Empirical Study on the Teaching Model of Autonomous Learning Course Based on the "Rain Class" of Higher Vocational Students

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Abstract. The current Chinese education is developing vigorously exploration and practice of the teaching model of outreach activities such as "Mu MOOCs" and "flip the classroom". However, we have realized that our traditional teaching model reform exist great resistance, in particular, the concept and the ability of our educators, students' lack of study desire, motivation is not strong, and students still do not have autonomous learning ability required by the new teaching model. These are the huge barrier for new MOOCs and flip classroom. And our research, aimed at exploring and practicing courses teaching model for training and evaluating students independent learning capacity, effectively improving quality of education teaching. We stressed full relies on current mature of network environment, especially we used "rain class" platform latest launched by Tsinghua University School Online, expand the class spatio-temporal, completely recycling our courses teaching process, in the specific of professional courses teaching. We have used "courses BPR+142 model", effectively realized in teaching students professional knowledge, skills, as well as conscious training, improvement, evaluation of students' autonomous learning ability. The paper is to practice and experimental verification of the effectiveness of the teaching model.

1. Overview on the Teaching Model of Autonomous Learning Courses based on Rain Class

Independent study is also known as self-regulated learning, which refers to the learners have knowledge and skills based on self-knowledge, independence and with the right way to use certain learning methods to access knowledge, to discover and to solve the problem. Generally, Independent study includes self-monitoring, self-directed and self-reinforcing. The independent learning capacity of high vocational college students includes: capacity of develop and adjustment learning target, and capacity to judge learning material and learning activities whether meet learning target, capacity to select learning material and learning content, capacity of self select learning activities way and implement learning activities, and capacity of exchange consultations with learning partners (including teachers), self regulation capacity on learning activities implementation situation, capacity of adjustment attitude, and motivation, emotional factors, self evaluation learning results and correction learning behavior etc.

Rain class (http://rain.xuetangx.com/) is an online teaching tool launched by Tsinghua University in April 2016. Through micro-credit services, for push before class, real-time answers, multi-screen interactive, answers question barrage and analysis of student data. On the student side, "rain class" provides in-class timed exercises, "don't understand" buttons, barrage, preparation before class, push PPT data, and other functions, helping students to preview, consolidate the knowledge and feedback learning information; On the teacher side, all the students learning behavior data can be automatic completely collected, helping teachers quantitative understanding students' learning effects and to grasp the trajectory students' learning.

In fact, we all know, in the education field at present, including the foundation education of
primary and secondary school, is developing vigorously practice exploration outreach activities of the teaching model of such as "Mu MOOCs" and "flip the classroom". But this need special pointed out that, while "mu class MOOCs" and "flip the classroom teaching model" gave us a good education concept and education thought, they also let us see the prospect and dawn of the traditional education pattern reform. However, we have to realized that the reform of our traditional teaching model exist great resistance, in particular, the concept and the ability of our educators, students' lack of study desire, motivation is not strong, and students still do not have autonomous learning ability required by the new teaching model. These are the huge barrier for new MOOCs and flip classroom. So, how to explore a course teaching model while effectively teaching students professional knowledge and skills, and be able to consciously cultivate and improve students' autonomous learning ability, it is so urgent.

2. Construction on Teaching Model of Autonomous Learning Course based on "Rain Class"

We use theory of constructivism and theory of learning Pyramid, and combine the actual conditions of higher vocational students and the characteristics of accounting professional course to construct teaching model of autonomous learning. Our teaching model of autonomous learning is mainly composed of course design, course preparation, classroom teaching, and summarizes the reflection. The teaching pattern of autonomous learning based on the rain class for higher vocational students' professional course we build is named BPR + 142 "curriculum model".

Here the so-called new classroom teaching Process design for the teacher being able to grasp the macro accounting professional talent training scheme, course standard and the requirement of teaching material, and able to accurately treat each class micro Process design knowledge and skills through good class - "teaching Process Reengineering", namely "course BPR" (Business Process Reengineering), stimulating the enthusiasm of students to participate in the study, leading the students to participate in, and then to achieve learning goals.

3. The So-called "Business Process Reengineering (Restructuring)"

(Business Process Reengineering, BPR) was first raised by America's Michael Hammer and James Champy, reached the prime of a kind of management thought in the 1990. It emphasizes the object and the business process as the center, to care about customer needs and satisfaction as the goal, to make fundamental rethinking and radical redesign to the existing business process, to use advanced manufacturing technology, information technology and modern management means to maximum realize functional integration of technology and functional integration of administration, to break the traditional functional organization structure, to establish new type of the process of organization structure, so as to realize the dramatic improvement of enterprise management in terms of cost, quality, service and speed etc..

Here we proposed course BPR (Business Process Reengineering), which is also stressed that the teaching Process as the object and center, to care for the needs of students and learning satisfaction as the goal, to make "the fundamental rethinking" and "radical redesign" to the existing traditional "teaching Process", to use the advanced network technology, information technology, mobile Internet, big data background to realize our great improvement on the teaching of efficiency, effectiveness, quality, service and so on.

Under our "course BPR", teachers should not only guide students to learn knowledge or improve skills, but also to observe, record the participation of students' learning attitude, participation, participation effect, and as the direct basis for student learning, evaluation of autonomous learning ability.

We took experiment in the course teaching according to our own new class design, paying attention to the student in the classroom response, and often periodically collecting students' feedback, adjusting and optimizing BPR "course", gradually forming the teaching model of constant and healthy of the course.

Our research, mainly including the cultivation of students' autonomous learning ability and
evaluation, emphasizes on fully depends on the network environment of the current mature. Especially we used rain class of the latest optimal platform at present, and with the expansion of space and time, radical redesign our class teaching process. In the course teaching of auditing practice, we adopted the "142" teaching model, "1" or "self preparation for 10 minutes before class", "4" or "autonomous learning for 40 minutes" on the class, and the "2" or "independent review" for 20 minutes after class.

By this way, with the help of the Resources before preparation and information push function for review materials after class by the rain class, as well as the comprehensive ability of students to automatically complete information acquisition, students of preview, review, class performance are at the mercy of the teacher, facilitate teachers to adjust teaching rhythm, teaching content, teaching means, teaching methods, etc., according to students' response and feedback, promote the effectiveness of the course teaching, improve the teaching quality of teaching, but also greatly promote the improvement of students' autonomous learning ability.

4. Empirical Research on Teaching Model of Autonomous Learning Course based on "Rain Class"

4.1 Empirical Research Process of "Rain Class" Teaching Model.

Project team performed an experimental research of reformation on teaching model of autonomous learning course based on the "rain class" for the major of accounting classes on grade 2014. At the beginning of the experiment, from our three parallel class KJ1401, 1402, 1403, according to our investigation to students class and the previous semester exam on the course of the tax law, we have chosen KJ1401 and KJ1402, whose learning attitude, learning ability and learning efficiency is basically at the same level. And KJ1401 class (53) identified as comparative class which adopts the traditional teaching model; And KJ1402 class (52) identified as experimental class to reform and experiment of the teaching model by the aid of "rain class" teaching platform. At the end of the experiment, on the one hand, by carrying on the questionnaire survey to the student about "rain class" teaching model, on the other hand, organizing comparative class and experimental class to participate in the final exam with same paper. In the teaching experiments, also introduced autonomous learning evaluation system developed by the project team to make process evaluation.

4.2 Teaching Model of "Rain Classroom" Empirical Data Analysis and Conclusion

To understand the effect of teaching mode of autonomous learning course based on the "rain class", the team used the software SPSS which was used for data processing to have independent samples t test, paired sample t test statistics, etc on experimental class and that in comparative class at the beginning of academic level and final exam scores of experimental class, etc.

First, the Academic Level of the Experimental Class Compared with Control Class at the Beginning of the Term (Before) A comparison of the two classes on the final exam results on course of tax law taught by the same teacher before the experiment. It can be seen from the table 1 significant probability is Sig. (2 - tailed) = 0.344, greater than the significance level of 0.05, which shows that the academic level of comparative classes and experimental classes at the beginning of the experiment is basic similar, no obvious difference.

<table>
<thead>
<tr>
<th>type</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Sig. ( 2-tailed )</th>
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</thead>
<tbody>
<tr>
<td>grade</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>KJ1401</td>
<td>53</td>
<td>70.30</td>
<td>8.89</td>
<td>0.344</td>
</tr>
<tr>
<td>KJ1402</td>
<td>52</td>
<td>66.43</td>
<td>9.63</td>
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</tr>
</tbody>
</table>

Second, Discipline Result Comparison of the Experimental Class KJ1402 before and after the Experiment (Before and After the Test). We were going to compare the two courses with teaching model of autonomous learning course before and after the experiment by the same class KJ1402 based on "rain class". The two courses opened before and after the two semesters, student
age was little different, the same teacher to teach, as core curriculum required by accounting major, also compared from the difficulty of the course itself, on the later semester, course of auditing practice with experimental model was harder than the course of "tax law" which with traditional teaching model before the experiment, see from table 2, the Sig. (2 - tailed) = 0.001 < 0.05 significance level, shows that the academic performance of experimental classes and contrast classes made evident improvement in the final exam.

<table>
<thead>
<tr>
<th>course</th>
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<th>Mean</th>
<th>Std. Deviation</th>
<th>Sig. (2-tailed)</th>
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</thead>
<tbody>
<tr>
<td>Tax law</td>
<td>52</td>
<td>66.43</td>
<td>6.63</td>
<td>0.001</td>
</tr>
<tr>
<td>Auditing practices</td>
<td>52</td>
<td>73.32</td>
<td>6.07</td>
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</tbody>
</table>

Third, The Final Exam Results of the Experimental Classes KJ1402 Compared with Class KJ1401 on Course of Audit Practice (After). On the second semester in 2015-2016 school year, I taught the courses of auditing practice for the class1401 and 1402. See from table 3, significant probability is 0.012, less than the significance level 0.05, sample overall mean with significant differences, shows that the experimental group and control group have obviously improved academic performance level on the course of auditing practice.

<table>
<thead>
<tr>
<th>grade</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KJ1401</td>
<td>53</td>
<td>65.53</td>
<td>7.91</td>
<td>0.0012</td>
</tr>
<tr>
<td>KJ1402</td>
<td>52</td>
<td>74.52</td>
<td>7.12</td>
<td></td>
</tr>
</tbody>
</table>

Concluded from the data analysis results, the teaching model of autonomous learning course based on the "rain class" can significantly improve the students' academic performance.

4.3 Learning Evaluation System and Use on the Teaching Pattern of Autonomous Learning Course based on the "Rain Class ".

Evaluation of online autonomous learning ability is the important guarantee of the process of learning under the network environment. Building a scientific evaluation system for the ability of autonomous learning can help students improve the ability of autonomous learning and improve the effect of autonomous learning through the lack of autonomous learning, through feedback adjustment. This is the value of the independent learning ability evaluation system.

According to the research framework of autonomous learning, from the consciousness of independent learning, learning attitude, time management, efficiency, cooperation ability and innovation ability and so on of the six dimensions. The Project team designed the evaluation index system of the ability of autonomic learning under the network environment.

The practice of teaching model on the curriculum of auditing practice based on "rain class", we organized the students autonomous learning under the network environment, and through the "rain class" platform for data collection, and provided the ability of autonomic learning evaluation report.

"Rain class" (http://rain.xuetangx.com/) through WeChat services, realize push before class, real-time answering question, multi-Screen interactive, answering barrage and student data analysis. On the student side, "rain class" provides in-class timed exercises. "Don't understand" buttons, barrage, preparation before class, push PPT data, and other functions, help students to preview, consolidate the knowledge and feedback learning information; On the teacher side, all the students learning behavior data can be automatic completely collected, which help teachers quantitative understanding students' learning effects and grasping the trajectory students' learning.
5. Practice of Enlightenment on the Teaching Pattern of Autonomous Learning Course based on the "Rain Class"

Practice shows that reform and practice on teaching model of autonomous learning professional course based on the rain class, to truly achieve the goal of teaching reform, improve teaching efficiency and effect, improve the students' comprehensive quality, including the independent learning ability, and there are still several key problems to be solved.

5.1 Depend on High Quality Teaching Resources

Using teaching model based on the rain class, the teacher must develop their own abundant high quality teaching resources, including pictures and PPT, including video, base, putted forward, and these resources must be selective, elaborate design, the high quality resources which suitable for the student use Internet platform for fragmentation learning by "rain class".

5.2 Depends on Excellent Network Teaching Platform

The teaching model of autonomous learning course based on the rain class impart knowledge can be done by the students through independent study before class, which requires computer hardware, software, micro teaching resources and the network teaching platform and support of rain class teaching platform adopted by us. Therefore, selecting and having a good command of a perfect education informationization network environment is the foundation of implementing teaching model of independent learning based on the "rain class". But from the situation we try out the "rain class" platform, there are still exist some problems. The stability of the "rain class" platform is not very satisfactory. Using this kind of teaching model, the requirements for network teaching software, network teaching platform dependence is very high. Students can't open the page or cannot submit exercises answers, which seriously affect the teaching efficiency and effect, in a certain extent. It affects students' learning enthusiasm and initiative, which is unfavorable for evaluation of students' learning and collection of examination data.

5.3 Depends on the Optimization of the Teaching Design and Strategy

The teaching model of autonomous learning course based on the "rain class" is a kind of brand-new teaching model, which needs continuous exploration and practice to improve and perfect the teaching design and teaching strategies of the teaching link and process, so can really improve the teaching efficiency and teaching quality of teaching model of autonomous learning course based on the "rain class", so as to improve the students' ability of autonomous learning and the ability of comprehensive development.

5.4 Depends on A New Curriculum Evaluation System

In order to adapt to the reform and practice of new teaching model, we must thoroughly reform the traditional curriculum evaluation mechanism, and combine qualitative evaluation and quantitative evaluation, summative evaluation and formative assessment. To reduce the proportion of final question paper examination results in overall grade, accordingly improve proportion of self preparation before class and class autonomous learning activities involved in performance and independent review after class to consolidate the whole progress, and to build the corresponding evaluation index system and evaluation standard.

5.5 Depends on the Teachers' Professional Competence

The teaching model of autonomous learning course based on the "rain class" makes students really become the subject of learning, teachers organizer and director of the learning activities, which requires teachers to change the education ideas, to master new teaching skills, and to constantly update their education and teaching knowledge, to constantly improve the ability of using new teaching strategy and improve information technology, to improve their professional competence as teachers.
5.6 Relies on Rigorous Teaching Organization and Management

Self preparation before class, which based on the "rain class" is the basis of the teaching model of autonomous learning course. It determines the efficiency of knowledge. Monitoring and management of self preparation before class directly influence the success or failure of the teaching model of independent learning course based on the "rain class". Class autonomous learning activity based on the "rain class" is the key of autonomous learning teaching pattern, to determine the degree of knowledge internalization, organization and management of class autonomous learning activities directly affect the classroom based on the rain of the quality of the teaching model of independent learning.

Conclusion

Practice shows that the colleges and universities carry out such teaching model of autonomous learning course based on the "rain class" is very popular, which can greatly promote students' learning enthusiasm and initiative. We follow the rules of general education teaching, pay attention to individual differences in students, and fully respect the principal position of students' learning. According to their aptitude, using highly developed network environment nowadays, using the mobile Internet, by reforming the traditional teaching model, in the course teaching to achieve the cultivation of students' autonomous learning ability and training, and can be implemented in the process of teaching evaluation and testing of students' autonomous learning ability, improve the teaching quality of specialized course education and improve higher vocational students' comprehensive quality and the individual survival and development ability, promote students' individual development and social progress.

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References

