

On-the-fly Notes: Instructor to Student Transfer of In-Class Produced Notes

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Abstract. This paper introduces a system that utilizes the capabilities of smart devices to create and transfer in-class made notes to the cloud in a real time manner. This system comes as an extension to the services made by traditional Learning Management Systems (LMS). The described system, used alone or joined with any LMS, facilitates immediate sharing and access to the notes produced in-class and it allows students to view these notes later at their convenience.

Keywords: E-learning · Education · Instruction · Class notes · Smart devices · Learning management systems · Blended instruction

1 Introduction

The popularity and widespread of handheld smart devices, along with the recent reliability and affordable prices of wireless networks, made the utilization of these resources in education a wise act [2]. The reliance on technology in education emerged because of the need to obtain flexible content that is easier to produce, demonstrate, transform, share, access, and reproduce [1]. The emergence of what is called “e-learning” applications has dramatically contributed to education and this gives justification to those governments, in many parts of the world, that monitor to a wide extent the spreading of e-learning resources [2, 6].

The spread of e-learning in the past twenty years is evident. With a growth rate exceeded the expectations in 2013, the growing market of e-learning for the next few years is estimated to even increase by 7.6 % growth rate contributing a revenue of \$51.5 billion by the year 2016 [2].

In a large research context, e-learning has proven efficiency in achieving quality results within short time [2, 4]. A massive research work has concluded an equivalent efficiency of online platforms as a medium to deliver instruction compared to traditional methods known from centuries [1]. These promising findings have been appealing to researchers to expand in the e-learning field.

1.1 Learning Management Systems

Recent trends in education have emphasized both web-based (i.e., pure e-learning) instruction and blended (i.e., hybrid) instruction [5]. Hybrid instruction, relying on both

traditional and web-based instruction, has evidently exceeded the advantages gained from each of its major components when taken alone. A significant contribution that came to support blended instruction is the advent of LMSs, also referred to as online learning platforms or Virtual Learning Environments (VLE), to which the success of e-learning is accredited [4].

An LMS is web-based software that manages learning resources and their users: instructors and learners. LMSs support in-class teaching by facilitating the creation, delivery and management of learning resources [3, 5]. Tracking the learner's performance is provided by LMSs via different means, such as online auto-assessment and scores recording. Today, LMSs are widely used in thousands of universities and institutions around the world for making courses and related learning resources available at the learner's best convenience, known as "anywhere anytime" access, and for promoting collaboration among learners and their instructors [5].

While LMSs are widely used nowadays, they are still at a primitive stage of utilization in terms of the availability of informal class instruction, for example extra explanations written on board. Several studies revealed limitation in the LMS capabilities of content creation (i.e., transfer of verbal and hand-written instruction that take place in class) [3]. Interestingly, issues such as capability of integration with external systems are relatively gaining higher significance than adding new features to any LMS [3]. The described system in this paper aims at facilitating in-class creation of notes and real-time transfer of those notes to the cloud. The notes are kept either by utilizing the capabilities of the existing (i.e., used) LMS or by giving each instructor a space to which the notes are uploaded and shared with students.

2 Bring Your Own Device

The era we live in is characterized as high in tech and smart devices. The world is now shifting towards what is called "Bring Your Own Device" (BYOD) [2]. BYOD outlines a trend in which individuals carry their own mobile devices, mainly capable smart phones and tablets, to wherever they go for productivity. Such trend, in conjunction with cloud services, exhibits flexibility in terms of remote accessing and accomplishing tasks. This trend covers a wide range of daily applications such as access to media, entertainment, social networks and education.

The advent of BYOD trend is attributed to the affordable prices of hand-held smart devices and the available cloud services. The new generations of smart devices are getting very popular with high demand from all age categories of users. Consequently, this trend is expected to result in less Personal Computers (PC) and more hand held smart devices. To support this argument, it has been reported that the number of PCs is expected to shrink from 28.7 % in 2013 into 13 % in 2017 [2]. In the meantime, the spread of tablets is expected to increase from 11.8 % in the year 2013 to reach 16.5 % by the year 2017 [2]. A recent study has shown that the time spent on smart mobile apps has exceeded the time spent on web browsing. Numbers have revealed tablets to be the mostly used mobile device among the K-12 sector [2].

2.1 Teaching in the BYOD Era

Teaching methods have been improving along years. Not only teaching styles but also the forms information delivered to students have always varied from time to time. While for many recent years professors in universities have relied on PCs inside classes to present their material, it is time to follow the BYOD trend and switch to more convenient and light-weight smart devices for instruction.

Hand-held smart devices such as large-screen smart phones and tablets support the use of digital pens (i.e., stylus) for interaction and user input. These portable devices can be used in presenting information as shown in Fig. 1, and thus instructors may rely in explaining the material on using them instead of the commonly used whiteboards. Smart devices facilitate two important tasks: recording and sharing information being presented to students in class. By using these smart devices, the content presented in class is recorded and archived for students' use at their convenience.

3 On-the-fly Notes Design

On-the-fly Notes system, introduced in this paper, aims at facilitating real-time transfer of the notes produced in class by instructors. The system utilizes either large-screen smart phones or tablets to create notes while instructing. Simultaneously, the notes are viewed on a larger board using a projector as shown in Fig. 1. These notes, captured as snapshots, are immediately transferred to the cloud, where students can always access anytime and anywhere.

Apart from being a medium to produce, demonstrate, share, and reproduce notes, On-the-fly Notes has more to offer. On the one hand, students will not need to write notes after their instructors. This will eliminate the distraction and loss of valuable instructed notes that occur when a student tries to coordinate between following the presented notes and writing them on a notebook. On the other hand, On-the-fly Notes saves a backup for class notes. This backup can be accessed anytime from anywhere by both instructors and students.

The On-the-fly Notes system comprises two modules: a web application and an android application. The android application is mainly used by instructors. The instructor dashboard in the android application contains three main components for each class (i.e., subject) he/she teaches: Books, Note Board, and LineDrive. The Books component, shown in Fig. 2, refers to the books and supplemental material that belong to the subject. The content of this component is uploaded by the instructor.

The Note Board component, shown in Fig. 3, refers to the white space given to the instructor as a whiteboard for making notes in class. The Note Board is projected on screen to students in the class time as seen in Fig. 4. The same content viewed on screen is captured as snapshots and transferred to the On-the-fly Notes cloud or to the used LMS. Students enrolled in that subject can access this content at their convenience. The LineDrive refers to the captured snapshots produced in class using the Note Board component. The LineDrive can be seen as a notebook of the instructor notes. The instructor has full control to modify the content by adding or deleting certain snapshots. The LineDrive and the Books components are what students can access for

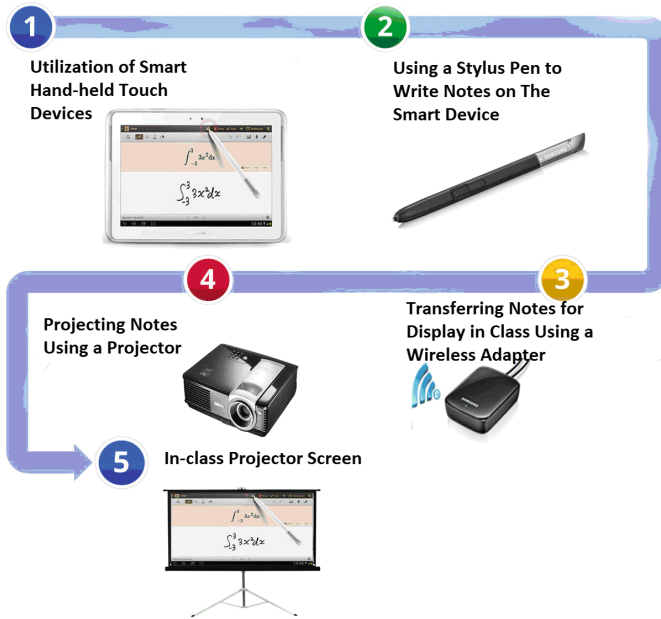


Fig. 1. The hardware needed to utilize a hand-held device for in-class instruction

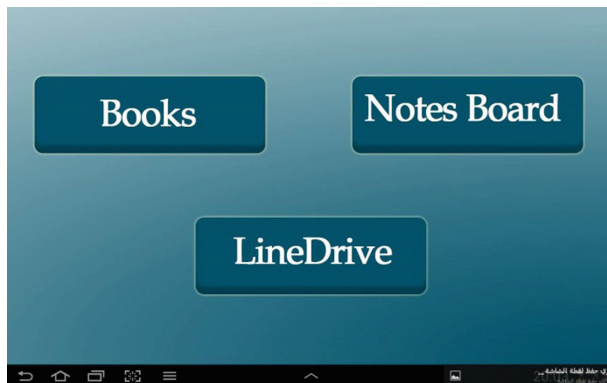


Fig. 2. The android application for instructors has three components: books, notes board, and linedrive.

each subject they are enrolled in. Access to these components can be using the android application or the web application.

The web application module of the On-the-fly Notes system can be used by both instructors and students. The instructor account can be set up to send all generated snapshots to an LMS. The instructor can manage all subject resources using his/her account through the web application. Students use the web application for joining subjects and accessing resources uploaded by instructors for those subjects.

Each student should maintain an account. The account is linked to a number of subjects taught by their instructors. To join a class the student sends a request to the instructor account.

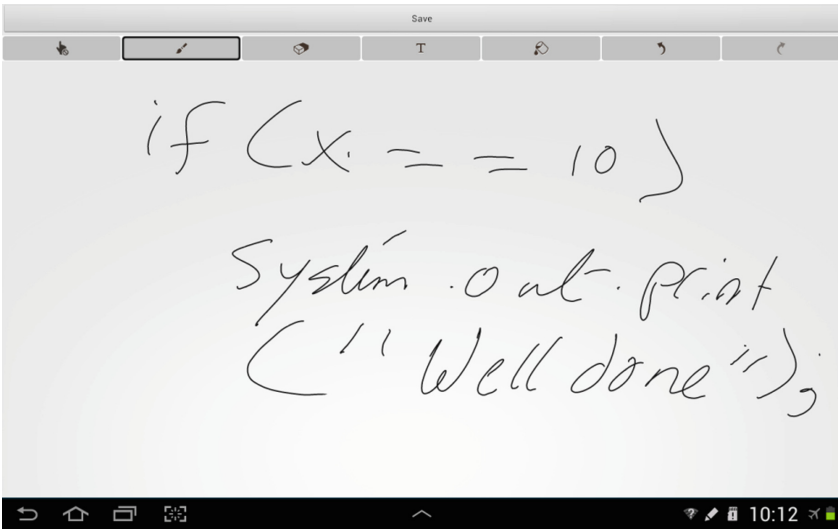


Fig. 3 A script written using the notes board in the instructor android application. This script is then captured as a snapshot and transferred to the cloud.

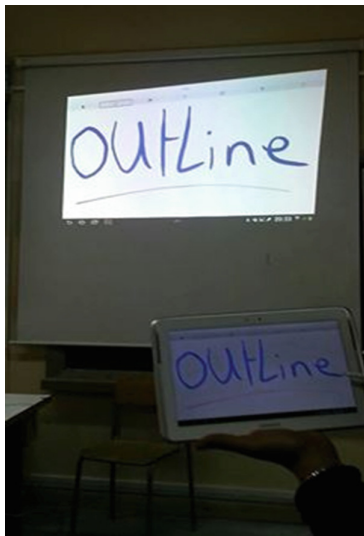


Fig. 4. Using the note board for in-class instruction and projecting its content on screen

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