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GLOCALISATION OF THE TEACHING OF SCIENCE: A CROWDSOURCING CALL

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Abstract
This article describes the research activities conducted so far on a project titled; "GLOCALISE". The main aim of this research is to re-purpose teaching to be learner-centred through inquiry-based, contextualised and learner engaging methods. The general objective is to contextualise learner-centred teaching approaches to Nigeria local setting. Nigeria being diverse in culture, tradition and language with the three major cultures/languages: Hausa, Ibo and Yoruba is explored in this project, hoping that when learning is put in the context of the learners, they will grasp better. Specifically, the subject focus of the project is science, bearing in mind that science is a field that requires inquiry, creativity, and collaboration. It demands learners' engagement through hands-on activities that will ensure they gain insights about learning scientific concepts. This implies that pedagogical methods and practices in science should add more rigor to developing lessons that are learner-centred such that both students and teachers can collaborate on problem-solving and inquiry-based ventures thereby becoming not just consumers but creators of innovative practices and teaching/learning methodologies.

Introduction

Nigeria being a multi-faceted country has rich and diverse cultures with different traditions and learning contexts. It is a reality in Nigeria that our traditional settings have been long used to teaching children with tales and moonlight stories within our context (Ehimwenma, 1996). Mathematics, all science subjects and in fact the newly introduced computer science are all taught

using foreign contexts and examples from foreign textbooks we adopt in Nigerian education system. Can we divorce our system from alien ways and imbibe our local context in our teaching? As a peradventure, our students will start to develop more interest in science subjects. Students have been found to develop phobia for science subjects perhaps because of the teaching styles that do not consider student-context?

The current situation in Nigerian schools is not commensurate with global demands of teaching. In terms of basic infrastructures and amenities, instructional resources and competent facilitators, enabling environment and stakeholders' support; Nigeria is yet prepared (Adedokun-Shittu and Obielodan, 2016). Despite this discouraging situation, students desperately require the skills and requisite knowledge to compete favourably with their peers globally. In Nigeria, sciences are the most often failed subject areas (West Africa Examination Council, 2014; National Examination Council, 2015) because they are taught with abstract concepts. It is conceived that if Sciences are taught in perspective of the students, it may enhance their comprehension and improve their performance (Adedokun-Shittu, 2016). Thus, there is need for learner-centred and context-sensitive approaches to be cultivated by teachers of science subjects (Biology, Chemistry, Mathematics, Physics, and computer science), that will be validated by experts and accepted by students. This will perhaps elevate our status from being just consumers to creators of knowledge.

The nature of learning in this contemporary time is such that learners are at the centre stage. Teachers therefore need to get used to the challenges that come with this reality. In learner-centered approach, inquiry-based, learner engagement and learner context are key elements teachers should focus on, to put them into spotlight in their chosen profession. The teaching of sciences requires methodologies and styles that focus on students' retention and knowledge application. A teaching style that de-emphasises the role of students as active partakers in their learning may not effectively achieve retention and application. What the Hausas refer to as "*gaani yaa fiiji*" the Ibos say, "'*ahumahu bu onye ozizi kacha mma*" and the Yorubas express as; "*iroyin ko to afojuba/iriri lagba*" is succinctly captured in the Chinese maxim: 'what I hear, I forget; what I see, I remember; what I do, becomes part of me'. These give a clarion call to teachers on the need to re-purpose their teaching to be inquiry-based, contextualised and learner engaging all of which are learner-centred. Importantly, sciences are taught to Nigerian students most often using foreign, textbooks and alien examples. This research is thus aimed at presenting learner-centred teaching approaches to science subjects contextualised to the major local settings in Nigeria

(Yoruba, Igbo, and Hausa). Thus, the project investigates the pedagogical requirements for teachers to implement the innovative approaches in learner context seeking to explore both global and local learner contexts by crowdsourcing to enrich learner experiences through engagement and collaboration.

This ongoing research on teacher-student collaboration showcases how sciences are being taught in a fun, engaging and localized manner. Imagine teaching simultaneous equations with local proverbs, or teaching multiplication without multiplying! Create a scenario for binary representation or creatively give inquiry-based activities for students to search, you will be surprised how much you are learning from these geniuses when you learn archeology in mathematics. How fun will it be if students are taught mathematics, physics, chemistry, biology and particularly computer science using localized, culturally situated and traditional context materials, language and art? Imagine teaching 'addition' in fact the whole of BODMAS with *lanka-lanka* (hop-scotch), *ayo olopon,* for addition/subtraction, *tente, tinko, okoto tita,* to teach multiplication/division. When we played the *okoto* back then, little did we realise it's ingraining in us gravitional force concept in physics.

Mathematical concepts can be learnt by adding up in *ayo olopon*, you are unconsciously conscious of even and odd numbers in *tente* and *tinko.* Do you remember our Yoruba poems teaching us counting? "*Eni bi eni, eji bi eji, eta nta gba, erin woroko,....*" what about *aalo apamo* (riddles)? What if you teach some concepts using this inquiry-based method? *Opa tinrin kan ile, okan orun – kini o*? *Ojo*. Treating climatic issues in environmental sciences, how does rain cloud form and how the downpour occurs – creating an exciting scenario through riddles could clear the coast before sailing. Think of proverbs that go along with concepts in physics, chemistry, biology. '*Laalaa to roke, ile lo nbo'* - a Yoruba proverb explaining perfectly the 'Law of Gravity'. '*Iromi to n jo lori omi, onilu re wa nisale odo'* - relating the upthrust that exists when a body is immersed in a fluid - that's Archemedes principle in Physics. What of Newton's law of motion? Can you think of any childhood play that can describe inertia in Newton's law? – Tug of war? Figure it out! All these are in our tradition, in our culture and language, forming the context in which our students will learn actively and engagingly. We need not wait for an *Oyinbo* man to call it ETHNOCOMPUTING/ETHNOMATHEMATICS/ETHNOPYHSICS/ ETHNOCHEMISTRY/ETHNOBIOLOGY for us before we adopt it.

Methodology

The approach of this collaborative effort is crowdsourcing ideas from within our local environment through a repository that will serve as an avenue for sharing and further collaboration glocally (both globally and locally). Nigeria is rich in culture, tradition, and language thus, the three major cultures/languages: Hausa, Ibo and Yoruba will be explored in this project. However, the pilot research will kick off with Yoruba, then snowballed to the two other cultures (Ibo and Hausa).

Thus, the specific objectives of this project are to:

i. explore globally and locally (*glocally*) through crowdsourcing some universal and unique values such as child's play, proverbs, idioms, antiques, tradition, culture… to concoct a blend of resources for teaching and learning;
ii. to create a web repository where knowledge contributors can deposit their ideas and educators can quench their thirst for innovative teaching methods;
iii. to validate pedagogical and assessment issues of contributions, lesson plan/activity sheets, rubrics …;
iv. to elevate the status of Nigerian educators from just consumers to creators of innovations/knowledge and creative teaching methodologies.

For this reason, we have created a repository (Repository more like Wiki) to serve a dual purpose:

- 1. where our knowledge contributors can deposit their ideas,
- 2. where all educators/learners can quench their thirst for novel ideas.

Screenshots of the Glocalise Repository

Figure 1: Homepage of the glocalise repository

Homepage where links such as sign up/login, about, mission,contact us, search query and links to other pages on the web repository can be accessed. The web repository is still under construction and undergoing series of redesign such as changing the glocalisation to glocalise being the name of the project and others.

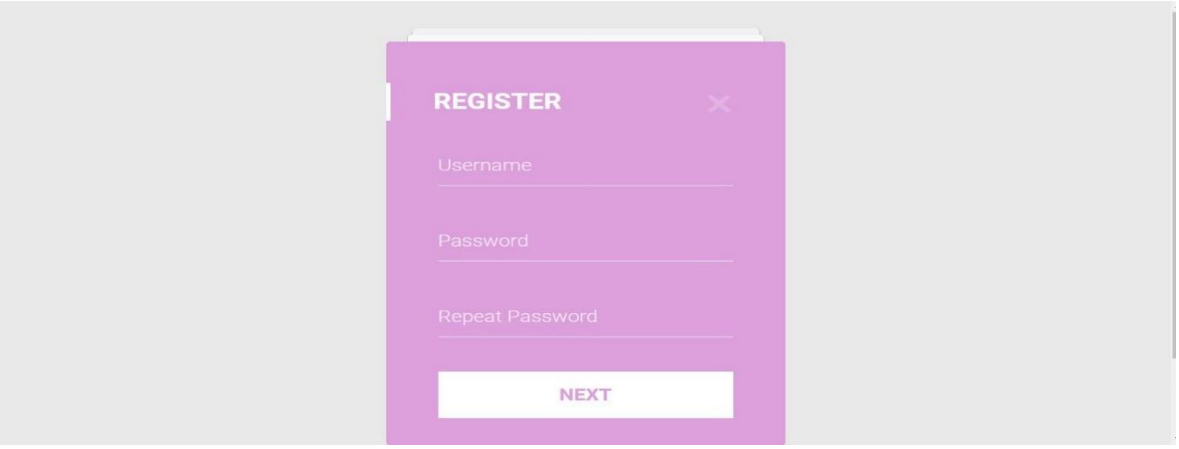

Figure 2: Shot of the register page.

Figure 2 displays the page where contributors and visitors register to access the web repository as contributors of resources or consumers of resources uploaded for public consumption. This is the first contact any interested users have with the web repository.

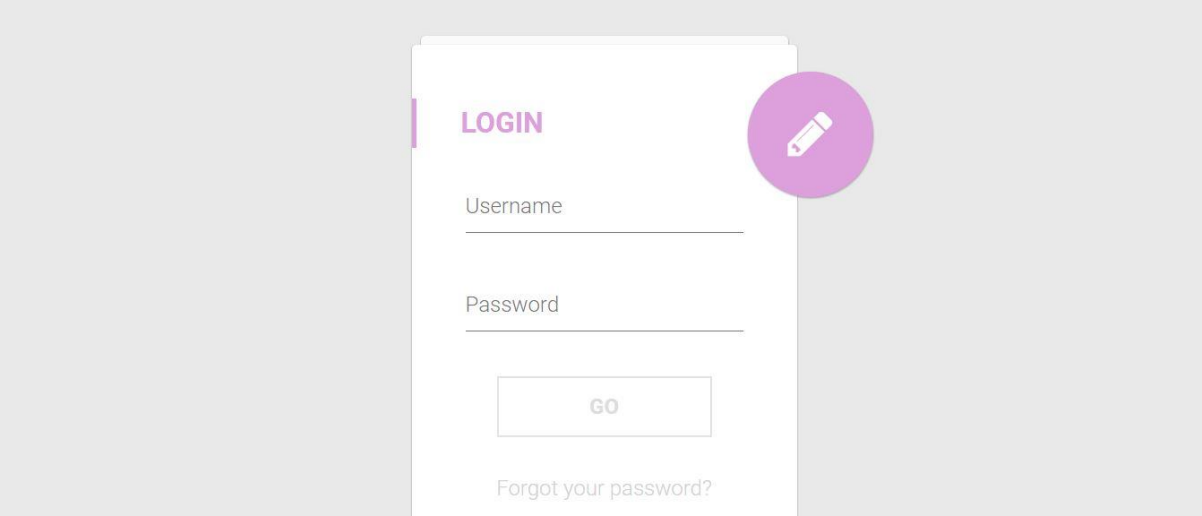

Figure 3: Shot of the login page

This page allows registered users to subsequently login with their details provided during sign up such that they can either contribute or access resources validated for public use.

Steps for accessing the repository:

- Contributors sign up, subsequently sign in,
- upload their contributions and wait for approval from administrators,
- revise submissions based on review comments from experts.
- final approval and contribution ready for online access
- consumers sign up and subsequently sign in for access to all contributions.
- consumers can make comments for improvement on contributions.
- consumers can become contributors after approval from administrator.

Our Contributors include:

- Student-teachers from National Colleges of Education and Faculties of Education and related Faculties across Universities within and outside Nigeria.
- In-service science teachers in both Primary and Secondary Schools.
- Retired teachers with relevant experiences of local languages, cultures and traditional games/activities/songs/proverbs to enrich content.
- Professors from related disciplines enrich the subject content.
- Educators to validate pedagogical and assessment issues of contributions, lesson plan/activity sheets, rubrics…

The summary of all these methodological processes can be found in the conceptual framework in figure …

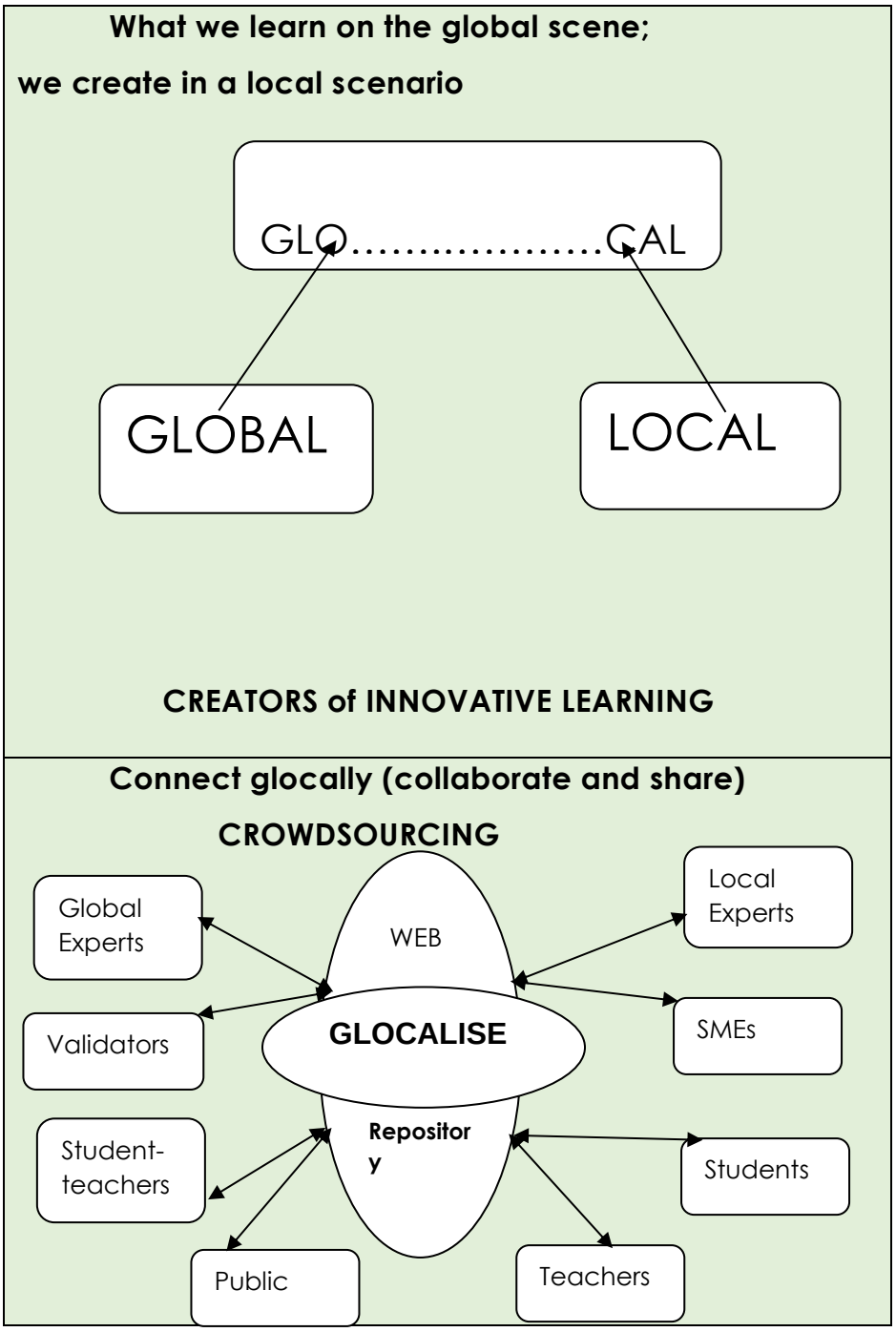

Figure 1: Conceptual Framework for the Project

Table 1 itemises the projects stream of activities sequentially and the expected outcome at each stage of the research. The first stage involves conducting training and awareness workshop across the country for personnel (student-teachers, in-service teachers, culture, language and subject matter experts…) on the need and how to create resources for teaching and learning sciences using our local context. Having created this awareness, collaboration among interested stakeholders will be solicited to create innovative ideas by concocting a blend between global concepts and local contexts that will be uploaded on the created repository for validation and sharing.

In the second stage, it is imperative to conduct empirical studies on the efficacy of this approach thus, interested teachers and other stakeholders who have decided to use this approach in their various classes will be observed, interviewed and surveyed. Results of these research will be analysed and their findings will be reported and benchmarked against existing literature. Finally in the third stage, resources created from activities of interested stakeholders such as activity sheets, lesson plan, evaluation rubrics, prototype curriculum for each subject based on their collaborative efforts will be validated by both global and local experts then proposed to the Ministry of Education (MoE) for adoption into the National curriculum of sciences and other subject areas.

Table 1: GLOCALISE Project Research Activities and Expected Outcome

Stages in the Research	Activities	Expected Outcome
Stage 1	Training of personnel/awareness workshop	Web repository for collaboration and sharing
	Crowdsourcing for innovative ideas	
	Creating/maintaining a web repository	
	Collaborating and sharing the innovation with interested stakeholders	
Stage 2	Conducting evaluation studies across all stakeholders	Presentation of report on outcome of validation researches
	Analysing results of studies conducted	
	Writing reports and reviewing literature	
Stage 3	Design prototype curriculum, activity sheets, lesson plans, rubrics…	Propose the innovative approach for science curriculum and other subject areas
	Validate approach through global experts	
	Propose the validated approach to MoE	

Conclusion and Implication

This shift in learning experiences calls for stakeholders in education to flexibly provide learning in a more creative and dynamic way to respond to different market niches. The curriculum cannot remain "safe" from change, teachers must be comfortable with being a facilitator rather than a "sage on the stage/talk chalk professionals", learners become active participants in their own learning and learning no longer permanently stays within the four walls of the classroom. It should also be understood that these approaches require broadening participation through building a network of teachers, experts in the field of the identified subjects, local/cultural experts and other stakeholders to brainstorm on how to expand opportunities for students' learning. Even though these approaches encourage the use of domestic and inexpensive materials as instructional resources, it still comes with a cost implication. However, the implication will be reduced with the willingness of all stakeholders to collaborate and share their wealth of resources through the glocalise web repository. This will require government, parents, subject matter experts, traditional experts and schools' administrators' support morally, intellectually and financially.

Research and Publications so far on the Project

1. Unilorin TETFUND Research 2017. "Contextualising the teaching of sciences: exploring local cultures and traditions".
2. Examining stakeholders' reaction to contextualized teaching of mathematics in Primary school in Ilorin. M.Ed Research Dissertation
3. Problem-based and Inquiry-based learning in a technology integrated biology class M.Ed Research.
4. Contextualizing Teaching in the Era of Learner-centeredness: Brazing Teachers up for the Challenges ahead. In Press
5. A Comprehensive Methodology for Teaching and Learning. In Press

Citations Related to the Project

Adedokun-Shittu, N.A., Yusuf, M.O. & Obielodan. O. (2016). Innovation Methods of Teaching Computer Science. In Methods of Teaching Science, Basic Technology, and Computer Science. Abimbola, I.O., Olorundare, A.S., Fajemidagba, M.O., Omosewo, E.O., Onasanya, S.A., Fakomogbon, M.A., and Adedokun-Shittu, N.A. (eds.) 310-313 Published by Faculty of Education, University of Ilorin.

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