The construction of a flipped classroom teaching mode of College English based on Rainclass and its effectiveness analysis

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Abstract. This study constructs a flipped classroom teaching mode for College English based on the teaching platform of Rainclass, and conducts a semester long practice of flipped classroom teaching in an advanced English class in GUET, aiming to explore the impact of flipped classroom teaching mode on the improvement of English level of higher-level learners. It is found that under the flipped classroom teaching mode, the overall improvement of students’ English level is significantly higher than that of learners with the same level under the traditional teaching mode. In terms of individual language skills, the flipped classroom teaching mode is more effective in improving students’ writing, translating and reading skills, while less obvious in the improvement of their listening skills.

1. Introduction
In 2012, the Education Department of China issued the Ten-year Development Plan of Educational Informatization (2011-2020), which proposes to promote education by modernizing educational informatization. This proposition is of great significance to promote the deep integration of information technology and education and teaching, and realize the all-round innovation of educational ideas, concepts, methods and means [1]. The Teaching Requirements for College English Curriculum also requires building an educational information system covering schools at all levels in urban and rural areas, and promote the popularization and sharing of high-quality educational resources. To a certain extent, the teaching and learning of English can develop towards the direction of individualization and autonomous learning without any limitations of time and space [2]. Therefore, under the background of information age, the static and dogmatic traditional College English teaching mode has lagged far behind the individual demand of different levels of students, so the teaching reform is imperative. Thus the flipped classroom teaching mode is introduced along with the widespread of online learning.

In a Flipped classroom teaching mode, the key points of student’s learning material and difficulties of the teaching content is inverted before the class in the form of micro video lectures with the aid of the information technology. Before class, students can watch teaching videos with the help of technical tools, learn new courses independently, complete online exercises and assess the knowledge learned. In the class, teachers and students cooperate in the tasks of searching for answers, exploring
knowledge, communicating for ideas and discussion for consensus, so as to internalize and transfer knowledge learned [3].

In the past ten years, with the rise of foreign language online learning and testing platforms such as MOOC, ITest, and FIF, researchers have begun to study and practice the flipped classroom teaching composed of language teaching and digital teaching resource, fully utilizing advantages of online teaching, flipped classroom, and digital classroom. Especially in College English teaching, which requires abundant of language skill practising and knowledge internalizing, the new teaching mode sheds new light on solving the problem of language teaching. The front-line teachers of College English education have also begun to study the flipped classroom teaching mode of College English based on micro class, MOOC, SPOC and various preamble learning apps [4-7], which provides insight into how to integrate the teaching mode of digital teaching platforms into College English teaching. Their studies and practice meet college students’ learning needs and greatly improve their English learning ability.

Rainclass is an online teaching software launched by Tsinghua University. The software connects online learning platform and classroom multimedia teaching. All students of all majors can learn online and interact with teachers online in the classroom. At present, Rainclass has been popularized in hundreds of colleges and universities in China, but there are few researches on the effectiveness of Rainclass-based teaching on CNKI. Then, this paper intends to study the effectiveness of Rainclass in College English flipped classroom.

2. Theoretical base and modal construction

2.1. Gagne’s nine events of instruction
According to Gagne’s information processing mode theory, learning process is the process of receiving and using information, and learning is the result of interaction between the subject and environment that restrict human learning process. Effective teaching requires teachers to create appropriate external conditions according to students’ internal learning conditions, and maximize the Involvement Load, so as to promote students’ effective learning.

Based on the understanding that learning is the internal process of students under the guidance of external teaching, Gagne thinks that teaching is an external event, which can influence the internal process of learning through teaching design. Therefore, Gagne designs a model for instruction based on his learning theory, which includes gaining attention, informing learners of the objective, stimulating recall of prior learning, presenting the stimulus, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer [8].

2.2. Dale’s cone of experience
In 1969, Edgar Dale published Audiovisual Methods in Teaching, in which he integrated Bruner’s [9] three modes of learning into “Tower of experience”. In the cone of experience, learners start his learning tour from practical experience, then to the indirect experience with the aid of some media to present direct experience of real events, and finally, learners observe an abstract symbol of real events. According to Dale, students must accumulate some concrete experience before they can understand the abstract concept of real events. On this basis, they can effectively participate in more abstract teaching activities. The above learning experience can be shown in the following figure [10]:

From the above figure, we can see that the experience at the bottom is the most specific, and the more abstract is on the top, various teaching activities can be arranged in a sequence according to the concrete abstract degree of experience. Therefore, Audio visual teaching materials and audio-visual experience are more specific and vivid than the upper language and visual symbols, which can effectively break through the limitation of teaching time and space. Learning media can make all kinds of teaching activities more specific, and can also create conditions for abstract generalization.

Education and teaching should not be limited to concrete experience, but should develop towards abstraction and universality. Concept is the most economical thinking tool, that can be used for logical reasoning. It simplifies and economizes people’s intelligence of seeking truth. In school teaching, making full use of various teaching tools and media can make learning more concrete and lead to better abstraction.

2.3. Rainclass teaching mode

Based on the above theory and students’ learning process, this study constructs a flipped classroom English teaching mode based on the Rainclass as follows:
Traditional language teaching mode focuses on the presentation of learning materials and the practice of knowledge points in classroom teaching. Students’ previewing of the learning material is under little guidance and supervision before the class. And after the class, students have to wait for feedback for their assignments and practice until the next class, which lags too much behind in time and lacks personalized and targeted evaluation. The teaching platform of extracurricular online learning based on MOOC and SPOC divides pre-class learning, classroom teaching and after-class testing into separate modules. The extracurricular learning records and classroom learning records enter into different learning systems, and teachers’ comments and feedback are fragmented. Based on the Rainclass, the flipped classroom teaching mode of College English can break through the barriers of online and offline teaching, make full use of the characteristics of Rainclass by integrating online and offline teaching and learning. In this mode, the presentation of knowledge is advanced to the pre-class session; the comments and feedback in the post-class session of a traditional mode are put into class session; and the self-examination, feedback, peer evaluation and interactive communication are put into the post-class session.

3. Research process

3.1. Experiment object
The subjects of this study are 61 freshmen from College of Electronic Engineering, Guilin University of Electronic Technology (GUET). Since September 2019, GUET has carried out a new round of College English teaching reform. Before the new students start English learning, they need to undergo a simulated test of CET-4. Those who achieve a certain score line are enrolled in the advanced English classes and can take CET-4 in the first semester. There are 4691 undergraduates from all majors in Grade 2019, 1552 of whom are enrolled in advanced classes, and taught by 10 teachers. In December 2019, after one semester of English teaching, 1381 of them took CET-4. There are 65 students in the advanced class in College of Electronic Engineering, 61 of whom took CET-4 in December 2019. In order to keep the data consistent, the experiment subjects are those who took both the pretest and post-test, including 61 in the experimental group and 1381 in the controlled group.

3.2. Experiment tools
The experimental group and the controlled group in this study are all the students in advanced English class of Grade 2019. They all use New Horizon College English 1 as curriculum materials, and the class hours and teaching contents are exactly the same. All the teachers are prominent teachers selected from the whole school. There is no significant difference in teaching experience and teaching ability. In the controlled group, the traditional teaching method was adopted, but the self-learning resources and tests of College English on U Campus, a supporting teaching resources platform, were added. On the basis of the traditional resources, the experimental group adopted the flipped classroom teaching mode based on Rainclass.

To test the effectiveness of Rainclass teaching mode on College English teaching, we conducted a pretest and post-test. The pretest is the entrance test mentioned above, which is an English proficiency test in consistency with CET-4 in both content and difficulty. The entrance examination was done on the computer, and after the examination, machine and manual marking are carried out. The post test volume is CET-4 in December 2019, and the scores are directly obtained from the big data of CET-4 scores in teaching administration office. The test content includes listening, reading, writing and translation. Therefore, there is no significant difference between the pretest and post-test in the difficulty of the test questions and the standard of evaluation. This research uses Spss21.0 to analyze the differences of the collected data between the two groups of students in the test results of the pretest and post-test.

3.3. Pretest
The students in the experimental group are selected from School of Electronic Engineering, with an average English score of 124 in Gaokao. They are selected into the advanced English class through the entrance CET-4 simulation examination. In order to clarify the difference of English proficiency between the experimental group and the control group before the experiment, we compared the scores of the experimental group with the average scores of the students in all the advanced English class in GUET, rather than with the average level of all the students in the whole school.

| Table 1. Comparison of pretest between experimental group and controlled group. |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
|                                | Experimental  Mean | Controlled Mean | t    | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |
| Total                          | 55.671875        | 55.071162       | 1.870| .201            | -.9534          | -2.184 to .278 |
| Listening                      | 16.558823        | 17.275811       | .383 | .134            | -.824           | -1.73 to .08    |
| Reading                        | 21.617647        | 20.5            | 2.084| .935            | -.048           | -1.03 to .94    |
| Writing & translation          | 17.229411        | 17.27205        | 1.764| .839            | -.0575          | -.529 to .413   |

From Table 1, it can be seen that the average score of the experimental group is 55.671875, while the average score of all the advanced classes is 55.071162. But after the One-Sample Test of the score of the two groups, we can see that the significance (2-tailed) t is 0.201, much greater than 5%. And there is no significant difference in each of the sub-items of listening, reading, writing and translation between the experimental group and the whole upgraded class before the experiment. Therefore, before the experiment, the English level of the experimental group both in total score and sub-items is roughly equal to the average level of all the advanced classes.

3.4. Teaching process
Pre-class online learning stage: The teacher put forward clear learning objectives for students, formulate self-learning guidance documents according to the classroom teaching content, and upload them to the Rainclass platform to provide guidance for students’ self-learning. Each micro video lasts for 7-10 minutes, which is conducive to stimulating the learning interest and motivation. In the pre-class knowledge understanding and acquisition stage, the teacher will sent the language learning micro video and supporting exercises on the Rainclass platform for students to watch, learn and practice. After the students finish the preliminary study, the teacher designs fast reading and intensive reading questions with Rainclass PPT software, and inspects the students’ ability of consulting literature, skimming articles and reading texts. The students completes the test on the mobile terminal, and Rainclass platform obtains data feedback to the teacher to provide data support for the teaching content for designing in-class teaching.

In-class Rainclass teaching stage: In the stage of knowledge maintenance, recall of prior knowledge and generalization, the teacher inserts teaching PPT in Rainclass teaching platform to facilitate students’ learning and teacher’s teaching at the same time, thus improving teaching efficiency. The teachers explain learning contents and sent evaluating questions through Rainclass, and the students learn knowledge and ask questions through their mobile phone. The teacher explains the difficulties and give feedbacks instantly according to the students’ performance on the platform. They can also perform tasks such as answering questions, organizing classroom activities, personalized counseling, so as to help students complete the internalization and solidification of knowledge.

After-class online assessing stage: In the assignment and feedback stage after class, students can watch playback of Rainclass teaching to consolidate the learning content, complete the new language training, correct assignments and upload them to the Rainclass platform again. Teachers comment, feedback and summarize on the platform or offline.

In this mode, teachers change from knowledge givers to learning guides and promoters, and students change from passive recipients to active researchers. In order to verify the effectiveness of the
Rainclass teaching mode, the author carried out a post-test to evaluate the effectiveness of such a mode.

4. Findings and evaluations

After a semester of teaching experiment, the author tests the effect of the Rainclass flipped teaching in the experimental class. The following is a report on the impact of flipped classroom teaching mode on the overall level of English and the English proficiency of various sub-items.

4.1. Diachronic comparison of the experimental group

The author extracts the results of the entrance examination (pretest) of the experimental group and the CET4 in December 2019 (post-test), and makes a vertical comparison as follows:

**Table 2.** Paired Samples Test of pretest and post-test of the experimental group.

| Paired Differences | Mean | Std. Deviation | Std. Error | 95% Confidence Interval of the Difference | t | df | Sig. (2-tailed) |
|--------------------|------|----------------|------------|------------------------------------------|---|----|---------------|
| Pretest - posttest | -10.1645 | 6.6983 | .8507 | -11.8656 -8.4635 | -11.1949 | 61 | .000 |

Here it is minded that in order to make a paralleled comparison of the two scores, we converted the 710 mark system of CET-4 to the 100 mark system. After conversion, the average score of pretest is 54.12, while the average for post-test is 64.682.

From Table 2, we can see that after one semester of flipped classroom teaching practice, the average score of CET4 in the experimental group has significantly increased by 10.1615. Through the paired samples test, the significance (2-tailed) is 0.000, far less than 5%, indicating that students' overall English level has been greatly improved.

In order to make a more specific comparison the improvement of the experimental group in post-test and pretest, we selected 10 students with the lowest scores in pretest, and compared their scores with those of the post-test.

![Figure 3. Comparison between scores of pretest and post-test of the lower group in the experimental group.](image-url)
From the above figure, we can see that all the students in the lower group have improved a lot in the post-test. The reason may be that under the new mode of flipped classroom teaching, students’ autonomous learning outside the classroom is effectively monitored, students can use fragmented time for language learning, so that their language input is greatly enhanced.

4.2. Parallel comparison of post-test between experimental group and controlled group

However, comparing the results of CET4 of all the students in advanced English classes in December 2019 with the result in the entrance examination, we also find significant improvement, which proves that after one semester of learning, students have made significant progress in both the traditional classroom and Rainclass teaching mode. In order to compare the advantages of the two teaching modes, we compared the scores of the experimental group with that of the all the advanced English classes.

Figure 4. Parallel Comparison between results of post-test of the experimental group and the controlled group.

From the above figure, we can see that the average total score of the experimental group in the CET4 is 460.452, while that of the controlled group is 445.049. And the average scores of the experimental group in each of the sub items of listening, reading, writing and translation are 148.984, 164.419 and 147.048 respectively, while those of the controlled group are 147.665, 157.668 and 139.716. We can see that the average scores of the experimental group in each of the sub items are higher than those of the controlled group. To further compare the difference of the two sets of data, the author conducted one-sample tests on the experimental group and controlled group. The results are as follows:

Table 3. Comparison of post-test between experimental group and controlled group.

|       | t   | df  | Sig (2-tailed) | Mean Difference | 90% Confidence Interval of the Difference |
|-------|-----|-----|----------------|-----------------|------------------------------------------|
|       |     |     |                |                 | Lower  | Upper |
| Total | 1.870 | 61  | .046           | 15.403          | 1.22  | 21.59 |
| Listening | .383 | 61  | .703           | 1.319           | -4.43 | 7.06  |
| Reading | 2.084 | 61  | .041           | 6.751           | 1.34  | 12.16 |
| Writing & translation | 1.764 | 61  | .049           | 7.332           | .18   | 6.49  |
In general, after four months of College English learning, all the students have greatly improved in CET4, and most of them have passed the examination. By comparison, the improvement of the experimental group is more significant. After data analysis, the average score of the experimental group is 15.403 higher than that of the controlled group, and the significance (2-tailed) is 0.046, lower than 5%. We can conclude that the Rainclass teaching mode is more effective in improving students’ overall English level.

From the perspective of sub scores, in the four language skills tests of writing, translation, listening and reading, the significance (2-tailed) is less than 5%, indicating that in comparison with traditional classroom teaching, the flipped classroom teaching mode based on Rainclass has obvious advantages in improving students’ reading, writing and translation ability. Especially in reading, the average score is increased by 6.751, and the significance (2-tailed) is 0.041, which shows that there is a significant difference between the reading performance of the experimental group and that of the controlled group. But in listening, the effect of flipped classroom is very little. This may be because in the traditional classroom, too much attention is paid on reading and explanation of language knowledge, which costs too much time, and the lack of supervision after class and reading training, so that students do read effectively. In the flipped classroom based on the rain class, students carry out targeted reading training under the guidance of the teacher’s Guide documents, and in the classroom, teachers consolidate and transform language knowledge. So there is significantly improvement in students’ quality and quantity of active reading.

5. Conclusions
With the emergence of modern education technology, the flipped classroom teaching mode by means of online learning platform has become a trend, especially in the current epidemic of Covid-19. With the help of the Rainclass mode, students can learn and process in advance knowledge that can only be obtained during the class under the traditional classroom teaching mode. And through the form of audio and video, the abstract language symbols are converted into concrete and direct information experience. This teaching mode reduces the difficulty of information processing, increases the load of learning tasks, and enables students to experience the language learning in a relaxed and pleasant atmosphere. Half a year’s teaching practice has proved that the Rainclass teaching mode can effectively solve the problem of reduction in teaching hour and expansion in student numbers in present College English teaching. Meanwhile, this teaching mode is highly in trend with the demand of “expanding output and strengthening practice”. Further more, Rainclass incorporates both online learning and classroom language practice, which can take into account the input of language materials and the output of language application, so as to significantly improve the effectiveness of College English teaching.

However, as an exploratory practice, this research has its limitations. The students in this study are selected from the whole college for their higher English level, with high homogeneity, so they can adapt quickly to the intensive requirements of a Rainclass flipped teaching mode. And during in-class teaching, Rainclass platform can only display and assess the same language learning material. For classes with large differences in language level, it is doubtful whether Rainclass can achieve the same effect without carrying out targeted and personalized language learning and training. What’s more, because students can’t upload the audio and video output of oral English output on Rainclass, and GUET has not purchased an effective oral test system, making impossible a large-scale oral proficiency test for the whole school students, so the author can’t form a persuasive and effective analysis on students’ speaking skills. However, from the perspective of subjective observation of the video provided by the students on oral training, students’ oral output is more standardized in language, content and structure. The effects of Rainclass flipped teaching mode on students oral English needs further study and more effective analysis.

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References

[1] Ministry of Education, Document 5 of 2012, the “Decade Plan for Developing Education Informatization (2011-2020)”. Information on http://old.moe.gov.cn/publicfiles/business/htmlfiles/moe/s3342/201203/133322.html.

[2] Department of higher education, Ministry of education. College English teaching requirements. Shanghai: Shanghai Foreign Language Education Press, 2007.6

[3] Strayer F 2012 How learning in an inverted classroom influences cooperation, innovation and task orientation. Learning Environments Research. vol. 15, 171.

[4] Lu H Y 2014. Feasibility Analysis on the Application of Micro-class Based “Flipped Classroom” Mode in College English teaching. Technology Enhanced Foreign Language Education (04), 33-36.

[5] Lv T, Wang N 2016. A Study on the Establishment and Effect of the Flipped Classroom Mode for SPOC+Teaching Resource Platform As applied in College English Teaching. China Educational Technology (05), 85-90+131.

[6] Dou J H, Wen S 2015. The Teaching Reform Exploration of College English Flipped Classroom Based on APP. Heilongjiang Researches on Higher Education (05), 162-167

[7] Hu J, Wu Z J 2014. An Empirical Study on the MOOC-based College English Flipped Classroom Instructional Model. Technology Enhanced Foreign Language Education (06), 40-45.

[8] Bruner, J. S. 1966. Toward a theory of instruction. Cambridge, MA: Harvard University. Gagne, Robert Mill (2005). Principle of Instructional Design (5th edition), Belmont, CA.

[9] Gagné, R. 1985. The Conditions of Learning and the Theory of Instruction (4th ed.). New York: Holt, Rinehart, and Winston.

[10] Dale, E. 1969. Audiovisual methods in teaching (3rd ed.). New York: Dryden Press.