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The Application of the Experimental Investigation Method in the Teaching Reform Project

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Abstract. The teaching reform project has great significance and positive effect on improving the teaching method, but it is often difficult to quantify its effect. The application of the experimental investigation method in the teaching reform project is helpful to verify the effectiveness of the teaching method and make the effect of the teaching reform project more intuitive and quantifiable. Taking the course of management as an example, this paper expounds the specific operation of introducing the experimental investigation method into the teaching reform project, and puts forward its advantages and deficiencies.

The teaching reform program is one of the scientific research projects that many university teachers have to undertake. In addition to carrying out the innovation of educational teaching theory and practice, applying some scientific research methods, especially some quantifiable indicators is also very important and necessary to quote them in the research of educational reform.

Experimental Investigation

Experimental investigation method refers to the selected one or more factors from many variables, which influence the survey questions will be place in the same conditions of small scale experiments, then the experimental data were processed and analyzed to determine whether the survey results worthy of a large-scale promotion in order to extract valuable information and provide the basis for decision making[1].

Comparison Test of Pre and Post. This method is used to collect the necessary data before the test period, then carry on the field test, and collect the relevant data again after a certain time of experiment. It understands the effect of the experimental variables on the output by comparing before and after the comparison. This is the simplest experiment, which is used to do experiments in the control group without the need for a control group. In order to determine the effect of the experimental results, investigator study the control group before them changed and the experimental group after the experimental factors changed. The formula is expressed as flowing:

$$E=X_2-X_1 \quad (1)$$

$$RE=E/X_1=(X_2-X_1)/X_1\times 100\% \quad (2)$$

This method of experiment looks more scientific, but the error of the experiment is not well controlled. Because it cannot eliminate the influence of other non experimental factors before and after the experiment. Because the changes of other non experimental factors before and after experiments make the measured values not entirely experimental results caused by purely experimental factors. Sometimes it may be non experimental factors, such as natural factors, psychological factors, business

factors and so on. These factors affect the change of experimental results. If the time interval between measurements is longer before and after experiments, the influence factors will be greater.

Comparison Test of Control Group with Experimental Group. It means that during the same period, the experimental group changed the experimental factors, while the control group did not change any experimental factors. The experimental data of the experimental group and the control group were compared after the experiment. The formula is expressed as flowing:

$$E = X_2 - Y_2 \tag{3}$$

$$RE=(X_2-Y_2)/Y_2 \times 100\% \tag{4}$$

The control group has obvious advantages in comparison with the experimental group, and the inerference and influence of other non experimental factors on the experimental results can be eliminated. Because this is a lateral contrast experiment, the non experimental factors such as natural factors, commercial factors and psychological factors are basically the same, which can be counteracted in the experimental comparison. The disadvantage of this method is that it cannot reflect the degree of change before and after the experiment. Secondly, it is very difficult to select the control group. The accuracy of the experimental results directly depends on the similarity between the control group and the experimental group. The closer the objective conditions are, the higher the accuracy of the experimental results. On the other hand, the accuracy of the experimental results is low.

Contrast Test of Control Group before and after. It mean established the experimental control group and experimental group. The experimental factors were not included in the control group, and those were changed in the experimental group. Then compare the experimental data of experimental group before and after with the control group before and after. So it has both vertical and horizontal comparisons. The formula is expressed as flowing:

$$E=(X_2-X_1)-(Y_2-Y_1) \tag{5}$$

$$RE=(X_2-X_1)/X_1 \times 100\%-(Y_2-Y_1)/Y_1 \times 100\% \tag{6}$$

There are advantages in the comparison group before and after experiment is quite obvious, it can control the influence of other factors on the experimental process, can also reflect the degree of change before and after the experiment. The disadvantage is that when measuring consumer behavior and attitude, it will be influenced by the attitude of investigators and respondents, and the influence of the changes of investigators and respondents before and after the experiment.

The Application of the Experimental Investigation Method in the Teaching Reform Project

The teaching reform project is usually the reform of the teaching method, which has a high degree of wisdom and has considerable difficulty. However, due to the difficulty of data measurement in teaching reform projects, the effectiveness and confidence of teaching projects are often difficult to be proved. The data characteristics of the experimental research method just make up for the unmeasurable problems in teaching reform projects. Therefore, with the continuous improvement of education and teaching methods, it is very necessary to introduce the experimental research method into the teaching reform project. We choose an example of an experiment that has been done in the course of university management. This experiment is a comparative experiment method, which is used to verify whether group cooperative learning can effectively promote students' learning and motivate students' interest in learning. Cooperative learning is a teaching method in class background system. In the classroom as the basic form of the system, the teacher adopts students learning group as the important teaching organization means. Through guiding team members to cooperate, play the positive role of groups, improve individual learning motivation and ability, so as to achieve the purpose of completing specific teaching tasks[2]. Management course is a creative course, which requires students to devote themselves to learning and ask students to make continuous efforts to innovate. At the same time, we should also examine students' teamwork and even leadership in this course. Group

cooperative learning seems very suitable for introducing into management course teaching, but is it really effective and what is the effect? So we took a comparative experiment to test it.

Experimental Preparation Stage. First, the selection of the experimental object. The project selected two teaching classes of international trade in a university as the experimental object. As a freshman students, not yet open management related courses. The first class was randomly selected as the experimental group, and the second was the control group. Second, the setting of the test period. A total of 18 teaching weeks for the second semester after the enrollment of the new students. Finally, the setting of the experimental conditions. 6-8 people in each group are free to combine, and the students' personal results are linked to the total score of the group. Researchers create a situation that only students can achieve their personal goals through group success, so that group members are more willing to help their group members do things that are good for group success. The team leader was elected by the democratic election, the students showed great enthusiasm for participation, and even the spontaneous design of the slogan and logo of the group. The teacher has become the guide and the help of the student, not the contractor.

Experiment Implementation Stage. Teachers use the same syllabus and courseware to teach in two classes. The operation of the experimental group is submitted and displayed in the form of a group, and the control group is in a personal unit. It was found that the work of the experimental group was more innovative and organized. As Piaget, a Swiss psychologist, said, learning is not a teacher who simply imparts knowledge to a student, but a process of building knowledge by the students themselves. Students do not accept information simply and passively, but actively construct the meaning of knowledge, which cannot be replaced by others.

Achievement stage. At the same time, the same examination papers are performed on the students. The result of the test is shown in Table 1. The average score of the experimental group is 82.92 points, while that of the synchronous control group is 78.20 points. The index of the test group is also obviously better than the control group. The result of the experiment shows that it is useful to introduce the teaching method of group cooperative learning into the course of university management.

Table 1 Summary of students' examination results

	Experimental group	percentage	control group	percentage
more than 90	7	13.2%	5	9.3%
80-90	35	66%	29	53.7%
70-79	7	13.2%	12	22%
60-69	3	5.7%	3	5.6%
less than 60	1	1.9%	5	9.3%
average	82.92		78.20	

Conclusion

Through the comparative experimental investigation method, it is proved that it is beneficial and effective to introduce the teaching method of group cooperative learning into the teaching of university management, and the effect is obvious. Introducing more scientific research methods into teaching reform projects is beneficial for improving teaching effect, promoting students' learning enthusiasm and improving teachers' inquiry ability. It is worth mentioning that the use of experimental investigation method to study the teaching reform project, there are also some natural deficiencies. The effectiveness of the experimental investigation is worthy of discussion. The validity of the experiment is in fact the extension of the application of the experimental investigation method, that is, how to apply the experimental investigation under the curtain circumstances. We can divide the effectiveness of the experiment into internal effectiveness and external effectiveness. The influence of irrelevant variables on experimental effectiveness is also called independent variable or external variable. It refers to a variable independent variables, it can also affect the data of dependent variable. These variables can interfere with the measured data of the dependent variables, weaken or invalidation the results, which are somewhat similar to the random interference items in the linear regression model. But it is not very

certain, because these variables can also be random. The influence of independent variables mainly comes from time effect, sample deviation, regression effect, loss effect and test effect. Time effect refers to any changes and events that affect the quantity during the experiment, and the effects are unreliable. When the sample deviation refers to the researcher to choose individual experimental group and control group differences in individual system, put forward the effective sample deviation of the threat, the experimental group and control group after the difference between measured data after the measurement data is likely to be caused by the difference between the two groups of sampling, and not due to the impact of experimental variables or treatment variable. The regression effect refers to the influence of the target group of extreme behavior on the trend of the development of the mean of behavior in the experiment. This is the instinct of human nature. The loss effect is caused by the independent variable formed by the "loss" of the experimental sample. If the sample "loss", the experimental group may become less representative. There is also a lack of external effects. The test effect refers to the effect of the experimental process itself on the observation results. The test results can be divided into two major categories: the main effect and the interaction effect. The main effect is the effect of early observation on the later observation, and the interaction effect refers to the effect of previous observation on the effect of the experiment. Therefore, investigators should actively control the influence of external variables on experimental results, ensure the effectiveness of the experimental investigation method, and make it better applied to teaching reform projects.

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