

## Developing the ability for a deep approach to learning by students with the assistance of MOOCs

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**ABSTRACT:** As a new learning environment, the MOOC (massive open online course) has spawned a new learning model with its unique characteristics and its massive on-line accessibility. In the MOOC environment, learners can choose and customise courses according to their individual educational backgrounds and personal or professional needs, and, then, realise the personalised content according to these prerequisites. Related to MOOCs is an approach to learning that requires learners to understand complex concepts, actively construct personalised knowledge and effectively apply that knowledge to real situations, ultimately promoting the development of higher-order thinking skills. In the context of the relationships between MOOCs and a deep approach to learning, this article analyses how MOOCs assist students in developing the ability for deep learning. In this article, MOOCs and a deep approach to learning are introduced respectively, and then the way in which MOOCs support the deep learning by students is elaborated in more detail, which lays foundation for further examination of MOOC in relation to effective learning.

### INTRODUCTION

Developments in science and technology and, especially, new developments in information technology, provide powerful technical support for education. With amazingly fast changes in IT technology, in this new digital environment and mobile-based learning, great changes are taking place in the learning style and thinking of students. However, due to the misuse of new learning tools and techniques, some learning activities allow only for surface learning, so the Internet could be even considered to be unsuitable for carrying out deep learning activities. There is some anecdotal evidence that this is true, however, the essence of e-learning is more complex and multi-dimensional.

In the era of the knowledge economy and information-oriented society, learners have to absorb and process knowledge and information quickly, have a deep understanding of often complex concepts, grasp the depth of their meaning and, thus, construct scenarios of personal knowledge to solve real life problems or address professional needs. A deep approach to learning appears to be an important learning method in the IT era, one in which concern about an individual learner's attention and ability to learn in the e-environment is widespread.

In 2012, in the network learning environment and accessibility for the general population, MOOCs (massive open online courses) began to expand rapidly and set off a boom of deep learning [1]. In the context of the MOOCs' ubiquity and the need for a deep approach to learning, this article addresses in detail how to adopt MOOCs to support and promote the deep learning of students.

### ORIGINS AND DEFINITIONS OF MOOC

The MOOC model originated in the US for curricula based on the Internet. This development dates back to 2007, when Professor David Wiley from Utah State University launched a network-open course called *Introduction to Open Education*. From then, users around the world could share curriculum resources and participate in the course [2]. Subsequently, Professor Alec Couros from University of Regina in Canada constructed an open network course *Media and Open Education* and invited many worldwide experts to participate in remote teaching in January 2008 [3]. These two open courses laid the foundations for the development of the MOOC model from the conceptual, educational and technical perspectives.

In 2012, the definition of MOOC provided by Wikipedia referred to world-wide distributed participation, network-shared and distributed resources, accessibility and availability, operational effectiveness being aligned with the scale, i.e. the greater the scale, the better the operating results, etc. Based on the concept of MOOC, it can be stated that learners and teachers scattered around the world are linked together through network discussions and information exchanges related to a given course. In the same year, the definition of MOOCs evolved to that of an on-line, open

access course for large-scale participation [4]. Therefore, a MOOC is a new development in the field of distance education and is an open access educational idea.

Kop and Sara Ibn El Ahrache proposed that MOOCs should mainly consist of five elements: teachers, learners, topics, learning materials and contexts [5]. Bond and Leibowitz observed and analysed ten MOOC courses, summed up the general operation mode of MOOCs, extracted the constituent elements of MOOC that were identified as substance elements (platform and tools, course information, learning activities) and people elements (teachers, students, curriculum coordinators) [6].

From these studies one can observe that the constituent elements of MOOC already contain human factors. It is also visible that research has shifted the focus in regard to MOOCs. Earlier, more attention was paid to their large-scale presence, wide-range appeal, and the wealth and accessibility of resources, and now it appears that the focus is on learning effectiveness and other educational issues. Researchers have started to pay more attention to various factors associated with on-line learning and on-line teaching methodologies.

## OVERVIEW OF DEEP LEARNING

In the mid-1970s, Ference Marton and Roger Saljo carried out a series of experimental studies on the learning process, and in 1976, jointly published the article *On qualitative differences in learning. I - outcome and process* which divided students into deep level learners and surface level learners according to the way in which learners access and process information. In the article, they proposed and elaborated on these two relative concepts that were deep learning and surface learning [7].

In 2004, the American Association for Educational Communications and Technology (AAECT) revised the definition of educational technology, which highlighted the ideas of deep learning and promoted deep learning as an important goal of educational technology. The 2004 AAECT definition emphasised that deep learning referred to the basis of understanding; learners could learn new ideas and facts critically, and integrate them into their existing cognitive structure that allowed connections between several ideas to be made, and the application of existing knowledge to new situations; informed decisions could be made and learning or real life problems resolved. [8].

Deep learning is an active, critical learning approach, and also an effective way to achieve meaningful learning. Deep learning requires learners to understand the nature of learning, develop higher-order thinking, actively construct knowledge, effectively manage knowledge and solve real problems.

From the perspective of learning objectives, Bloom divided cognitive learning goals into six levels: knowing, understanding, application, analysis, synthesis and evaluation, respectively [9]. The surface learner functions only at the first two levels that is knowing and understanding, which refer mainly to a brief description of knowledge and the memory function, while the deep learner may progress to application, analysis, synthesis and evaluation, which are higher cognitive levels, not only involving memory, but a thorough understanding and application of knowledge. Deep learning occurs at an advanced level of knowledge acquisition, which means that higher-order thinking is the core feature of deep learning, the development of higher-order thinking skills contribute to deep learning, and reciprocally, deep learning helps to improve the quality of learners' thinking and learning effectiveness.

## HOW MOOCS CAN ASSIST STUDENTS TO FORM THE ABILITY OF DEEP LEARNING

The MOOC model implies that students will actively explore learning under the guidance of teachers, focusing on self-exploration, which fully embodies the principle of personalised learning and helps students to develop innovative and creative abilities, and to mobilise fully their interests in learning. So, MOOCs are consistent with the idea of deep learning, as the MOOC model implies a deeper learning. MOOCs can further students' deep-level learning ability in the following ways:

*MOOCs advocate personalised learning and stimulate learning interests of students, which is a motivation for deep learning:* as a new learning environment, MOOCs create opportunities for students to adjust their learning according to a specific purpose and style. Learners can arrange their own learning process, skip some content as needed, for example, a video that they are already familiar with or increase the video's playback speed according to their own circumstances. If some videos are very difficult to learn, learners can play them several times to absorb the information better or slow down the speed of the video if it is too quick. Learners may also decide on their own learning time, equipment and place; they have flexibility and can effectively learn, so as to realise their own initiative and creativity through this highly individualised learning. Because explaining the theoretical knowledge by using MOOCs can be highly comprehensive, therefore, classroom teaching can be really transformed into a *student-centred* place, where the role of the teacher is converted into that of an assistant or a guide facilitating interactive teaching activities.

*MOOC teaching emphasises the creation of learning scenarios to stimulate interests in learning, which is yet another motivation for deep learning:* the famous American psychologist Bruner pointed out that the best motivation to learn was having an interest in the learning material itself, and that one should not pay too much attention to incentives,

competition and other external stimuli. MOOC teaching emphasises the interest that students must have in the topic at hand and their desire to explore it according to their needs and situation, their interest in organising teaching materials, creating teaching scenarios and in designing teaching process. Guided by reflective questions, students will generate strong interest in the learning content; their desire to learn and motivation will make them effective and successful learners.

*MOOCs focus on the learning process of students, where the reflection on the learning process and self-evaluation of learning outcomes is crucial, which is also an important indicator of deep learning:* during the process of MOOC learning, students actively explore knowledge under the guidance of teachers - but teachers are just organisers and facilitators, who do not regulate the process of learning. Students gradually master new knowledge through self-studying textbooks, hands-on practice and panel discussion. Knowledge could be differently absorbed and understood by different students, due to the diversity of students' backgrounds and educational experiences. However, teachers have to ensure that students explore full knowledge related to their studies and express their independent views. At the same time, teachers should respect students' exploration results and respect students' independent thinking process.

Timely feedback is most helpful for MOOC learners, so after students finish a test, they should know the results as soon as possible. If students or teachers are not satisfied with the scores, the unsatisfied students could repeat the relevant part of the MOOC a few more times. Evaluation of the learning process focuses on students' self-learning mode, the way the student learns could be grasped to guide them in a direction that would be beneficial in their individual case. Also, self-assessment and peer assessment during the evaluation process allow students to gradually grasp the correct way of learning, boost their motivation to learn and master their own learning strategies to truly improve the quality and effectiveness of learning.

*MOOCs focus on training the innovative spirit of students, and innovative spirits will pursue higher goals through deep learning:* creativity is the ability of students who using existing knowledge and experience, will come up with new ideas, turn challenges to opportunities and successfully resolve problems - they may come up with, and be guided by, highly personal, subjective factors during this process. MOOC teaching emphasises the dominant position of students and treats student questions as a main teaching method. Students firstly learn, then, explore topics with teachers providing assistance only and leaving the students the freedom of exploration, which ultimately will develop students' individual strengths, initiative and creative abilities.

MOOC teaching makes full use of leading and exploring to stimulate students' initiative, students only need to take that initiative to develop their innovative spirit. They will also reflect on their own individual strengths, application and creation abilities that are the ultimate goals of deep learning. From the instinctive sentiment for knowledge and the need for it, to abstractly summarising and freely utilising the acquired knowledge, they internalise every new bit into their own knowledge systems [10].

*MOOC teaching focuses on the comprehensive application of knowledge and the ability to solve practical problems - the integrated use of knowledge and practical ability is the value proposition of deep learning:* deep learning emphasises the active creation of knowledge, cultivation of students' innovative spirit, and creativity in solving practical problems as per learning values.

MOOC teaching theory also attaches great importance to students' ability to comprehensively use the learned knowledge, the ability to creatively solve practical problems. The model advocates the application of student knowledge, testing knowledge in practice, so as to enhance the knowledge at a deeper level of understanding. It is central to the process to allow students to apply the acquired knowledge to solve practical problems, to appreciate the value and significance of learning, experience learning achievement and, thereby, generate enthusiasm for learning. This way learning becomes fun, and playing games that lead to achievement is a source of motivation for students. The integrated use of knowledge and the ability to solve practical problems are the real value of deep learning.

*Through analysing big data provided by MOOCs, the learning nature of students and unique features of the learning process can be discovered, which may lay foundations for constructing the deep learning model of MOOC learners:* due to the technical structure of MOOCs, teachers can record the learning process and track learners using a variety of data. Through these data, teachers not only can analyse the similarities of large scale MOOC learners at the macro level, but also can analyse the personalised learning characteristics of learners at the micro level, not all of which can be achieved by the traditional courses. With the help of the real-time teaching data provided by MOOCs, teachers can better guide students, group them to make use of incentive mechanisms, stimulate cooperation and create a community of learners that is aware of their individual differences and conducive to the development of each team member.

In the deep-level interactive process and according to the MOOC data, teachers can suggest problem-solving tools based on student thinking, their own knowledge or team cooperation strategies and, thereby, help students to correct the erroneous solutions and methods just in time. At the same time, teachers should pay attention to the individual differences of students and let them participate in the process of thought formation so as to encourage students' initiative and autonomous cooperation which will aid deep learning [11]. Figure 1 depicts the process of MOOCs' role in the formation of students' deep learning ability.

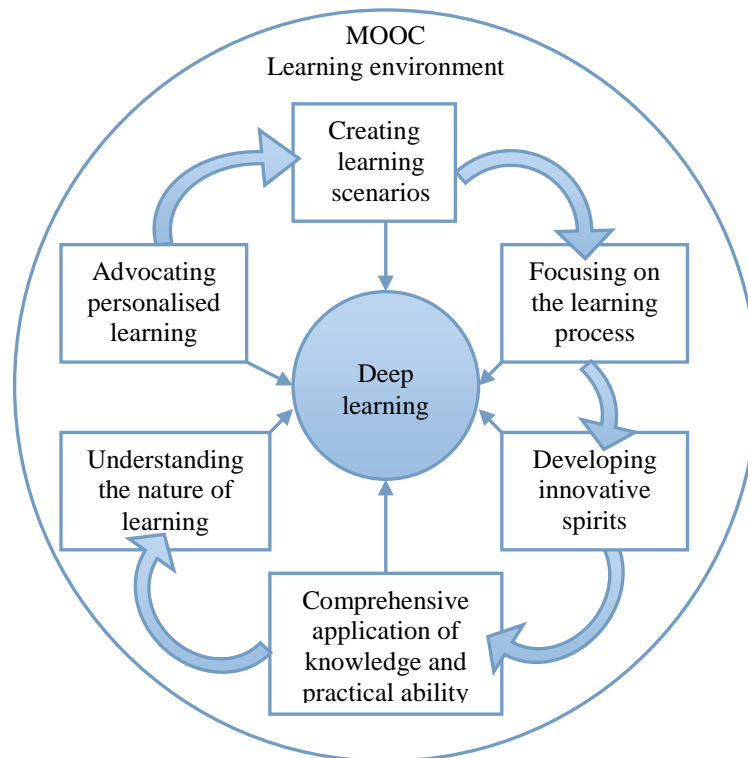


Figure 1: MOOCs' role in the formation of students' deep learning ability.

## CONCLUSIONS

MOOC teaching can promote deep learning by students, and has a far-reaching impact on the teaching process and research. It was not difficult to foresee that MOOCs would bring a great change to the globalisation of higher education. MOOCs not only enable different groups of people around the world to have access to shared educational resources, but also they make large-scale and personalised learning feasible. For colleges and universities, education through MOOCs is not only about utilising an innovative technology, but it also brings profound changes to the whole educational system, including teaching methods, personnel training and other teaching aspects. With the development of computer- and learning science, more studies on MOOCs in relation to the development of deep learning attitude by students will be conducted and popularised.

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