

## Online collaborative learning model design supported by big data technology

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**Abstract:** Collaborative learning has been highly praised since its emergence because it can enhance learners' social interaction and cognitive development. Through the integration with mobile Internet, online collaborative learning can play the characteristics of personalized learning on the original basis. In addition to the learning resources provided by the network, learners' online interaction and learning data are also digital resources of great significance. With its unique advantages, big data technology can bring the functions of these data resources to the extreme.

### 1. Introduction

With the rapid development of information technology and the promotion of "Internet +" in the field of education, e-learning has become a useful supplement and learning method to traditional education. Facing the impact of the wave of Internet, many scholars are worried about whether the Internet has become a barrier to the emotional interaction between individuals. How to enhance the emotional interaction and individual contribution rate among learners on the Internet has become an important issue in the information age, and it is also an urgent problem to be solved in online learning.

### 2. Literature Review

#### 2.1. Online collaborative learning

Compared with the traditional teaching mode, online collaborative learning mainly has the characteristics of enhancing communication efficiency, diverse group cooperation modes, strengthening social communication skills and improving teaching structure. The advantages of online collaborative learning are mainly reflected in the integration of technology and collaboration, which can give full play to the advantages of online learning resources, give learners a variety of interaction and conversation ways, enhance the mutual dependence of individuals in the group, and fully mobilize the enthusiasm of learners in social interaction and communication in the network environment<sup>[1]</sup>.

In addition, the online learning environment gives learners a variety of information, which can support learners to carry out the necessary interaction in the process of effective cooperation. At the same time, the number of resources and operation rights of the interactionists can be adjusted according to their own needs, which gives learners full freedom of learning. In the process of online collaboration, it allows learners to play a role in the process of information sharing.

#### 2.2. Challenges in online collaborative learning

Due to the problems of evaluation mechanism and learners' learning motivation, the main problems

of online collaborative learning are confusion and role confusion in the process of learners' collaboration [2] and social slack in the learning group. At the same time, Kreijns, Kirschner and Jochems gave the problems in the process of online collaborative learning through research on the realization of social interaction in computer-supported collaborative learning: in the process of online collaborative learning, the teachers did not give sufficient learning help to the learners, and the learners did not have emotional interaction in the online environment, so they lacked mutual trust and sense of belonging within the groups[3]. At the same time, there are also problems of designing teaching activities and guiding learners to cooperate effectively.

### 2.3. Big data technology

Education big data is a subset of big data [4], which is a mass of data generated in the process of education. According to the literature research, there is no accurate definition of education big data. However, from the original understanding of big data, we can know that education big data is a collection of data collected from the process of education for educational development according to the needs of education and learning. Educational big data has the characteristics and advantages of big data, including educational data mining, learner modeling, learning prediction, resource push, learning analysis and learning warning[5]. Therefore, it can meet the needs of the whole, whole process and all levels of education.

Compared with traditional education and data, the advantages of big data in the field of education are not only reflected in the quantity, but also in the value. Education supported by big data can create a variety of learning modes for various types of learners, create personalized learning direction for learners, and conform to the education concept of teaching students in accordance with their aptitude.

According to the above analysis of the shortcomings of online collaborative learning, big data technology can mainly collect and analyze the data generated in the process of learners' group collaborative learning, and monitor the slack phenomenon in the collaborative process, so as to enable teachers to implement adjustment. In addition, through the learner modeling technology of big data, the learning tendency and learning advantages of individuals in the group can be described, which can produce suggestions on the division of roles in the group, and also enable learners to gradually understand their own development direction.

Therefore, combined with the technical characteristics of big data, the support of big data for online collaborative learning is mainly reflected in four aspects, namely monitoring, regulation, role allocation and learner development modeling.

## 3. Model Design

### 3.1. Function of Model

Combined with the characteristics of technology and the problems faced by online collaborative learning, the main users of the model are platform operators, teachers, team leaders and individual learners (see Table 1).

Tabel 1 users who use this model

users	actions
platform operator	Collect and analyze the data
instructor	Understand the learning process and adjust their teaching strategies
team leader	Adjust their collaborative process
learner	Adjust their own engagement

The model mainly includes user module, situation module, group module and resource module. The

group module is the focus of the model because it can produce a large amount of learner data, and it is also the module for teachers to monitor and adjust. The user module, scenario module, group module and resource module of the model are introduced in detail.

### 3.2. Online collaborative learning based on activity theory and Constructivism

Online collaborative learning based on activity theory is mainly composed of four links, which are to determine the theme of the activity, assign the role of the group, carry out collaborative construction and display the group works (see Figure 1). The activity idea of constructivism is mainly reflected in the assignment of the role of the group and the collaborative construction. Each group determines the learning theme by analyzing the activity task requirements given by teachers. When determining the task of group members, the group members assign the roles of leader, time planner, resource collector and knowledge recorder by analyzing the advantages and characteristics of each member. The group members work out the activity order in the process of knowledge generation, so as to carry out collaborative knowledge construction and group work. In the presentation session, we should reflect actively within the group and learn from other learning groups.

### 3.3. Construction of Model

Based on the functions of monitoring, regulation, role assignment and learner modeling, the online learning collaboration system supported by big data mainly includes four functional areas: the "create learning task" functional area for instructors, the "collaborative learning process" functional area for learning groups, the "learning test" functional area for learning practice, and the "learning evaluation" functional area for learning evaluation (see Figure 1).

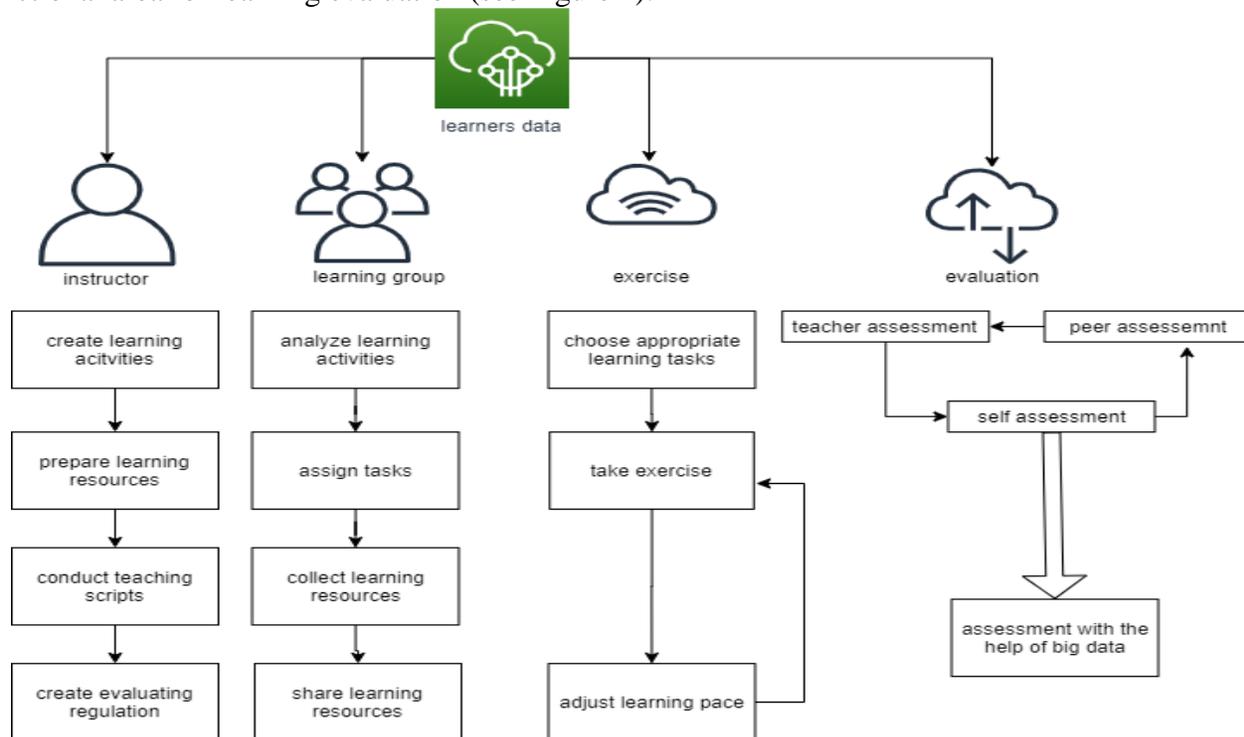


Figure 1 online collaborative learning supported by big data

#### (1) Create learning tasks

According to the students' data collected by the online collaborative learning system supported by big data, teachers comprehensively analyze the learning dynamics of each student, create teaching plans and prepare learning resources according to the teaching plans provided by the learning system, and provide personalized evaluation standards for each student.

## (2) Collaborative learning process

The learning system dynamically monitors the collaborative learning process of the learner group and provides role assignment suggestions to the learner group. At the same time, by tracking the way of resource search of learners, the appropriate learning resources can be adapted to the learners group. As for the "learning dissociation" individual of the group, teachers can monitor from the monitoring area of the learning system, so as to intervene in the learning group.

## (3) Learning exercise

According to the type of knowledge, the learning system chooses the appropriate learning evaluation method, and re tests the students according to their learning experience and performance.

## (4) Learning assessment

Learning assessment adopts the way of work evaluation and test paper evaluation. The evaluation of learning works of learning groups consists of teacher evaluation, group mutual evaluation and component mutual evaluation. The individual learning performance of learners is evaluated by the way of test paper.

## 4. Conclusion

With its powerful prediction and analysis function, educational big data technology not only provides teaching decision-making function for teachers, but also carefully depicts learners' learning portraits, so that students can understand their own advantages and disadvantages, and be familiar with their own learning preferences and interests. Only in this way can students learn to learn knowledge and skills at the same time, and educational big data technology can bring learners learn, the change of learning style and learning role provides an opportunity.

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