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# Taking Advantage of MOOCs in K-12 Education: A Blended Approach

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# Mobile and Blended Learning Innovations for Improved Learning Outcomes

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# Table of Contents

**Section 1**
**Blended Learning**

*Marva Mirabolghasemi, Universiti Technology Malaysia, Malaysia*
*Noorminshah A. Iahad, Universiti Technology Malaysia, Malaysia*

*Virendra Gawande, Sur College of Applied Sciences, Oman*

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*Angeline M. Pogoy, Cebu Normal University, Philippines*
*Prosper Bernard, University Consortium Americas, Philippines*

*Margaret Anne Carter, James Cook University, Australia*
*Paul Pagliano, James Cook University, Australia*
*Cecily Knight, James Cook University, Australia*
*Donna Goldie, James Cook University, Australia*

**Section 4**
**Literature Reviews**

# Chapter 15

# Taking Advantage of MOOCs in K–12 Education:
## A Blended Approach

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## ABSTRACT

*Technological opportunities are opening new ways for educators to enhance K-12 instruction. While many educators are incorporating digital technologies into their teaching, there is evidence to show that K-12 educators have a lack of training, time, and resources to implement learner-centered digital instruction. Massive Open Online Courses (MOOCS) have gained a reputation for providing online learning in higher education and are now extending to K-12. The unique digital advantages as well as the rising number of students enrolled in schools has led to discussions about the potential of MOOCS for students in K-12 (ages 4-19 years) education. This chapter provides a review of the literature of early pioneering work of MOOCs in K-12 within North America. Early MOOC classes are explicated and positives and challenges discussed. It appears from the review that there is a place for MOOCs to be embedded into a blended K-12 environment to extend and enhance existing curricula.*

## INTRODUCTION

Learner-centered instructional environments facilitate the learning process and improve overall learning outcomes (Blumberg, 2008). However, researchers have found that instructors find difficulties designing courses based on learner-centered principles due to physical boundaries and time constraints (Brush, & Saye, 2000). With the emergence of Massive Open Online Courses (MOOCs), researchers (viz., Li, Zhang, Bonk, & Guo, 2015) posit that blending MOOCs into traditional instruction can support those learner-centered principles. Advocates, such as Thurne (2003), postulate that blended learning is a logical and natural evolution to a pedagogical framework. Thurne describes it as an elegant solution

to the challenges of tailoring instruction to meet the needs of individuals. It provides an opportunity to take advantage of both the technological advances provided by online learning and participation in traditional learning (Suprabha, & Subramonian, 2015). This chapter articulates the use of MOOCs in a K-12 blended learning environment in North America.

## Massive Open Online Courses (MOOCs)

A MOOC is an online learning platform that delivers free education courses without enrollment restrictions. MOOCs have typically been designed for higher education courses. The rising number of students enrolled in K-12 education has led to discussions about the potential of MOOCs (Dermirci, 2014; Norris & Soloway 2012). The first MOOC was offered by the University of Manitoba, Canada in 2008 and had over 2000 students participate (Adair, Alman, Budzick, Grisham, Mancini, & Thackaberry, 2014; Dermirci, 2014; Liyanagunawardena, Adams, & Williams, 2013).

The nature of these courses contrasts with typical online courses because any person who wants to take the course can sign-up without any restrictions or having to be a registered student at a university. MOOCs originated from the philosophy of a few professors who felt knowledge should be free and accessible to anyone who wanted to learn (Bali, 2014; Dermirci, 2014; Johnston, 2013; Saadatmand, & Kumpulainen, 2014). Traditional higher education institutions may restrict the type of learner accepted based on economics, demographics, geography, prerequisites, or attendance limits (Liyanagunawardena et al., 2013; Saadatmand, & Kumpulainen, 2014). The companies and organizations that develop MOOCs break these barriers by providing the general public with free and equal access to high quality education (Holotescu, Grosseck, Cretu, Naaji, 2014; Liyanagunawardena et al., 2013).

Some diversity exists amongst pedagogical styles and credit options that developers of MOOCs offer (Bali, 2014; Pannoni, 2014). There are two distinct types, xMOOCs and cMOOCs. xMOOCs are a type developed by Coursera and edX that use a more traditional style of teaching with lectures, videos, and quizzes (Siemens, 2012). cMOOCs are centered on connectivity through technology platforms, such as digital social media tools, that allow students to communicate and share ideas (Adair et al., 2014; Dermirci, 2014; Ferdig, 2014; Horn, 2014; Liyanagunawardena et al., 2013). MOOCs started as a non-profit initiative by a few top universities but now for-profit companies like Coursera are becoming major developers. Even though the courses are free, most providers or developers of MOOCs offer options for college credit or a verified certificate for a small fee (Liyanagunawardena et al., 2013). The non-profit organization started by Harvard and MIT, called edX, offers the option to earn a verified certificate for a low fee or audit the course for free. Audited courses are still open to the public and free to anyone who wants to learn (Locke, 2013). Several states want to force universities to accept MOOCs as valid college credit in order to expedite baccalaureate degrees (Adair et al., 2014).

So how have discussions about MOOCs started to take precedence in K-12 education in the United States? The style of learning seen in today's students, known as the Net Generation, has changed and therefore educators are seeing the need to change their pedagogy to match those differences. The traditional K-12 classroom is outdated and is considered uninspiring or irrelevant by most students (Prensky, 2001). Today's students grew up in what we refer to as the Digital Age and have different expectations about learning. In addition, employers are seeking employees with the skill set necessary to thrive in the Digital Age. Many K-12 schools and colleges are failing to meet today's requirements because of inadequate resources and lack of teacher preparedness (Conley, 2010).

MOOCs are based on online learning tools like videos, games, and social media; tools that youth are both interested in and familiar with (Locke, 2013; Saadatmand & Kumpulainen, 2014). Students often prefer to use multiple resources, look-up information on their own, view information in short segments, and receive immediate feedback, and the model for delivery of knowledge in MOOCs often lends itself to this format (Saadatmand & Kumpulainen, 2014). There is noticeable potential for MOOCs to add enriched learning opportunities. Full establishment of these courses in K-12 education is gaining momentum by schools exploring and experimenting with different applications. Research to date, however limited, shows use of MOOCs in K-12 schools to have positive results (Pannoni, 2014; UK Department for Education, 2014). These studies show that K-12 students are already starting to use MOOCs on their own accord to learn about what interests them or prepare for tests and college. Learning online is something familiar to them and is a part of their daily learning outside the classroom. In order to engage students in the classroom, students not only need to have more control and responsibility for their learning but start using the tools they already use in daily life (Scherer, 2014).

The integration of MOOCs could solve many problems that exist in K-12 education. Technology integration is important to foster $21^{st}$ century learning, but the cost of digital tools can be expensive. Free access to MOOCs could reduce the cost that districts spend on online educational resources. Online courses could also help reduce cost by lessening the need for paper in the classroom (Scherer, 2014). More importantly, these courses make it possible for students to have equal access to quality education; especially for disadvantaged lower income schools.

MOOCs in K-12 schools could help make up for teacher shortages and alleviate problems resulting from high student to teacher ratio (Locke, 2013). Students would be given the opportunity to work at their own pace and move ahead to more advanced curriculum that may not be regularly offered, including advanced placement (AP) courses and gifted programs. The learning environment delivered through MOOCs is enriched through student autonomy, rigor, relevance, and content mastery (Saadatmand & Kumpulainen, 2014). Currently, the most sought after use for MOOCs in the K-12 setting are advanced placement courses and college and test preparation.

## A New Model for K-12 Learning

Pedagogies used in K-12 education are typically those designed for the industrial era and are not appropriate for this digital age (Mehta, 2013). Instruction is commonly dominated by memorization practices with pedagogies that do not help students understand the concepts (Fullan, & Langworthy, 2014; Ubuz & Üstün, 2004; Williams-Carling, 2009). It appears that educational leaders have become more focused on test grades than content mastery. In a positive move, philosophies and practice move toward learner-centered pedagogies and technology is providing affordances that are personalized and contextualized (Crompton, 2014).

To take advantage of these technologies, the blended approach may be considered by educators in K-12 settings. Blended learning refers to a mix of traditional face-to-face instruction and online components (Kassner, 2013). The blended approach has seen a massive growth in recent years and this trend is expected to rise (Staker, & Horn, 2012). The intention is not to swap one medium for another, but take the best of what each has to offer. In a survey involving 627 K-12 teachers, who were practicing the blended learning approach or had used the approach in the past, Werth, Werth, & Kellerer (2013) found teachers indicating student ability was either better or much better in their classes that used blended learning models. Similar results were also recorded for student engagement. Other positive results included

better or much better teacher to teacher communication (61%), student-to-student and parent-to-teacher communication was the same or better (87%), teachers indicated that their ability to monitor student learning was better or much better (77.5), and classroom management was better or much better with the blended learning approach (64.1).

Empirical evidence such as this is becoming increasingly common in the past decade, supporting the argument that blended learning is more effective than face-to-face instruction or online instruction on its own (Means, Toyama, Murphy, Bakia, & Jones, 2010; Nagel, 2009). Online learning is being explored by educators for the unique affordances it can provide (Horn, 2014). The developers of MOOCs offer a new type of online learning that aligns to K-12 education. Research has been dedicated to online learning as a better method for K-12 students to learn (Barbour et al., 2006; Staker & Horn, 2012). Student-centered learning should be personalized, authentic, engaging, and have students critically thinking about the content (Humphries, & Ness, 2015).

It can be challenging for a K-12 teacher to provide student-centered learning in a traditional class-room setting (Brush, & Saye, 2000). "Increasingly, students are seen as the consumers of an educational service" (Adair et al., 2014). Many classroom settings are still teacher-centered with students as passive learners (Mueller, Knobloch, & Orvis, 2015). Online education could give students the opportunity to take a more active role in their learning. As a part of the online learning environment students can use social media outlets to communicate and collaborate with not only their peers but also students around the country and world (Ferdig, 2014). Learning through MOOCs requires teachers to take on the facilitator role, which is the first step to a student-centered learning environment (Adair et al., 2014). Furthermore, the flipped classroom could be another approach successful with MOOCs (Holotescu et al., 2014; Najafi, Evans & Federico, 2014).

## Implementation of MOOCs in K-12 Education

### Cost

Many companies providing online courses and curriculum are expensive (Horn, 2014). The high cost could eliminate online learning as an option for many schools. MOOCs can be used as a free option for online learning. Cost-effectiveness is crucial within educational institutions and requires a transparency among the various levels of governance which must consider a blend of online alternatives to tradi-tional instruction (Montgomery, Hayward, Dunn, Carbonaro, & Amrhein, 2015). There are additional cost benefits, for example, cost of professional development is a necessary expense that schools could cut by using MOOCs to deliver such courses to teachers (Horn, 2014). A vast amount of professional development courses already exist for K-12 teachers. In addition, online courses also reduce the need for so much paper use in the classroom helping schools cut material cost which can be very expensive in many schools (Scherer, 2014).

### Access and Equity

Disproportionate distribution of funding for public education has left the US facing a problem of edu-cational inequality (Carneiro & Heckman 2003; DiPrete and Eirich, 2006). The mission of MOOCs specifically addresses the US national crisis by providing high quality education without any restrictions,

including financial background. While there is a plethora of empirical and theoretical literature centered on cost to institutions, cost and equitable access to students using a blended approach with online access from home is lacking.

While students would have the same enrollment opportunities to free MOOC courses (Horn, 2014; Liyanagunawardena et al., 2013; Saadatmand & Kumpulainen, 2014), if K-12 students are required to work from home, they will need internet connectivity, a computer, and other peripherals, such as headsets and microphone to be able to access the learning materials. It should not be expected that students will have all these materials. If schools want students to conduct online learning at home, necessary measures should be implemented to that students have these resources. This may mean that students are loaned or even given these materials. If equipment is purchased by the school, this will obviously add to the overall cost and may not be as cheap to implement as MOOCs may initially appear.

## Teacher Disparity

Schools are experiencing a shortage of teachers qualified to teach $21^{st}$ Century skills. Math, science, and computer science are of major concern and highly qualified teachers in these areas of study are in high demand (Locke, 2013). MOOCs could serve as a means to compensate for the disparities (Locke, 2013). Professional development MOOCs could prepare teachers to become highly qualified in the needed areas. Computer science MOOCs could supplement teacher knowledge and sufficiently prepare students. Colleges more than support K-12 schools using MOOCs to learn challenging fields like math and science especially since many of the current MOOCs are led by top universities (Najafi et al., 2014).

## Enriched Learning

While technology offers a great potential for K-12 education, many teachers lack the knowledge and skills to use technology effectively (Cheon, Lee, Crooks, & Song, 2012; Crow, Santos, LaBaron, McFaden, and Osborne, 2010). MOOCs can provide students with education from experts in content and in online learning pedagogies. This is a good example of how blended learning with MOOCs can be used to connect with experts at teaching online and experts in classroom learning.

Empirical evidence shows that MOOCs can be used to increase accessibility and personalization for students (Nelson, 2013). These elements are key for student engagement in learning (Ford, & Roby, 2013). Student motivation is increased when digital tools they are familiar with and already use outside of the class are also used inside class (Scherer, 2014). Student testimonies attest that MOOCs allow them to work at their own pace, focus on mastering the content, and learn valuable study skills (Atkeson, 2014; Bock & O'Dea, 2013; Holotescu et al., 2014). Online courses such as these help build student autonomy and teach them self-responsibility for their learning (Holotescu et al., 2014). Students who are actively involved in their learning progress are more likely to be successful (Ryan, & Deci, 2000). When learning is focused on mastery goal orientation instead of performance, student learning increases (Dickinson, 1995).

Furthermore, by lessening the time spent on lecturing and grading, the use of MOOCs would give teachers more time to facilitate learning and provide instant feedback. These courses are also great tools to provide data on learning progress (Bock & O'Dea, 2013). Having that data collected automatically could save teachers precious time. Having the data instantly would allow for faster teacher feedback.

MOOCs can increase learning through their connective design that brings students together with social media tools. For students to be able to communicate and collaborate with hundreds or even thousands of other students from all over the globe delivers an unmatched learning experience (Ferdig, 2014). Online discussion boards, blogs, and wikis support students who would never meet under normal circumstances to work together and share knowledge (Bock, & O'Dea, 2013; Holotescu et al., 2014; Saadatmand & Kumpulainen, 2014). Students would have the chance to work with higher-achieving peers, a strategy used in traditional classrooms, on a much broader scale (Bock, & O'Dea, 2013). The difference of having massive enrollment numbers in a MOOC can transform the learning experience and generate higher-level thinking that would not be possible without that technology (Ferdig, 2014). Research shows learning and interest are increased when students use social media tools to create and share knowledge. Social media tools also bring together students from all backgrounds and "eliminate geographic and economic barriers in education" (Saadatmand, & Kumpulainen, 2014).

## AP Courses, Test and College Preparation

The benefits of using MOOCs for advance placement, test preparation, and college preparation are starting to be noticed (Bock, & O'Dea, 2013; Locke, 2013; Sandeen, 2013). "Online learning in general tends to be a really good fit for students that are self-motivated" (Bock, & O'Dea, 2013). Students who are actively involved in their learning progress are more likely to succeed when given autonomy (Holotescu et al., 2014; Ryan, & Deci, 2000). Several MOOCs are designed specifically as advanced placement and test preparation courses for K-12 students (Atkeson, 2014; Locke 2013). Many MOOCs are developed and led by professors from top universities, such as HarvardX, free MOOC courses provided by Harvard University. These courses can meet the challenging curriculum expected of AP courses. Scrutiny about the quality of AP courses has led some colleges to not even allocate credit for the course. However, if students were taking courses developed from universities like, MIT and Harvard, colleges would undoubtedly accept these credits (Horn, 2014). In one Florida case study, students who took online AP courses scored higher on the exams than the state average (Najafi et al., 2014).

The zero cost makes it possible for all schools to offer AP courses. Free quality education is vital for students of low-income schools that otherwise could not afford the materials and teachers to proctor AP courses (Najafi et al., 2014). In addition, many schools have a difficult time finding qualified teachers for advanced courses. Too many students are missing the opportunity for advanced placement due to these unfair constraints that are out of their control (Locke, 2013). Gifted students, who are often not challenged enough, could use MOOCs to explore and expand their interest (Horn, 2014; UK Department for Education, 2014).

A study by the National Center for Public Policy and Higher Education and the Southern Regional Education Board, showed 60 percent of first-year undergraduate students were not prepared academically for college level courses (Atkeson, 2014). Recently in 2014, edX created new courses specially tailored to prepare secondary students for college. The CEO of edX, Mr. Agarwal, announced "he hopes the new curriculum will give more high school students exposure to higher-level coursework, allowing them to enter college having already completed many of their first-year classes" (Atkeson, 2014). Several MOOCs are being created now to serve the necessity of college preparedness (Najafi et al., 2014). Students, regardless of access to MOOCs in school, are taking it upon themselves to prepare for college using these courses on their own accord (Locke, 2013).

## Integration of MOOCs into K-12 education

Certain types of MOOCs are needed to best meet the needs of K-12 students (Najafi et al., 2014; Locke, 2013). Professors of leading universities are typically the developers and instructors of MOOCs. Although effective for undergraduate and advanced placement student populations, college professors would not be designing for the content required at the K-12 level. Furthermore, they would not be focusing pedagogical methods for a K-12 audience.

The main developers of MOOCs still use video recordings of lectures as the main delivery method (Horn, 2014; Johnston, 2013; Norris, & Soloway 2012). Traditional lectures are not engaging enough for primary and secondary students. Students also need more opportunities to apply the knowledge they have constructed. Using the MOOC model, educators could customize the courses specifically for K-12 students. The change is quickly taking place as courses are being created by subject experts in the primary and secondary field (Bock, & O'Dea, 2013; Locke, 2013; Pannoni, 2014). Customization directed at high school students was recently executed by edX (Atkeson, 2014; Najafi et al., 2014).

Research studies suggest it would be better to use MOOCs as a supplement in a blended setting of traditional face-to-face instruction and online learning (Atkeson, 2014; Locke, 2013; Pannoni, 2014). A blended learning framework could be practical for all grade levels (Locke, 2013). Research shows some students prefer face-to-face interaction with a teacher in order to get feedback (Najafi et al., 2014). Teacher presence also has shown to be beneficial for students' ability to follow the anticipated pace of the online course content (Najafi et al., 2014). Even Coursera, one of the largest MOOC companies, stated that MOOCs should serve to improve the traditional approach of learning not replace it completely. The company believes a blended classroom will better meet the needs of a diverse student population (Locke, 2013). "Test results showed that students who watched online lecture videos in addition to their face-to-face classroom scored higher than those who only relied on face-to-face classroom learning" (Najafi et al., 2014)

Like with any educational tool, the educator plays the decisive role in the tool's effectiveness. An iPad could be bought for every student but if the teacher doesn't know how to use the tool appropriately then that educational tool will not increase learning. Therefore, professional development for educators must be provided for effective integration. Fortunately, professional development MOOCs are offered for free.

## MOOCs Concerns Addressed

There are several concerns surrounding the use of MOOCs in K-12 education. Will teachers be prepared or know how to use the courses? Will the online learning platform be able to serve primary and secondary students' needs given that these courses are mostly designed for college students? Is it easy for students to cheat? What about students who aren't motivated to learn on their own? Will students be prepared to take courses that are more challenging academically? Can schools afford enough computers or digital devices to deliver MOOCs? These concerns are addressed through the following research and practices. Educational leaders, principals, educators, and parents should work together to share their research and experience about using MOOCs. Continual contact and collaboration through digital social media tools would alleviate many of the present concerns (Ferdig, 2014; Saadatmand & Kumpulainen, 2014).

First, concerns of teacher readiness are addressed through professional development courses delivered through MOOCs. There are several free courses already available that instruct best practices for teaching in a blended setting (Horn, 2014). Unfortunately, many K-12 teachers lack understanding in how to ef-

fectively integrate technology into the classroom and technology is applied in a way that demonstrates a lack of breadth and depth (Groff, & Mouza, 2008; Levin, & Wadmany, 2008). Teachers must be competent using digital tools to evaluate and increase student learning. Teachers must also be able to model good digital citizenship in regards of safe, legal, and ethical use of digital information and technology (ISTE Standards for Teachers, 2008). These are all necessary skills in order to integrate MOOCs effectively. Teacher comfort level for using technology is consequential and tends to limit what they are willing to teach. Researchers suggest teachers should try completing a MOOC to familiarize themselves with the process. Teachers who have completed a MOOC state they are more likely to use the technology in their classroom (Holotescu et al., 2014; UK Department for Education, 2014). In addition, by participating in a MOOC teachers will know firsthand what works and what doesn't so they may adapt the course to best fit the needs of their students. Therefore, it is encouraged for teachers to take more than one given there are different styles of MOOCs available (Ferdig, 2014).

Additionally, teachers may be concerned about losing some control over what content students are exposed to (UK Department for Education, 2014). Using a blended model of traditional and online learning could moderate these concerns. Teachers could choose to supplement their curriculum with MOOCs where they see it enhancing their curriculum. MOOCs use open source content therefore teachers could use only certain parts of a course and adapt those parts in their classroom (Holotescu et al., 2014; Pannoni, 2014). MOOCs are designed to be non-committal courses so students could also take just select parts of courses that their teacher sees fit for a particular lesson (Ferdig, 2014). Schools should support teachers to build their own MOOCs or create their own videos for sharing content (UK Department for Education, 2014).

A blended learning environment also lessens the concern about cheating since teachers are there to oversee student work (Locke, 2013). Other critics of MOOCs propose the courses would only work for students who are self-motivated or have good study skills (Horn, 2014). This could be avoided in K-12 as a teacher facilitator would be overseeing the process and providing motivational tactics and necessary support (Holotescu et al., 2014). Research found that the vast communication and peer support unique to MOOCs can help unmotivated students who need extra support (Ferdig, 2014). Most critics of MOOCs complain about the low completion rate of approximately 10 percent. However, since K-12 students wouldn't be given the option of taking a MOOC commitment-free, as the general public is, the statistic is not relevant (Locke, 2013).

Student preparedness is a matter that should be determined by school counselors. Just as students should be supported now, there would need to be support from parents, teachers, and school staff for success in this new endeavor (Atkeson, 2014). Lastly, some schools fear that budgets will not cover the cost for computers and other technology needed to deliver MOOCs. However, President Obama set a policy for the federal government to help ensure that by 2017 every student will have a laptop, tablet, or smartphone and schools will have enough bandwidth to support every student being online (Scherer, 2014).

## Current Integration

MOOCs are a recent phenomenon in higher education and are quickly becoming a reality in K-12 education (Norris, & Soloway 2012). As early as this year, the first MOOC designed for high school students was created (Atkeson, 2014; Horn, 2014). The number available for secondary students from edX is now 44 courses (Atkeson, 2014; https://www.edx.org/course). High school students account for 150,000 of the three million students enrolled at edX (Atkeson, 2014). Coursera does not yet offer courses solely for

K-12 students but they do have professional development courses for teachers. Another MOOC company known as, Instructure, has several courses now for teachers and students. Of particular interest to some teachers, the company has a course to help educators use the popular game of Minecraft for learning (Atkeson, 2014).

Now that more K-12 courses are available it will be easier to adopt them into school practice and policy. Regardless, many students are still using the courses on their own to help prepare for college and study for their AP and standardized exams. Unfortunately, authorizing credit for MOOCs it is not up to individual schools but state policy. Schools are still encouraging students to take these courses by offering non-academic credit (Atkeson, 2014).

EdX also realized the need to help schools provide quality computer science education. They designed a course able to be used by students independently or by teachers to deliver instruction (Najafi et al., 2014). In 2013, Florida allowed students to earn high school credit for completing a MOOC in any subject with an end-of-course exam. One Florida county is trying to develop their own MOOCs using game-based learning targeting high school students (Horn, 2014; McGrory, 2013).

Other cases include MOOCs designed for engineering career paths developed by Wendy Drexler, chief innovation officer at the International Society for Technology in Education

(Atkeson, 2014; Ferdig, 2014; Pannoni, 2014). In Pennsylvania, students were able to take edX courses as electives and reported the experience to be more challenging and made them feel better prepared for college (Atkeson, 2014). Even the Smithsonian Institute is using MOOCs to provide educational opportunities for students and teachers such as virtual field trips, interactive experiences, and teacher training (Horn, 2014).

## CONCLUSION

In this chapter, a blended approach has been described that includes MOOCs in K-12 education. MOOCs have gained a name for providing online learning that is free and available to the masses without geographical or demographical restrictions (Liyanagunawardena et al., 2013; Saadatmand & Kumpulainen, 2014). MOOCs are available for a variety of subjects and the substantial student enrollment numbers and continually growth of the MOOC movement have forced educators to discuss how these courses could change the future of education (Dermirci, 2014; Norris & Soloway 2012).

This chapter highlights some of the benefits of using MOOCs within a K-12 blended approach, such as providing accessibility, personalization (Nelson, 2013), and self-autonomy, (Holotescu et al., 2014). The online component can enable students to learn valuable study skills and work at their own pace (Atkeson, 2014; Holotescu et al., 2014; Bock, & O'Dea, 2013). Many of these skills may be lacking from students who have only experienced a highly structured traditional schooling. Motivation is a crucial component driving a student to pay attention and be an active learner. Scherer (2014) described how the use of MOOCs increases student motivation and allow them to use digital tools they are familiar with and already use outside of the class to learn (Scherer, 2014).

Involving MOOCs in K-12 blended learning is still in its infancy. There are a great many questions that still remain unanswered. As Montgomery et al. (2015) described in the conclusions to their research, there is a great potential for the use of MOOCS to benefit all ages of students and it is important that these opportunities are explored.

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