

The Practice and Effect of Journal Club Teaching Method in the Cultivation of Graduate Students Majoring in Biology

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Abstract: In order to help graduate students improve their research abilities more quickly, especially literature research ability, this research attempts to apply the Journal Club teaching method to the practice of graduate teaching and study its effectiveness. There are 30 academic master's students majoring in biology at the 2022 level of Jiangxi Science & Technology Normal University as the research object. The Journal Club teaching method in the "Frontiers of Life Sciences" course was implemented, and the graduate students' understanding and recognition of Journal Club were investigated through a survey questionnaire. The results indicated that graduate students had less understanding of Journal Club activities, but after the activities, their English expression ability has improved and their understanding of the latest scientific research progress has deepened. The study also found that after the Journal Club activity, graduate students clearly realized that a reporting time of 5-10 min was more appropriate, and the literature in their own research field was more conducive to scientific research. Moreover, selecting a review for reporting would benefit students the most and have the widest range of benefits. Finally, graduate students have also put forward some suggestions for Journal Club activities, which have certain reference significance for continuous improvement in the future. In summary, this method is feasible and effective in cultivating the scientific research quality of graduate students.

Key words: Journal Club; literature research ability; scientific research quality; graduate education

1. Introduction

Different from undergraduate education, the cultivation of scientific research quality is important to graduate education ^[1]. The traditional teaching model is mainly teacher-centered ^[2]. Therefore, exploring new teaching model is crucial to improving the scientific research quality of graduate students ^[3]. To cultivate the scientific research quality of graduate students, we should cultivate their ability to retrieve, read and analyze literature ^[4].

Journal club (JC) is a literature study model, also known as literature report or literature salon. It was first used in European and American medical graduate education. Later, it is defined as an educational seminar, which is a group of people regularly discussing the current literature together, usually around a defined topic, to promote a review of research in a certain field and discussing the application of current research for potential possibilities ^[5-8]. In recent years, due to the epidemic and other reasons, online JC and virtual JC have also appeared ^[9]. JC is

often used in postgraduate education to help students become familiar with frontier scientific literature in new fields of study as quickly as possible, improve understanding and discussion skills, and is especially helpful in cultivating critical evaluation skills. It is a commonly used academic method for communication methods and education in European and American universities^[10-11]. In China, more and more teachers apply JC in teaching^[12].

As a literature study model, JC plays a decisive role in graduate education^[13]. JC teaching method is an effective method to cultivate the scientific research quality and ability of academic graduate students^[14]. Du (2014) elaborated on the positive role that JC could play in the academic enlightenment stage of Chinese science graduate students^[15]. Wang *et al.* (2015) developed a teaching model that combines JC and progress discussion in postgraduate training^[16]. The teaching effect of this method mainly depends on the selection of literature content and the specific organizational form^[17]. At the same time, based on reading the latest literature, JC requires a certain timeliness, and should be completed under the guidance of the instructor^[18]. At present, many universities are exploring the application of JC in postgraduate education in different majors, which is a feasible and important way to directly improve the scientific research literacy of postgraduates^[12, 17].

Based on literature analysis, the role of JC in postgraduate training is summarized, which mainly includes the following three aspects. Firstly, JC helps to improve graduate students' scientific research interests and English expression skills^[3, 14, 16-17, 19-23]. Secondly, JC could improve literature acquisition and reading abilities, scientific research design abilities and data processing abilities^[22, 24]. Thirdly, JC is conducive to cultivating graduate students' comprehensive scientific research and innovation capabilities, exploring scientific research thinking and critical thinking, enhancing innovation awareness, which is conducive to improving the quality of graduate student training^[3, 12, 17, 19-27].

In brief, frontier scientific research is generally published in an international language, and JC can play an important role in the training of graduate students. To obtain the latest frontier progress, English comprehension and expression skill are also important. In order to help students learn to read literature, emerge new ideas from reading and prepare for their future research, JC teaching method has been adopted in the course of Frontiers of Life Science Research. On the one hand, it guided students to access to more English literature after entering the graduate stage, and on the other hand, it enables students to learn how to stimulate inspiration and form good ideas in discussions. Different opinions and ideas during the discussion process is more likely to promote thinking. Therefore, JC was attempted to carry out in the course of Frontiers of Life Science Research to enhance scientific research literacy such as professional English and literature retrieval. After implementing the JC teaching method, relevant experience was acquired to use for subsequent promotion.

2. Method

JC activity was arranged to report the latest progress in life science research in English, each student was required to select relevant and suitable literature to report on the research of their respective research groups. In details, tasks were assigned a few weeks in advance. To learn the preparation for reporting the latest research literature (including literature selection, English literature reading, etc.), the course discussion was arranged one week before the report.

The discussion involves preparation work, doubt, difficulty etc. Moreover, there is a brief questionnaire required to be completed before the discussion. The usual grades of the course are given in combination with oral reports and the mutual evaluation of students. The oral reports were scored by the teacher, and the student was evaluated as excellent by elected in QQ group voting. The effectiveness of JC teaching method was evaluated by the questionnaire survey.

It is worth noting that, to learn scientific research progress in the relevant fields quickly, the high-quality English literature in own research field, especially some review paper published in the formal academic journals in the past three years should be selected. On the one hand, there is a wealth of information which contributes to quickly gain an understanding of the field; On the other hand, the review is relatively easy to understand and suitable for the graduate students in the lower grade.

Questionnaire survey method was used to evaluate the implementation and effect of JC teaching method. To compare the difference before and after JC activity, two questionnaires were designed separately on <https://www.wjx.cn/>, and send the questionnaire link to the class QQ group before and after the course. Both two questionnaires included 12 questions, four of which were the same. The questionnaire is anonymous to confirm the authenticity of the data. Meanwhile, considering the limited number of students in this major, in order to further validate the data, JC would be spread in other science and engineering majors.

3. Results

3.1. Survey before JC activities

Firstly, a survey was conducted on “graduate students’ understanding of JC activities” (Table 1). Before launching JC, 88.89% of graduate students had read English literature, but only 40.74% had heard of JC (reporting on the latest literature progress) or seminar (reporting on personal scientific research progress) activities, and only 25.93% had participated; Only 44.44% were willing to report the latest literature progress in English. The main reason for their unwillingness to participate is that they could not express themselves, accounting for 70.37%; the second reason is that they do not dare to express, accounting for 33.33%.

Table 1 Graduate students' cognition of JC

Questions	Options	Proportion/%
Have you read English literature before?	Yes	88.89
Have you ever heard of JC (reporting on the latest literature progress) or seminar (reporting on personal scientific research progress) activities?	Yes	40.74
Have you participated in a JC or seminar event before?	Yes	25.93
Are you willing to report on the latest literature progress in English?	Yes	44.44

Secondly, it explored the types of literature that graduate students choose when reading literature and the purpose of reading. 70% to 80% of graduate students have mainly read experimental and review articles, followed by methods articles (Figure 1a). Graduate students hope to obtain content about experimental design ideas from English literature, followed by experimental methods and research progress (Figure 1b). The above data showed that there was currently little training in this aspect for postgraduate students and needed to be further strengthened.

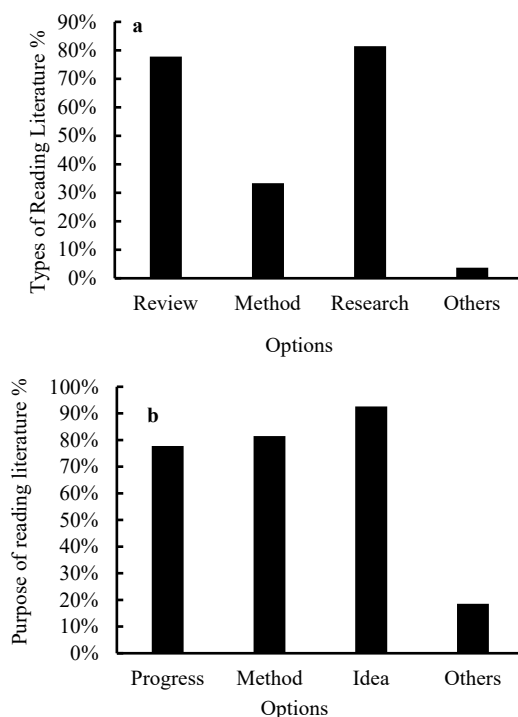


Figure 1 Types of literature selected for graduate literature reading and the purpose of reading

3.2. Survey after JC activities

Firstly, an investigation was conducted on “the role of JC in improving postgraduate students’ abilities”. The results showed that 83.33% believed that JC was helpful in improving their English expression ability, 62.5%, 29.17% and 12.5% respectively believe that JC was helpful in understanding the latest research progress, experimental design ideas and experimental

methods. Moreover, 79.17% of graduate students expressed their willingness to continue to participate in related activities in the future, indicating that graduate students recognized this activity and hoped to further improve themselves in the future.

Secondly, “the work that needs to be done before and after JC activities” was also investigated. The results showed that 54.17% of graduate students believed that they needed to be familiar with the pronunciation of professional English before JC activities, 37.5% believed that they also needed to be discussed on the selected literature whether it was suitable and have good quality (Figure 2a). After the JC activity, 62.5% and 16.67% respectively believed that it was necessary to collect unresolved questions during the activity and make suggestions for improvement (Figure 2b).

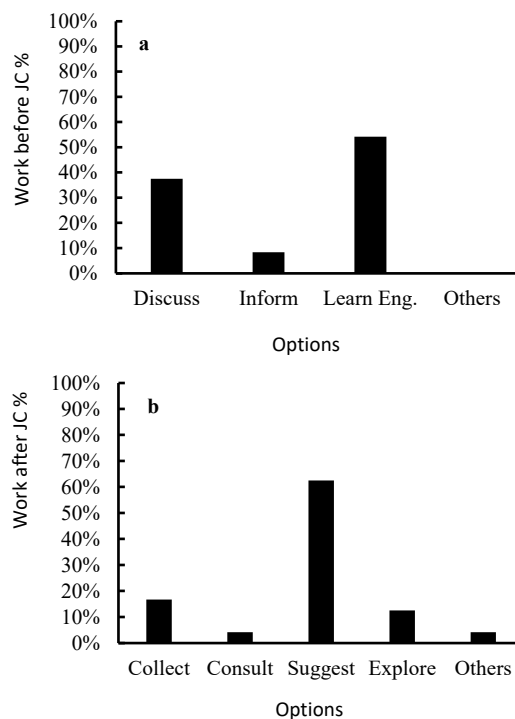


Figure 2 The work before and after JC activities

Thirdly, “the selection of content when reporting literature” was investigated. The results showed that during the JC activity, 79.17% of the graduate students believed that only the essential parts were selected in the report, and 12.5% believed that figures and tables were more important (Figure 3a). During the JC activities, 45.83%, 25%, 8.33%, 8.33% and 8.33% believed that the reported content should be included reference values, research ideas, experimental design, key results, and the shortcomings of the literature. (Fig. 3b).

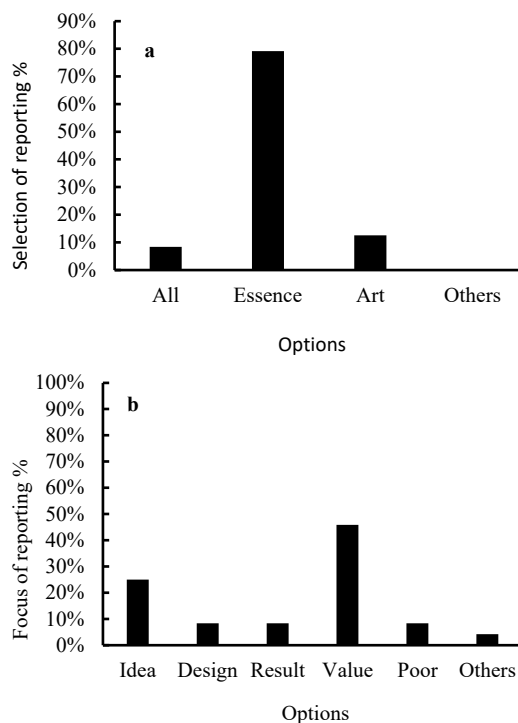


Figure 3 Selection of content for graduate student literature reporting

3.3. The differences before and after JC activities

In order to compare the differences before and after JC activities, the questionnaires set up four identical questions, aiming to understand the differences in postgraduate students' cognition of JC activities before and after JC (Table 2). For the question of "How long is the appropriate time for each student to report in JC activities?", 55.56% of the graduate students before JC thought that 5-10 min was appropriate, 37.04% thought 3 min was appropriate; while, after JC, 87.5% of the graduate students considered 5-10 min was more appropriate, and 12.5% considered 3 min was appropriate. Regarding the question of "what kind of literature to choose is more conducive to scientific research", 88.89% of the graduate students before JC believed that it was more conducive to scientific research to choose literature in their own research fields for reporting, 48.15% and 48.15% of graduate students respectively considered that top journals such as NCS could be chosen and the latest literature published in that year. After JC activities, 54.17% of graduate students believed that it was more conducive to scientific research to choose literature in their own research fields for reporting, 16.67% and 29.17% of graduate students respectively believed that they should choose top journals such as NCS and the latest literature published in that year. In a word, most graduate students believed that the reporting time should be 5-10 min, and they should choose literature in their own research field.

Regarding the question of "Which literature should be chosen for reporting, personal benefits will be greater?" before JC, 62.96%, 25.93% and 11.11% of graduate students respectively

believed that personal benefits would be greater if they choose literature review, experiment and method for reporting during JC activities. After the JC activities, 62.5%, 16.67% and 20.83% of graduate students respectively believed that choosing literature reports on reviews, experiments and methods would benefit them more. Regarding the question of “Which literature to choose for reporting, the benefits will be wider”, 85.19%, 40.74% and 40.74% before JC believed that reporting on literature review, experiment and method will benefit more. After JC, 83.33%, 50% and 45.83% of the graduate students respectively believed that they would benefit more from choosing literature review, experiments and methods for reporting. In brief, as the question about whether the benefits are greater or broader, review literature was the first choice whether survey before or after JC.

Table 2 The differences in graduate student cognition before and after JC

Question type	Questions	Options	Proportion before JC/%	Proportion after JC/%
Single choice	How long is the appropriate time for each student to report?	A. 3 min	37.04	12.50
		B. 5 min	29.63	45.83
		C. 10 min	25.93	41.67
		D. 20-30 min	3.70	0.00
		E. others	3.70	0.00
Multiple choice	How to select literature for reporting that is more conducive to scientific research?	A. NCS and other top journals	48.15	16.67
		B. The latest publications	48.15	29.17
		C. Top scientists'	25.93	0.00
		D. Own research field	88.89	54.17
Single choice	Which type of literature should you choose to report on that will benefit you more personally?	A. Reviews	62.96	62.50
		B. Methods	11.11	20.83
		C. Experiments	25.93	16.67
		D. Others	0.00	0.00
Multiple choice	Which type of literature should be chosen for reporting that would benefit a wider range of people?	A. Reviews	85.19	83.33
		B. Methods	40.74	45.83
		C. Experiments	40.74	50.00
		D. Others	7.41	0.00

3.4. Graduate students' suggestions for JC

Regarding JC activities, the postgraduate students' suggestions mainly include: more related activities can be carried out and the activity time can be extended appropriately; the general content that needs to be reported should be prescribed in advance; activities should be carried out throughout the entire course; the literature selected for reporting could be enriched, etc. Regarding how to systematically improve students' English expression skills, students'

suggestions before JC activities mainly included reading more aloud and listening more (such as English songs and movies, etc.), often using English to express their opinions, reading more English literature, practice the reporting on literature and communication with others etc. The main suggestions after JC included conducting short oral exercises and reading articles every day, appropriately organizing oral communication activities; reading English literature; watching videos of some reporting; speaking more, practicing more and expressing more; improving professional English abilities, etc. The above suggestions showed that graduate students had a positive attitude towards JC activities, but further improvement was needed.

4. Summary

The survey results showed that graduate students own less cognition of JC before JC activities, indicating that the current training for graduate students was too little and needed to be strengthened in the future. Secondly, a survey on the role and arrangement of JC was conducted after JC activities. The results showed that graduate students' English expression skills improved and they had a deeper understanding of the latest scientific research progress. At the same time, "the work that needs to be done before and after JC activities" was also investigated. The results showed that they needed to be familiar with English and also needed some communication and guidance in selecting literature before JC; the suggestions could be proposed to improve the report after JC. When reporting the literature, the essential parts, figures and tables only be selected, and the reference values and research ideas in the literature mainly be reported. Thirdly, the postgraduate students' cognitive differences before and after JC activities were investigated. It was found that after the JC activities, postgraduate students clearly realized that the reporting time of 5-10 min was more appropriate. It is more conducive to scientific research to choose literature in their own research fields. Review literature reports will benefit more and more widely. Finally, graduate students also put forward some of their own opinions on JC activities and suggestions on how to systematically improve students' English expression ability, which were significant for the continuous improvement.

In addition, there are several aspects that need to be noted when organizing JC activities. Firstly, the literature should be mainly selected some high-quality SCI published in recent years, and the content should be consistent with the determined theme (generally related to the research direction). Secondly, the control of reporting time, language expression ability and skills, accurate English expression, enthusiasm for participating in discussions and critical thinking are also important for the quality of postgraduate learning in the process of JC [17]. Thirdly, graduate students who give lectures must be well prepared, including in-depth interpretation of the literature, clear ideas for speeches and targeted questions. At the same time, participants should actively participate in the discussion [28].

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