

*Promoting a Student Interactive Learning Environment
using Smart Class Rooms: An Enhanced Approach for
Namibian Universities*

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Abstract

Over the past years, there has been an incredible increase in the use of Information and Communication Technology (ICT) in all the aspects of life from education, business and government operations. A vast number of confirmed studies such as e-Learning for an effective education delivery at high institutions across the world have been carried out and publicized to implement ICT

services and infuse new technological approaches and have been effective. However, more still needs to be done in order to improve and transform the teaching and learning process using ICT in the classroom especially in developing countries. To this point, Namibian universities still use the traditional stand-and-deliver lecture style. This dominating teaching method is associated with lots of confinements particularly when dealing with huge numbers of students in big lecture halls and class rooms. Some of the short comings associated to this teaching approach include poor audibility of lectures, deprived visibility and destitute student engagement.

For this reason, there is an acute need to withdraw from this teaching approach to a more flexible and an interactive way that stimulates profound teaching and learning by allowing the student to be a part of a classroom of students. Such an environment creates a great opportunity for students to learn from each other and not entirely on the teacher alone.

Author Keywords

Smart Classrooms, Interactive Learning, ICT

Introduction and Background

Over the past decades, the use Information and Communication Technologies have recently gained groundswell of interest in high institutions [1]. In a class room, the students' performance is commonly influenced by a lot of factors and research shows that in most cases, the physical setting of the class room can have an evident impact on student learning [2]. The availability of resources which includes the accessibility to class materials plays a significant role in determining how conducive the classroom is. Studies on the introduction of using ICT to deliver

lectures in high learning institutions have rapidly increased over the past decades [3] and the use of ICT have greatly changed the face of education [2]. However, there is still more that need to be done.

With the advancement of technology, the concept of Smart Classrooms using technologies such as whiteboards was also introduced [4]. This are classrooms where teaching and learning is heightened by combining different components such networking devices, advanced software and audience response technologies. With the model of Smart Classrooms, both the teacher and the students are involved in the teaching process [5]. Carl Wieman in one of his paper wrote: "It's what's going on in the students' brains that matters. It's not who is teaching your huge class that matters but how they teach it" [6]. With this statement, one would think that perhaps it would be better to change the instruction design rather than the tool used, although this may be true, we still need to make sure that we are using the available technology in a way that indorses active learning because in most cases, learning is entirely based on what the lecture up in the front is doing. As a result, student's learning is stifled and deprived.

Research shows that with the use of interaction strategies in the class rooms, students learning at different rates and abilities can highly benefit from each other. It is also believed that a weak student can improve his learning by up to 73% when interacting with a classroom of students [6].

This paper aims to present a proposed design of a novel system which allows for maximum student engagement and active participation during class period especially in large class rooms. This innovation allows students to post questions from their mobile devices during the class and get constant responses from both the lecture and fellow students in real time. The questions and feedbacks are then displayed on a projector mounted on the wall, visible to all and conveyed to all the nodes in the network. The same system further allows lectures to distribute class notes, quizzes and tests to student's devices. The application can further be extended in use cases such as distributing student's assignments and tracking class attendance thereby saving time and resources.

Related Work

A number of Student Interactive Systems have been initiated. In [6] a student-classroom interaction tutorial-like system using learning automata was developed. With this system, each member of the classroom is endorsed to learn not only from the teacher(s) but also to grasp knowledge from fellow students.

Further, in [7], a virtual interactive classroom which uses the RTMP (Real Time Messaging Protocol) was developed. This system allows teachers and students to issue streaming audio, video and other data messages to present streaming media with interaction or navigation as though they were studying in an actual classroom. Although this is a great system, it is still unable to solve the current dilemma as it was aimed to be an E-learning where students in various locations can interact.

Most of these systems are only being used in developed countries and therefore there is a serious need for them

to be implemented in developed countries. Our work therefore attempts to address this matter.

Problem Statement

With the increase of university intakes every year, lectures and tutors are usually faced with a lot of challenges when it comes to dealing with huge numbers of students. This situation is worsened by the fact that Namibian Universities still use the stand-and-deliver traditional lecture method which is associated with a lot of inconsistencies such as poor audibility of lectures and deprived visibility to students most particularly in

outsized class rooms. Although this method is common and has been in use for decades, it is deemed to be very inconvenient in institution of high learning and can be deleterious to students thus contributing to poor performance.

Research Goals

Main Goal

The main objective of this study is to develop a system that stimulates profound teaching and learning by fostering a more interactive and an immersive classroom environment where students are free to contribute in real time, ask questions, debate on ideas and get constant response from the lectures and from each other in real time.

With the new design, we will overcome many of the shortcomings and inadequacies such as poor audibility of lectures, deprived visibility and shyness to ask questions which are associated with teaching in big class rooms and lecture halls.

The sub objectives of the proposed study are:

- Use the human in the loop approach to identify and propose solutions for a user enhanced experience of teaching in big classrooms.
- Discuss emerging technologies which can have and used for scenarios similar to our study, inline with the users we are designing for.
- Analyse the above factors/findings to design a suitable tailored solution that will work, based on the findings.

To achieve this objective, we are going to answer the following **Research Questions**:

1. How can we create a learning environment that overcomes poor audibility of lectures and deprived visibility?
2. How can we implement a learning environment that improves interaction between lectures and students for example by allowing shy students to ask or give feedback in crowded rooms?

Method:

The proposed system will be designed as an android app which can be installed on the student's mobile phones and computers. The app will be integrated with the Real Time Messaging Protocol (RTMP) which allows for high speed transmission of audio, video and data between flash player and the server[]. However, for this project, we are only focusing on the transmission of data between the nodes and not audio or videos.

Research Status

At the moment, we are still at the initial phase of this project and we are thus working hard to clearly outline and understand the system requirements and user specifications.

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