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## Learning Theories: ePedagogical Strategies for Massive Open Online Courses (MOOCs) in Higher Education

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# Macro–Level Learning through Massive Open Online Courses (MOOCs):

## Strategies and Predictions for the Future

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## Chapter 6

# Learning Theories: ePedagogical Strategies for Massive Open Online Courses (MOOCs) in Higher Education

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### ABSTRACT

*This chapter reviews various learning theories about e-pedagogical strategies for the effective use of massive open online courses (MOOCs) in higher education. E-pedagogical strategies refer to the various teaching methods or approaches used by educators when encouraging students to engage with online learning. An up-to-date broad knowledge of learning theories is required by educators to inform and inspire their teaching approaches. Before developing lesson plans, educators should have a clear idea of the learning outcomes which they hope the learners will achieve by engaging with the lessons, be they delivered on or off line. By knowing the desired learning outcomes in advance of developing the lesson plans, educators have the opportunity to consider various learning theories, teaching methods, and pedagogical strategies to select the most appropriate one(s) to use when creating course content for MOOCs. The chapter continues the discussion on 'ePedagogy and interactive MOOCs' from the perspective of addressing the topic of 'ePedagogy and students' use of HCI (integrating interactivity into asynchronous MOOCs).*

### INTRODUCTION

Pedagogy is the science of teaching and learning, encompassing the study of a broad range of teaching strategies/methods and learning theories to facilitate intellectual engagement with students

to encourage learning. Pedagogy is the study of learning in specific circumstances to formulate a theory of effective learning (Kumar, 2007). E-pedagogical strategies are about formulating theories of effectiveness of learning in environments which use information communications technology

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## ***Learning Theories***

(O'Donnell, Sharp, Wade, & O'Donnell, 2013). The motivation for this chapter is to review some, but not all learning theories and then discuss their suitability as e-pedagogical strategies for MOOCs in higher education.

When developing course notes and assessments many teachers are not consciously aware of which learning theories they are using and why (Hassan, 2011). Some teachers simply follow the instruction methods employed by teachers which they themselves had in the past. Ideally, all teachers should be familiar with the main learning theories which are: behaviourism, cognitivism, and constructivism (Yilmaz, 2011) before they commence teaching. This awareness would encourage teachers to be more consciously aware of the teaching methods which they are using and why they are using them. Teachers need to learn how to teach in a supportive environment (Scott, 2011). Some teachers deliver a set lesson from a presentation which they believe adequately covers the topic but leave no time for discussion or questions from students. Learning theories explore different aspects of the learning process and are therefore essential for effective teaching practice (Yilmaz, 2011). Reviewing various different learning theories may inspire teachers to vary their teaching methods.

A massive open online course (MOOC) refers to a freely available online course which offers unlimited participation and the opportunity to build communities of practice. MOOCs provide students with electronic access to peer support from other learners and the opportunity to interact with experts in the subject matter (McAuley, Stewart, Siemens, & Cormier, 2010).

The opportunities for teaching and learning have radically changed in recent years (Ozkan & Koseler, 2009). No longer do students have to attend lectures. Should a student miss a lecture through illness/work, or some other constraint on their time, he/she can later watch streamed online webinars if they are available, or engage in online discussions about the lecture which they have

missed. Alternatively, students can read notes or presentations which have been made available online, through a learning management system or otherwise. Some teachers feel threatened by the use of technology in education because they fear that eLearning may make them redundant. However, 63 percent of the students surveyed who were studying in Trinity College Dublin and 58 percent of the students surveyed who were studying in the Dublin Institute of Technology (O'Donnell & Sharp, 2012) disagreed with the statement that "the use of technology in education could successfully replace the learning achieved through interaction with lecturers" (O'Donnell & Sharp, 2011, p. 14). In 1958 Burrhus Frederic (B. F.) Skinner (1904-1990) (Skinner, 1958) suggested in an article that audio visual aids enhance lectures, demonstrations and textbooks and may in the future even replace them (Skinner, 1958), audio-visual aids have not yet supplemented lectures, demonstrations, and textbooks, but they have certainly enhanced them.

Some lecturers put webinars of their lectures and files of their presentations or course notes online; to help their students revise, etc. other lecturers choose not to share videos of their lectures, or make available presentations or course notes online. Some of the reasons why lecturers choose not to make webinars, presentations and notes available online are: to encourage students to attend class in person and to protect the copyright of their course material. While some other lecturers feel they have insufficient training in the use of eLearning platforms to effectively engage with them. Others feel that they simply do not have the time to engage with eLearning environments. In a survey of forty-one lecturers, only 15 percent of them felt that they had sufficient time to create course material for eLearning (O'Donnell, 2008).

MOOCs offer learners a totally different learning experience to the one offered by traditional bricks and mortar universities with their ivory towers and walled gardens (McAuley et al., 2010). MOOCs are a relatively new departure

from traditional teaching methods. The lectures involved in developing MOOCs would require: the belief that MOOCs are the way to go in providing education for the masses; the motivation to set up a MOOC; the time to set up the MOOC; sufficient time to engage with the students who enroll on the MOOC; and adequate funding to support their endeavours. Similar to traditional teaching methods lecturers involved in setting up MOOCs would also require: a good working knowledge of information and communications technology (ICT); the time necessary to create course materials; support for their actions from their university's management team; and most importantly a good understanding and appreciation of learning theories and e-pedagogical strategies.

Over the years there has been much discussion of pedagogical strategies and learning theories for traditional teaching methods. Wang and Shen (2012) while discussing mobile learning suggest that it is essential to develop pedagogical strategies and instructional design approaches to suit m-learning in order for it to achieve its full potential. The learning environments of MOOCs warrant similar discussion and research as has been devoted to traditional teaching methods and m-Learning (mobile learning), so suitable pedagogical and instructional design approaches can be devised. Sonwalkar (2008) points out that although every new technological approach to education has had some impact; in general the perceived benefits are overstated and the overall impacts are modest. It is too early in the MOOC debate to comment on how great the impact will be on higher education, but, by aligning suitable e-pedagogical strategies and learning theories to MOOCs the level of impact achieved may be beneficial to some learners. Gourley and Lane (2009) suggest that every university has the opportunity to bring education to all in a worthwhile educational endeavour by opening up education and making it more democratic. At

present pedagogical models and technological frameworks for MOOCs are receiving quite some media attention and scholarly debate (Grünwald, Meinel, Totschnig, & Willems, 2013). Only time will tell how significant the impact of MOOCs will be on the ivory towers of traditional brick and mortar universities. Accreditations of qualifications, issues of plagiarism, and who will foot the costs of developing and supporting MOOCs, are only some of the many issues which must be resolved before MOOCs have any major impact on existing universities.

“Vygotsky is a firm believer that social interaction and cultural influences have a huge effect on a student and how learning occurs. Teachers should recognize the diversity of the class and embrace their differences” (Powell & Kalina, 2009, p. 245). Personalised eLearning could be used to enable teachers to embrace diversity in the classroom and the different learning requirements of students. To achieve personalised eLearning in a MOOC would be a challenging undertaking due to the large amount of students who generally sign up to engage and the complexity involved in authoring for adaptive learning experiences.

The literature review on MOOCs provides background information on some existing examples of MOOCs, including Coursera, Udacity, and edX, and some different types of MOOCs, including: MOOC, cMOOC and xMOOC. The section on learning theories for higher education includes some background information on behaviourism, cognitivism, constructivism, connectivism, computer supported collaborative learning (CSCL), experiential learning, cultural-historical, social learning theory and activity theory. This is followed by a discussion on e-pedagogical strategies for higher education, which includes issues, controversies and problems associated with MOOCs. This chapter then finishes with suggestions for future research directions and the conclusion.

## **LITERATURE REVIEW ON MOOCs**

“There are more people in the world than ever before, and a far greater part of them want an education” (Skinner, 1958, p. 969). This statement holds true to this day; can MOOCs be the solution to providing education for all who are motivated to engage and learn, even those who cannot afford to attend traditional universities? Some current examples of MOOCs are: Coursera (Coursera, 2014), Udacity (Udacity, 2014), edX (edX, 2014) in the United States; Open2Study (Open2Study, 2014) at the Open Universities Australia; and Futurelearn (Futurelearn, 2014) at The Open University (OU, 2014) in the UK. “The UK’s Open University (OU) offers a model of an existing institution which has developed over the last 30 years into an e-university, within an accepted quality framework” (Mayes, 2001, p. 465). Should MOOCs be the solution to providing education for all an acceptable quality framework will have to be established for accreditation purposes.

The concepts of ‘e-university’, ‘online university’ and ‘virtual university’ can imply borderless markets for higher education or alternatively traditional distance education courses (Mayes, 2001). E-universities are not free or cheap to provide, similar to universities made from bricks and mortar, MOOCs must be developed and maintained to a very high standard and the students must be well supported academically, which requires substantial financial backing. “Venture capitalists are interested in the financial capital that can be generated by xMOOCs and have set up commercial companies to help universities to offer xMOOCs for profit, e.g. Coursera and Udacity” (Yuan & Powell, 2013, p. 7). A concern with offering xMOOCs for profit would be the quality of the qualifications awarded and how costly these qualifications would eventually become. “New start-ups, such as Coursera and Udacity have adopted MOOCs as disruptive innovations with a focus on developing new business models, new markets and new ways to serve different needs

of learners” (Yuan & Powell, 2013, p. 14). Different learners have different needs, so MOOCs may be the solution for some learners to achieve qualifications but not all. Table 1 provides some information on the foundations and affiliations of some MOOCs, namely Coursera (Coursera, 2014), Udacity (Udacity, 2014) and edX (edX, 2014).

MOOCs are freely available distance education courses, which are designed to provide ubiquitous access to all potential participants (students, managers, employees, lifelong learners, hobby enthusiasts, and etcetera). MOOCs vary in their size and accessibility (Baggaley, 2013). One of the limits to the massiveness of MOOCs, is the capacity of the servers which support the website for the MOOC to scale up and support the number of participants who are enrolled at any one time (Salmon, 2012). “Different ideologies have driven MOOCs in two distinct pedagogical directions: the connectivist MOOCs (cMOOC) which are based on a connectivism theory of learning with networks developed informally; and content-based MOOCs (xMOOCs), which follow a more behaviourist approach” (Yuan & Powell, 2013, p. 7). Table 2 provides further information on MOOCs, cMOOCs and xMOOCs.

The use of MOOCs does not necessarily have to be perceived as a threat to traditional good old fashioned lectures (GOFLs), but could be seen as an opportunity to disseminate GOFLs to a broader audience. Pao-Ta et al. (2013) proposed that a near reality approach to online GOFLs which encompasses both the teacher and the presentation would improve the courseware by preserving the instance of situated learning through body language, interaction within the learning environment and the content of the presentation. In this way distance learners would not only learn from the information contained in the presentation, but also gain from experiencing the lecturers’ interpretation and explanation of the content, and the lecturer’s interaction with students who are present at the time of recording. Participants in a study conducted by Gordon et al. (2010) identified



Table 1. Foundations and affiliations of: Coursera, Udacity, and edX

MOOC	Founded By	Affiliations
Coursera	“Start up company” (DeSantis, 2012, p. 1). “\$22 million in funding from Kleiner Perkins Caufield & Byers and others” (Korn & Levitz, 2013, p. 1). “New Enterprise Associates Inc. Put \$8 million into Coursera” (Korn & Levitz, 2013, p. 2). “founded by two Stanford University professors, Daphne Koller and Andrew Ng” (DeSantis, 2012, p. 1).	“Princeton University, the University of Pennsylvania, the University of Michigan at Ann Arbor, and Stanford” also the “University of Virginia” (DeSantis, 2012, p. 1). “The École Polytechnique Fédérale de Lausanne, in Switzerland, and the University of Edinburgh, in Scotland” (DeSantis, 2012, p. 2). “The California Institute of Technology, Duke University, the Georgia Institute of Technology, the Johns Hopkins University, Rice University, the University of California at San Francisco, the University of Illinois at Urbana-Champaign, the University of Toronto, and the University of Washington” (DeSantis, 2012, p. 3). Emory University and Mount Sinai School of Medicine (Korn & Levitz, 2013). Antioch University announced “that it would allow students to take some Coursera classes for credit” (Korn & Levitz, 2013, p. 3).
Udacity	Sebastian Thrun “a co-founder of Udacity, which launched in 2012 with a \$21.5 million bankroll from such prominent backers as Andreessen Horowitz, says his fledgling industry is in “a state of experimentation”” (Korn & Levitz, 2013, p. 1). Sebastian Thrun, formerly of Stanford University started “a new online university called Udacity” (Salmon, 2012, p. 1).	Udacity has “joined with Pearson PLC’s Pearson VUE to offer fee based proctored exams at the company’s 450 test centers world-wide” (Korn & Levitz, 2013, p. 2). Concerns about cheating and plagiarism can be alleviated through the use of Pearson test centres (Yuan & Powell, 2013).
edX	“EdX is a non-profit online initiative created by founding partners Harvard and MIT” (edX, 2014). “Harvard University and the Massachusetts Institute of Technology announced a plan to invest \$60-million in a similar course platform called edX” (DeSantis, 2012, p. 2).	“Harvard University, Massachusetts Institute of Technology, University of Texas system, University of California, Berkeley, Georgetown” (Korn & Levitz, 2013, p. 1). edX has “joined with Pearson PLC’s Pearson VUE to offer fee based proctored exams at the company’s 450 test centers world-wide” (Korn & Levitz, 2013, p. 2).

Table 2. Information on MOOCs, cMOOCs, and xMOOCs

Type	Definition	Characteristics
MOOC	A MOOC refers to a freely available online course which offers unlimited participation and the opportunity to build a community of practice.	“Moocs tend to be simpler and more impersonal than previous forms of online education: no teachers; no supervision; no fees nor entry requirements” (Baggaley, 2013, p. 368).
cMOOC	“Allow users to create diverging paths through the learning material” (Grünewald et al., 2013, p. 1).	“Featuring information generated by the students” (Baggaley, 2013, p. 368). “cMOOCs provide a platform to explore new pedagogies beyond traditional classroom settings and, as such, tend to exist on the radical fringe of HE” (Yuan & Powell, 2013, p. 7).
xMOOC	“Based on a well-defined sequence of learning content” (Grünewald et al., 2013, p. 1)	“Course content is defined by the course designers” (Baggaley, 2013, p. 368). “the instructional model (xMOOCs) is essentially an extension of the pedagogical models practiced within the institutions themselves, which is arguably dominated by the “drill and grill” instructional methods with video presentations, short quizzes and testing” (Yuan & Powell, 2013, p. 7).

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the advantages of e-lectures over live lecturers as follows: ubiquitous access, unrestricted by time, accessibility, choice of content and available to download for the purpose of revision or reflection.

Streaming of GOFLs could be incorporated into MOOCs to ensure that students get the best of both teaching approaches. In traditional courses which follow the GOFL approach, the students must progress through a course as the lecturer has planned, but some MOOCs offer students the opportunity to navigate through the course as dictated by their individual idiosyncratic learning styles and requirements.

Evaluations of MOOCs are required to establish which e-pedagogical approaches work best and in what instances (Calderwood, 2013). Students' opinions on the use of MOOCs are necessary to inform potential educators which teaching approaches students believe work well and the teaching approaches which do not achieve the desired learning outcomes in students. The early involvement of users in the evaluation of the design process could avoid costly re-designs in the future (Følstad & Knutsen, 2010). Learner users' feedback should be regularly encouraged and welcomed in the interest of achieving good quality learning experiences from MOOCs. Evaluation can provide useful feedback to inform the development of future designs (Gena & Weibelzahl, 2007). Learners' and educators' evaluations of MOOCs will help to inform and improve the design and development of future MOOCs.

Expertise in a subject domain is not sufficient for individuals to take on the role of educators, knowledge of pedagogy and instructional design are also required to effectively assist others in learning (Yilmaz, 2011). Teachers require some form of recognised teacher training and qualifications. In addition, teachers need to keep abreast of the state of the art in teaching methodologies and learning theories, to include learning theories and teaching methodologies for eLearning and e-pedagogy. "Students deserve to be taught in

ways that actively engage them in the learning process, are student-centred, and evaluate their knowledge using a variety of measures" (Rieg & Wilson, 2009, p. 292).

The skills and strategies involved in successfully teaching online are not the same as the skills and strategies required to teach in traditional educational environments (Naidu, 2013). This observation from Naidu is very true for both teaching online and teaching on MOOCs teachers require adequate training in the effective use of ICT, training in the operation of eLearning platforms, possibly some assistance in creating suitable learning objects, knowledge on the effective use of discussion boards, practice in creating and using multiple choice questions and help in setting up suitable assignment and assessment strategies online.

MOOCs afford potential students the opportunity to engage with course content from different disciplines at many different levels. For example, this may benefit students in deciding which discipline best suits their learning preferences and the level which best reflects their learning requirements when selecting an undergraduate course to study at university. Alternatively, someone in employment may not require an actual qualification but need to engage with a course of study on a specific topic to enhance their contribution to the organisation, for example, change management. Change management encompasses a broad range of activities which all have to be scheduled and completed in a systematic and timely way to ensure success, effective change management can be crucial to an organisation's future success (Todnem, 2005). The trading environment in 2014 is still highly competitive and good quality online learning resources will benefit employees who are motivated to learn. The type of learners portrayed above may not need to engage with the complete course but just the topic relevant to their specific needs, hence, course completion or lack of completion is not an issue for them (Fini, 2009; McAuley et al., 2010).

Clarà and Barberà (2013) suggest that there is a requirement to build a new pedagogy for MOOCs. This chapter reviews some but not all learning theories and then discusses how these relate to e-pedagogical strategies for MOOCs. The following learning theories will be defined and discussed: behaviourism, cognitivism, constructivism, connectivism, computer supported collaborative learning (CSCL), experiential learning, cultural-historical, social learning theory and activity theory.

## **LEARNING THEORIES FOR HIGHER EDUCATION**

This chapter focuses on some learning theories and how they can relate to e-pedagogical strategies for MOOCs in higher education. The advent of MOOCs could potentially reduce the cost of a university education and disrupt existing higher educational models (Yuan & Powell, 2013). One of the implications for higher education is the opportunity to offer students inexpensive accredited university courses through open education which is less expensive to provide than traditional lecturing (Yuan & Powell, 2013). The current cost of higher education may act as a deterrent to students getting the qualifications they deserve (Yuan & Powell, 2013). Increased tuition fees or increased student contributions or registration fees may act as a deterrent to student engagement in higher education and thus impact on their educational qualifications and credentials regardless of their academic potential. For example, the student contribution for higher education in Ireland is increasing as follows: “The maximum rate of the student contribution for the academic year 2013-2014 is €2,500. Budget 2013: It was announced that the student contribution will be €2,750 in 2014-2015 and €3,000 in 2015-2016” (CitizensInformation, 2014, p. 3). These increases in student contributions over the next few years will adversely impact on families, particularly those who have several young adults of university

going age and do not qualify for grants. Not all the families who previously may have been in a position to send their young adults to university may in the future be able to afford to send their young adults to university. Other cheaper options to achieve higher qualifications may have to be considered. Cost savings can motivate students to engage with eLearning courses (Kim, 2011).

“Professionalism in teacher education and development demands that teachers have not only a disciplinary knowledge base related to their subject but also a strong command of learning theories and their applications for instructional practices in the classroom” (Yilmaz, 2011, p. 204). A strong command of learning theories and their applications would also be required by professional teachers in MOOCs to ensure learners benefit from a worthwhile learning experience. In a paper Hassan (2011) suggests that “four schools of education are put into focus: behaviourism; cognitivism; cultural-historical; socio-cultural” (p. 330) as educational philosophies of learning theories. Table 3 provides brief definitions for some of the learning theories discussed in this chapter.

Table 4 provides a list of some learning theorists, their lifetimes, and the learning theories or concepts with which they are associated.

Figure 1 provides a timeline for some of the key figures associated with learning theories.

### **Behaviourism**

“The behaviourist theory is basically a theory that focuses on how the environment helps to shape the learning processes of an individual” (Jackson, 2009, p. 20). A subject is presented with a stimulus and then the subject of the experiment is expected to exhibit a certain response. Generally if the response is correct the subject is rewarded. In the case of an animal the reward is a treat or a piece of food. In the case of a student a correct mark is allocated or a piece of candy. Reinforcement is important in the behaviourist learning theory.

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Table 3. Definitions for some learning theories

Learning Theory	Definition
Behaviourism	The word behaviour refers to how one conducts oneself in person, in front of others and towards others. The word behaviourism refers to the study of the way in which an animal or person responds to environmental stimulus.
Cognitivism	The word cognition refers to the mental processing which takes place in comprehending information, solving problems and making sense of the environment in general. Cognitivism is the psychological study of how the mind works when learning, processing information and creating knowledge.
Constructivism	The word construction refers to the manual process of building or creating something new. Constructivism is the study of how people build knowledge by integrating new knowledge with existing knowledge.
Connectivism	The word connect refers to the process of joining one or more things together to make something bigger or different altogether. Connectivism is the study of the interaction which takes place when people psychologically connect with each other. Connectivism is similar in concept to Vygotsky's zone of proximal development.
CSCL	Computer supported collaborative learning (CSCL) refers to the learning which can take place as a result of the work undertaken by a group of people who have come together online to achieve the same objective.
Experiential learning	Experience is the knowledge or skill which is gained through personal active involvement or exposure to an event. Experiential learning refers to the learning which results from doing something, particularly if the task is incorrectly performed the first time.
Cultural-historical	Cultural-historical learning theory researches the effect that past events and cultural influences will have on the learning experience.
Social learning theory	Social-learning theory refers to the learning which takes place directly from social contact or observation of social occurrences.
Activity theory	Activity theory refers to the learning which takes place from understanding the activity itself, the reasons for performing the activity and the expectant and actual outcomes.

Table 4. Learning theorists and associated learning theories/concepts

Learning Theorist	Lifetime	Associated with Learning Theory/Concept
Ivan Petrovish Pavlov	1848 - 1936	Classical conditioning and behaviourism
Edward Thorndike	1874 - 1949	Law of effect
John B. Watson	1878 – 1958	Behaviourism
Clark Hull	1884 –1952	Behaviourism
Vygotsky	1896 – 1934	Zone of proximal development and cognitivism
Jean Piaget	1896 – 1980	Cognitivism
Burrhus Frederic Skinner	1904 - 1990	Behaviourism
Benjamin Bloom	1913 – 1999	Bloom's taxonomy and cognitivism
Jerome Seymour Bruner	1915 -	Discovery learning and cognitivism
Noam Chomsky	1928 -	Cognitivism

Figure 1. Timeline for some of the key figures associated with learning theories

Learning Theorist	1840 - 1849	1850 - 1859	1860 - 1869	1870 - 1879	1880 - 1889	1890 - 1899	1900 - 1909	1910 - 1919	1920 - 1929	1930 - 1939	1940 - 1949	1950 - 1959	1960 - 1969	1970 - 1979	1980 - 1989	1990 - 1999	2000 - 2009	2010 - 20..
Ivan Petrovich Pavlov																		
Edward Thorndike																		
John B. Watson																		
Clark Hull																		
Vygotsky																		
Jean Piaget																		
Burrhus Frederic Skinner																		
Benjamin Bloom																		
Jerome Seymour Bruner																		
Noam Chomsky																		

“Behaviorism as a teacher-centered instructional framework for a long time dominated educational settings, shaping every aspect of curriculum and instruction” (Yilmaz, 2011, p. 204). Over time other instructional frameworks and learning theories were introduced some of which will be discussed later in this chapter. John Watson and Ivan Pavlov were the leaders in work on behaviourism in 1926 (Gallagher, 2014). This work influenced others to engage in the process of understanding how the learning process operates. The works of Watson and Pavlov influenced Burrhus Frederic Skinner (March 20, 1904 – August 18, 1990) to study psychology in Harvard University (Gallagher, 2014). Morris et al. (2005) state that B. F. Skinner “was the father of applied behaviour analysis” (p. 99). The fundamental basis of behaviourism as a learning theory is the imitation of what others say or write (Dolati, 2012).

“According to the behaviouristic theory, all development and education is based on building up conditioned reflexes and habits” (Hassan, 2011, p. 330). Behaviourist learning theories are all based on the concept that we respond and make decisions based on presented stimulus (Dolati, 2012; Gallagher, 2014).

“Behaviourism, along the lines of B. F. Skinner, views the learner as basically passive and just responding to stimuli” (Hug, 2010, p. 61). “Skinner is noted for his contributions to the study of animal behaviour” (Chomsky, 1959, p. 26). Skinner is also remembered for further developing the concept of ‘teaching machines’ (Pressey, 1926), which were researched by Sidney L. Pressey as machines designed “for the automatic testing of intelligence and information” (Skinner, 1958, p. 969). Numerous researchers and scientists before and after Pressey and Skinner reviewed the use of teaching tools for passing on knowledge to others. “The identification of the earliest teaching machine is dependent on one’s definition of such machines” (Benjamin, 1988, p. 703). ELearning, technology enhanced learning, online learning, blended learning, distance learning, MOOCs and so forth, could all be considered as adaptations or modern day advances on the concept of teaching machines, which are facilitated through the affordances of ICT. The initial objective of machine or computer aided learning was to encourage learners to learn basic threshold concepts to free up the time for educators to deal with higher level learning concepts.

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It was envisioned that teaching machines would adapt to the learning needs of each student, a precursor for authoring tools for adaptive eLearning or personalised eLearning. For more information on the work of Burrhus Frederic Skinner please refer to the additional reading list at the end of this chapter. “The behaviourist approach was basically preoccupied with objectively observable and measurable teacher and student behaviours through a stimulus-response framework” (Yilmaz, 2011, p. 204).

Behavioural learning theories do not account for the fact that all learners perceive the world in a different way and these individual differences may influence the learning process (Kolb, Boyatzis, & Mainemelis, 2000). “Behaviorism is more concerned with behaviour than with thinking, feeling, or knowing. It focuses on the objective and observable components of behaviour” (Dolati, 2012, p. 753). Behaviorism is restrictive in that subjects (animals or students) are only expected to deliver pre-determined responses, they are not encouraged to think outside of the box, because if they do, the response will be incorrect and therefore deemed wrong, therefore no reward (treat or mark) will be allocated.

“Even though behaviourism did explain how behaviours got changed, it failed to account for how conceptual change occurred. Because it does not explore mental processes or what is going on in human minds” (Yilmaz, 2011, p. 204). Dissatisfied with the limitations of behaviourism, many disillusioned psychologists sought other theories to explain the learning process (Yilmaz, 2011).

Powell and Kalina (2009) suggest that “Substantial individual thought needs to be acquired in content or subject areas for students to actually understand the material instead of just being able to recite it” (p. 242). Behaviourism is a suitable learning theory for some contexts but not all contexts.

There are times when one has to conform in education to ensure successful operation; this is an example of classical conditioning (Jackson,

2009). For example, in school when the bell rings signalling the end of one class period, or the end of the day, students know at the stimulus to act according to previous instruction: to stay put if they have another class in the same room, to move to another classroom if necessary, to attend the canteen or yard for lunch, or go home for the day (Jackson, 2009).

There is no ‘one size fits all’ solution to education (Jackson, 2009) and no learning theory will be best suited to all learning situating and requirements. Therefore it is important for those who aspire to be instrumental in the learning experience of others through MOOCs to be familiar with the various learning theories and choose the one which they believe to be the most fitting to the desired learning outcomes.

## **Cognitivism**

“It is indeed a fact that massive general transfer can be achieved by appropriate learning, even to the degree that learning properly under optimum conditions leads one to ‘learn how to learn’ ” (Bruner, 1977, p. 6). Cognitive learning theory is more concerned with how knowledge is absorbed into the learner’s mind and connected to other knowledge structures which already exist, than how learners respond to external stimulus as in behaviourism. “In the cognitive learning theory, the learning is influenced by the learner’s goals, expectations, and experiences. In fact, experience often decides how an individual learns and is the key to learning” (Rutherford-Hemming, 2012, p. 130). In behaviourism learning is associated with responses to external stimulus not internal stimulus like motivation and self actualisation. Cognitive learning theory is associated with the concept of integrating new information with existing information to build on a learner’s overall knowledge. The cognitive theory of learning enables learners to use new information to test knowledge gained through previous experiences (Jackson, 2009).

“In cognitive learning theory, the key to learning and behaviour involves the individual’s cognition, meaning a person’s perception, thought, memory, and ways of processing and structuring information” (Rutherford-Hemming, 2012, p. 130). The challenge to educators in MOOCs is to provide learning resources which will stimulate learners perception, thoughts and processing techniques to turn information into knowledge. “In contrast to behaviorism, cognitivism is a relatively recent learning theory and its features are not well known or are confused with constructivism by teachers” (Yilmaz, 2011, p. 204). If teachers are getting confused between cognitivism and constructivism possibly more instruction is required on these specific learning theories. “Cognitivism, primarily built on Jerome Bruner’s “discovery learning” and Lev Vygotsky’s “zone of proximal development”, applies to any deep processing as learners explore, organize and synthesize content” (Hug, 2010, p. 61). Apart from personal reflection the synthesis of course material and existing knowledge will also benefit from the collaboration and interaction undertaken with peers and educators. Cognitive learning theories tend to emphasize cognition over affect (Kolb et al., 2000) and is an alternative framework for teaching and learning (Yilmaz, 2011).

“The concept of blending cognitive and social learning experiences in a way that engages students actively and reflectively has significant implications for online instruction targeting higher-level skills, and is particularly applicable to the development of collaborative problem-solving abilities” (Posey & Pintz, 2006, p. 686). The concept of blending cognitivism and social learning experiences is relevant as an e-pedagogical strategy for MOOCs in higher education because as previously mentioned learners can learn through their own reflections and interactions with peers.

“Piaget explored the genesis of cognitive structures and the process that underlies learning and knowledge construction” (Yilmaz, 2011, p. 206). Piaget commenced building

his theories on learning while observing how his own children made sense of the world and constructed knowledge through learning and playing together, “Cognitive constructivism came directly from Piaget’s work” (Powell & Kalina, 2009, p. 242).

“Cognitivism, as a philosophical and educational school, focuses on studying the cognitive abilities and mental processes of the individual” (Hassan, 2011, p. 335). An individual’s cognitive ability and method of mental processing will influence their ability to learn and the way in which they learn. “Emotion and motivation are also important dimensions of cognitive functioning and education” (Demetriou, Spanoudis, & Mouyi, 2011, p. 602). As well as a learner’s cognitive ability and method of learning, their emotional state and motivational levels will also influence their ability to learn. The emotional feelings and motivational levels of individual students are important elements of their educational experience and learning outcomes, learning outcomes are also vital to teachers (Økland, 2012). “Cognitivism focuses therefore on the unobservable and what is happening inside the learner’s head. Understanding is obtained by adding facts to meaning and therefore it advocates an investigative approach where students are active in learning” (Hassan, 2011, p. 335).

## **Constructivism**

In behaviourism learners are expected to respond in certain ways to specific stimulus, whereas in constructivism learners are expected to add through experience and other environmental factors to the taught learning objects to make their own sense of the subject matter and how it applies to the world. Constructivism is the study of how learning takes place and how learners create knowledge structures based on their interaction with the environment (Jackson, 2009; Økland, 2012). “There are two major types of constructivism in the classroom:

## **Learning Theories**

1. Cognitive or individual constructivism depending on Piaget's theory, and
2. Social constructivism depending on Vygotsky's theory" (Powell & Kalina, 2009, p. 241).

Students are encouraged to construct their own knowledge from information made available individually or in groups. Constructivism is practically the opposite of behaviourism. In constructivism learners are encouraged to learn through active engagement, by associating new information with existing information, to form new knowledge or understanding of the meaning of concepts. In behaviourism, learners are expected to learn responses to stimuli by rote and not alter in any way the expected responses, similar in concept to rote learning.

"A staple narrative of learning theory in higher education is how, sometime during the 1970s, the 'cognitivist' theory of learning was displaced by the 'constructivist' theory" (Kotzee, 2010, p. 177). The evolving theories on how learning takes place is relevant to MOOCs, perhaps over time, theorists will introduce new learning theories relevant to this teaching paradigm shift in online education. "Evolving from cognitivism, constructivism considers knowledge to be something that an individual constructs out of his experiences" (Hassan, 2011, p. 335). Both cognitivist and constructivist learning theories are relevant to MOOCs which are considered controversial pedagogic phenomenon at present. Only time and evaluations on the pedagogic phenomenon of MOOCs will tell if new learning theories are required. Constructivist learning is an interactive dialogic activity (Hug, 2010) and learners learn by constructing their own knowledge (Chieu, 2007). "Constructivism is a vague concept, but is currently discussed in many schools as the best method for teaching and learning" (Powell & Kalina, 2009, p. 241).

"Constructivist theories for learning emanate from the idea that students should be actively engaged in the learning process as they relate

new knowledge to what they already know and refine previous skills in terms of newly acquired techniques" (Scott, 2011, p. 197).

Collaborative learning sees teachers and students in an environment where students can practice knowledge building skills through interaction and collaboration and is therefore considered constructivist learning (Gan & Zhu, 2007). Kotzee (2010) suggests that constructivism is not suitable as a realistic teaching practice and Ruey (2010) proposes that knowledge is constructed through consideration of the ideas of others and one's own reflections and experiences. Constructivism may not be deemed suitable as a realistic teaching practice but it may still be deemed as a suitable learning theory for MOOCs through the use of discussion boards and video conferencing, which enable learners to interact and collaborate to turn information into knowledge.

One of the points on constructivism made by Powell and Kalina was that "In order for teachers to use it effectively, they have to know where the student is at a given learning point or the current stage in their knowledge of a subject so that students can create personal meaning when new information is given to them" (Powell & Kalina, 2009, p. 241). Personalised eLearning would facilitate the teachers knowing what stage of learning each student had achieved and provide teachers with the opportunity to direct students to specific learning objects suited to their learning needs at any specific point in time. The learning requirements of students are dynamic and will change daily/hourly/annually depending on their commitment, exposure to learning resources and ability to open their minds and learn. Other factors will also play a part in how and why students learn. Mayes (2001) suggests that matching the learning requirements of individual students and their preferred learning styles to relevant learning content has previously been neglected. Further research is required on the development of authoring tools to facilitate personalised eLearning to assist teachers who wish to effectively use constructivism in their



teaching practices. By adding an authoring tool for personalisation to existing MOOCs this would enable teachers to effectively use constructivism as a teaching method. Educators can empower students by allowing them to learn in their own unique ways (Karagiorgi & Symeou, 2005).

As rightly pointed out by Kotzee (2010) “People know different things because they are interested in different things and have had different opportunities to find things out” (p. 179), therefore each and every student comes to a learning environment with a different variety of prior knowledge. According to Demetriou et al. (2011) learning to learn requires some control over the processing of the material to be learned and by judiciously using relevant prior knowledge to facilitate and enhance new learning, the learning will endure. Personalised eLearning would facilitate the different learning requirements of individuals who wish to build on their specific knowledge base by tailoring the learning materials to suit the prior knowledge of the learners.

Personalised eLearning could be achieved for students by enabling educators to adapt the MOOC to suit the learning requirements of individual students. By personalising students’ MOOC experience, information overload could perhaps be reduced and student attrition rates increased. Powell and Kalina (2009) recommend promoting individual learning through specifically designed classroom activities. Individual learning or personalised learning may be required for effective teaching but it is not easily achieved, especially in classrooms where there are large numbers of students. An authoring tool for personalised eLearning would be required, which has the functionality to assess students’ current abilities and on the basis of this information propose suitable learning objects to support individual learning.

Learners require the ability to filter information for themselves to avoid information overload, some rely on instructors to filter information (Fini, 2009). Alternatively, personalised eLearning could be used to avoid information overload by filtering the information which each student receives.

Fini (2009) attributed highly controversial feedback from participants about the tools to “their various learning styles, personal objectives, time availability, etc.” (p. 16), and suggested this aligns with the idea of personalised learning environments where each student engages with a personalised environment as opposed to the universities standardised learning environment (Fini, 2009). Although the concept of providing learners with personalised learning environments appears ideal, the realisation of learning experiences which adapt to the specific personal requirements of every student is still a very complex process. “Learning analytics currently sits at a crossroads between technical and social learning theory fields. On the one hand, the algorithms that form recommender systems, personalization models, and network analysis require deep technical expertise” (Siemens & Gasevic, 2012, p. 1). Not all teachers have the technical expertise to develop adaptive learning experiences for their students. A system is required which will match products and services to users needs (Mulwa et al., 2011). The complexity involved in developing adaptive courses needs to be reduced before personalised eLearning can be achieved by non-technical authors (O’Donnell et al., 2013, p. 278).

## **Connectivism**

George Siemens, a researcher at Athabasca University who developed connectivism and cMOOCs, said in an interview conducted by Alan Brown (2013) “With 2-3,000 students from nearly 60 countries, there is a much greater opportunity for groups of students to adapt course content to reflect their own interests” (p. 24). MOOCs provide students from all over the world with the opportunity to connect with others who share similar interests. Connectivism is learning which is supported and enhanced through social networking (Hug, 2010).

“Since its formulation in 2005, connectivism has received strong critiques from several authors from different points of view” (Clarà & Barberà,

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2013, p. 133). Clarà and Barberà (2013) conclude their discussion on connectivism as follows “taken from a psychological point of view, connectivism, as currently formulated, should be abandoned as a learning theory and as a theoretical guide for pedagogy in MOOCs and in Web 2.0 environments in general” (p. 134), this conclusion concurs with the findings of other researchers who have reviewed the ontological and epistemological aspects. Mackness et al. (2010) surmised that the concept of connectivism as a new theory remains undecided by the wider community. The concept of connectivism may not be perceived by all as a new learning theory but connectivism is still relevant to the discussion on e-pedagogical strategies. Connectivism cannot be ruled out as an appropriate learning theory or e-pedagogical strategy for MOOCs until further research has been conducted on this issue. “The massive nature of participation in a MOOC creates new opportunities for strengthening the social dimension of learning” (Grünewald et al., 2013, p. 8).

### **Computer Supported Collaborative Learning (CSCL)**

A suitable way to prepare students for collaboration is to have them engage with collaborative activities online (Gordon et al., 2010; Hughes, Ventura, & Dando, 2004; Posey & Pintz, 2006). The use of discussion boards and video conferencing in MOOCs could facilitate online collaboration between students. For monitoring and evaluation purposes, educators need to understand and measure the dynamics between learners in CSCL environments (Persico, Pozzi, & Sarti, 2009). The educators managing the course could monitor the engagement of students in the collaborative environment and benchmark their involvement in the discussions taking place. Content analysis techniques facilitate an understanding of student engagement and the dynamics and effects on learning (Persico et al., 2009). MOOCs afford students from all over the world the opportunity

to meet in online communities to openly discuss their learning requirements, thus, harnessing the potential power of social networking through asynchronous and synchronous communication. CSCL facilitates student engagement in small groups to solve problems (Posey & Pintz, 2006). CSCL can also be used by large groups of students who share common interests. In a community of practice (CoP) students through collaboration with others are able to share experiences, discuss information and create knowledge and expertise (Heo & Lee, 2013). Students are also able to support each other by providing peer review reports on the work of others in the CoP. Peer review provides students with the opportunity to critically appraise the work of other students and to receive feedback from other students on their own work (Hughes et al., 2004).

Teachers should encourage students to engage in discussions of course content to assist them in developing critical thinking skills and thinking for themselves (Powell & Kalina, 2009). Online dialogues with peers and teachers in accordance with Vygotsky’s ‘zone of proximal development (ZPD)’ can be used in MOOCs through video conferencing to enable students improve their critical thinking skills.

### **Experiential Learning**

Experiential learning is the learning which takes place as one experiences doing something. A good example of experiential learning is the learning which takes place when one is learning how to skate. An instructor may inform a learner of the approach to take when starting to skate: how to apply the brakes; to turn; twirl; and so forth. But, only through experiential learning will one actually learn how to skate, find and maintain one’s balance, and become proficient at skating. Knowledge cannot be transferred from a teacher to a student, students have to learn by themselves (Karagiorgi & Symeou, 2005) and for themselves. All a teacher can do is to provide students with an

instruction set to complete the task in the safest possible way. In constructivist learning theory the goal is not to transfer knowledge but to empower learners in thinking for themselves (Karagiorgi & Symeou, 2005). In a MOOC teachers have the opportunity to provide learners with the best possible learning materials and discussion forums to assist them in making sense for themselves to inform their own understanding and knowledge. Experiential learning and constructive learning theory are closely connected (Rutherford-Hemming, 2012).

Experiential learning theory (ELT) defines learning as a result of the knowledge gained through experience, which emphasises the important role which experience plays in learning (Kolb et al., 2000). In a MOOC the teachers may provide the learning materials and access to discussion boards but learners will have to engage to learn by experience. Kolb (1984) suggests that experiential learning is a combination of experience, perception, cognition, and behaviour.

Some of the learning outcomes from experiential course designs may not be immediately obvious in higher education but may become evident at a later stage (Lizzio & Wilson, 2004) when evidence comes to light of how students' performance was influenced by their educational experiences (Hassan, 2011). Assessment of learning is an important part of knowledge acquisition as it lays down the foundations for further learning (Hassan, 2011).

### **Cultural-Historical**

“Vygotsky (a Russian psychologist) was one of the founders of the cultural-historical theory of human development and learning” (Hassan, 2011, p. 331), which recognises the impact that culture and history have on the developmental and learning processes of society members. Cultural and social activities have a tremendous impact on human learning and will influence the type of learning which takes place. Cultural

influences can play a key part in the development of cognitive function (Yilmaz, 2011, p. 207). Humans basically learn the communication patterns and norms of behaviour associated with the cultural group or society to which they belong. Yilmaz (2011) proposes that all complex mental processes commence as a result of human interaction. All interaction between people will be influenced by the culture and history of the people. MOOCs can be accessed by people from many different cultures, when developing content educators should be mindful of this fact.

### **Social Learning Theory**

In social learning theory people can learn by observing the actions of others without the need to practice or imitate the behaviour (Rutherford-Hemming, 2012). When designing e-pedagogical strategies social learning theory is relevant, for example, one can learn from videos of science experiments without going to the expense of purchasing all the necessary equipment and chemicals and personally carrying out the experiments. The socio-cultural concept of learning theory is similar in concept to Vygotsky's cultural historical school which emphasise the use and relevance of both practical and intellectual tools in shaping society (Hassan, 2011). The society and environment in which one develops from childhood to adulthood will have a major impact on intellectual and physical development. Educators when designing course content should be aware that students from all over the world and from a broad range of socio-cultural perspectives will engage with MOOCs and tailor the content accordingly.

### **Activity Theory**

“Activity Theory explains the learning processes that result from particular actions of learners in a particular context, actions that eventually benefit the learners through expanded knowledge, skills,

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and attitudes as the final result” (Heo & Lee, 2013, p. 136). We have all learned from our actions, particularly the ones that hurt, after once burning oneself off the oven door, one is extra careful in all future dealings with the oven door. “Active learning is explored from a constructivist perspective in which students adopt an analytic approach to questioning and problem solving” (Scott, 2011, p. 191). Interactive computer activities can draw students in or immerse them in activities which can enhance their engagement and subsequent learning. Some eLearning applications enables learners to complete an online pre-test which provides the learner with the opportunity to learn from their mistakes and to make a better attempt at the real test.

Table 5 provides brief explanations of how the learning theories that are discussed in this book chapter are relevant for MOOCs.

## DISCUSSION ON E-PEDAGOGICAL STRATEGIES FOR HIGHER EDUCATION

The process of creative writing remains the same despite the tools used to record the author’s words. So: be the words carved in stone, written with an inked feather on parchment, typed on a manual typewriter or on a personal computer using word processing, or recorded on a voice recognition application, the underlying principle and outcome remains the same. That is: the author is recording their thoughts for their own future perusal or to be read by others. Similar to this concept, the process of learning remains much the same whether a child follows guidance from a parent, one follows instructions from a manual, one reads and absorbs information, or one attends lectures and engages with the topic being discussed. Therefore,

Table 5. How these learning theories are relevant for MOOCs

Learning Theory	How These Learning Theories Are Relevant for MOOCs
Behaviourism	Behaviourism is the study of how one conducts oneself in person, in front of others and towards others or how one responds to environmental stimulus. Educators monitor and assess how students engage with the course, relate to each other and how students react to the stimulus presented within the MOOC.
Cognitivism	Cognitivism is the psychological study of how the mind works when learning, processing information and creating knowledge. Educators have to take into account the cognitive processing involving in the learning process in all educational settings including MOOCs.
Constructivism	On creating the course content for MOOCs educators must consider how learners build knowledge by integrating new knowledge with existing knowledge and plan the flow of course content appropriately.
Connectivism	The educators who are involved in developing MOOCs should be mindful of the interaction which they expect or hope learners to have with other learners on the course.
CSCL	The MOOC course developers may endeavour to encourage computer supported collaborative learning (CSCL) between groups of learners who wish to achieve the same objective.
Experiential learning	The course organisers may set several online assessments, quizzes or tests for learners to engage with again and again to provide them with the opportunity to learn from their mistakes.
Cultural-historical	Due to the ubiquitous nature of MOOCs and their world wide use creators should consider the impact that cultural influences will have on the learning experience and try to tailor their content appropriately.
Social learning theory	Social learning theory refers to the learning which takes place directly from social contact or observation of social occurrences. Learners who are participating in a MOOC have the opportunity to learn directly from engaging online in social contact with other learners.
Activity theory	Activity theory refers to the learning which takes place from understanding the activity itself, the reasons for performing the activity and the expectant and actual outcomes. There are many ways that activity theory can be incorporated in MOOCs.

if a student reads and learns from course content online, observes a webinar of a lecture, or actively engages with an online community of practice; the underlying concept of learning remains the same. Hence, e-pedagogy is the same as pedagogy but delivered through different mediums made possible through technological affordances.

“Simulation is now touted as a wonderful methodology to use in teaching and evaluation. One of the reasons for this is because simulation draws on a variety of adult learning theories” (Rutherford-Hemming, 2012, p. 130). In social learning theory people learn from observing the actions of others, simulations are an excellent example of how social learning theory could be used as an e-pedagogical strategy to enable learners learn from observing the actions of others as depicted in simulations. The simulations authoring tool developed as part of the GRAPPLE project (GRAPPLE, 2008) aimed at providing educators with an authoring tool to create adaptive simulations from which others could learn through observation (Glahn et al., 2011). Simulations draw on a variety of learning theories and are therefore appropriate for use as an e-pedagogical strategy for MOOCs.

### **Issues, Controversies, and Problems Associated with MOOCs**

With respect to the proliferation of MOOCs in recent years, Yuan and Powell (2013) suggest that “there is a risk that the current enthusiasm is being driven by a self-selecting group of highly educated IT literate individuals who are able to navigate the sometimes complex, confusing and intimidating nature of online learning” (p. 3). This is an interesting observation and in some respects highly educated IT literate individuals may intimidate other lesser qualified educators into thinking that their contributions as educators are inadequate. By implementing MOOCs it may appear that some educators feel the need to literally educate the masses for fear that the delivery of others may be lacking. Alternatively,

the use of MOOCs may provide the opportunity to many people around the world to access a top quality educational environment free of charge, therefore offering those with potential but no monetary resources the opportunity to engage with high quality learning materials, which have been compiled by experts.

“In general, there are concerns about the pedagogy and quality of current MOOC courses, with a clear distinction between process and content-based approaches” (Yuan & Powell, 2013, p. 3). Due to the visibility of and accessibility to course material used by e-universities the quality can easily be assessed by others (Mayes, 2001). Top professors from well recognised universities have been involved in the creation and development of MOOCs while knowledgeable of the fact that the course material and pedagogical approaches used will be open to the scrutiny of their peers, learners, professionals and society in general. Leacock and Nesbit (2007) suggest that clear benchmarks are required to ensure that learning objects are developed to a high standard.

The achievements of the United Kingdom’s Open University provide proof that effective learning can take place online and therefore student learning does not necessarily need to occur on campus (Mayes, 2001). This positive outlook for online learning bodes favourably for MOOCs. Online learning provides ubiquitous access and flexibility to learners (Ruey, 2010). MOOCs enable learners of all ages and from all over the world to engage in learning opportunities which previously were not available.

In a discussion on for-profit higher education, Mayes (2001) observed that accreditation agreements between universities and private colleges leading to ‘diploma mills’ raise several concerns for the quality of this educational experience. In a paper which discusses Campus Canada, a secure repository for storing digital certificates, Richards et al. (2006) mention concerns regarding the issuing of fraudulent diplomas from diploma mills, certification without translation and proof

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that the name on the certificate is in fact the person who completed the online course. There are many relevant concerns about certification of qualifications achieved through engagement with MOOCs: accreditation, authentication, identification, and plagiarism.

Pesce (2011) stresses the importance of understanding and maintaining the pedagogical justification of educational institutions and Ozkan and Koseler (2009) observe that the successful management of eLearning environments are challenging. Questions remain to be answered about the pedagogical approach to be used, students' experiences and feedback; and the necessary organisational mechanisms required to support MOOCs (Yuan & Powell, 2013). Not many institutions have the necessary resources and sufficient knowledge of e-pedagogical strategies to effectively develop MOOCs (Yuan & Powell, 2013).

Usability of MOOCs is crucial to their overall success. Learners should be afforded the opportunity to engage with the course content seamlessly. The tool of delivery should be easy to use, therefore allowing the learner to avoid any unnecessary cognitive load (Fini, 2009). Support should be available to students who have difficulty in using the interface to the course. Some students may leave the course due to frustrations with the user interface not the course itself. If a course is freely available there is more possibility of a potential student walking away from it due to usability issues than if a student has paid fees to enroll. Students who pay fees to engage with an online course are more likely to seek help and persist.

Postareff et al. (2008) suggest the challenge is to change teacher's conceptions rather than their teaching techniques. Teachers should be familiar with a variety of pedagogical approaches to enable them to select the most appropriate to use to achieve specific learning outcomes. The pedagogical approaches and teaching methods used by educators are more important than the tools used to transmit the courses. Some prominent educators feel that their lectures are lost on a few hundred students,

when thousands could benefit through the use of MOOCs. It is important that all teachers pay some heed to the concept of teaching and not only teaching methods and approaches. Irrespective of the methods used to teach, be they chalk and talk, lectures, presentations, blended learning, technology enhanced learning, or MOOCs, the quality of the students learning experience will largely depend on the ability of the teacher to empower others to learn.

In web-mediated education many learners experience alienation, loneliness and indifference (Kim, 2011). Learners can experience alienation, loneliness and indifference also in large lecture theatres. In web-mediated education it is up to the facilitators to encourage the learners to engage with their peers and become involved in CSCL. Educators can also encourage learners to form a community of practice with other online students, who are similarly motivated and share the same interests.

## **FUTURE RESEARCH DIRECTIONS**

MOOCs are still a relatively new and unexplored phenomenon. Many evaluations of MOOCs are required to establish which e-pedagogical approaches and learning theories work best and in what instances. Research studies based on existing users' perceptions and experiences of using MOOCs, cMOOCs and xMOOCs are required to inform educators who wish to delve into this concept: to promote existing university courses or to deliver online courses to thousands of potential learners.

Further research is also required on the development of authoring tools to facilitate personalised eLearning to assist teachers who wish to effectively use constructivism in their teaching practices. One of the points on constructivism made by Powell and Kalina (2009) was that teachers have to be aware of what learners do and do not know so the learners can create personal meaning from new information

provided. Personalised eLearning would facilitate the teachers knowing what stage of learning each student had achieved and provide teachers with the opportunity to direct students to specific learning objects suited to their learning needs at any specific point in time. Students learning requirements are dynamic. Mayes (2001) suggests that matching the learning requirements of individual students to learning content has previously been neglected. The addition of an authoring tool for authoring adaptive learning experiences to existing MOOCs would enable teachers to effectively use constructivism as a teaching method. Educators can empower students by affording them the opportunity to engage with learning experiences which adapt to their individual learning requirements. In order for this to happen there is a need for freely available authoring tools which will enable non-technical academic authors or teachers to create adaptive learning experiences.

## CONCLUSION

The two essential components of modern science are (i) the empirical or factual component which constitutes the making of observations and recording of same and (ii) the theoretical components which constitutes the systematic approaches to explaining and analysing the observations made in the empirical component (Hull, 1943). Numerous attempts have been made to try to explain how learning occurs. Some learning theories have been discussed in this chapter. Overall, these various learning theories all have something to offer in the consideration of e-pedagogical strategies for MOOCs.

All educators should be familiar with the various learning theories and understand how they can enhance the learning experience of students. This understanding will augment their teaching practices be they on or offline. A MOOC no matter how cleverly designed will only empower learners who are motivated to engage and learn, similar to traditional teaching environments.

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## **KEY TERMS AND DEFINITIONS**

**Behaviourism:** The word behaviour refers to how one conducts oneself in front of others or towards others. The word behaviourism refers to the study of the way in which an animal or person responds to environmental stimulus.

**Cognitivism:** The word cognition refers to the mental processing which takes place in comprehending information, solving problems and making sense of the environment in general. Cognitivism is the psychological study of how the mind works when learning, processing information and creating knowledge.

**Community of Practice (CoP):** A community of practice is a group of people who share common interests and goals, who come together to learn from each other.

**Computer Supported Collaborative Learning (CSCL):** Computer supported collaborative learning (CSCL) refers to the learning which can take place as a result of the work undertaken by a group of people who have come together online to achieve the same objective.

**Connectivism:** The word connect refers to the process of joining together one or more things to make something bigger or different altogether. Connectivism is the study of the interaction which

takes place when people psychologically connect with each other. Connectivism is similar in concept to Vygotsky's zone of proximal development.

**Constructivism:** The word construction refers to the manual process of building or creating something new. Constructivism is the study of how people build knowledge by integrating new knowledge with existing knowledge.

**ePedagogy:** ePedagogy is about formulating a theory of effectiveness for teaching in an environment which uses information and communications technology (ICT), the World Wide Web (WWW) and broadband access.

**Experiential Learning:** Experience is the knowledge or skill which is gained through personal active involvement or exposure to an event. Experiential learning refers to the learning which results from doing something, particularly if the task is incorrectly performed the first time.

**MOOC:** A Massive Open Online Course (MOOC) refers to a freely available online course which offers unlimited participation and the opportunity to build a Community of Practice.

**Pedagogy:** Pedagogy is the science of teaching and learning, encompassing the study of a broad range of teaching strategies to facilitate intellectual engagement with students to encourage learning.