Difficulties, problems and countermeasures in Chinese

educational technology researches

CHEN Yun-hong, LI Bing, XIE Bai-zhi

(Center of Educational Technology, Fourth Military Medical University, Xi'an Shaanxi 710032, China)

Abstract: The paper discussed the difficulties and problems in experimental researches in educational technology, such as misunderstanding in teachers' concept, disjointedness between theory and practice, inadequate understanding of dialectics in experimental educational technology researches, research project selection and theoretical hypothesis formation are passive and onefold, single and irregular experimental control, simple ways and methods of measurement, more quantitative analysis and fewer qualitative analysis, simple statistical analysis. And provide some suggestions: bottom-up selection; various kinds of research training; emphasizing experimental data; controlling experimental process effectively; combination of qualitative and quantitative researches; integration of various research methods.

Key words: educational technology; experimental research; problem; countermeasure

Educational technology is a cross-border science. Various theories in this field originate from achievements in other subjects ranging from informatics, psychology, sociology to philosophy. Therefore, a new tendency draws a great attention of more and more researchers. This new tendency is that in order to solve problems about psychology, education, and behavior in educational technology, investigations of phenomena and principles in educational technology application should be conducted across different subjects.

Experimental research methods in educational technology is a way to collect and handle research materials by using mathematical tools, which are one of the important research methods to carry out educational research activities. In the actual educational technology research, selecting appropriate research methods has a significant effect on research findings. Reasonable and advanced experimental research methods can describe educational phenomena and disciplines in an overall, objective and accurate way, exert effectiveness of data and materials to the extreme, and go deep to know the disciplines behind the complicated phenomena in educational technology. The more experimental researches are conducted, the more mature and scientific the development of educational technology is.

Experimental researches in educational technology and general experimental researches have something in common, and also have some differentiations. As educational researches go in depth, it becomes more essential to adopt mathematical analysis. Quantitative method is seen as important tool and expression method to study educational phenomena and discover educational disciplines. For instance, first, more and more educational

CHEN Yun-hong, female, Master, associate professor, Center of Education Technology, Fourth Military Medical University; research field: education technology.

LI Bing, male, correspondence author, professor, Center of Education Technology, Fourth Military Medical University; research field: distance learning.

XIE Bai-zhi, male, professor, Center of Education Technology, Fourth Military Medical University; research field: educational technology.

researches adopt multianalysis. Second, quantitative method such as "Meta-analysis" begins to be used in the fields that qualitative method traditionally predominates. Vague mathematics turns to be widespread in educational researches. Nowadays, a considerable part of research articles about educational study and educational technology study published in both foreign and domestic journals adopt quantitative method. Educational technology researchers must have a good command of quantitative method so that they can read relevant literatures and write high-level research articles. However in terms of present practical research articles in academic journals, few research articles have experimental data or evidence and necessary qualitative study. In the following we show our opinions about difficulties, problems and countermeasures in experimental researches in educational technology.

1. Difficulties and problems in educational technology experimental researches

1.1 Misunderstanding in teachers' concept

Quite a lot people in the society, including many teachers argue that the teacher is not a knowledge creator but a knowledge deliverer. With this view in mind, they will not see educational activities as objects of academic researches. Naturally they will not realize that teachers carry a heavy burden of develop educational science. In the aspect of developing educational academic researches, people usually lay an obligation on educators, hoping that they will discover new principles, create new methods, guide educational practice and develop educational science.

The present situation in educational technology researches is as follows. (1) Teachers regard educational technology researches as jobs of theoretical workers in educational technology. Their work is instruction that has nothing to do with educational technology researches. (2) Although some teachers have a desire to do the researches, they are plunged in heavy teaching work and spare no time and effort to conduct the researches. (3) Still some teachers who are willing to do the researches have time and effort but they have trouble in finding educational technology research projects and in addition to be unfamiliar with the process and method of educational technology. Eventually they are frightened to flinch.

1.2 Disjointedness between theory and practice

In the field of educational technology, theory and practice are separated for a long time. The research projects of some researchers severely disjoint the actual need in educational technology. Furthermore, they generalize their research findings to the practice of educational technology, which teachers and educational administers can't accept. Therefore, there exists a huge gap between educational technology theory and practice. Theory and practice are like two parallels which seem impossible to intersect forever. In order to bridge the gap, efforts from both educational technology theory and practice are needed. Theoretical researchers should set up the idea to serve the educational practice, go further into the front line of education, investigate the educational practice and help practical workers to settle some theoretical problems which need to be clarified. Practical workers should establish active mode to be diligent in discovery, cherish creative ideas and be good at finding research projects.

1.3 Inadequate understanding of dialectics in experimental educational technology researches

Most people simply believe that if there are adequate hardware equipments and resources, educational technology experiments can be carried out and surely can be successful. Most teachers and educational technology workers haven't realized that experimental researches not only rely on hardware and resources, but also count on detailed experimental design which can reify the theoretical hypothesis. Any fault in the experimental process will

result in failure. But of all research articles we have read, few have negative analysis. Most research articles turn a blind eye to the failure of testing the hypothesis. In these experimental reports, some researchers don't analyze results dialectically. Not negative results but positive results are mentioned and not failure but success is discussed. They never know that it is failure that contains the most valuable factors.

1.4 Research project selection and theoretical hypothesis formation are passive and onefold

Research projects are supposed to originate from the actual need of practitioners. Researches are expected to be done under the cooperation of practitioners and researchers in the practice. Research results should be understood, controlled and carried out. Researches should aim at solving practical problems and improving social activities. On the basis of the above view, action research catch greater attention of educational technology researchers. However, currently most our research projects selection comes from exterior, which is not generated from teaching practice and is passive. The flaw is to consider research hypothesis as the starting point of researches.

Moreover, there are more repetitive researches and few innovative researches. In early 1980s, computers entered into the American primary and high schools and in China computers are also introduced into primary and high schools of China simultaneously. But in fact, the application and development of computer technology at schools depress those who expect this new technology will bring a great educational revolution. The effects of some computer software are not satisfactory. From 1996, the United States make great effort to develop internet –based online education and set up campus intranet at primary and high schools. At the end of 1990s, campus intranet of Chinese primary and high school arise quickly. But majority of campus intranet bring practical help to teaching and administration due to the lack of relevant researches and policy supports. While in 1999 and 2000 American educational technology standards, related techniques and criteria of teachers and students are explicitly prescribed. That is to say, Americans invest in hardware as well as construct human resource. When we bring in advanced foreign teaching modes and methods, we often adopt them without any adjustment, regardless of historical and cultural differences among countries. Of course, this issue has already been noticed. But this also indicates that some of our experimental researches follow foreign researches blindly and do a lot of repetitive researches. Some researches imitate foreign theories or involve simple criticism so that creative ideas can not be generated and new ideas and methods of experimental researches can not be proposed. Consequently, academic experimental researches fall behind the social development. With the introduction of new concept and technology, educational technology researchers may probably get lost. On the other hand, the generalization of research findings and external validity are inadequate. Researches about teaching modes, which are not generalized into pedagogic practice, are relatively more but in the surface level. Research variables and methods are comparatively simple, not systematic. The fact that some important variables are neglected and other meaning information is omitted makes it difficult to draw an integrated and accurate conclusion.

1.5 Single and irregular experimental control

Experimental control is not normative and formalized. Experimental plan and design are rough due to carelessness and limited time. Independent variables of the experiments can not be manipulated, dependent variables can not be measured, and uncorrelated variables are not effectively controlled. Researchers have no idea about the experimental stage and time, and which person is responsible for a certain step, and the expected effects. Thus the experiment results can not meet the demand of solving educational problems. In addition, the standardization of tracing the experiments is low, the subject selection is at will, and simple experimental methods are used such as experimental group and control group. All these factors cause the low internal validity of

experimental researches, which possibly results in the impractical research conclusions.

1.6 Simple ways and methods of measurement

Measurement refers to conducting measurement on experimental environment, subjects and results by making use of some measurement tools in teaching process or educational experiments, in order to obtain the needed proof requested by hypothesis testing. However, the current measurement methods adopted in our experimental educational technology researches are so limited such as simple questionnaire survey and test. Few measurement tables are designed to examine students' development such as thinking development and emotional change. It is not precise in sampling design, measurement tool selection, and evaluation. The major cause of these problems is that researchers lack training of using and evaluating educational measurement tools.

1.7 More quantitative analysis and fewer qualitative analysis

Reasons of generation and development of educational technology phenomena are complicated. Answers to some questions can be provided through data collection, analysis and testing. Moreover, statistical analysis of these data can provide a clear formalized description for educational technology researches. This situation makes researchers adopt more quantitative analysis and fewer qualitative analysis when they do their educational technology researches. Qualitative researches focus on situational study, emphasize contexts, interpret the results and count on context of data collection. Qualitative researches can be conducted within a school, a class, a family or a certain natural context. Researchers observe the behaviors and activities within their natural context and describe these in their entirety from beginning to end. Qualitative researches are interactions between researchers and subjects, which interpret the "quality" of subjects in their entirety through long, deep and detailed experience. In qualitative researches, it takes researchers quite a lot of time to go into schools, families and society and investigate related problems. Away from the context, it is impossible to know connotation and significance of educational activities. As a result of eagerness to obtain research findings, it should be worried about time consumption and finance, simple and objective quantitative data analysis influenced by advance in information science, most current research articles tend to use quantitative research methods. Therefore, qualitative researches become rare. Although some teachers make some progress through their own efforts, their achievements are often characterized as experimentalism and unilateralism, low theoretical standard, lack of synchronic and diachronic comparison, and plain analysis of problems.

1.8 Simple statistical analysis

Selection of statistical methods is the key factor which affects the validity of statistical results. Without adequate fundamental knowledge of statistics, effective statistical analysis of experimental data can not be achieved, which makes data analysis inaccurate and simple. Statistical methods such as X^2-test, t-test, correlation analysis, regression analysis, multivariate analysis are seldom used by researchers.

2. Suggestions on developing experimental researches in educational technology

2.1 Project selection: Bottom-up selection

Most educational experiments including educational technology experiments are carried out by individual schools and universities. It is school authority that makes a decision or choice about the kind of experimental projects, which lack communications among schools and communications between the upper and the lower. The school authority gets to know a certain message of educational technology experiment from a journal or a symposium, and they are seized by a whim to do the research without feasibility reasoning only to be in fashion.

Some school authorities take educational technology experiments as a way to gain reputation of emphasizing scientific researches, obtaining promotion or dealing with examination of the higher-up, which results in lack of overall picture of project selection. Therefore, the process of experiments should be more scientific. Researchers need to hunt for projects in educational practice. Projects need to contain explicit hypothesis. A formal selection of projects should be achieved after reviewing literatures carefully and reasoning. This is what bottom-up project selection really means. In addition, in order to study the project better, project study group need to be set up among different schools so that project researches can be done through cooperation by exerting power of each individual school.

2.2 Various kinds of research training

Training can be divided into two categories. On the one hand, researchers are trained by means of seminars and symposiums; On the other hand, methods of doing researches are taught systematically including experimental theory, variables, procedures, testing, and special measures in order to make sure that each group members involved in the research project grasp the factors and keys of experimental methods.

2.3 Emphasizing experimental data

In the educational technology experiments, experimental records need to be objective. The selection of statistical data analysis needs to be suitable. When data can not root for the experimental hypothesis, the more valuable factors and unexpected results may be acquired by attributing to the right reasons, finding out the failure factors and analyzing deeply. Hence, no matter whether an experiment fails or succeeds, it is a meaningful attempt.

2.4 Controlling experimental process effectively

Educational experiments require more labor and constrained by experimental equipments and other conditions so that it is difficult to control phenomena and environment. Meanwhile, subjects of educational experiments are man so it is of great difficulty to control the process as strictly as that in natural science. In spite of that, researchers should have an explicit description of experimental process and control those manmade intervening variables, which may have a certain effect on experimental results. Therefore, such experiments have requirements on researchers or all the members attending the experiments. For example, some experiments require researchers who are proficient in related experimental techniques and well-trained. Some experiments need the assistantship among schools and related units. All in all, it is essential to ensure internal and external validity.

2.5 Combination of qualitative and quantitative researches

Qualitative and quantitative researches are not sharply separated but relying on each other, penetrating into each other, and complementary to each other. In fact, qualitative researches contain elements of empirical study. Qualitative and quantitative researches reflect the dialectic relationship between quality and quantity of an object. Quality and quantity of any object are always indispensable and unitive. Quality is based on quantity and quantity is of a certain quality. Qualitative study on an object may naturally lead to quantitative study of this object. Therefore, qualitative study and quantitative study are complementary to each other.

In the field of educational technology, quantitative and qualitative data analyses are two major domains. Qualitative and quantitative researches have their own characteristics and strengths. Researchers should not have prejudice on either of them and they should choose suitable research methods according to their own specialty and purposes. Combining qualitative and quantitative methods enable researchers to compare and test the results gained from two methods so that results could be more reliable.

2.6 Integration of various research methods

Every method has its own strength and weakness. Literature review, surveys, and content analysis are synchronic under most circumstances but experimental research methods are generally diachronic. In order to acquire relatively comprehensive data and materials, it is advisable to use various methods synthetically, such as questionnaire, interview, observation, literature study, case study, etc.

Take educational technology practice into consideration, we should analyze the problems and difficulties existed in the present experimental researches in educational technology and provide some suggestions which may have some limitations. In order to improve the development of experimental researches in educational technology and push forward educational technology, it is expected that fellow researchers in educational technology could exchange ideas.

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