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Review Article

Educational Technologies for Online and Blended Learning in Medical Science

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Abstract

Traditional face to face teaching methods have several weaknesses practically in regards to student motivation, participation and engagement. Online and blended learning is a practical and useful combination of traditional classroom lectures with technology-based approaches to learning and teaching aimed to address the flaws of face to face teaching. Due to the increased demands for students-centred learning strategies, online and blended learning has become an effective teaching method to increase student motivation, engagement and achievement. Indeed, technology has played and essential role in the success of online and blended learning strategies. The use of web-based tools and applications have increased the ways and approaches blended learning is implemented and delivered. This paper aims to describe some different current and emerging essential online tools for teachers to utilise in enhancing and achieving online and blended learning practices in the higher education sector. This paper describes tools that can be applied outside of the traditional Learning Management System (LMS) and to be used to complement the current online and blended learning practices.

Keywords: Blended Learning; Kahoot!; Edmodo; Schoology; Socrative; Edpuzzle

Introduction

The current face to face delivery of education has some flaws and weaknesses particularly in the area of active learning and student engagement [1]. It has been shown that through lecturing alone students lack the motivation needed to achieve effective learning [2]. It is well established that traditional lecturing is a teacher-centred approach. Therefore, the role and beliefs of the teacher must be reconsidered to achieve a change in pedagogy from a teacher-centred to a learner-centred learning approach. Student-centred learning increases student motivation, engagement and active learning. E-learning has been shown to facilitate student-centred approaches. E-learning is a mode of study that heavily depends on powerful information and communication technology (ICT) tools and applications, where the delivery of teaching material and the completion of course requirements is achieved off campus. Furthermore, Internet-based applications allow students and teachers to interact and communicate without the need for face to face contact. Research studies show that student outcomes were enhanced by the use of learning and teaching tools [3,4].

E-learning has become an attractive mode of study for many higher education students. It has been shown to be a flexible and interactive learning environment through which students can acquire knowledge without having a face to face contact with their teachers or physical presence in the classroom. Online based applications such as virtual classrooms have enabled teachers and students to have a shared interactive media experience where they can have video conferences, video lessons and other stimulating learning activities.

Blended learning is the delivery of teaching using a combination of traditional face to face methods and E-learning using online digital applications and tools. Many universities and education providers are utilising blended learning as a preferred mode of study environment [5]. The increased availability and accessibility of Internet-based technology have led to the development of a variety of learning and teaching applications available for teachers and therefore, blended learning has become a widely practised mode of study delivery. Also, advanced computers, smartphones and tablets support and contain many different tools that can be used to facilitate blended learning. There are many advantages associated with blended learning, most notably increased student flexibility, motivation and engagement [6].

There are some different internet-based learning and teaching applications such as Blackboard, Canvas, Moodle and other interactive systems that have been used to deliver learning material via blended learning mode. However, with increased advancement and development in information technology and internet-based applications, there are new applications and tools facilitate enhanced blended learning in conjunction with the currently available tools and applications. The paper aims to discuss some emerging tools that can improve blended learning.

Current and Emerging Blended Learning Tools

Game-Based Learning

Game-based learning utilises video game aspects to construct online learning environment; it has been shown to be an effective learning strategy; as it provides learning through trial-and-error mechanisms along with feedback on progress and achievements. Game-based learning is based on the experiential learning theory [7].

Experiential learning emphasises the usefulness of direct learning experience, reflection and observation, abstract conceptualisation and active experimentation in a continuous cycle. Games can provide the necessary learning environments where all aspects and stages of experiential learning are practised [8]. Game-based learning is a useful tool in blended learning. Tutorials and some assessments can be provided via traditional classroom environment, while case studies and exercises can be learned through games via experimentation and observation.

It has been demonstrated that using game-based learning provides students with an immersive and exciting learning environment that can include humour, interaction and drama, further, it is a useful way to encourage student motivation and learning [9]. Importantly, gamification of learning encourages students' learning process in different ways including cognitive psycho-motor domains. That is gamified learning material contains rules and rewards to guide, instruct and motivate learners to think and analyse the learning scenario to make accurate and thoughtful decisions [10]. When compared with the traditional online-based learning tools, gamified web-based applications can base on real life and more challenging scenarios and hence student learning is enhanced and the learning environment is targeted and practical.

Kahoot!

Although Kahoot! had been produced a few years ago, it is one of emerging and popular learning platforms that delivers learning through the game-based environment. It is primarily a student response system that immerses students in a game-like assessment, discussions and surveys [11]. Khoot! is free web-based software and it doesn't require software installation. Also, Kahoot! can be accessed from any location. Students don't require a separate account to access the learning material. However, access to the internet and any device with a web browser, such as an iPad android device is required [12]. Instructors and teachers usually create an account and set up the required learning environment. Kahoot! has been reported to be beneficial to student learning through promoting competitive learning, which increases student motivation and engagement [13]. Furthermore, using Kahoot! in blended learning classes has been shown to be associated with increased number of students participating during class, suggestion students are more engaged, confident and motivated to partake in class activities [14]. Currently, some different gamification applications provide game-based learning environment similar to Kahoot!. These include FlipQuiz, Duolingo, Ribbon Hero, ClassDojo and Goalbook [15].

Edmodo

Edmodo is a free social learning tool. It can be used by instructors, students, educational institution and even parents [16]. Edmodo allows the instructor and student interaction, furthermore, it allows students to collaborate, share content and access study material and grades. Edmodo's webpage layout is similar to that of Facebook, but it is a lot more private and safe to use. It enables instructors to make and control accounts and provide access to their students only. Once a student is provided access by their teacher, they will receive a group-specific code which will allow them to register in the group; hence they can access and connect with the group page. Because access is provided by the teachers, participation is limited to only those registered, therefore, avoiding unwanted participants in the group and thereby providing a safe and secure learning and social environment [17]. Edmodo has been designed to provide an easy method for instructors and students in a virtual classroom environment where they can connect, share and collaborate. The foundational design of Edmodo is based on learning through social networking, which has been shown to enhance students learning and outcomes. Learning strategies that can be implemented using Edmodo include quizzes, student collaboration and discussion and conduction student polls and surveys. Furthermore, social networking could have a positive impact on how students collaborate, share and ultimately learn through social networks in addition to the traditional face to face classroom-based activities [18]. A recent study by Balasubramanian., *et al.* [17] investigated whether the use of Edmodo increases student engagements and responsible learning. The authors found that Edmodo encouraged support and communication using discussion forums. Furthermore, participants found Edmodo was easy to use and user-friendly. Edmodo has been shown to be an effective educational tool for blended learning. Indeed, teachers who have incorporated this tool found that Edmodo helped strengthen student relationships

and enhanced student learning within the classroom [19]. Additional features of Edmodo that can help facilitate blended learning include students' ability to share content, submit assignments and other assessments; the teachers can post individual or group feedback, the teachers can also post teaching materials and notes and announcements. Therefore, Edmodo can be regarded as Learning Management System (LMS) which can enable instructors and teachers to create and control the online portion of their class effectively and easily [17]. In 2011, Edmodo was chosen by the American Association of School Librarians as one of the top learning websites that encourage innovation, creativity, active participation and collaboration in teaching. Currently, Edmodo has more than 6.5 million users and participants around the world; this number is likely to increase as teachers become more aware of it. Also, Edmodo can also facilitate online conferences with hundreds of participants [17].

Schoology

Schoology is web-based collaboration and learning application; it can be used by schools and higher education institutions. The theoretical foundation of Schoology is that learning can be achieved via social networks. Therefore, it combines elements of medial social platforms and learning management system [20]. It provides online access to teachers and students to teaching materials. Schoology can be utilised free of charge which can be vital for financially disadvantaged schools and higher education providers. Similar to other online learning tools Schoology allows online collaboration between teacher to teacher, teacher to student and student to student [21].

Similar to Edmodo the design and features of Schoology can resemble that of Facebook, where teachers and students can converse and message each other, furthermore, learning resources and information can be shared in a virtual classroom environment. Therefore, the design supports interactive communication and academic and scholarly information exchange. It allows instructors to set up discussion and collaborative boards and groups and create assessment tasks. Additionally, students can access teacher feedback, their grades and other important announcements and teaching material; It has been suggested teacher-student communications increases when students can obtain such information. It has been found that using Schoology, students found assessment submission, taking tests and communication is easy and effective. Also, students can maintain access to resources and information in their courses after the semester ends [22]. A recent study by Joshua., *et al.* [20] investigated the effect of social learning network platforms on student collaboration and motivation. It has been found that utilising Schoology was associated with increased learning motivation and learning achievements as well as instructors' teaching efficiency. Furthermore, Schoology can enhance student learning motivation and collaboration and ultimately learning progress and outcomes. Implementation of Schoology as a tool for blended learning mode has been associated with a positive attitude towards learning. Indeed, Rubio [23] found that using Schoology as a mixed learning strategy to teach literature increased student motivation and was associated with a positive attitude towards learning.

Socrative

Socrative is a cloud-based student response and assessment system that can be accessed on any device that has an internet connection and does not need any specialised hardware to be used. It has been shown to be a useful tool for blended learning as it increases student engagement and collaboration in the classroom [24]. The primary function of Socrative is the ability to assess student knowledge and comprehension of course materials and topics in the form of a short answer, true or false, or multiple-choice questions. Student responses are collected in real time which allows the teacher to provide rapid student feedback and initiate further discussion on the assessed topics in the classroom. Socrative can be used for both summative and formative assessments; it allows teachers to generate simple quizzes that students can take quickly using computers or mobile devices such as tablets, laptops and smartphones. Also, Socrative also grants gaming opportunity where students in teams can compete against each other in "Space Race" game, in Space Race student teams race to answer questions to launch their rocket as fast as possible into space [24].

There are two versions of Socrative, free and charged accounts. The charged account provides more function such as increased student class size and the number of classes. The free version mainly consists of two accounts; these are Socrative Teacher account and Socrative Student account. The teacher component enables the teacher to create and control formative and summative assessment questions, conduct student polls and view results. The student account is a much simpler platform which allows students to take quizzes and questions and participate in class activities. Socrative provides greater flexibility and access to students by eliminating the requirements for students to create individual accounts. Instead, the teacher provides an access code where students can join a virtual classroom.

The use of Socrative replaces the traditional student response systems and devices. Traditionally, the most common method for assessing and gaining immediate student feedback during class activities was to use a clicker, which is a small electronic device that uses infrared or radio frequency to transmit and record students' responses to questions [25]. Use of clickers has been associated with immediate feedback to students and teachers, increased student engagement to participate and anonymity of the responses motivates hesitant or shy students to contribute. In a study by Lim [26] found that the use of Socrative increased student engagement. Furthermore, it was found that students had enhanced learning experience and improved per-

formance. In another study, it was found that using Socrative in a blended learning setting increased in-class student participation and engagement [27].

Edpuzzle

Edpuzzle is a free online tool that permits teachers to create interactive videos [28]. EdPuzzle enables teachers to add and edit contents to videos from a wide variety of online sources, including YouTube, Khan Academy and TED Talks, in addition to that of videos made by the instructor [29]. Furthermore, video quizzes can be created from online sources and incorporated into the video itself. Quizzes can be short answer, true or false or multiple-choice questions. It can be useful for blended learning strategies, notably flipped classroom, where teachers can deliver in-class lessons and then create interactive video quizzes to increase student motivation and participation. The teachers can monitor student performance using student performance tracking tools provided with Edpuzzle. Indeed, student performance is easily observed because EdPuzzle grades assigned class videos. Also, individual student progress can also be tracked via the data extracted on how each student answered the quizzes.

Conclusion

Online and blended learning is becoming an increasingly favourite mode of study. Currently, some different web-based applications and tools can be employed by education practitioners when implementing online and blended learning. Educational tools such as Kahoot! provide student learning through gamed based elements and increases student motivation. Tools that look similar to Facebook such as Edmodo and Schoology provide a safe and effective learning environment and improve student collaboration.

Conflict of Interest

The authors declare no conflict or interest.

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