



Integrated Teaching Reform of LRSPW Curriculum Based on Informatization Technology

Yang Zhao¹, Xiangrong Jiang^{2(✉)}, Yongling Wang¹, and Jianfeng Li¹

¹ School of Information Science and Engineering, Harbin Institute of Technology (Weihai), Weihai, China

{zhao.yang,yongling.wang,lijianfeng}@hit.edu.cn

² School of Marxism, Harbin Institute of Technology (Weihai), Weihai, China
jiangxr@hit.edu.cn

Abstract. “Internet+ mobile terminal” has been a major development trend in teaching informatization in the universities with the emergence of Web 3.0 technology. This paper provides an informatization teaching mode that aims to improve the innovative course of Literature Retrieval and Scientific Paper Writing (LRSPW) set up by the School of Information Science and Engineering at Harbin Institute of Technology (Weihai). Interactive teaching mode is carried out on the Rain Classroom Platform which is introduced to explain typical cases in the field of LRSPW. Besides, academic ethics, responsibility of scientific research personnel and innovative consciousness are gradually integrated in the course, in order to guide students to establish correct values of scientific research. Further, flipped classroom is employed for the students to deepen the understanding and application of key contents, which also can train the students’ ability of expression and cooperation. The practice results show that the integrated teaching mode proposed in this paper can effectively improve the teaching effect and the learning enthusiasm of students.

Keywords: information literacy · literature retrieval · academic paper writing · academic ethics · educational reform

1 Introduction

Education of information literacy for undergraduates is one of the main tasks of research-oriented university [1]. It is significant for cultivate information literacy to obtain and utilize information in an effective and efficient way [2]. Actually, there is obvious demand of information retrieval for the undergraduates due to their deep participation in scientific research projects. Hence, many universities have already offered the course of Literature Retrieval and Scientific Paper Writing (LRSPW) so as to help students master the skills of literature retrieval, and make them comprehensively and accurately obtain the target information from a large number of literatures [3]. Meanwhile, students are required to grasp the knowledge of scientific paper writing. Then, they can accurately summarize

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and express findings of the project in scientific language, which is helpful for writing and publishing academic papers. Hence, LRSPW is arranged as an innovative course, which is offered in the summer semester for the all-grades students in the Harbin Institute of Technology (Weihai). This will provide great help for students to engage in scientific research and write innovative papers. According to the analysis of the current teaching situation by authors, the existing problems mainly include three aspects. Firstly, the teaching form is mainly traditional teacher-centered mode. Thus, it lacks practical segment, which results in dull atmosphere and low participation of students in the classroom. Secondly, the teaching content excessively focuses on the introduction of various literature databases, and lacks operation and summary of retrieval methods. Finally, the education of academic morality is weakened due to insufficiency of understanding the importance of ideological and political education. In addition, since the final course report is selected as the form of course assessment, the attention of students is easily concentrated on the report rather than practice operation.

The current teaching results show that it is difficult for students to have a holistic cognition of the obscure theoretical knowledge and use it independently, due to the limitation of class hours and simplification of teaching mode. With the rapid development of information technology and its wide application in the field of education, diverse teaching means and platforms have been provided for teachers, which continuously make teachers promote development and innovation of teaching methods [4]. In the “Internet+” time, it is necessary for the teachers in university to explore the way to deeply integrate new idea and novel information technology with education and teaching reform [5].

In order to solve the problems above and improve autonomous learning ability of students, the software named Rain Classroom and a popular teaching model of flipped classroom are adopted as hybrid teaching tools, which greatly improves classroom participation of students. Further, academic ethics, responsibility of scientific research personnel and innovative consciousness are gradually integrated in the curriculum so as to make students establish correct values of scientific research. These attempts on teaching reform of LRSPW are demonstrated to be effective in improving the teaching effect and students' learning enthusiasm.

2 Informatization of Teaching Method

2.1 Rain Classroom Platform

In the context of “Internet+ education”, many smart teaching platforms have been applied to colleges and universities, and the platforms are innovative in teaching models and methods. Information technologies of cloud computing, mobile internet and big data analysis has been integrated into the rain classroom platform. Such platform provides the intelligent and data-based information support for all teaching processes, which greatly increases the teaching interaction and enriches the teaching process. The whole teaching process can be monitored and evaluated in way of real-time information push and interaction by using the rain classroom platform. Rain classroom integrates PowerPoint (PPT), MOOC (massive open online courses) and mobile WeChat by freely combining different teaching resources, giving teaching greater flexibility. For instance, it is convenient for teachers to insert questions, such as single choice questions, multiple

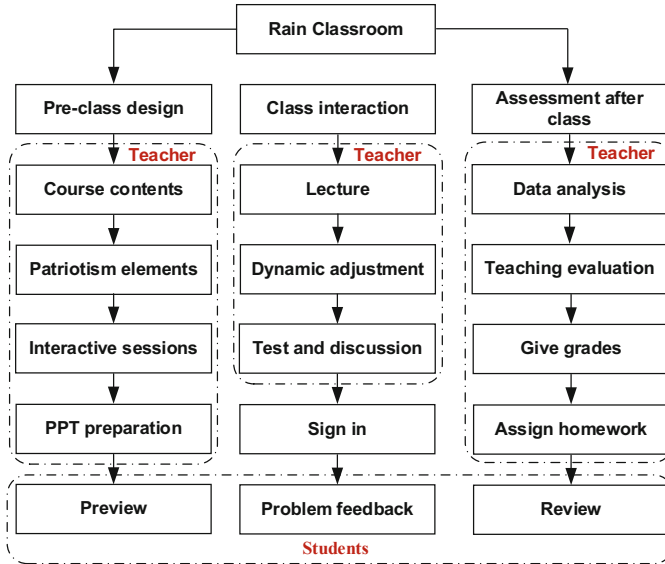


Fig. 1. Main function of rain classroom platform

choice questions, blank filling questions, subjective questions, etc. into the PPT, and upload test papers, homework, courseware, expansion materials by using the plug-in unit of rain classroom platform for PPT. Meanwhile, the main functions of the WeChat applet on the student side of the rain classroom include students signing in class, answering questions, sending bullets and marking PPT that they don't understand. A teaching mode in the whole process course is constructed by taking advantages of the intelligent and data-driven of rain classroom platform in present work (as seen in Fig. 1).

2.2 Contents of the Curriculum

The teaching contents of LRSPW mainly consists of 5 chapters, which are (1) Introduction; (2) Academic ethics; (3) Literature retrieval methods; (4) Writing requirements and methods of paper; (5) Paper submission preparation and precautions. The first chapter is the starting point for the integration of ideological and political teaching in this course. In this part, students need to know that academic papers are essentially the value embodiment of innovative labor of researchers in the process of implementing scientific research. Meanwhile, literature retrieval is a very important premise for the research activities. The second chapter aims to help students to understand and compliance with academic ethics in the form of specific cases. It is of great significance to cultivate their sense of patriotic and professional responsibility. Design of literature retrieval scheme, the writing method of academic papers and the teaching interaction of submission training are the main contents in the last three chapters. These contents play a role in training students to face scientific research challenges, project difficulties and career planning.

3 Teaching Reform Methods

One of main objectives in the undergraduate education is to cultivate the learning interest and problem-solving ability of students. Hence, the teaching reform on curriculum of LRSPW should focus on solving the following problems.

- How to cultivate ability of efficient literature retrieval and analysis for students.
- How to cultivate the dialectical thinking ability and opinion about value of scientific academic paper writing for students.
- How to improve ability to write academic papers for students.
- How to integrate the patriotism of serving the country with science and technology into curriculum learning for students.

Actually, the problems above are corresponding to the aims of the present work as seen in Fig. 2.

Thus, the teaching reform of LRSPW curriculum were carried out from three aspects, which are the teaching methods, teaching contents and evaluation methods, respectively (as seen in Fig. 3).

3.1 Adjustment of Teaching Contents

First step is to simplify and adjust the content of the original course. All the similar content in each chapter is adjusted to one chapter for systematic explanation. For example, the contents refer to literature review including journal papers, opening report and graduation thesis are introduced uniformly in one chapter. This part will take the introduction of common features as the main idea, and will be described in the way of specific differences. Then, typical articles and cases are analyzed so as to acquire a better understanding on the literature review.

Second step is to increase the description of literature screening and reading principles. The development of the Internet makes it easy for students to obtain a large amount

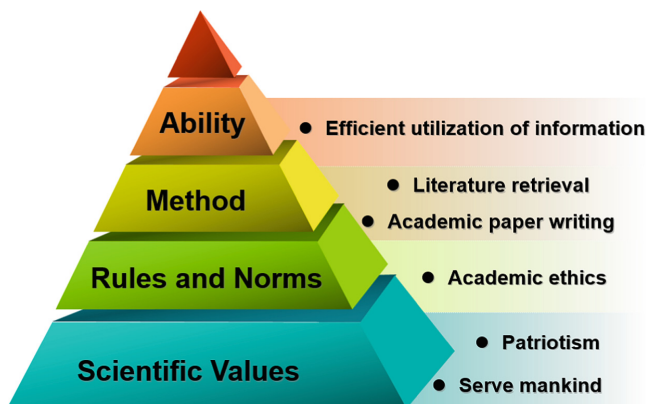


Fig. 2. Aims of the teaching reform for LRSPW Curriculum

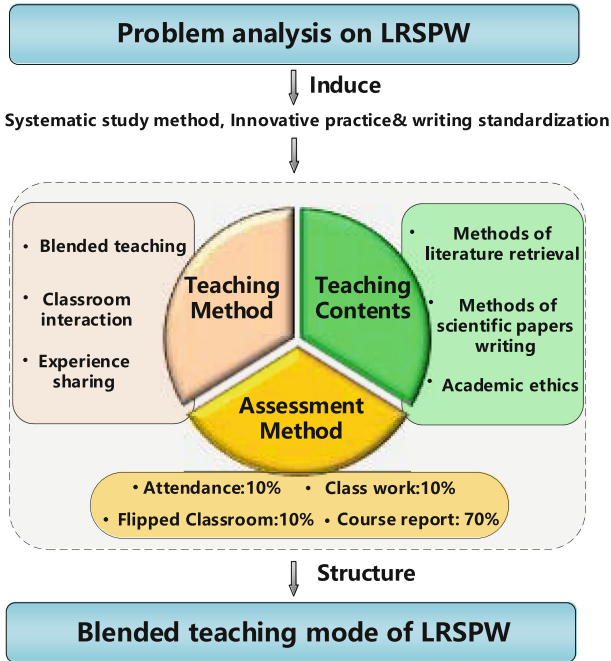


Fig. 3. Schematic diagram of research approaches and methods for LRSPW teaching reform.

of data. Hence, how to screen the required data, obtain reliable data, and track the latest research progress are quite significant but rather difficult for the students.

Third step is to add the introduction on typical cases of academic misconduct at home and abroad, especially in the falsification of experimental data and plagiarism of thesis.

Flipped Classroom is employed to train the students on their ability of expression and team work in the last part.

3.2 A New Structure of Curriculum Framework

Given that LRSPW includes many contents, the class hours of this course are relatively limited (16 class hours). Thus, three teaching modules are reconstructed based on the course content and the principle of personalized teaching.

- **Instruction session.** Heuristic teaching, case teaching, flipped classroom and interactive teaching are adopted for the students, according to the various contents such as the literature retrieval and reading methods, writing characteristics and precautions of Chinese and English academic papers, review and evaluation of academic papers, and academic ethics.
- **Flipped classroom session.** The students who choose the course are divided into several groups, and each group will set up a team leader. Then, the division of labor is carried out according to the contents of literature retrieval, information analysis,

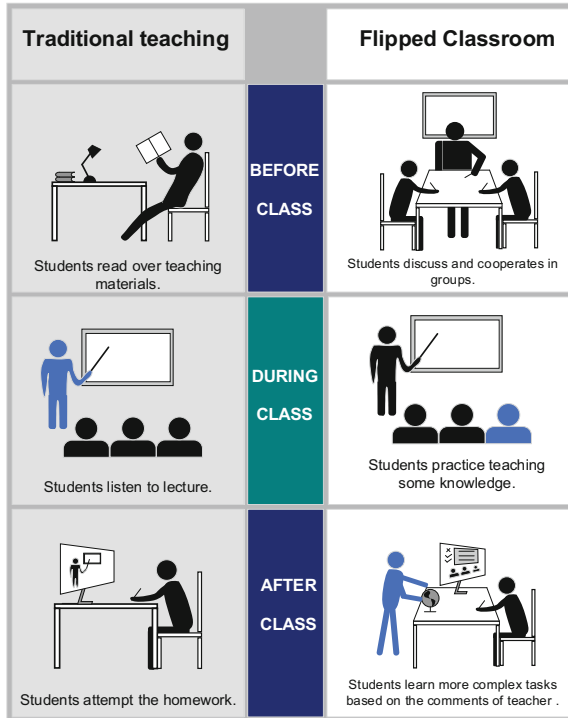


Fig. 4. Diagram of flipped classroom design for LRSPW teaching reform.

summary of knowledge point, and preparation of lecture notes. Next, the team leader will give the presentation on behalf of the whole group. Finally, the teacher will make a comprehensive comment about the presentation for each group, so that students can have a deeper understanding of the corresponded content (as seen in Fig. 4).

- Share and exchange session. Each team will introduce their own experiences and lessons in the process of cooperation, and how to efficiently carry out literature reading, preparation and reporting of PowerPoint. The team leader coordinates and organizes the writing of the exchange experience report, which is submitted to the teacher in the form of course assignments. Then, the teacher evaluates the students according to their familiarity with the literature and their performance in the flipped classroom.

3.3 Integrated Teaching Method

Teaching methods of LRSPW need to be more diversified, which is helpful to cultivate the ability of independent thinking and mutual communication for the students. The existing cramming teaching method restricts the transfer of knowledge and affect the teaching effect, especially for LRSPW that need practice. Hence it is difficult to satisfy the learning requirements of students. In the present work, the teaching methods are reformed as follows:

- Multimedia teaching plan method. To enhance the intuition of teaching and highlight the key points of course, multimedia teaching is selected as the primary means, for instance, the PPT, and blackboard writing is used as a supplementary. Especially, Rain class is adopted in the course of LRSPW. Rain class takes PPT and WeChat, which are the most familiar tools for teachers and students, as tools to provide a new interactive experience for the teaching process (as seen in Fig. 5). The process of using Rain class can be monitored by the big data means.
- Case teaching method. Students are guided to combine theoretical learning with practical operation in way of literature retrieval, literature analysis and tracking of the latest research progress according to their interesting subjects or undergraduate graduation projects. Then, the homework of some students who accomplish well will be selected as the typical case to be analyzed and explained in the class. In addition, the typical mistakes in the graduation thesis of former students were collected to explain as the demonstration, in order to intuitively and deeply understand and master the content of the course.
- Interactive teaching method. The teacher and students analyze and explain the same excellent homework, respectively. On the other hand, the student who accomplishes the homework well is invited to share his experience. At the same time, answer questions for students will be performed any time after class in online form, so as to deepen their understanding of the knowledge points of the course.
- Flipped classroom method. First, all the students are divided into several groups, and each group consist of 5 members. Next, various task based on the contents of LRSPW will be randomly assigned to all the group. Each group selects one person to explain the task in the form of PPT, and the other members are responsibility of literature retrieval, data collection and PPT design. After the students finish presentation, the

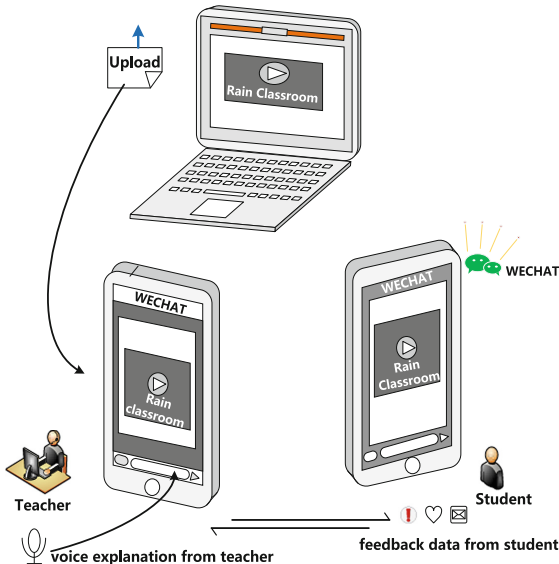


Fig. 5. Diagram of rain classroom platform

teacher guides the other groups to perform the discussion and comments, so that the students have a deeper understanding of the content in the course through the exchange of roles.

4 Conclusions

In the context of “Internet+ education”, utilization of smart teaching platforms has promoted developments of intelligent teaching mode. LRSPW is a course to cultivate ability of information utilization and academic paper writing for undergraduates, which plays an important role in promoting them to participate in scientific research. Hence, LRSPW is regarded as one of the important means of cultivating innovative talents in research-oriented universities. The study on the teaching mode of LRSPW is helpful to stimulate the interest in learning for students, which improve their ability on the collection, analysis and utilization of scientific research information. The integrated teaching mode has been proposed to learn the skill of literature retrieval and paper writing in the ways of interaction and participation between teachers and students, such as the typical case discussion, experience sharing and teamwork in the flipped classroom. Meanwhile, it was found that the use of rain classroom platform can improve learning willingness and self-study ability of students. Furthermore, the integrated teaching mode can bring students good experience and satisfactory results, compared with the ones for traditional teaching mode.

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