLOGY

An attempt was made to consult textbooks on Igbo language and an Igbo-English dictionary so as to know the rudiments of the language taught at the elementary level of education. Two existing Web-based e-learning systems were also studied and from the experiences gathered, Igbo e-Learning system was developed using Java and compiled using Netbeans IDE 5.0 and Microsoft Access 2007 as the database. The systems evaluated are:

> - The interactive language-learning system developed in the Computer and Network Centre at National Taiwan University: A two-tier client-server architecture is used for the language learning system.
> At the client side, both the language player interface and the authoring tool interface use the DBMS (Database Manager System) to access the course materials in the server via the HTTP protocol in the Internet/Intranet (David, et al).
> - The E-Language project, a joint project of the U.S. Department of Education and the Chinese Ministry of Education:
> A Web-based language learning system that takes full advantage of computing and network technologies and current understanding of second/foreign-language learning. It combines sound pedagogy, appropriate technology, and engaging content. Students explore the environment and use the target language and other language tools to gather information that solve a problem or puzzle. The system is composed of four major components: delivery, communication, feedback, and management (Yong, 2002). The criteria used for the evaluation are:

Content
Accuracy, relevance and how current, factual and non-bias, clarity of presentation, level of suitability to the students, adequacy for students to achieve their objectives, logical presentation, in-depth coverage of topics and freedom from spelling and grammatical errors.

Media
Clarity of graphics, videos and audios are ease of understanding and usage in a pedagogically sound manner.

Activities
How challenging, interesting and appealing and how they vary in approaches to cater for different types of learning styles of learners, incorporation of varieties of instructional modes to promote interactivity, how they help the learners to achieve learning objectives and how they encourage creativity, critical thinking and problem-solving skills.

Navigation
How intuitive they are, consistency in location so that the students know their location in a lesson, allowance of students moving back and forth easily from different parts of the lesson with ease, allowance of students to proceed at their own pace and repetition of sections as often as they need to. Provision of book marking features so that students can return to the last accessed page.

Overall Appearance
Layout and design consistency throughout, simplicity and effectiveness and use of contrasting colours to make text clear and readable.

Technicality
Determining if system and resources can run with minimal plug-ins.

Interoperability
Compliance of the content with *SCORM and IMS*[2] standards.

Testing
Availability of activities at appropriate points in a lesson e.g. after completion of each unit. Do the activities measure student's achievements based on the pre-defined learning objectives? Are there varieties of feedback tools/strategies to measure student's performance? Is the feedback immediate and useful? Are there adequate exercises for students to practise until learning objectives are achieved?

BACKGROUND INFORMATION

The Igbo language (also known, less commonly as Ibo) is an African language, spoken in several African countries including Nigeria, Equatorial Guinea and Congo among others. Having about eighteen million speakers, it is ranked fifty in the ranks of languages based on numbers of native speakers after Chinese, English, French and the likes (see:http://www.mirrorin.com).

It belongs to the 'Benue-Congo' family of languages, which is a subgroup of the major 'Niger-Congo' family of languages. It is similar to Yoruba and Chinese in the sense that it is a tonal language. Like many African languages, the Igbo language has to its credit a number of dialects, distinguished by accent or orthography but almost universally mutually intelligible.

They include the Idemili Igbo dialect (used in Chinua Achebe's *Things Fall Apart*), the Delta Igbo dialect (spoken in Delta State of Nigeria, hence the name) among others. Due to the wide variety of these dialects, a standardized orthography though very difficult became very necessary. The most widely accepted of these standardized dialects is known as the *Central Igbo*, which is a dialect based on the dialects of two members of the Ezinehite group of Igbos in Central Owerri province, eastern Nigeria.

In Nigeria today, many Igbos do not use the language in their daily communication. It is a fact that in many urban Igbo areas, the use of 'Nigerian Pidgin English' has replaced the use of Igbo in daily conversation. Also, another fact is that lesser and lesser people, from one generation to the other know how to speak the language. The average Nigerian child especially from affluent home communicates in English for eighty percent of his daily conversation.

There are many ways and avenues for them to learn English language but few, if any way for them to learn their native language. Parents take pride in their children's ability to speak English language fluently more than their ability to speak their native language.

At this rate, the threat of extinction that looms over Igbo language is greater than ever before and if nothing is done to reverse this trend, the world's fiftieth ranked language in terms of number of native speakers will be a forgotten language. It has therefore become imperative to provide a means whereby people especially the younger generations can learn the language in the comfort of their homes especially where Internet connectivity is non-existent, limited or not reliable.

E-LEARNING

There are various definitions of e-learning and one thing that is common to them all is the term 'technology. Essentially, it is about the transmission of learning content using information technology and often refers to delivery using intra or Internet (Sarojni, 2007). It involves a learner using a variety of computer and networking technologies to access training materials. It is education offered using electronic delivery methods such as CD-ROMs, video conferencing, websites and e-mails to facilitate and enhance learning through the use of devices based on computer and communications technology (Hobsons, 2005). It covers a wide set of applications and processes such as Web-based learning, computer-based learning (CD-ROM), virtual classrooms, and digital collaboration (Glossary of Terms, 2002, Sushil and Fred, 2004).

E-Learning aims at replacing old-fashioned time/place/content predetermined learning with a just-in-time/artwork- place/customized/on-demand process of learning. It builds on several pillars, vis. management, culture and IT (Maurer and Sapper,2001).

In an overall definition, it is the use of electronic technology to support and enhance teaching and learning. Types of e-learning (WorldWideLearn, 2007):

- ➢ Purely Online: No face-to-face meetings,
- ➢ Blended Learning: A combination of online and face-to-face,
- ➢ Synchronous,
- ➢ Asynchronous,
- ➢ Instructor-Led Group
- ➢ Self-Study
- ➢ Self-study with subject matter expert
- ➢ Web-Based,
- ➢ Computer-Based (CD-ROM), and
- ➢ Video/Audio tape.

Electronic Learning Systems: There are different types of learning systems available for e-learning and they include the following:

Stand-Alone Systems
They are computer software that requires no more than the computer and perhaps some peripherals like a laser disk player and/or a CD-ROM drive.

A standalone application deploys services locally, uses the services, and terminates the services when they are no longer needed.

If an application does not need to interact with any other applications, then it can be a standalone application with its own exclusive local service deployment. Services locally deployed by this application are not available to any other application; in addition, no remote services are available.

Stand-alone learning systems are usually self-study i.e. with or without a subject matter expert.

Intelligent Tutoring Systems (ITS)

Broadly defined, an intelligent tutoring system is educational software containing an artificial intelligence component. The software tracks student's work tailoring feedback and hints along the way. By collecting information on a particular student's performance, the software can make inferences about strengths and weaknesses, and can suggest additional work. It is a system that provides individualized tutoring or instruction. It must contain three components, which are:

> - An expert model is a computer representation of a domain i.e. knowledge of the domain.
> - The student model evaluates each learner's performance to determine his or her knowledge, perceptual abilities, and reasoning skills i.e. knowledge of the learner.
> - The instructor model encodes instructional methods that are appropriate for the target domain and the learner i.e. knowledge of teacher's strategies.

Based on its knowledge of a person's skills, strengths and weaknesses, participant expertise levels, and student learning styles, the instructor model selects the most appropriate instructional intervention.

The goal of ITS is to provide the benefits of one-on-one instruction automatically and cost effectively. Like training simulations, ITS enables participants to practise their skills, by carrying out tasks within highly interactive learning environments. A student learns from it by solving problems. The system selects a problem and compares its solution with that of the student and then it performs a diagnosis based on the differences. After giving feedback, the system reassesses and updates the student skills model and the entire cycle is repeated.

Web-Based Learning Systems: Through a Web interface, students are able to not only learn the lessons anywhere at any time but also practise at leisure pace, thus overcoming the limitation imposed by time and space. Web-based delivery involves delivering learning contents online and using an examination stored on a server and made available to students through a Web browser.

Examinations are done online and marked immediately by the server software and the marks stored for later use. It is generally easy to set up and use. It is especially suiTable for formative tests, which the student can take from any lab or from home without needing any additional resources.

It can be particularly useful when the assessment is formative because students can re-take the test and will be presented with similar, but different, questions on each attempt. Marking is also fast, reliable and objective, and students can, if desired, see their results before leaving the test room (see: http://www.elearn.malts.ed.ac.uk).

Architecture

The term 'architecture' is used by different communities to describe a view (typically a high-level overview) of the range of functions or facets of an e-learning system or infrastructure.

As such, the term is used in both general and technical contexts. In some cases the term has a technical meaning (though not a consistent technical interpretation) and applies to an implementation, in other cases it describes a conceptual organization of components, whilst in others it defines an action plan.

Tiers/Levels of E-Learning Architecture (Karen, 2001)
Business Strategy and Architecture. This addresses how e-learning should link to the project's business strategy, issues, and goals.

It documents performance goals for e-learning. It lists critical outcomes and identifies metrics that indicate success, such as cost, speed, quality and revenue. Success measures directly the reasons for initiating e-learning. Once measures of success have been identified, it captures baseline data as a comparison point for e-learning returns.

Finally, it determines a realistic timeframe for achieving critical outcomes.

Technical Architecture.
It looks at the required components and functionality of learning. Most e-learning require an open architecture, and must include standards for integrating existing elements, such as legacy learning, enterprise applications, online learning, and emerging tools.

Learning Strategy (Experiences And Content)
This focuses on learning strategy, matching learning experiences and content. Presentation and distribution methods offer a wide array of options and require extensive technical infrastructure. The most widely used presentation methods are Web-Based Training (WBT), Computer-Based Training (CBT), and teleconferencing. The most widely used distribution methods are CD-ROMs, intranets, and the Internet.

Matching content to delivery is critical because different presentation and distribution methods best support various learning experiences. Regardless of presentation and distribution method, e-learning effectiveness depends on its deployment strategy, ease of use, and content quality and relevance (Burns et al, 1991)

Framework
The e-learning framework is a service-oriented factoring of the core services required to support e-learning applications, portals and other user agents. It provides a platform for policy makers by offering a coherent vision of how to integrate systems to support organisational and cross-organisational processes to enable effective e-learning supporting planning activities.

It supports planning for technical and interoperability specifications and standards development. The ultimate aim of the framework is, for each identified service, to be able to reference an open specification or standard that can be used to implement the service, and also to be able to provide open-source implementation toolkits such as Java and C# code libraries to assist developers.

The intention is not to provide a blueprint for an open-source solution, but rather to facilitate the integration of commercial, home-grown, and open source components and applications within institutions and regional federations, by agreeing common service definitions, data models, and protocols (see: http://www.jisc.ac.uk).

Infrastructure
It is the permanent foundation on which e-learning is built. In e-learning contexts "e-learning infrastructure", "technical infrastructure", and "ICT infrastructure" all convey a range of meanings.

For the technically inclined, "infrastructure" often describes a bottom "layer" of an architectural description or diagram, indicating network hardware components, communications processes, services and protocols.

However, for others, it can also serve as a label that includes the "applications layers" or even more broadly, the entire platform required to deliver services.

It must address governing principles, processes, and structures that will contribute to e-learning success or failure.

The infrastructure's essential elements are building blocks that support one another.

Interoperability

It is used to encapsulate the various levels of connectivity necessary to create end-to-end infrastructure linking systems and services in a meaningful way for the user. To maintain and extend the value of pre-existent investments in e-Learning systems and preserve digital learning material there is a need to support interoperability specifications and emerging standards that allow learning resource reusability and integration of operational e-Learning environments.

Frameworks and architectures that provide an overall model of the infrastructure required to support e-learning are being developed. Advanced Distributed Learning's Sharable Content Reference Model (ADL's SCORM model, SCORM 2001) is probably the most important step towards the development of interoperable e-learning systems by providing the means to overcome the incompatibility issues posed by proprietary implementations through proper standard descriptions of learning content objects and related material and functionalities.

SCORM (SCORM 2001): stands for Sharable Content Reference Model. SCORM is a set of specifications for developing, packaging and delivering high quality education and training materials whenever and wherever they are needed.

The use of SCORM enables reusability, accessibility and durability of the learning material in technology changes, and interoperability between different e-learning platforms. SCORM contains a rich dictionary of metadata terms that can be used for describing educational content.

A generic architecture that supports the export of the educational content of an e-learning platform to SCORM can be implemented.

This architecture would also support the transformation of the metadata contained in the relational database to the format described in the IMS Learning Resource Meta-data Information Model (IMS LRM 2001). These metadata, used to describe the learning resources, will also be included in the generated SCORM Content Packages.

The architecture follows a multi-tier approach with three distinct tiers (Polyxeni et al, 2003):
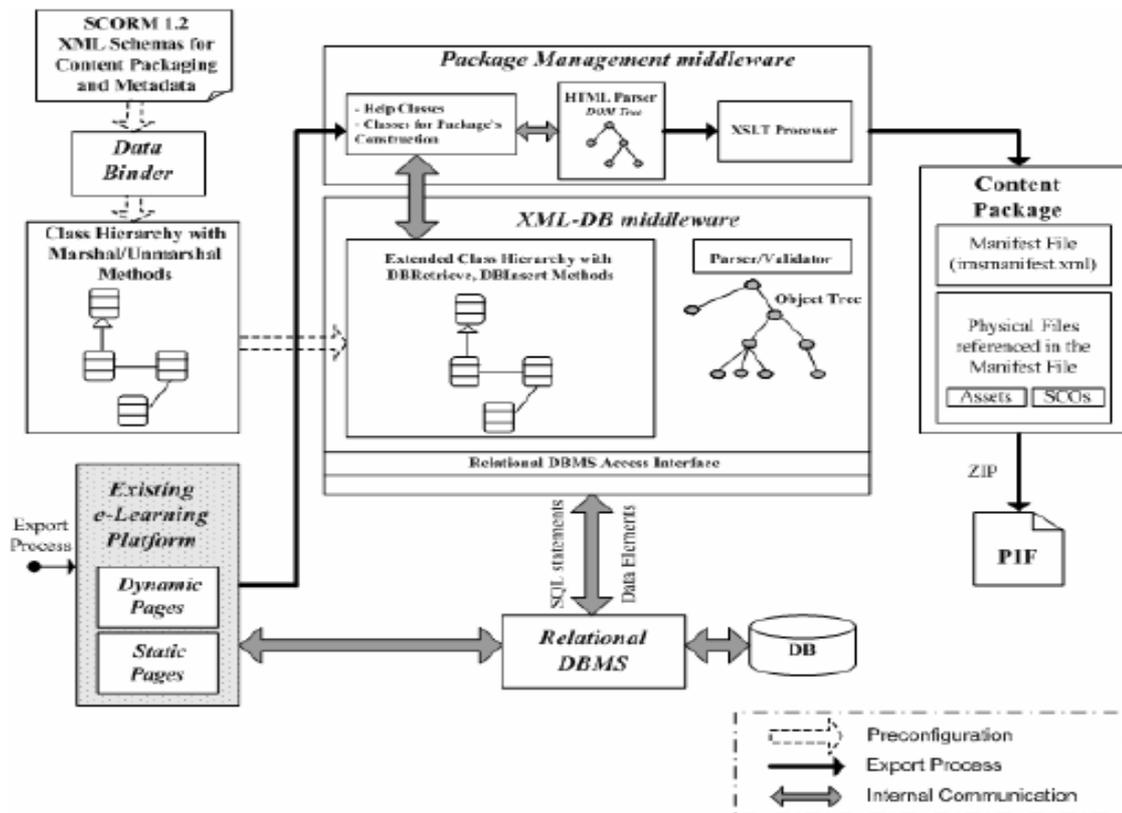
Figure: 1
Multi-Layer Approach for Exporting Educational Content of an
E-Learning Platform to SCORM

Platform

The major problem with existing e-learning platforms is that most of them impose dependencies on content and system functionality. These dependencies include:

> ➢ **System Component Dependencies:** Modern e-learning platforms integrate functions such as authoring, course/user management, and content retrieval/presentation. These functional components are often tightly coupled. As a result it is hard, for example, to integrate a new publication sub-system or personal learning environment.
>
> ➢ **Data Format Dependencies:** Many of the current e-learning systems organize and store the course structures tightly coupled to the specific functionality of the system. The courses are not platform independent. Packaging standards such as Learning Technology Standards Committee (LTSC) and SCORM are forced to take up a rather abstract point of view on learning objects.

The necessary platform-independent model of the fine-grained internal semantics of e-learning content is topic of current research. These dependencies can be avoided by applying content management concepts such as separation of specification (code) and publication of course content.

DESIGN, IMPLEMENTATION AND SNAPSHOTS OF OUTPUT

System Design

The design was carried out taking the following into consideration:

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- ➢ **Entry behaviours:** Description of what a learner must know before entering into the training program i.e. the base level of knowledge, skills and attitudes.
- ➢ **Learning objectives:** Ordered sequence of what a learner should be able to do after going through the program.
- ➢ **Learning steps:** Description of how to perform the tasks.
- ➢ **Performance test:** Description of how well the tasks must be performed.
- ➢ **Structure and sequence of program.**

The system design was carried out using 'Enterprise Architect 6.5', a UML (Unified Modeling Language) 2.0 IDE tool. It provides a comforTable, graphical and easy-to-use approach to the use of UML in modeling systems.

Implementation

The programming language used for implementation is Java. However, the program was developed using Netbeans IDE 5.0 developed under Sun Public License (SPL) based on software from netbeans.org. It runs on Java HotSpot™ Client VM 1.5.0_05-b05 and Java version 1.5.0_05. It is a Sun Microsystems product. It provides a graphical tool for designing and testing in Java. The Database was implemented using Microsoft Access 2007. This was used for ease of connection between the Java codes and the database more especially on Windows XP operating system − service pack 2 and also because of the ease of use provided by MS Access 2007 in comparison with other database design tools.

Snapshots of the Application

The following are the modules in the Igbo language learning system:

Login Module

This is the module wherein the user is granted access into the system once the application has been invoked. It requires the user to enter a username which is not currently being used by any other user of the system.

Figure: 2
Login Interface.

Select Activity Module

This is where the user chooses the activity that he/she wants to learn after being given access.

Figure: 3
Select Activity Interface.

Learning Activity Modules

These modules cover the learning/studying of the activity selected by the user. Each activity differs from the other.

There are several learning-activity modules in the system: Courtesy, Day, Household, Numbers, Parts of the body and Time.

The learner first selects a learning activity and afterwards clicks the sound button to play the lesson.

Figure: 4
Learning Activity Interface (Parts of the body).

Test Module

This module tests the knowledge acquired by the user after going through a particular activity.

Figure: 5
Test Activity Interface (household).

Correction Module
This is where the user views the answers to the questions and has the opportunity to go back and answer the questions.

Figure: 6
Correction Interface (household).

Using the Program
Once Baby Dee is launched, the user logs in by selecting his user name or by registering. The user can then select any of the following activities:
Courtesy: Welcome, good-day, I am fine, how are you etc.
Numbers: 0, 1, 2,...
Day: The days of the week.
Parts of the body: The different parts of the body.
Household: Household objects like fork, plate, television, etc.
Time: Second, minute, hour, day, week, etc.

Once the window for a particular activity comes up, the sound button is clicked to play the sound that teaches how to pronounce the words.

Next button is provided to learn more and Back button to repeat any previously learned materials. For each activity, a test module is presented for the learner to evaluate how much he has learnt. The score is also provided once the OK button is clicked.

There is also a correction of the test once the answer button is clicked on the test window. The menu button on the test window allows the user to select an activity he wants at any point in time. The Quit button is provided on the main window to leave the application.

CONCLUSION

The Igbo language is a complex language with many dialects making it difficult to identify the central Igbo from other dialects. The fact that many of the current generation of youths from the Igbo speaking eastern part of Nigeria neither speak nor understand the language (to an accepTable level), does not help one in the quest for discovering which is the central form of the language.

E-learning systems have a large advantage over traditional learning environment as they eliminate the tension and stiffness associated with classrooms and teachers. Developing a standalone e-learning system for the teaching and learning of Igbo language is the best way to solve the problem of lack of continuity of the language, especially when such a system is targeted at children (It is easier to learn languages at that early stage in life) and especially in places where Internet connectivity is non-existent or not reliable.

This work is a step in the right direction of arresting the extinction that looms over Igbo language as one of the minor languages of the world as a standalone Igbo language learning system has been presented.

RECCOMENDATIONS FOR FURTHER WORK

Other local languages can be included to make it a multi-lingual e-learning system and the test module can be made to test the ability of the learner to pronounce the words correctly.

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