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Research and Practice on the Design of Online Learning Activities for Distance Education Oriented Towards Deep Learning

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Abstract: ***Based on Five-stage model, Deeper Learning Cycle (DELC), and other related theories, This study focused on the design of online learning activities. It explored and implemented a framework for designing online learning activities aimed at deep learning. The learning process was divided into four stages: preparation, information exchange, knowledge construction, and knowledge development. The activity design was driven by tasks, problems, or projects, with difficulty progressing in stages. It emphasized feedback and reflection, providing necessary learning support to help students in distance education optimize their learning experience, gain a deep understanding of knowledge, and improve higher-order thinking skills. Ultimately, this could enhance the teaching quality of online courses.***

Keywords: Deep learning, Learning activity design, Distance education, Five-stage model, Online learning**.**

1. Introduction

General Secretary Xi Jinping has pointed out that developing new quality productive forces is an intrinsic requirement and important focal point for promoting high-quality development (2024). It is essential to continue making progress in innovation and accelerate the development of new quality productive forces. Developing new quality productive forces and fostering innovative capabilities are closely linked to the cultivation of higher-order cognitive abilities. The development of creative, applied, and critical thinking skills is one of the key factors driving the formation and growth of new quality productive forces. In the context of globalization and the knowledge economy, nurturing innovative talent has become a common goal for educational development across countries. Therefore, cultivating students' higher-order cognitive abilities and promoting "deep learning" has become an important issue in educational research. Deep learning primarily involves training students to convert information into knowledge, critically acquire knowledge, and solve practical problems, which are core elements of the demand for innovative talent in today's society. The realization of deep learning is an important indicator of improved educational quality and a crucial path for the development of new quality productive forces.

Distance education offers the advantages of flexibility and economies of scale, but over the years, the issue of educational quality has remained a pain point and a significant challenge. Improving the quality of distance education is not merely about enhancing the quality of course resources but also paying attention to the learning process. The traditional online learning model, purely based on resources, mainly involves watching videos and reading course materials, which is monotonous and fails to engage and sustain students' enthusiasm for learning. There is limited interaction between teachers and students, as well as among students themselves, which can lead to feelings of loneliness and anxiety during the learning process, negatively impacting the learning experience and outcomes. Wang and Li (2002) argue that well-designed online course content is key to helping students effectively acquire knowledge. However, without excellent online instructional activity design and active guidance from instructors, there is no guarantee that students will fully utilize the developed content. Distance education should shift from focusing on resource design to emphasizing activity design, stressing students' social learning abilities. Through carefully designed and effectively organized teaching activities, it can enhance teacher-student and student-student interactions, promote deep learning, and develop higher-order cognitive skills, representing a significant breakthrough in improving the quality of distance education.

2. Literature Review

2.1 The Theory of Deep Learning

The concept of deep learning can be traced back to the 1950s. Bloom's classification of cognitive dimensions in "Taxonomy of Educational Objectives" reflected that "learning varies in depth" (Anderson et al., 2009). Beattie (1997) and Biggs (2003) explored the nature of deep learning from different perspectives, suggesting that it involved students actively employing diverse learning strategies like self-directed inquiry, interactive discussion, systematic reflection, and situational learning to achieve a deep understanding of knowledge and apply it to solve real-world problems. Jensen and Nickelsen (2010) defined deep learning as the process where new knowledge or skills must undergo multiple stages of learning and high-level analysis to be applied in ways that changed thoughts, self-control, or behavior. They proposed Deeper Learning Cycle (DELC) and outlined seven necessary stages and strategies for achieving deep learning, which offered valuable guidance for instructional design.

Research on deep learning in China began later. He and Li (2005) defined deep learning as students' critical reception of new knowledge based on understanding, integrating it into existing cognitive structures, and applying existing knowledge to new contexts to solve new problems. Duan and Yu (2013) distinguished deep learning from surface learning from four aspects: learning objectives, cognitive activities,

behavioral representation, and learning outcomes. They emphasized that deep learning focused on developing higher-order cognitive abilities like analysis and creativity, and involved high emotional and behavioral engagement, aiming at concept transformation and the development of complex cognitive structures. Hu and Dong (2017) defined deep learning as proactive and critical meaningful learning, requiring learners to process knowledge information deeply within real social contexts and complex technological environments, actively establishing connections between old and new knowledge to understand complex concepts deeply and apply them to solve complex problems, ultimately developing higher-order thinking skills. In summary, deep learning is an exploratory learning approach where students use various strategies for deep information processing, proactive knowledge construction, critical higher-order thinking, and effective knowledge transformation and transfer to solve practical problems.

2.2 Instructional Design Supporting Deep Learning

Strategies for designing instructional activities that support deep learning generally fell into two categories: problem-based and task-driven. The goal of these designs was to develop higher-order thinking skills. Bloom categorized cognitive objectives into six levels: remembering, understanding, applying, analyzing, synthesizing, and evaluating. The latter four levels corresponded to deep learning, which should be emphasized in online activity design. Deep learning cannot be achieved overnight and requires gradual progression. The DELC divided the deep teaching process into seven steps, with the sixth step of deep processing building on the preceding stages. This model was designed according to students' cognitive patterns and was mainly aimed at traditional face-to-face teaching. Salmon (2000) proposed a Five-stage model for online learning activity design (Figure 1). This model includes access & motivation, online socialization, information exchange, knowledge construction, and knowledge development. Access & motivation and online socialization help eliminate technical barriers, stimulate motivation, and create a positive online learning environment for subsequent interaction, collaboration, and higher-order cognitive development. During the information exchange stage, interactive learning activities are designed to encourage discussion, exchange, and collaboration, forming an initial learning community. In the knowledge construction stage, learners are encouraged to critically reflect on course materials, connect learning with prior experiences, and interact online, with a focus on developing three higher-order thinking skills: critical thinking ability, creative thinking ability, and applied thinking ability. In the fifth stage, learners are guided to apply what they have learned to personal practice, reflecting and assessing the achievement of individual learning goals.

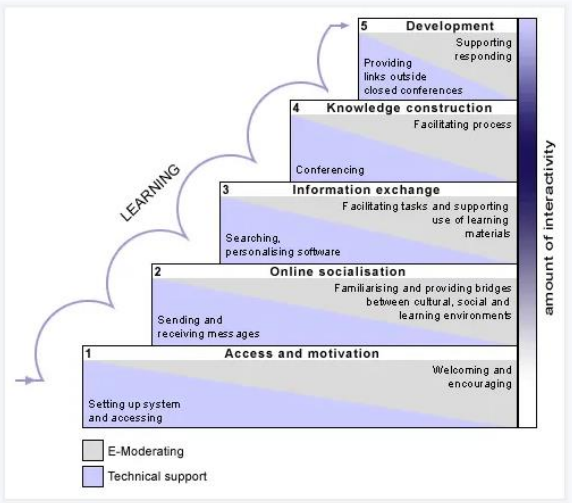

Figure 1: Five-stage model

3. Framework for Designing Online Learning Activity on OUC Learning Platform

The OUC (the Open University of China) learning platform is a key platform for implementing modern distance education in China. This platform supports resource and data sharing and offers comprehensive functionality. It provides various resources, including teaching documents, interactive textbooks, recorded materials, personal question banks, etc., allowing teachers to effectively complete instructional design. It also offers detailed learning analytics by recording and analyzing all aspects of teaching and learning behavior, such as browsing course materials, watching videos, discussing, submitting assignments, online testing, and learning outcomes, creating multidimensional analyses of resource utilization, student engagement and activity. This provides excellent technical support for both teaching and learning.

Based on Five-stage model and Deep Learning Cycle (DELC), and considering the current situation of distance education in China, this research designs an online learning activity framework aiming at deep learning, using OUC learning platform (Figure 2). The learning process is divided into four stages: teaching preparation, information exchange, knowledge construction, and knowledge development. **In the stage of preparation**, teachers evaluate the teaching subjects and environment, including students' levels, background knowledge, and the functionality of the teaching platform. Based on this, teachers design instructional goals and arrange teaching content. **In the stage of information exchange**, teachers will try to establish connections and trust among students through online activities, which lays the foundation for a positive online learning culture. Over time, students build connections, adapt better to online learning, and begin to share and exchange information. Participating in learning activities helps activate prior knowledge related to the course, preparing them for new knowledge acquisition. In **the stage of knowledge construction**, teachers help students assimilate and transfer knowledge through online activities, encourage critical thinking about course content, and guide students to link learning with prior experiences and interact online with teachers and peers. Student interactions become more collaborative, allowing them to use higher-order thinking to analyze, reflect, and critique, transforming them from mere knowledge receivers and transmitters into creators of

knowledge. **In the stage of knowledge development**, feedback and interactions between teachers and students become deeper, guiding learners to apply learned content to personal practice, reflect and evaluate the achievement of their learning goals.

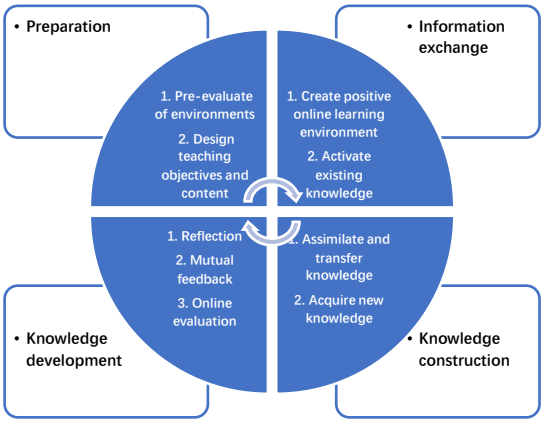

Figure 2: Framework for designing online learning activity on OUC learning platform

4. Teaching Practice and Application Effects of Online Deep Learning Models

This study focuses on the course "Accounting System Design," which is a specialized elective for undergraduate students majoring in accounting. This course aims to familiarize students with relevant financial regulations, master the principles and methods of accounting system design, understand the characteristics of accounting activities and basic internal control design, identify issues in accounting system design, and propose reasonable improvements. One of the course objectives is to enhance students' deep learning capabilities. The online learning activities were centered around key knowledge and issues in learning. For each of the five formative assessment tasks, several online learning activities were designed for each stage and implemented in specific teaching practices. The design of learning activities at each stage is shown in the following diagram.

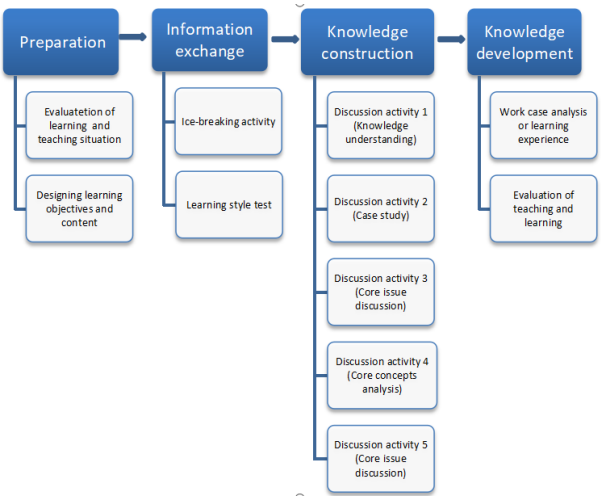

Figure 3: Online learning activity implemented on OUC learning platform (taking "Accounting System Design" as an example)

4.1 Preparation

In this stage, the teaching team evaluates the overall situation of students, course content, and functionalities of the learning platform. Based on this, teaching goals and content are designed, and almost all the activity designs are initially completed.

4.2 Information Exchange

This stage mainly includes two activities: an ice-breaking activity and a learning style test. The ice-breaking activity requires students and tutors to introduce themselves and their expectations or plans for the course in the forum. Through these introductions, students meet each other online and some connections start to form, establishing an initial learning community and online learning culture. Students also complete a learning style test to know more about their own learning preferences, which helps them find suitable learning methods. These activities help to foster a positive online learning atmosphere for the next stage.

4.3 Knowledge Construction

In this stage, five discussion activities are designed according to the five formative assessment tasks. These activities include understanding key concepts, case analysis, and core issue discussions. Each activity is scored between 10 to 20 points, totaling 80 points. In addition to posting their own opinions, students are required to reply to at least five classmates' posts. Students are not mere recipients of knowledge, they are also builders of the learning community. These discussions stimulate students' further reflection on the topics. They receive feedback on posts from their peers, offering various perspectives on the same content, which challenges their original knowledge structures and thinking patterns, deepening their understanding of the issues. This stage is crucial for knowledge construction, as students continuously assimilate and transfer knowledge through participation in these activities, leading to new cognitive structures. Activities are task, problem, or project-driven, with progressive difficulty, emphasizing feedback and reflection, and providing necessary support to help students optimize their learning experience and improve higher-order thinking abilities.

4.4 Knowledge Development

In this stage, students analyze a case study or write reflective summaries on the content and learning process. They also provide feedback on the course teaching, helping teachers improve future teaching designs.

4.5 Application Effects

4.5.1 Increased Online Learning Participation and Quality

Students' enthusiasm for online learning has significantly increased, and online learning activity are higher. For instance, in the Fall term of 2023, the total course visits reached 70,322 times, with an average of 316.8 visits per student. The total number of forum posts was 5,747, with an average of 25.8 posts per student, significantly higher than other undergraduate courses. Students' posts are of high quality, with many students leaving comments and evaluations on their peers' posts, gaining diverse perspectives and expanding

their views. Posts with no content, such as "check-in" or "punch-in," have disappeared from the forum. The online interaction between students is enhanced and the learning experience is optimized. The learning community is initially formed.

4.5.2 Improved Problem Analyzing and Solving Skills

Taking problems, projects or tasks as the carrier, the learning activities is learner-centered and progressively challenging. This promotes active knowledge construction and avoid being trapped in one-way and passive knowledge reception, and improve their independent learning ability. Through forum discussions, students internalize and transfer knowledge continuously, improving their problem analyzing and solving skills and developing higher-order thinking abilities.

5. Conclusion

In the field of distance education in China, there is significant emphasis on the development of online course resources and improving the quality of live and face-to-face teaching. However, there is a lack of attention to the design and organization of online learning processes and activities. The construction of course resources mainly focuses on instructional videos and accompanying texts, with students' learning also centered around these videos and texts. These learning resources are largely geared towards memorization and understanding, resulting in a single learning model that makes it difficult to maintain students' interest. Consequently, students' enthusiasm for participating in online learning is low, and there is limited high-quality interaction between teachers and students or among students themselves, which is not conducive to deep learning or the cultivation of higher-order thinking skills.

This study addresses the above issues by focusing on the design and organization of online learning activities in distance education. It adopts a problem-based or case-based strategy, as well as project-based inquiry learning activities to provide learners with more practical, real-world experiences. The aim is to build a "bridge" between course knowledge and the real world, helping learners activate prior knowledge, iteratively refine that knowledge through learning and discussion, and proactively construct new knowledge systems. This shift from passive learning to active learning is intended to stimulate learners' enthusiasm, enhance their ability to deeply understand knowledge, and improve their problem-solving skills, thereby improving the quality of distance education.

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