

Retraction

Retracted: Application of Large-Scale Cognitive Social Networks Based on Cooperative Transmission Mechanisms in Exploration of Flipped Classroom Teaching Strategy

Complexity

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] C. Zeng, "Application of Large-Scale Cognitive Social Networks Based on Cooperative Transmission Mechanisms in Exploration of Flipped Classroom Teaching Strategy," *Complexity*, vol. 2021, Article ID 8988165, 11 pages, 2021.

Research Article

Application of Large-Scale Cognitive Social Networks Based on Cooperative Transmission Mechanisms in Exploration of Flipped Classroom Teaching Strategy

Chen Zeng ^{1,2}

¹College of Teacher Education, Zhejiang Normal University, Jinhua 321004, Zhejiang Province, China

²Yancheng Teachers University, Yancheng 224002, Jiangsu Province, China

Correspondence should be addressed to Chen Zeng; zengc@yctu.edu.cn

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With the deepening of the research on flipped classroom teaching theory, the flipped classroom teaching model has gradually been applied to classroom teaching at all levels and types of schools, and some beneficial results and experiences have been obtained. Due to the relatively low self-learning ability and motivation level of students, in the implementation of flipped classrooms, the quality of preclass self-study links is difficult to guarantee, resulting in unsatisfactory results of flipped classroom teaching in secondary vocational schools. This article aims to solve the current dilemma faced by the optimization of the flipped classroom teaching mode of programming courses by studying the course platform based on the flipped classroom teaching model. The source-destination node distribution is constructed with a model based on node affinity to restore the actual network node distribution architecture. The change in the distribution of source-destination nodes has led to different degrees of aggregation in the overall data flow of the network. After that, the capacity and delay performance of the primary network and the secondary network will change as the degree of data flow aggregation changes. By laying base stations in the main network, we reanalyzed the network. Through the comprehensive analysis of students' learning status through the scores of students in class and the test situation after class, we modify the specific teaching plan of flipped classroom. Experiments have proved that the in-class flipping model we proposed effectively avoids the inherent shortcomings of students who are not strong in autonomous learning before class, solves the problem that secondary vocational students cannot do well in autonomous learning before class, and improves students to a certain extent. The results show that the flipped classroom teaching model in class can provide more powerful value for vocational teaching to achieve this goal.

1. Introduction

In recent years, with the support of information technology, Khan Academy, large-scale open online courses, Technology Entertainment Design (TED), and flipped classroom teaching videos have become popular all over the world, and technology and courses have gradually moved towards a development trend of in-depth integration [1]. The Office of Educational Technology of the U.S. Department of Education officially promulgated the National Educational Technology Plan titled “Transforming American Education: Technology Promotes Learning” and proposed the use of technology to promote twenty-first century learning. This shows that

information technology is becoming the main driving force for fundamental changes in the forms of teaching and learning [2]. In the “Horizon Report” of the American New Media Alliance, “flipped classroom” is listed as the first of the six technologies in the three stages, becoming the most realistic main technology application trend. Nowadays, many colleges and universities have accepted this approach, allowing students to spend their valuable classroom time [3, 4]. In the practical activities, they fully demonstrated their status as the subject of learning in the real world. Once this understanding affects Chinese universities, it will forcefully push back the practice of flipped classroom teaching in primary and secondary schools [5].

The education industry has been exploring the changes and updates of education models. The original model is basically a solidified model, nothing more than the teacher's full preparation before class, designing all aspects of classroom teaching, forming teachings, having classroom goals and teaching links, and strictly following the preparedness in the classroom. The content is taught to students. In this class, students are the teachers' loyal audience, which is why there is a theory of duck-filling teaching [6]. The content taught by the teacher limits the depth and breadth of student learning to the greatest extent. The teacher does not allow students to cross the boundaries of book learning. Many contents are out of date and out of touch with the times, but as long as it is required by the syllabus, the teacher still wants to instill these things without knowing it. As a domestic classroom teaching model, it can no longer be quiet. It must be used for reference, critical absorption, and more advanced education. The teaching mode injects fresh vitality into our local education and teaching, which is a meaningful and valuable exploration [7].

The application of flipped classroom teaching models is gradually localized, and most of them are changed on the basis of flipped classroom teaching models, making flipped classrooms more suitable for local classrooms. The problem of this thesis is mainly based on literature analysis and surrounding school research. The students' autonomous learning ability and motivation level are relatively low. During the implementation of the flipped classroom, the quality of the preclass self-study link cannot be guaranteed, resulting in the ineffective teaching effect of the flipped classroom. We have designed an "in-class flip" mode according to the characteristics of students, courses, and teaching modes, making full use of teaching resources such as microclass videos to achieve the established teaching goals. We use the "flipped in-class" teaching model to optimize the traditional flipped classroom and improve the learning effect of the flipped classroom as the research goal. We use systematic problem-solving methods to design the teaching content and teaching process and construct an in-class flipped classroom teaching model that enables students to complete each subtask step by step during the learning process to complete the total teaching task.

This article analyzes the current status of online education development and existing problems, points out the shortcomings of the MOOC teaching model, and makes a more in-depth analysis and demonstration of the flipped classroom teaching model. This paper introduces the distribution of source nodes and destination nodes (source-destination nodes) based on the social attributes of nodes into the cognitive wireless network for the first time and theoretically analyzes the influence of the social attributes of nodes on the capacity and delay of general cognitive networks. Aiming at the general cognitive network, this paper introduces the cooperative transmission mechanism of primary users and secondary users and studies the influence of source-destination node distribution and cooperative transmission mechanism on network performance based on the social attributes of nodes. This paper also found that this new type of source-destination node distribution can

effectively reduce the operating cost of the network. This article introduces the design of the teaching content of the in-class flipped classroom. In the implementation process, the in-class flipped classroom is developed smoother than the traditional flipped classroom. In the flipped classroom teaching mode, the classroom atmosphere is very active, and the teacher's classroom introduction has played a role. It is very important for students to know the general content of this lesson, as well as the main function and main content of the task list, so that students can quickly enter the stage of independent learning. In the self-study stage, the problems encountered by students can be solved in time, and the teacher can summarize the main aspects of the problems encountered by the students in the learning process, and then they can focus on solving them. Under the traditional flipped classroom teaching model, the completion rate of students' autonomous learning before class is not high, which seriously affects the teaching progress. Teachers must reorganize learning in the classroom.

2. Related Work

Several teachers at the University of Miami started such an attempt in the interpretation of macroeconomics [8]. Of course, this is a subversive attempt. The content tried is what the teacher used to teach in the classroom. If the teacher does not teach it anymore, what should I do? It is easy to do. Let the students solve this content by themselves outside of the classroom; what problems do they solve in the classroom? The whole is upside down, but a simple adjustment of the learning sequence has brought different gains. The biggest advantage of this is that the students' desire to learn is stimulated. Their teaching model has already had the embryonic form of a "flipped" classroom [9]. At the 11th International University Teaching and Learning Symposium held in Jacksonville, Florida, USA, a conference paper submitted by Wesley Baker aroused everyone's interest. The "classroom flipping movement" mentioned in this paper has been cited by everyone. Wesley Baker's "flipped" classroom has become a mature new model of education and teaching: the teacher is no longer the role of a phonograph, he can contribute more actively to students, that is, to broaden students' horizons and perspectives through network tools. The field of vision gives students a broader space and prevents their thoughts from being trapped in a small circle [10].

The delivery and acceptance teaching model is based on Herbart's famous four-stage teaching method, emphasizing that teaching should promote students' mastery of systematic knowledge and prepare students for their future lives [11]. The advantages of the transfer-receive teaching model are specifically expressed as follows: teachers teach efficiently in class. Knowledge helps students gain a lot of knowledge in a limited classroom, which helps students improve their abstract thinking ability [12]. However, it is difficult for students to truly understand the received information. Cultivating a singular and modular personality is not conducive to the development of innovative and analytical students, and it is not conducive to the cultivation of

students' innovative thinking and practical problem-solving abilities. In order to help his cousin solve math problems, Salman Khan recorded the content of the tutorial and uploaded it to the YouTube website. Because the video is short and concise, you can pause at any time, fast forward, or repeat playback according to your own learning steps [13]. Therefore, these video resources for assisting learning will soon be enthusiastically sought after by learners on the Internet. Since then, Khan has successively recorded many learning videos of different subjects, uploaded and shared on the Internet, and opened the Khan Academy channel.

The problem-inquiry teaching mode is a teaching mode with Piaget's cognitive development theory, Bruner's discovery learning theory, and constructivist and humanistic learning theories as the guiding ideology [14–16]. This teaching mode is dedicated to improving students' scientific thinking ability in self-exploring problems. This teaching mode is dedicated to cultivating students' thinking ability and problem-inquiring ability. Students have been trained to a great extent through group study and discussion, communication, and cooperation abilities; students' democratic spirit and sense of collaboration have been strengthened. Solving ability has been correspondingly exercised. However, the disadvantage of this model is that the scope of use is limited to small class teaching, so the economic and time cost of teaching will be higher. In the problem-inquiry teaching model, teachers must pay attention to appropriate encouragement and support for students' novel viewpoints and do not judge the right or wrong of students' viewpoints at will and create a harmonious and equal teaching atmosphere based on guidance [17, 18]. This will encourage more students to actively participate in class discussions and be more willing to express their opinions.

The flipped classroom teaching model set by related scholars can be divided into two parts: preclass learning and classroom learning [19]. There are a wide range of video sources. They can be recorded by the lecturer themselves, or they can use high-quality educational video resources publicly available on the Internet. At present, the highly recognized resources in China mainly include China's national quality courses, university open courses, etc., and teaching can also be carried out through high-quality resource platforms created by universities such as Xuetang Online and Rain Classroom. If the teacher's foreign language proficiency is higher, he can choose online course resources in a wider range, such as open classes at edX, Khan Academy, Harvard Yale, and other prestigious schools. After the students have watched the video, they can record their thoughts during the learning process through online channels and leave messages online for doubtful places in the course [20–24]. The in-class stage mainly includes five parts: problem determination, independent exploration, collaborative learning, communication of results, and feedback and evaluation. At this stage, teachers mainly answer questions for students based on their learning situation before class. In addition, they will organize students to cooperate and exchange results to help students set up specific situations and give full play to their initiative [25–28].

3. Flipped Classroom Model Based on Online Teaching Platform Learning

3.1. Information Technology Methods and Analysis Used by the Flipped Classroom Teaching Model. At the beginning of the flipped classroom teaching model, the technical means used was screen recording of teaching videos and then uploaded to the network or directly distributed to students. This is also the common technical means used by flipped classrooms at present. In fact, the flipped classroom is open to the technical means it uses. In theory, any technical means that can carry teaching materials, realize knowledge transfer, and facilitate students' independent learning can be used as a technical means for flipped classrooms. The main technical means used to implement the flipped classroom are mainly used in two aspects: the generation technology of teaching materials and the release technology of teaching materials.

MOOC is not a traditional distance education; it provides a complete learner-centered teaching model. In the course of teaching, there are clear course goals, teaching activities, teaching feedback, evaluation, assessment and certification, and other teaching links, which is a closed loop of teaching activities. The schematic diagram of the main teaching activities of MOOC teaching mode is shown in Figure 1.

3.2. Flipped Classroom Model Based on Online Courses. Through a unified flipped classroom platform, it is conducive to the unified deployment of curriculum construction tasks for teaching units and the implementation of training for teachers, which is convenient for large-scale construction. At the same time, the course platform based on flipped classrooms does not aim to be large and comprehensive. The most cost-saving technical solutions can be adopted, and the most convenient recording technology can be used to improve the efficiency of course construction, greatly reduce construction costs, and establish large-scale promotion advantages. Unlike uploading videos to public video websites, teaching materials are based on a dedicated course platform, which can carry rich course information, can realize various ways of communication and interaction, and can flexibly adjust according to the progress of the course, and can control the uploading of learning materials. With modification and cancellation, students can learn 7*24 hours a day. Through the dedicated course platform and in-class quizzes, teachers can promptly understand the learning situation of students and adjust the course content according to the students' mastery, focus on common problems, and targeted counseling on personality problems. The flipped classroom teaching model based on the open online course program is shown in Figure 2.

4. Optimization Model of Teaching Mode Based on Social Cognitive Network

4.1. Network Layout Model. We stipulate that the network is a square per unit area, and the primary user nodes and secondary user nodes are distributed in the network at the

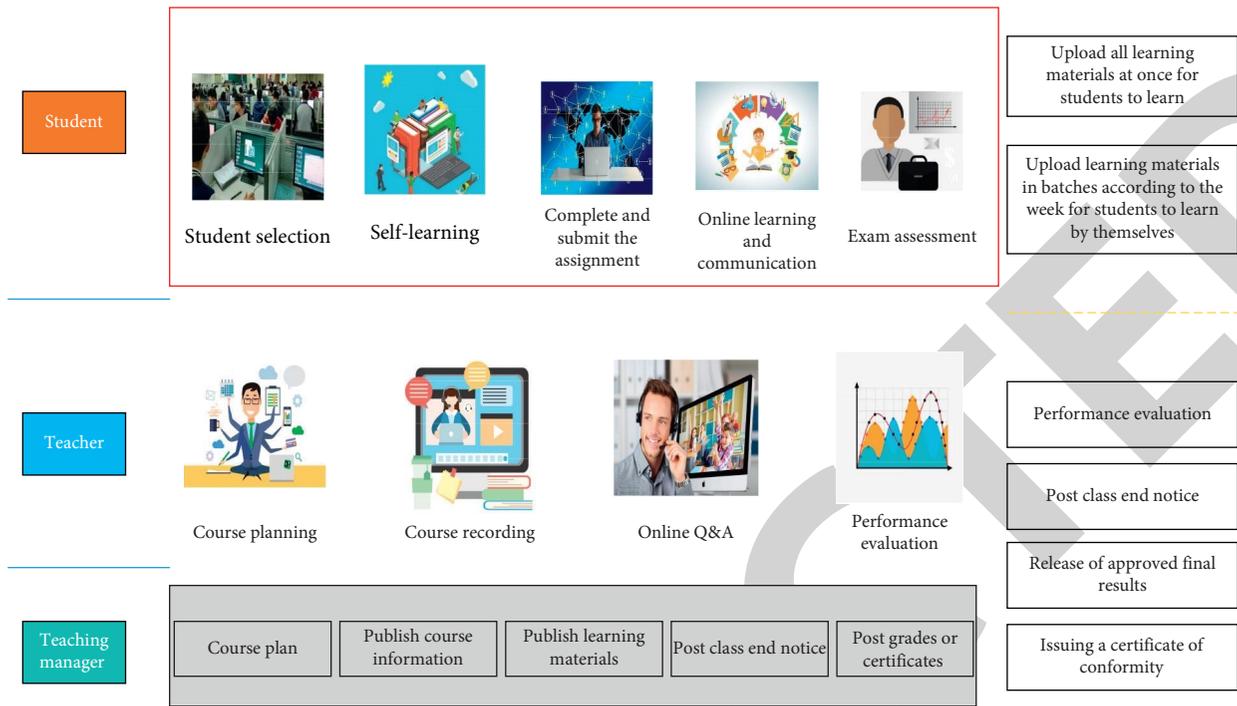


FIGURE 1: Schematic diagram of the main teaching activities of MOOC teaching mode.

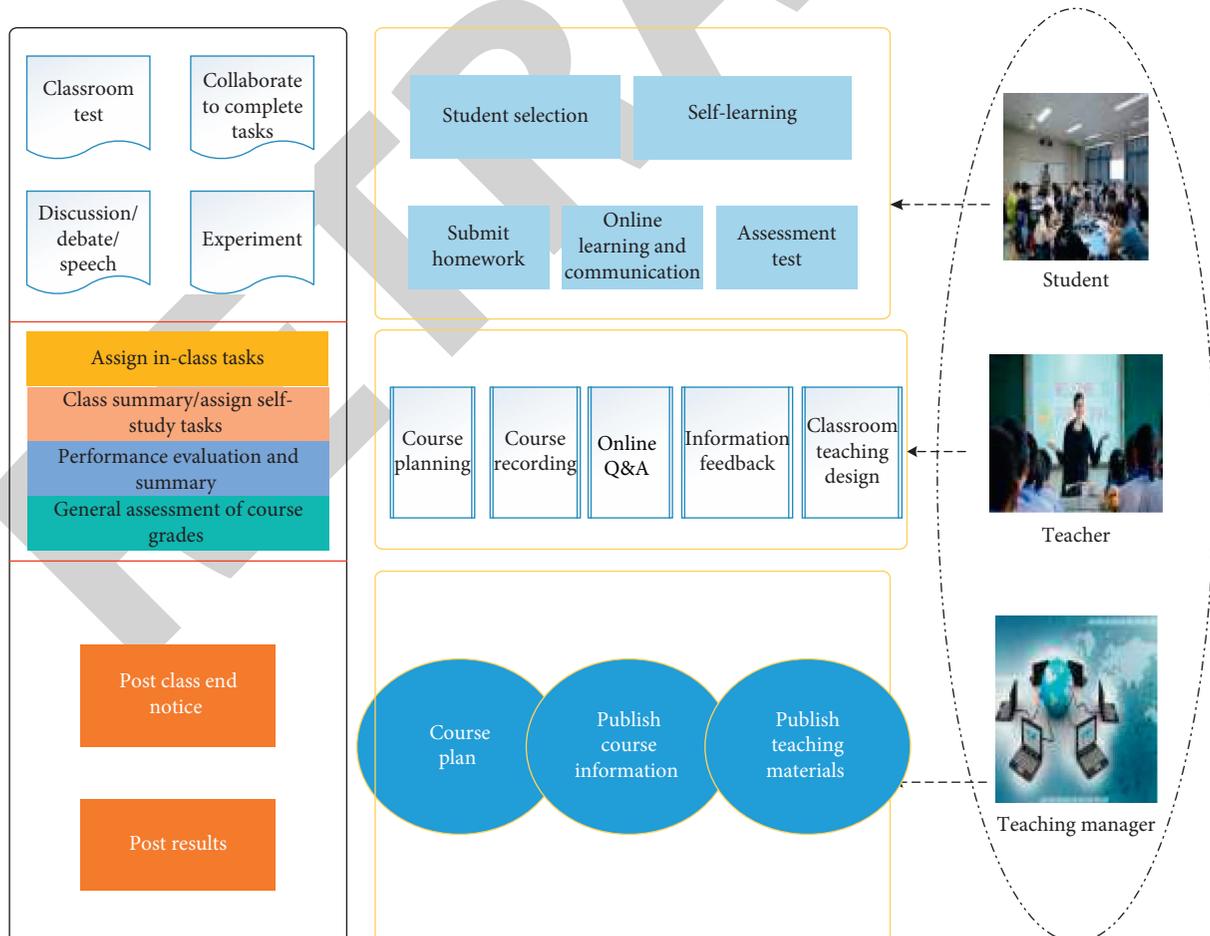


FIGURE 2: Flipped classroom model based on open online courses.

same time. In this case, both the primary user node and the secondary user node are static nodes. At the same time, the primary user nodes and secondary user nodes are randomly distributed in the network and both obey the Poisson point process, and the distribution densities are n and m , respectively.

The static primary user nodes are randomly distributed in the network with a density of n according to the Poisson point process; on the other hand, the mobile secondary user nodes follow an improved uniformity.

All primary user nodes or secondary user nodes are divided into source-destination node pairs on a one-to-one basis, and any source node matches its destination node according to a model based on the degree of affinity.

In this article, we remodel the relationship between nodes in the cognitive network from a new perspective of geographic location information so that the distribution between source and destination nodes can truly restore the inherent social attributes. Whether it is our daily life experience or the large amount of user data provided by some online social network platforms, it tells us the fact that the establishment of friendship and the types of mutual communication in real life are strongly related to the geographic location information. Therefore, we use the following model based on the degree of closeness to establish the relationship between the friend relationship and the node position. We consider two nodes i and j in a single network and define the affinity of j relative to i as

$$\text{Rank}_i(j) = \left[k_{i-1}: |X_i - X_j| \geq |X_i - X_k| \right]. \quad (1)$$

We establish the probability that j is a friend of i as

$$\Pr(i: j) \longrightarrow [\text{Rank}_i^\alpha(j)]^{-1}. \quad (2)$$

Substitute the weighted normalization factor:

$$G_1 = \prod_{j=0}^n j^{-\alpha}. \quad (3)$$

It can be inferred that the probability distribution is

$$\Pr(i: j) = \frac{1 - G_1}{1 + G_1} \cdot [\text{Rank}_i^\alpha(j)]^{-1}. \quad (4)$$

4.2. Transmission Model. We assume that the network is a square per unit area, and primary users and secondary users are uniformly distributed in this square at the same time. The main user nodes are Poisson distribution in the network, and the node distribution density is n . All main user nodes together form a main network. In addition, we divide all primary user nodes into an even number of one-to-one source-destination node pairs, and each source node corresponds to a destination node. Similar to the structure of the main network, the nodes in the secondary network also obey the Poisson distribution, and the node distribution density is m . According to the same method, all the secondary user nodes are divided into an even number of one-to-one corresponding source-destination node pairs. The

data packet transmission process of the primary user based on the static cooperative secondary user is shown in Figure 3.

We stipulate that the node distribution of primary and secondary users is the same as that of primary and secondary users in the self-organizing network. The difference is that we have laid out l base stations in the main network. Interference is an important factor that must be considered in wireless transmission. In this article, in order to simplify the model and facilitate the analysis of network performance, we only consider the path loss of the signal during transmission.

We use the famous Shannon formula to express the transmission rate of the node and design the corresponding transmission strategy to achieve this rate. Below we describe the transmission rate of the primary user node and the secondary user node in detail. Assuming that there are N_s receiving and sending nodes for the primary user and N_s receiving and sending nodes for the secondary user in the network, they are transmitting data at the same time, then the transmission rate between the i -th pair of primary user receiving and sending nodes is defined as

$$R_p^i = \ln \left[\frac{I_p^i + I_{sp}^{i-1} - P_p^i g}{I_p^i + I_{sp}^{i-1} + N_0} (X_{p,tx}^i - X_{p,rx}^i) \right]. \quad (5)$$

At the same way, the transmission rate between the receiving and sending nodes of the j th pair of users can be defined as

$$R_s^j = \ln \left[\frac{I_s^j - I_{ps}^j - g \cdot P_s^j}{I_s^j - I_{ps}^j + N_0} (X_{s,tx}^{j-1} - X_{s,rx}^{j-1}) \right], \quad (6)$$

where P_s^j is the transmission power between the receiving and sending nodes of the j th pair of users; I_s^j is the j th user receiving and sending node, the receiving node receives interference from the other secondary transmitting nodes; I_{ps}^j is the j th secondary user receiving and sending node, the receiving node is subject to interference from the other primary transmitting nodes; N_0 is the white noise power.

We use the affinity model to describe the social relationship between nodes in the network. The intimacy model can better capture the characteristics of people's social communication habits in real life and is more ubiquitous and more comprehensive than some other social models. According to the affinity model, the probability of a source node becoming a friend with any node is inversely proportional to the α power of the number of nodes around the source node.

For convenience, we consider a single square network with n nodes randomly distributed in the network. Two nodes i and j are randomly selected, and the degree of affinity of j relative to i is defined as

$$\text{Rank}_i(j) = \left[k: (X_i - X_j) \geq (X_i - X_k) \right], \quad (7)$$

where X_i and X_j represent the positions of nodes i and j in the network. Our probability model for establishing a friend relationship between i and j is

$$\Pr(i: j) \longrightarrow [\text{Rank}_i^\alpha(j)]^{-1}, \quad (8)$$

where α represents the power rate exponent.

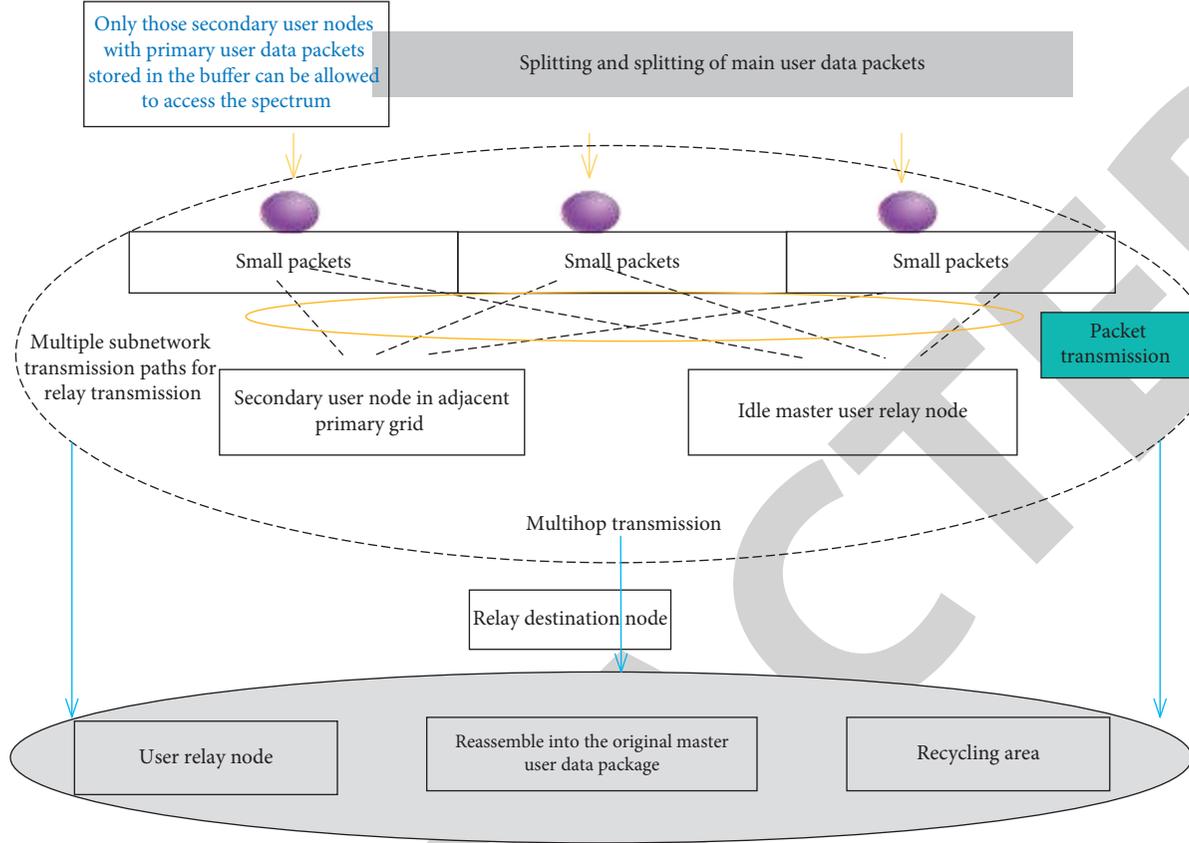


FIGURE 3: Primary user data packet transmission process based on static cooperative secondary users.

4.3. *Network Traffic Aggregation Analysis.* We still use a model based on affinity to determine the destination node corresponding to each primary user or secondary user node, which makes the distribution of source-destination nodes present a “small world” characteristic. This characteristic determines that our work is very different from the traditional network. The average distance between any source-destination nodes in the network is as follows:

$$E(X_i - Y_j) = \begin{cases} 1, & \alpha \in [0, 1), \\ (\ln n)^{-1}, & \alpha = 1, \\ n^{\alpha-1}, & \alpha \in (1, 1.5), \\ \frac{1}{2} \ln n, & \alpha = 1.5, \\ n^{-1/2}, & \alpha \in (1.5, \infty), \end{cases} \quad (9)$$

where α is a parameter that characterizes the degree of aggregation of network data streams. It can be seen from the above formula that, as the value of α increases, each source node tends to choose a node closer to itself as the destination node, which leads to the aggregation of the overall data flow in the network. The larger the value of α , the shorter the

average distance between the source and the destination node, and the greater the degree of aggregation of network data streams.

5. The Application Experiment of the Flipped Classroom Teaching Model in the Classroom of Programming Courses

5.1. *Experimental Design and Implementation.* Although the experiment is carried out under natural and real conditions, there will be interference from accidental factors. To ensure the reliability and validity of the experimental results, the existence of irrelevant variables shall be fully considered when the experiment is designed. When conditions permit next, we try to keep the influence of irrelevant variables on the experimental results as low as possible.

The subjects of the experiment are the second and third classes of a certain major. The experimental group is composed of 50 students from Class 3, and the control group is composed of 50 students from Class 2. Through the pretest, it is concluded that the information literacy, independent learning level, and average grades of the first two classes of the experiment are equivalent, which can be regarded as basically the same. The classroom used in the experiment is a multimedia network classroom, the teaching mode of the experimental class is in-class flipping, and the teaching mode of the control class is the flipped classroom teaching mode of “preclass-in-class,” two classes are taught

by the same classroom. The number of teaching hours and teaching content are basically the same.

In the in-class flipped classroom teaching model, the student's self-learning phase is completed in the classroom. Although the time and space of this phase are limited, students can complete the viewing of the teaching video through the teacher's platform. You can communicate and discuss with your peers in time. If you encounter problems that are difficult for everyone to solve, you can ask the teacher for help in time; from another perspective, the development of in-class flipped classroom teaching, teachers do not need to be like the "before class-in-class" flip mode. It is necessary to provide tutoring to students before class. Teachers only need to prepare high-quality teaching video resources before class. More importantly, teachers only need to provide necessary assistance or ask video-related questions when students watch videos in class. It is for students to discuss so that students' thinking is fully active, and students solve problems through peer communication and group cooperation to complete knowledge internalization.

This research experimental class uses the in-class flipped classroom teaching model to teach classes, and the self-study time is placed in the class. The microclass resources used are teaching resources organized by SAPs theory, and the video is segmented. According to investigations, students in the control class have computers at home and can access the Internet.

5.2. Analysis of Teaching Effect

5.2.1. Data Collection. According to the needs of the experiment, this article designs a work evaluation scale based on the experimental teaching content and through discussions with the teacher. There are two scales, namely, the group evaluation scale and the work evaluation scale. During class, students conduct mutual evaluations based on the contributions and performance of their own group members and get each student's group interaction score and conduct self-evaluation based on the quality of their own works; teachers give scores to the submitted works and get expert scores. Based on the data obtained from the above steps, we use IBM SPSS Statistics 20 to analyze the collected data and analyze the impact of the in-class flipped classroom teaching mode on classroom teaching from different aspects.

5.2.2. Longitudinal Analysis of Experimental Class Teaching Effect. From a longitudinal analysis, the researcher took the experimental class as a separate research entity during the teaching process during this period of time and conducted an independent sample T test to analyze whether the experimental class's academic performance before and after the implementation of the teaching model was significant difference. Figure 4 is a statistical analysis of the pretest scores and posttest scores of the experimental class.

According to the analysis of the data, the results of the experimental class have been greatly improved after nearly two months of practice. This shows that the use of in-class

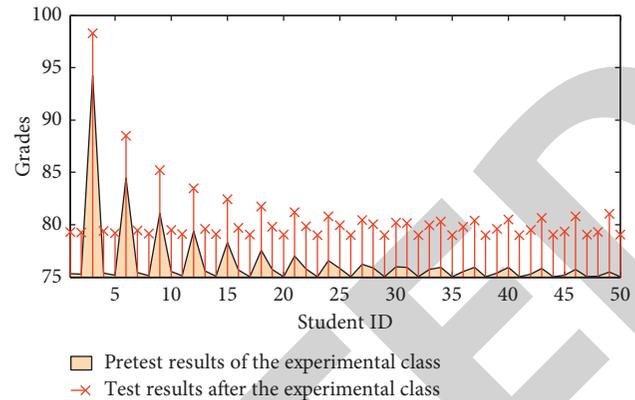


FIGURE 4: Test of the difference of test scores before and after the experimental class.

flipped classroom teaching mode in programming courses in classroom teaching can improve grades, and the effect is obvious.

5.3. Comparative Analysis of Teaching Effect between Experimental Class and Control Class. Before the experiment, we test the basic cognition level of the two independent samples of the experimental class and the control class and get the difference between their averages and perform an independent sample T test on them to analyze whether the difference in their scores is significant. In the course of the experiment, each class will have a work. After each class, the researcher will score the work according to the evaluation scale of each work. A total of four classes of work scores were selected for analysis. The work scores of the two classes were tested here to test the changes in students' learning ability and learning level, and the independent sample T test was used to analyze the learning status and learning status of the students in the two classes.

The pretest score statistics of the control class and the experimental class are shown in Figure 5. The score of the control class is higher than that of the experimental class. Figure 6 shows the statistics of the test results of the two classes. The results of the experimental class and the control class are significantly different after passing the practice. After nearly two months of in-class flipped classroom teaching mode practice, there is a significant difference in academic performance between the experimental class and the control class. Judging from the results, it shows that this teaching mode can improve students' academic performance, and in the teaching process, the problem of self-learning before the flipped classroom is solved.

5.4. Analysis of Learners' Attitudes towards the Two Teaching Modes

5.4.1. Learners' Acceptance of the Two Teaching Modes. The acceptance analysis results of the two teaching modes are shown in Figure 7. 82.81% of learners are interested in the in-class flipped classroom teaching mode, indicating that most of the secondary vocational students use the in-class

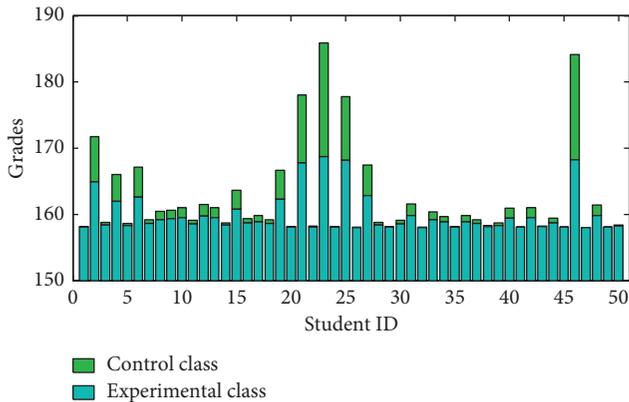


FIGURE 5: Test for the difference of the pretest results between the experimental class and the control class.

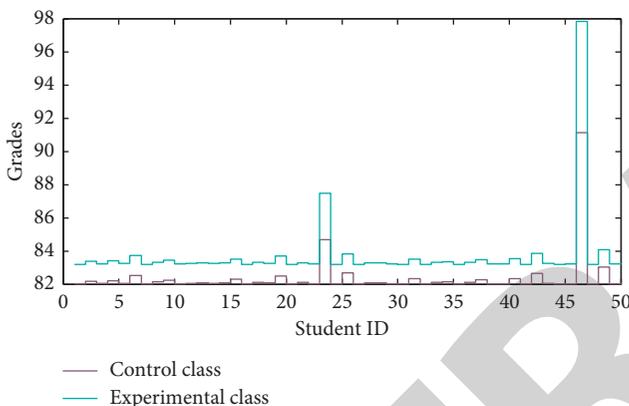


FIGURE 6: Test results of differences in test results of the experimental class and control class.

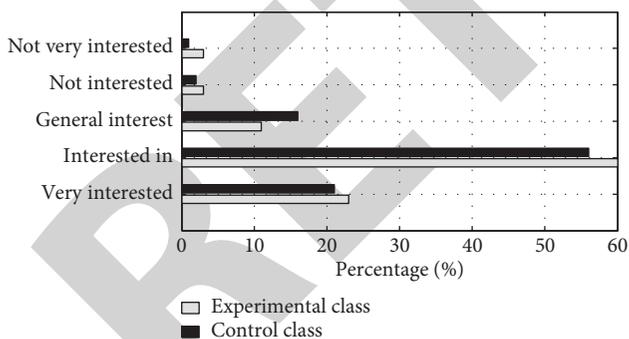


FIGURE 7: Learners' interest in the teaching model.

flipped classroom in programming courses. The teaching mode is very interesting. 11.51% of the learners think it is average, and only 5.73% of the learners are not interested in this teaching mode. Through interviews with teachers and other learners, we learned that teachers will patrol the class during class. For some students, for this kind of teaching mode, there is some pressure. In contrast, 21.01% of the students in the control class felt very interested in the “before-in-class” flip mode, 57.82% were interested, and 15.73% of the students found it fair. In comparison, the

students were very interested in the two teaching modes. The acceptance level is about the same. Therefore, when the teacher implements the in-class flipped classroom, he must take into account the feelings of the learners and reduce the pressure of the learners in the learning process. Interviewing the learning of the control class, because in the “before class” flipped classroom teaching model, the teacher’s participation is not as high as that of the in-class flipping, and students feel more free.

5.4.2. Adaptability of Autonomous Learning in the Two Modes. The survey results of students’ adaptability to autonomous learning under the two teaching modes are shown in Figure 8, 57.38% of learners believe that the in-class autonomous learning under the in-class flip mode is helpful for knowledge mastery and can adapt. 44.93% of the learners think that the “before class-during class” flip mode is helpful, and nearly 40% of the learners think that this mode is not very helpful for autonomous learning. Self-directed learning is placed in class when you encounter problems in class, you can ask your classmates or teachers at any time, which is very helpful to learning knowledge. No matter what kind of teaching method, teachers will pay attention to communication and discussion. In-class communication and discussion avoid the limitation of space and time after class, which leads to poor learning effect. Problems in self-learning in class can be solved in time to facilitate learners to proceed to the next stage of learning more smoothly.

5.4.3. The Degree of Communication of Learners’ Collaborative Learning in the Two Teaching Modes. The results of the analysis of the communication level of learners’ collaborative learning under the two teaching modes are shown in Figure 9. Under the in-class flip mode, 85% of the learners believe that it is easy to communicate and discuss in-class in the flipped classroom teaching mode. 3% of learners feel that communication in this environment is problematic. This shows that the in-class flipped mode of collaborative communication is acceptable to learners, and they find it easy to communicate. In the “before-in-class” flip mode, 39.28% of students think that communication is average, and 37.03% of students think that communication is difficult. In-class communication can promptly feedback problems to teachers, solve problems in a more timely and efficient manner, and promote the internalization of learners’ knowledge. If self-study is placed before class, learners need text or voice communication, which is very inconvenient and cannot be shown to their peers at any time.

5.4.4. Learners’ Views on Learning Resources under the Two Teaching Modes. Figure 10 shows the analysis results of learners’ perceptions of learning resources in the two teaching modes. Teachers provide learners with a wealth of learning resources during the in-class flipped classroom teaching process. Learners select the learning resources they

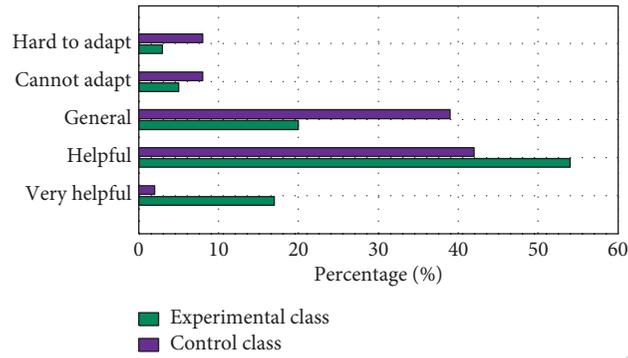


FIGURE 8: The learner's degree of adaptability to the teaching model.

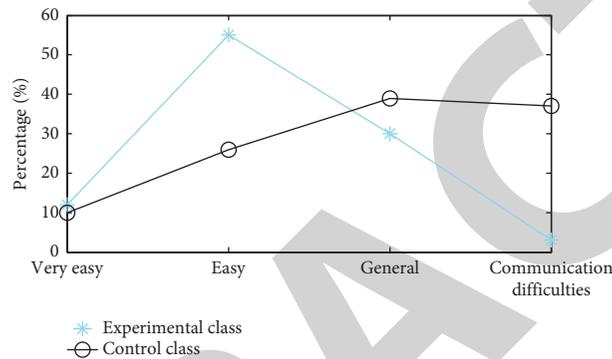


FIGURE 9: The degree of learner communication.

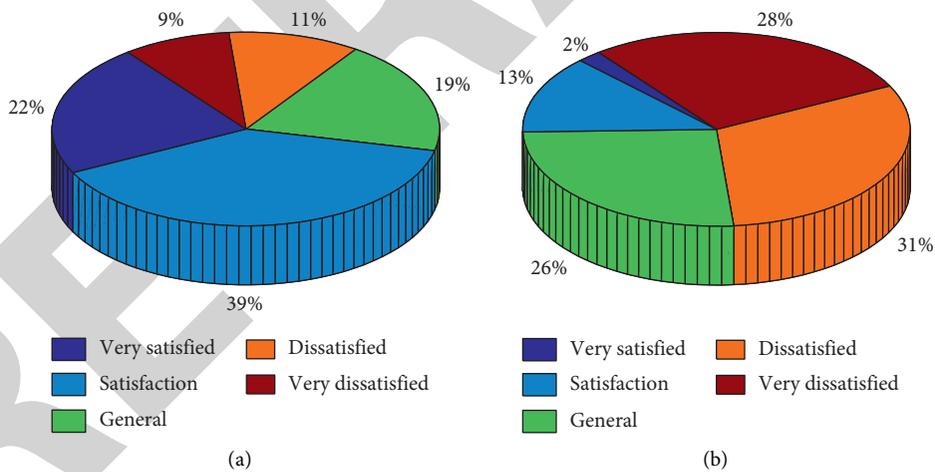


FIGURE 10: Learners' satisfaction with learning resources. (a) Experimental class. (b) Control class.

need according to their own needs so that learners with different needs can quickly find the learning resources they want. The teaching resources in this mode have not been decomposed, sorted, and reorganized, and the teaching video time is a little longer, which is not conducive to the extraction of knowledge points for students, and it is difficult to find what they need during the review process.

5.4.5. *The Degree of Help of the Two Teaching Modes to the Learning Effect.* The analysis results of the degree of help of the two teaching modes to the learning effect are shown in Figure 11. Most learners believe that in-class flipping has a significant effect on improving the end, and a small number of learners believe that the effect is not very obvious. In the “before class-during class” flip mode, 71.04% of students

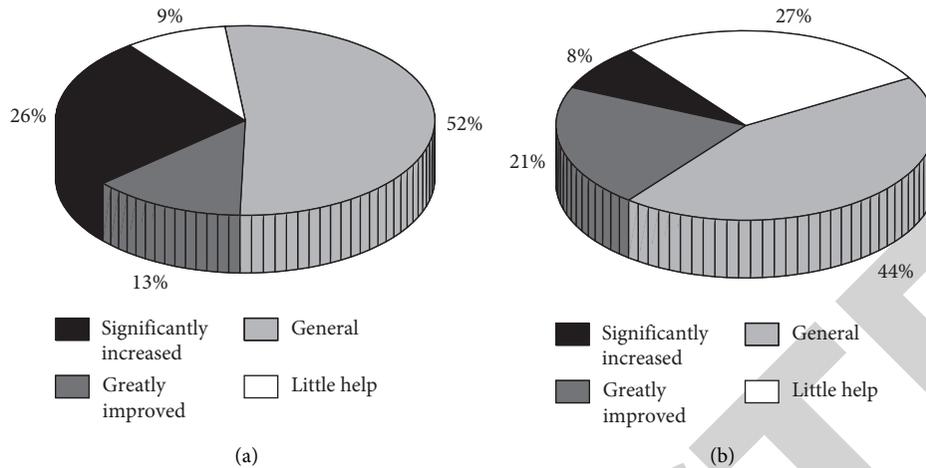


FIGURE 11: How helpful the teaching mode is to the learning effect? (a) Experimental class. (b) Control class.

think that it is generally helpful or not helpful for improving program design skills.

6. Conclusion

The superiority of the flipped classroom teaching model based on the online teaching platform requires the close integration of the online teaching platform and traditional classrooms to exert excellent results. Therefore, the development of an open online teaching platform based on the flipped classroom teaching model has greater practical significance. An open, low-cost, and universal online teaching platform is of great significance to the popularization of the flipped classroom teaching model. In this paper, we study the capacity and delay performance in large-scale cognitive social networks based on cooperative transmission mechanisms. We still use a model based on the degree of affinity to describe the source-destination node distribution so that the distance between the source-destination node changes with the value of α . Based on the assumption that secondary user nodes can provide relay transmission services to primary user nodes, we propose corresponding transmission protocols for two different models of static and dynamic secondary networks. Specifically, we proved that no matter how the value of α changes, the primary network can always achieve the progressively optimal single-node throughput performance per unit time under the cooperation of the secondary user nodes. It is worth mentioning that while providing relay transmission services for the main network and improving the transmission performance of the primary user, the transmission performance of the secondary user itself will not be compromised in the order of magnitude. This paper studies and designs the in-class flipped teaching model, uses systematic problem-solving methods to design the teaching content and teaching process, and builds an in-class flipped classroom that enables students to complete each subtask step by step during the learning process to complete the total teaching task. The in-class flipped teaching mode is applied to the classroom teaching practice of programming

courses, through a certain scale of comparative practical teaching, the teaching effect data are analyzed, and the function and effect of the in-class flipped teaching mode are verified. The experimental analysis results show that this mode is more effective than the “before class-in-class” teaching mode in improving the teaching effect of secondary vocational students.

The survey feedback after the system went online gave the conclusion of the implementation effect of the system: on the one hand, the system has achieved most of the expected functions. Teachers and students gave high evaluations on the functions and ease of use of the online teaching platform. The open teaching platform of the flipped classroom teaching model allows teachers to implement the reform of the flipped classroom teaching model more conveniently; on the other hand, teachers are not satisfied with the online test function, students are not satisfied with the online test, and negative opinions were also raised. In view of the abovementioned shortcomings, the following two tasks will be carried out in this subject: first, we will overthrow the design plan of online test function, examine the function and design of similar mature products, and redesign or integrate third-party online test modules to better meet the teaching requirements; second, we will provide teachers with in-depth training in preparation for recording of flipped classroom teaching materials, formulate video recording standards, and improve the quality of teaching videos on the online teaching platform.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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