A Step Towards Smart Learning:
Designing an Interactive Video-Based M-Learning System for Educational Institutes

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ABSTRACT

The popularity of smart learning has soared due to its flexibility, ubiquity, context-awareness, and adaptiveness. In particular, video-based m-learning has the biggest impact on the learning process. Its live and realistic features make learning interactive, easy, and fast. This article establishes the importance of video-based learning and m-learning in smart learning while discussing the basics of a smart learning environment and requirements. A framework and model for smart learning is presented. A streaming video adaptation model is also proposed for mobile devices. Based on the model, an interactive video-based smart learning system has been designed, which allows for the streaming video of live as well as prerecorded lecture sessions offering an interactive teaching-learning experience. The application supports both mobile devices and desktop computers. The model is practically implemented with a group of students and their feedback shows a high rate of acceptance of the system while a sizable percentage of them acknowledged that it improved their teaching-learning process significantly.

KEYWORDS

Collaborative Learning, Contextual Learning, Interactive Learning, LMS, M-Learning, Multimedia Learning, Real-Time Learning, SLE, Smart Learning, Ubiquitous Learning, Video Streaming, Video-Based Learning

1. INTRODUCTION

The development of ICT-based learning is rapidly changing the way we learn. The learning mechanisms are getting transformed into friendlier ways and, furthermore, shifting the learning focus from general to learner-centered learning. In the line of advancement of learning technology and paradigms, smart learning is the next evolutionary way of learning.

Our conventional learning systems are often not flexible and adaptive to students’ dynamic need. For example, in an institutional education system, if a student is unable to attend a class he/she misses what has been taught in that class unless the teacher devotes some extra time for him/her. But considering the busy schedules of teachers, it is impracticable to attend the students separately if such instances of missing classes become more frequent. A smart learning system can be the ideal solution for these issues. Smart learning offers more flexibility (in terms of time and location), greater learner engagement, motivation, and feedback.
Smart learning converges the concept of modern learning (different possible way of learning facilitation like personalized, situated, collaborative, etc.) with smart technologies (Adu & Poo, 2014). It includes formal and informal learning, social and collaborative, adaptive and personalized, and situational learning. Smart learning allows delivering appropriate learning content to the right person at the right time and adapting the learning content as per visual and instructional preferences of the learner. The knowledge development is not restricted to an individual learner, but also extends to different categories of learners, peers, learner groups and teachers.

Mobile devices play a crucial role in realizing the smart learning due to its edge in terms of portability and mobility. Particularly, the increasingly prevalent usage of smart devices (e.g. smartphone and tablets) as the primary computing devices (Pramanik, Choudhury, & Saha, 2017) has fueled the realization of smart learning. The learners can access a live or recorded lecture session from the teacher with online and offline interactions through video streaming. The temporal and spatial flexibility frees the learner from being bound to a particular location while learning. The learner can learn ubiquitously, as and when required, with no space and time constraints and, most importantly, cost-effectively. But supporting video streaming and playing it on mobile devices is a challenging task. The mobile devices are highly heterogeneous in terms of hardware and software they support. Also, they support different audio, video encoding formats, streaming technologies, color, resolutions, and data connectivity. This results in nonuniform support of video on mobile devices. To leverage smart learning, these challenges should be effectively addressed.

1.1. Contribution of this Paper
This paper presents a model, design, and implementation details of an interactive video-based m-learning approach incorporating smart learning paradigm that will aid in regular classroom study in an institutional learning scenario. Further, in the paper, an adaptability model is presented. The adaptability model is one of the key features in the design of interactive video-based learning, which will address the technical issue regarding the acceptability of transmitted video streams homogeneously across the different type of mobile devices. The application will allow the learner to gain new knowledge in a flexible and adaptive manner. A prototype model is being implemented with a group of students to assess their acceptance and the functioning validity of the system. The results are quite encouraging with high percentage of acceptance. The focus of the paper and the other contribution made in the paper has been summarized in Figure 1.

1.2. Organization of the Paper
The rest of the paper is organized as follows. Section 2 ascertains the importance of video-based m-learning with the help of an institutional case scenario. It also discusses different approaches to video-based m-learning and associated challenges. The other notable works in the direction of video-based m-learning, in the context of smart learning, are discussed in Section 3. Section 4 presents a framework for video-based smart learning. A model on interactive video based smart learning is proposed in Section 5, while a video streaming adaptable model is presented in Section 6. The design and implementation demonstration of interactive video-based learning are established in Section 7. The details assessment of the model is discussed in Section 8. It covers how the interactive video-based learning system abides the smart learning environment, a brief comparative analysis with other similar systems and the limitation and scope of improvement of the work. The work has been implemented and tested with a good number of students and their assessments are also presented in this section. Finally, Section 9 concludes the paper.
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