

Virtual Classrooms: The Future of Education

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Abstract— With the advancement in technology and the internet, the way that teaching and learning occurs is expected to follow suit. Africa in particular has been at the background of education and fast falling back. A change in line with the technological advancements that are currently transforming our world as we know it is expected in the educational system. New platforms for learning can and should be adopted into the education system to further expand how and when students learn. People are having to do more work to survive in this world, with students having to juggle both work and studies in order to pay fees and living expenses, they cannot afford to be tied down by traditional learning paradigms that force them to be at a certain place at a certain time for learning to occur. The future of education is anytime, anywhere based learning with a drastic move towards a student-centred learning environment. This paper proposes a Virtual Classroom platform as a key enabler for an anytime, anywhere, student-centred learning environment.

Keywords— E-Learning, virtual classrooms, application server

I. INTRODUCTION

Africa is in need of mathematics and science teachers and better learning infrastructures. The South African education department has over the years faced great challenges with regards to the number of students that pass science subjects such as Mathematics and Physical science. Many relate this problem with the former apartheid government that deprived “black” children of their right to higher education. The education department has adapted various strategies to help improve matric marks at the end of the academic year. One such initiative to help with the given problem is the concept of Electronic Learning.

Electronic Learning, which is better known as e-Learning or e-Education, is the intentional use of networked information and communications technology in teaching and learning [1]. In the South African context, the concept of e-Education revolves around the use of Information and Communication Technology to accelerate the achievement of national education goals [2].

In efforts to help alleviate this problem, companies such as Telkom, Eskom and Microsoft in partnership with the South African Department of Education have rolled out initiatives such as the provisioning of Information Technology equipments to schools. This e-Learning endeavour aims to help students gain access to more resources besides the traditional textbooks and teachers, while enhancing their computer literacy skills.

II. CHALLENGES

Many schools in disadvantaged areas of South African are normally understaffed and lack basic learning and teaching resources such as textbooks. E-Learning holds the potential to suppress or totally eradicate this problem as electronic versions of teaching material are and can be made readily available. How this can be done seamlessly and efficiently is the subject of this paper using existing infrastructures.

III. VIRTUAL CLASSROOMS

Virtual classrooms exploit the notion of using IT infrastructures to facilitate learning. A virtual classroom is expected to best mimic a traditional classroom setting in order for it to be well received by the general public. Virtual classrooms as an added learning platform must therefore support classroom interactions that occur in a regular classroom which includes but is not limited to verbal and visual communication. It is imperative that such platforms not only support such means of communication using technology but implementations should remove any significant differences noticeable to a user to further enhance the user’s experience. This means a user must have an illusion of being in a physical classroom while engaged in a learning session.

IV. RELATED WORK

A. WiZiQ

This web based implementation includes features such as voice calling, video, instant messaging and a whiteboard. User generated content can be uploaded and shared among users in a given session. The whiteboard feature allows for real time communication using text, pictures and slides [3].

B. Thutong

Thutong is South Africa’s free educational portal launched by the government of South Africa, offering a range of curriculum and learner support material, professional development programs for teachers and administration and management resources for schools. Thutong features a searchable database of resources for various education sectors, grades and subjects [4]. It also acts as a news and information carrier, reporting on the latest developments in South African education while offering its users a chance to interact with experts in the education community both locally and internationally using the forum feature.

C. Dr Math

The infamous instant messaging application, Mxit client, launched in 2003, introduced an innovative twist early 2007. Math on MXit, or Dr Math as it's popularly known, is an initiative launched by the Meraka Institute of the Council for Scientific and Industrial Research that has proven the efficacy of a chat support service. Dr Math links students to tutors who answer any question from the entire high-school mathematics syllabus. The initiative has grown quite popular since its inception as more students become aware of its existence and further growth is still expected. It currently boasts of more than a thousand students. This growth has been largely influenced by the low cost of the service. Messages are carried through a data connection such as GPRS which in South Africa is much cheaper than sending an SMS [5, 6].

V. RESEARCH GOALS

The vision of Dinaledi, a governmental initiative, is to have 50 000 students passing mathematics in the final year matric exam [7]. This vision is still far from being reached. There is a need to shift focus from one form of learning to include other learning platforms such as virtual classrooms. Currently the biggest challenges facing the inclusion of virtual classroom in the South African education system is the high cost of internet access and the low numbers of household internet access mediums such as computers or laptops. This research will thus focus on novel ways to minimize cost without digressing from the main aim of facilitating learning on a virtual platform.

VI. PRELIMINARY ARCHITECTURE

The proposed architecture involves a math application server that can be accessed through the http protocol from any access network. As a standalone server, users can log on and take full advantage of its services. Two clients will be considered, a computer based client (UCT IMS client) and a mobile client (still to be developed) as both have distinguished advantages and disadvantages in the South African context.

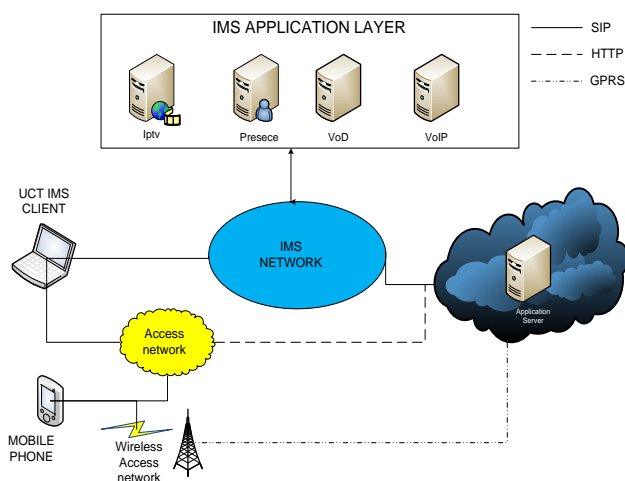


Fig 1: Preliminary architecture

D. Math Application Server:

The application server will host a searchable data-base for past maths papers, audio and video, while providing the basic required classroom facilities such as instant messaging, voice and video calling/conferencing, and facilitating the real-time white board interactions of various users currently logged on into a session. It will also manage the presence of users to facilitate a presence based form of communication.

E. UCT IMS Client vs. Mobile Client

The UCT IMS client will be used to test the application server functionalities since the characteristics of a virtual classroom such as text, presence audio and video, are readily available as application servers on UCT's IMS test-bed. This will help to lower cost if the user is already subscribed to these services in the IMS.

The project will also seek to investigate the development of a mobile client that will allow users to access the application server. Due to the limitations posed by mobile phones (screen size, battery life), further research will be conducted to fully determine the feasibility of such a project on a mobile phone.

VII. CONCLUSION

Virtual classrooms will soon form part of education in the near future. They have been and are still being used successfully in many countries to further enhance the learning process of students. With the roll out of IT based solutions such as Gauteng Online and Kanya, an opportunity for new learning platforms has emerged and should be exploited. This paper proposes the use of virtual classrooms as an added learning platform and means to provide this service at a minimal cost to the user.

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Michael Nyarko obtained his BSc (Eng) Electrical and Computer degree from the University of Cape Town and is currently doing his MSc degree in Electrical Engineering. His research interests are IP Multimedia Subsystems and Electronic Learning Application Servers.