Assessment and Evaluation Reform in Experimental Psychology Course from the Perspective of Integration of Labour Education and Practical Education: Implementation and Its Effect

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Abstract: Policies related to labor education and the reform of educational evaluation in the new era have been intensively released recently, which providing a policy basis for the teaching reform of learning evaluation for professional courses in colleges and universities. Under the background of these policies, this research investigated the implementation and effect of the reform of integrating labor education into practical education in the core compulsory course called Experimental Psychology at Linyi University. The reform focused on process evaluation of the teaching of experiments in the course, based on the reform ideas of "one integration, one change, and three trainings". The findings showed that the reform was of great significance for cultivating and improving undergraduates' innovative spirit and practical ability, which not only enable undergraduates to acquire rich content knowledge of software programming of psychological experiments, but also acquire the basic ability and skill to be competent in software programming.

1. Introduction

Experimental Psychology, with a total of 80 class hours and 4 credits, is one of the core compulsory courses of undergraduates in the Department of Education at Linyi University since the establishment of Applied Psychology major in 2005. It is a research methodology course to guide the application, research, and teaching of psychology, which plays a significant role in the course system of Applied Psychology major. The course has a history of 16 years and has been taught by three lecturers in turn. The author of this study, as the third lecturer, had been teaching this course since the second semester of 2013-2014, who had finished the teaching to the undergraduates majoring in applied psychology from 2012 to 2018 for seven turns, and had some good teaching performances, for example, Shandong Province-Level Third-class Prize of Teaching Competition of Young Lecturers in 2018.

However, in the past, there have always been some problems in assessment and evaluation of this course, such as over-reliance on the score of the final exam, and ignoring the performance of regular assignments. In fact, regular assignments, including experiments, are indispensable parts in cultivating the abilities of innovation and entrepreneurship, especially software programming in experimental psychology, which is very important for professional learning. Therefore, under the background of educational evaluation reform in the new era in China, how to further deepen the reform of learning evaluation of experimental psychology is an important issue that needs to be explored.

As we all know, educational assessment and evaluation in China are facing a comprehensive reform now. In October 2020, the Central Committee of the Communist Party of China and the State Council issued the "*Overall Plan for Deepening Educational Evaluation Reform in the New Era*" [1], which requires all departments to conscientiously "improve outcome evaluation, strengthen process evaluation, explore value-added evaluation, improve comprehensive evaluation", "strengthen labour education evaluation...enhance process evaluation, incorporate the performance

of learning and practice in labour education courses into the portfolios of students' comprehensive quality", "improve the academic evaluation system via organically combining process evaluation and outcome evaluation." From the perspective of labour education, the teaching of experimental design and implementation in experimental psychology course can be used as a part of labour education, because enough physical and intellectual activity is necessary for hands-on experiments. Meanwhile, software programming, which is helpful to conducting experiment, takes a long time and lasts for the whole semester, so it can be used as a part of process evaluation in practical education. In short, through the integration of labour education and practical education, this reform aims to achieve the long-term effect of the teaching of experiments. This ideology guiding our reform had also been supported, and affirmed by the latest policies in the field of labour education.

Policies related to labour education have been intensively released recently. Among all of the policies in the field of labour education, the most important one is the "*Opinions on Comprehensively Strengthening Labour Education in Primary schools, Middle Schools and Universities in the New Era*" issued in March 2020 [2]. The opinions clearly require: "Colleges and universities must clarify the main courses in which labour education can be integrated. Among them, the undergraduate-level course does not less than 32 class hours. In addition to the compulsory courses of labour education, other courses should organically integrate into the content of labour education, based on the characteristics of disciplines and majors." "Colleges and universities should focus on innovation and entrepreneurship through actively carrying out internship training, professional services based on different characteristics of disciplines and majors, …etc. Teachers should pay more attention to the application of new knowledge, new technology, and new methods, creatively solve practical problems, and enable students to enhance their sense of honesty and accumulate professional experience."

Based on this *Opinion*, the Ministry of Education further issued the "*Guiding Outline of Labour Education in and Primary schools, Middle schools, Universities (trial version)*" in July 2020 [3]. In order to put labour education into practice, the *Guiding Outline* elaborately introduced the basic concepts, objectives, contents, paths, components, evaluation, implementation, and guarantee of labour education in primary schools, middle schools, and universities. Among them, the requirements for universities of the *Guiding Outline* were generally consistent with the above opinions, and further emphasized: "Labour education should be organically incorporated into professional education, innovation and entrepreneurship education. ... Professional courses should be mainly combined with service learning, practical training, scientific experiments, social practice, graduation design, etc. in order to carry out kinds of labor practices. ... It is necessary to evaluate practice activities related to labor education in time in order to promote undergraduates' development."

Therefore, in higher education, labour education and practical education are closely related and integrated. For undergraduate students majoring in Applied Psychology, experimental psychology is the main course supporting labour education, which completely reflects the characteristics of the discipline of psychology and the major of Applied Psychology, such as emphasizing experiment and empirical spirits, and training undergraduates' solid abilities to do scientific research and innovation by hand-on "learning by doing". It organically incorporates labor education contents such as software programming training represented by new technology such as E-Prime 3.0 in psychological experiments, which is helpful to prepare students' abilities to solve practical problems creatively, and enhance scientific research ethics training, such as the virtue of honesty, and accumulate professional experience in psychological experiments research. In sum, it is policy-based, theoretically supported, and academic logical to design the teaching of experiments in experimental psychology course from the perspective of integration of labour education and practical education, which is of important significance.

2. Design of Assessment and Evaluation Reform in the Teaching of Experiments

2.1 Policy Basis of Reform

With the gradual deepening of educational evaluation reform in the new era, the requirements and assessment of undergraduates' abilities of innovation and entrepreneurship have become higher and higher. However, undergraduates majoring in applied psychology have traditionally received the training of demonstration-based experiments in Psykey^R system of the teaching of experiments, and had poor ability to independently and innovatively carry out design-based experiments and comprehensive experiments. Meanwhile, there was also a lack of assessment and evaluation of undergraduates' abilities to conduct experiments in an experimental psychology course. If things continue going on like this, it is bad to cultivating and training the abilities of undergraduates majoring in applied psychology to innovate.

Design-based experiments refer to experiments in which students design and implement the experimental schemes by themselves according to the given experimental objectives and conditions; comprehensive experiments refer to experiments in which the contents of the experiment involve the comprehensive knowledge of the course or the knowledge related to this course. As early as 2004, the Ministry of Education issued the "*Evaluation plan for undergraduate-teaching level in colleges and universities (trial version)*" [4]. This plan required the establishment of design-based and comprehensive experiments in the teaching of experiments, and clarified the proportions of both kinds of experiments. For example, if courses with comprehensive and design-based experiments accounted for $\geq$ 80% of the total number of courses using experiment method, and the effects were good, they were A level; similarly, if courses with comprehensive and design experiments account for 50% ~ 60% with good effects are C level.

Moreover, in 2014 and 2015, the Ministry of Education issued the "*Notice on constructing a National Model Center of the Teaching of Experiments*" for two consecutive years [5], which required strengthening the part of practical education. According to professional characteristics and talent training requirements, universities should increase the proportion of practical education and endow it with the necessary credits (class hours). In addition, universities should reform the contents, improve the conditions, and innovate the models of practical education through increasing the number of comprehensive and design-based experiments, and advocating self-chosen and collaborative experiments.

2.2 Logic and Design of Reform

Obviously, it can be seen that two policies above, specifically, the "*Evaluation plan for undergraduate-teaching level in colleges and universities (trial version)*" [4] and "*Notice on constructing a National Model Center of the Teaching of Experiments*" [5], had provided policy basis for the reform and design of assessment and evaluation in this study. According to the requirements of these two policies, we made the reform design called "one integration, one reform, and three trainings" (See Figure 1 for details) in order to solve the long-existing problems, such as lack of evaluation and assessment of abilities to conduct hands-on experiments in an experimental psychology course in our department.
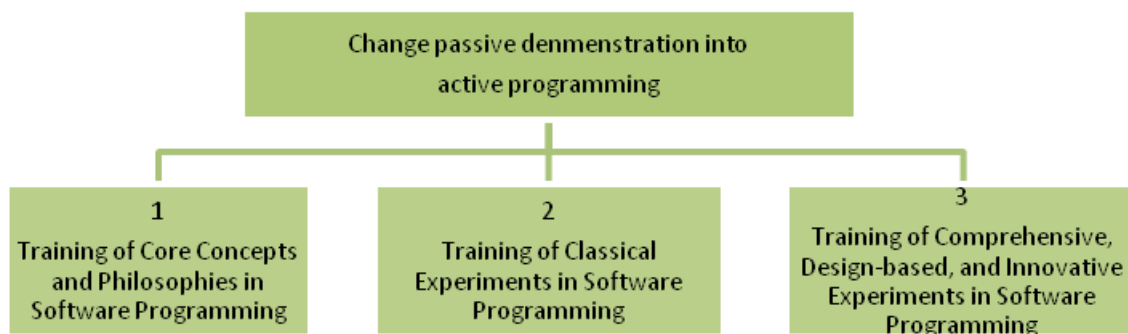

Fig.1 Design of Assessment and Evaluation Reform in the Teaching of Experiments

Let's explain the reform design in detail below. Firstly, the guiding ideology of the reform is to integrate labour education and practical education. Secondly, the core task is to "change passive

demonstration into active hands-on software programming of experiments", which is divided into three specific subtasks for targeted exercises and further evaluation across the whole semester, including: "Training of Core Concepts and Philosophies in Software Programming" (taking 5 class hours, and accounting for 20% of the total score), "Training of Classical Experiments in Software Programming" (taking 11 class hours, and accounting for 40% of the total score), "Training of Comprehensive, Design-based, and Innovative Experiments in Software Programming" (taking 11 class hours, and accounting for 40% of the total score).

3. Implementation of Assessment and Evaluation Reform in the Teaching of Experiments

3.1 Aims of Assessment and Evaluation

Through training the thinking and ability of undergraduates' software programming, the aims are to improve undergraduates' abilities to ask, analyze, and solve problems for better innovation and entrepreneurship.

3.2 Dimensions of Assessment and Evaluation

3.2.1 Assessing and Evaluating Core Concepts and Philosophies in Software Programming

Firstly, according to the principles of outcome evaluation, we introduced the core concepts and philosophies of E-Prime programming into the final examination because E-Prime is known to be the most powerful and flexible experiment generator. E-Prime^R is the most comprehensive software available for psychological and behavioral experiments research, which provides a truly easy-to-use GUI environment for computerized experiment design, data collection, and analysis. E-Prime provides millisecond precision timing to ensure the accuracy of your data. With the creation of your own computerized behavioral and psychological experiments, you can collect, edit and analyze your data conveniently.

In the class of the teaching of experiments, undergraduates were trained to draw an experimental procedure from big to small according to the logic, including experiment, session, block, and trial. Moreover, philosophies of E-Prime programming were taught in all aspects from variable control, experimental process, reaction record to statistical analysis of results. Lastly, three basic principles, including the principle of structure, model, and process, and four kinds of experimental design models, including parallel, serial, nesting, and balance model, were introduced to teach undergraduates a deep understanding of the content and form of experimental design, as well as the essence of variable control from a theoretical perspective.

3.2.2 Assessing and Evaluating e-Prime Programming Performance of Classical Experiments and Experimental Paradigms

The primary goal of this coure reform is to improve the teaching of the classical experiment for demonstration and verification E-Prime software programming teaching. In the previous experiment teaching system such as Psykey^R, undergraduates can only passively accept the experiments that have been done, and can not actively design and program them. However, in E-Prime software programming, undergraduates can reproduce the classical experiment paradigm again, which helps to consolidate and deepen the classical experiment procedure, furthermore, flexibly use it. Moreover, because the classical experiment designs are reproducible, they are more suitable for process evaluation. Therefore, this reform attempted to enhance process evaluation through software programming training of classical experiment, which is also in line with the policy requirements of "*Guiding Outline of Labour Education in and Primary schools, Middle schools, Universities (trial version)*" [3]. According to the new ideology of labor education evaluation under the guidance of the outline, we evaluated the process and effect of undergraduates' training performance of classical experiments.

Specifically, we use E-prime software to simulate the classical experimental design in the research fields of attention, memory, and emotion etc., in order to deepen our understanding of the classical experimental design, and lay a solid foundation for design-based and innovative

experimental research in the future. The focus of process evaluation is to emphasize the mastery of classical paradigms in the research fields of attention, memory, and emotion, as well as the deep understanding of between-subjects, within-subjects, mixed design, single-factor and multi-factor experimental design. After skillfully mastering these classic experimental paradigms, we can better use the theoretical knowledge we have learned to solve practical research problems.

3.2.3 Assessing and Evaluating e-Prime Programming Processes and Outcomes of Design-Based Experiments

This reform has also improved outcome evaluation via combining outcome evaluation with process evaluation. The gains across the whole semester are reflected by the processes and final E-Prime software program of the design-based and innovative experiments. It was required to submit an E-Prime software program of the design-based and innovative experiments at the end of the semester. This work can not be finished in a day, which required undergraduates to accumulate step by step in the whole semester. On the one hand, by evaluating the details of experimental design and the bugs of E-Prime program, we can judge undergraduates' ability to design and conduct experiments in the process of programming training, that is, the ability to make stimulus materials such as words, pictures, sounds and videos, and the ability to arrange experimental stimulus materials based on experimental design. On the other hand, by evaluating the quality of experimental report writing, we can evaluate undergraduates' summarize and reflection ability after finishing experiments, including statistical analysis of data, discussion of results, conclusion making, and so on.

3.3 Subjects of Assessment and Evaluation

Assessment and evaluation are mainly based on teachers' evaluation, supplemented by the combination of undergraduates' self-evaluation and peer evaluation.

4. Effect of Reform Implementation

Software programming training of comprehensive and design-based experiments is an important part of reform in the teaching of experiments. Generally speaking, this kind of training is of great significance to cultivate and improve undergraduates' innovative spirit and practical ability. Specifically, the expected outcomes have been achieved in terms of knowledge and abilities.

4.1 Acquiring Rich Content Knowledge of Software Programming in Psychological Experiments

Through the reform, undergraduates have understood the theoretical content knowledge of E-Prime programming in psychological experiments, such as three basic principles and four experimental design models. The interview suggested that undergraduates experienced increases in their interests and showed gains in content knowledge of software programming in experiments. During practicing experiments, undergraduates had the opportunity to reflect on the theory of experiments and E-Prime programming. This reflection has proven to be an effective pathway of increasing positive attitudes and interests toward E-Prime programming.

4.2 Acquiring the Basic Abilities Necessary to Software Programming in Psychological Experiments

With the implementation of the reform, undergraduates majoring in applied psychology have skillfully mastered the abilities to generate classical experimental paradigm, including: study-recognition paradigm, global-local paradigm, negative priming paradigm, Stroop color word interference paradigm, free recall paradigm, DRM paradigm, IAT paradigm, Go/NoGo paradigm, N-back paradigm, using E-prime to design questionnaire. Besides, undergraduates were prepared for designing their own experimental programs creatively and use the basic programming skills of E-prime to achieve this.

5. Conclusion

As a core compulsory course in Applied Psychology major, *Experimental Psychology* plays a significant role in the course system. Therefore, under the background of educational evaluation reform in the new era in China, we attempted to deepen the reform of learning assessment and evaluation of this course through integrating labour education and practical education. Our research provided qualitative data on the effect of the reform, and indicated that the reform had reached two goals: increasing content knowledge in software programming and improving basic abilities of experimental design and conduct.

Acknowledgement

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