

Teaching Strategies to Promote Undergraduates to Engage in Deep Learning

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Abstract: To create a “golden course” means improving the quality of education and teaching, and cultivating high-quality talents. “Golden courses” require high-quality learning by college students. Many studies show that deep learning is a higher quality of learning. We study three teaching strategies to promote students’ deep learning. We use classroom space to awaken students’ consciousness. We apply the Brubacher reflection model to improve students’ reflective ability. We change the traditional teaching methods and guide students toward establishing a correct view of learning.

1. Introduction

In June 2018, the Ministry of Education held a New Era of National Undergraduate Education Conference and proposed the concept of a “golden course” for the first time. A “golden course” has the characteristics of high order, innovation and challenge. Making a “golden course” means improving the quality of education and teaching, and cultivating high-quality talents. “Golden courses” require high-quality learning by college students.

Quality learning has two dimensions. One is whether the learning methods adopted by students are of high quality, and the other is whether students achieve high-quality learning results. There is a causal relationship between these two dimensions; high-quality learning methods will lead to high-quality learning results. Many scholars have studied high-quality learning methods and come to almost the same conclusion: high-quality learning methods involve deep learning [1].

Many scholars have studied teaching strategies to promote students’ deep learning. Some scholars have studied deep learning from the perspective of guiding teachers in adjusting their ideas and teaching behaviors [2]. Other scholars explore deep learning from the perspectives of determining appropriate teaching objectives, selecting appropriate teaching content and organizing effective learning activities [3]. Still other scholars have studied deep learning by exploring holistic teaching methods and adopting appropriate evaluation methods [4]. Therefore, most existing studies have examined teaching strategies to promote students’ deep learning from the perspective of the teachers’ teaching. This paper explores teaching strategies to promote deep learning by college students from the perspective of students’ learning.

2. The meaning of deep learning

In 1976, Swedish scholars Marton and Saljo found significant individual differences in learning processes and outcomes when students were confronted with learning material. Some students are deep processors of information, while other students are shallow processors of information. In shallow processing, students focus on learning the text itself, which means that students apply rote learning strategies. In the case of deep processing, by contrast, students learn the intentional content of the material, which means that students understand what the author wants to express [5]. Since then, many scholars have studied deep learning.

Biggs, Entwistle, Ramsden and other scholars believe that deep learning is reflected in the learners' use of diversified learning strategies. For example, students read widely, integrate sources, exchange ideas, relate individual pieces of information to the overall structure, and apply knowledge to the real world. Finally, students achieve a deep understanding of the material [6]. Lu Linhai, a Chinese scholar, believes that deep learning refers to a learning method in which college students are motivated by understanding the subject and developing their abilities. They pay attention to the principles behind knowledge and the connections between knowledge. Deep learning is a process of deep thinking and higher-order thinking [7]. Deep learning refers to a learning process in which students participate fully and actively, experience success and grow by focusing on challenging learning topics [8].

The relationship between deep learning and surface learning is not either/or. The same student can first use surface learning for the same learning content, and then use deep learning with the memory and understanding of the learning content. In this sense, students can transition from surface learning to deep learning. Surface learning is the foundation and beginning of deep learning [9]. We should adopt appropriate teaching strategies to promote students' transformation from surface learners to deep learners.

3. Teaching Strategies to Promote Undergraduates to Engage in Deep Learning

We can only understand teaching when we focus on learning. All the thinking about, and design of, teaching strategies should be based on the understanding and grasp of learning. Otherwise, teaching may become an activity without practical effect and meaning, deviating from the law and purpose of learning [10]. Therefore, it is of great significance to study teaching strategies to promote deep learning of college students from the perspective of student learning.

3.1 Arouse Students' Subject Consciousness by Leaving Space in Class

The term "white space" originated from traditional Chinese painting. It is one of the important techniques of expression in many artistic genres. Classroom "space" means that teachers intentionally set aside time for students to think and feel independently, so as to provide opportunities for students to construct their own cognitive structure, engage in inquiry activities and express their understanding of the subject. Classroom space creates conditions for students to discover, analyze and solve problems. Classroom space art avoids the overflow of teaching. Classroom space can stimulate the students' interest in learning and their thirst for knowledge. Classroom space can not only activate students' imagination and thinking but also improve students' participation in class. In the end, students engage in deep learning [11].

According to the teaching process, the classroom blank can be divided into leading blank, linking space, climax space and closing space [12]. Classroom space can be divided into filling space, combining space and opening space [13]. The difficulty and frequency of creating white space should be appropriate. The difficulty should not only be suitable for the students' zone of proximal development but should also be illuminating and thoughtful. Leaving blank space in too difficult

places will leave students at a loss. Leaving space in a place that is too easy will make the student in a “slippery white” (no white) state. Appropriate classroom space will achieve the effect of “no painting is a wonderful place.” White space makes the class wonderful.

For example, after asking questions in class, teachers should leave space, which not only enables students to search for relevant information from their own cognitive structures but also enables students to express their views clearly and logically. After students have answered the questions, the teacher should leave more space, which not only gives the students who answered the questions time to rethink but also allows other students to judge, revise, and expand their answers. Students can stretch their imagination in the harmonious classroom atmosphere, speak freely and inspire each other.

It is difficult, however, to say how long a pause is appropriate because of the difficulty of the questions will vary, as will the students’ understanding and mastery of the knowledge used to solve the problem. Teachers should fully understand the learning process of students and give them the necessary guidance and help when they are at a loss or in trouble.

3.2 Improve Students' Reflective Ability by Using the Brubacher Reflection Model

Dewey believes that reflection is active, persistent and careful consideration of any belief or assumed form of knowledge focused on its basis of support and the further conclusions it tends to reach [14]. Compared with many developed countries, China ranks first in the credits required in the undergraduate curriculum, theory credits, compulsory courses, teaching weeks, and classroom teaching hours. In class, students are accustomed to playing the role of the audience, becoming the “silent majority.” Students are bound by numerous “water courses.” Learning time and learning space are severely limited [15]. In this case, students have little opportunity and space for reflection. Learning science has repeatedly demonstrated the importance of reflection in deep learning [16]. Reflection can promote students’ deep understanding of information and active construction of personal meaning. Reflection is conducive to the transfer and application of experience and skills and the effective solution of complex problems. Reflection promotes the achievement of deep learning.[17] Studies also show that excellent students prefer to adopt reflective and pragmatic learning methods compared with ordinary students. High academic achievement is related to deep learning, while poor academic achievement is related to surface learning [18].

How can teachers promote the interpenetration of reflection and deep learning? J. W. Brubacher, an American educator, conceived reflective teaching from the time dimension based on drawing lessons from other people's thoughts. He believed that reflective teaching practice can be divided into three categories. The first is reflection-on-practice. The second is reflection-in-practice. The third is reflection-for-practice. Reflection-on-practice means that reflection takes place after practice. Reflection-in-practice means that reflection takes place in the process of practice. Reflection-for-practice is the expected result of the first two kinds of reflection. Reflection-for-practice and reflection-in-practice eventually form advanced reflection, which allows subjects to develop the habit of thinking before practice in order to improve practice [19]. Applying Brubacher’s reflective teaching theory to students’ deep learning, students will be asked to reflect before learning, during learning and after learning. The three kinds of reflection form a continuous cycle, which is a spiraling process [20]. The use of the three kinds of reflection will improve students’ reflective ability.

For example, a hybrid teaching mode is applied to let students learn the calculation of double integrals in a cartesian coordinate system. The purpose of this part of online learning is to enable students to understand the theory and method of converting double integrals into quadratic integrals and to apply the method to calculate double integrals. Before online learning, the teacher should not only ask questions about the relevant knowledge that students have learned but also ask questions about the calculation of the double integral that students will learn. These questions will activate

students' existing knowledge and experience, strengthen the connection between new and old knowledge, and encourage students to establish reflective consciousness. In offline (classroom) learning, teachers should ask questions to understand what students have learned and provide a strong starting point for online learning. In addition, teachers should encourage students to examine their own learning attitudes, learning methods and learning habits. Let students learn to learn, learn to engage in deep learning [21]. After studying offline, students are required to fill out a "class record form." On the one hand, students are required to reflect on the classroom learning results, sort out the knowledge and skills they have learned, demonstrate their mastery, and improve the knowledge structure. On the other hand, students are required to review the classroom learning process, find existing problems and deficiencies, and remedy weak links.

3.3 Guide Students to Set up the Correct View of Learning by Changing the Traditional Teaching Methods

Students' view of learning refers to their individual, intuitive understanding of knowledge, learning phenomena and experience. A student's view of learning is gradually formed in daily learning activities, classroom teaching and the social environment. Every student has a set of learning concepts, which guide their learning activities and their evaluation of teachers' teaching [22]. Learning view has an important influence on students' learning style, and different learning views have different influences on students' learning styles. Without considering environmental factors, the applied knowledge learning view has positive predictive power for deep learning and negative predictive power for shallow learning. The learning view of mnemonic knowledge has positive predictive power for both deep learning and shallow learning, but it makes students more inclined to shallow learning. Building a classroom learning environment conducive to communication and interaction between teachers and students, as well as between students and students, and improving students' learning participation, can make students more inclined to deep learning [23].

We can help students establish a correct view of learning in the following ways. First, teachers can fully internalize the constructivist teaching view. Constructivism believes that students' learning is a process of endowing new knowledge with meaning based on existing knowledge and experience. The meaning of knowledge cannot be directly transmitted. Researchers have compared the influence on college students' learning outlook of teaching calculus by two different methods. One is the traditional teaching method using lecturing and textbooks, and the other is the constructivist teaching method, using group cooperation and word problems without providing answers. Constructivist teaching cultivates a more mature view of mathematics at the end of the semester. Another researcher compared the changes in college students' learning views under the two teaching methods and found that students under the constructivism teaching method put more emphasis on critical thinking and peer interaction in learning activities than those under the traditional teaching method [24].

Second, teachers can implement a flipped classroom. The inversion of the learning process and the application of a fragmented learning mode have a profound impact on students' learning outlook. Before class, students read materials or watch videos to carry out independent learning, extract old knowledge, learn new knowledge, apply the knowledge, and analyze and solve problems raised by teachers. At this stage, students' original knowledge and experience begin to connect with new knowledge, and students' first internalization of the new knowledge occurs. In class, the knowledge that students have learned before class collides with the new cognition and understanding generated by the learning activities such as discussion between teachers and students and students' exploration. The students' second internalization of knowledge occurs at this point [25]. After class, students assimilate or adapt the knowledge internalized in the first two stages into their cognitive structure through self-reflection, so that their cognitive structure can be expanded or restructured. Students'

third internalization of knowledge occurs at this point. In a flipped classroom, students learn and internalize knowledge before, during and after class.

4. Conclusions

Persistent deep learning is an effective way for college students to acquire knowledge, improve their abilities and shape their values. It is an effective way to achieve the goals of college education and teaching. We study three teaching strategies to promote students' deep learning from the perspective of students' learning. We use classroom space to awaken students' consciousness. We apply the Brubacher reflection model to improve students' reflective ability. And we change the traditional teaching methods and guide students to establish a correct view of learning.

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