



Research on the Innovation of the Cultivation Mode of Biology Postgraduate Students in Local Normal Universities — A Case Study of Xinyang Normal University

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Article History

Received: January 8, 2020


Revised: February 2, 2020

Accepted: February 10, 2020

Published: February 12, 2020

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Abstract

Postgraduate education is the highest level of education and the cradle of training high-level professionals in China. The quality of postgraduate training is the lifeline of postgraduate education, which determines the potential of the country's future economic and social development and the competitiveness of talents. With the continuous expansion of the national graduate enrollment scale, it is of great theoretical and practical significance for local normal universities to cultivate biological professionals to adapt to the development of life science and social needs, and to explore a new model for the cultivation of biological postgraduate professionals. In the past 14 years, the College of Life Sciences of Xinyang Normal University has been focusing on the construction of "Supervisor-Team-Discipline", determined to improving the theoretical quality and practical ability of postgraduate students, that is, "One center, Two improvements" of the new model of training biological postgraduate students, which has important theoretical significance and potential application value for the continuous improvement of teaching quality of biological postgraduate in education.

Keywords: Biology; Postgraduate; Personnel training; New model.

1. Introduction

1.1. The Scale of Postgraduate Enrollment Continues to Increase

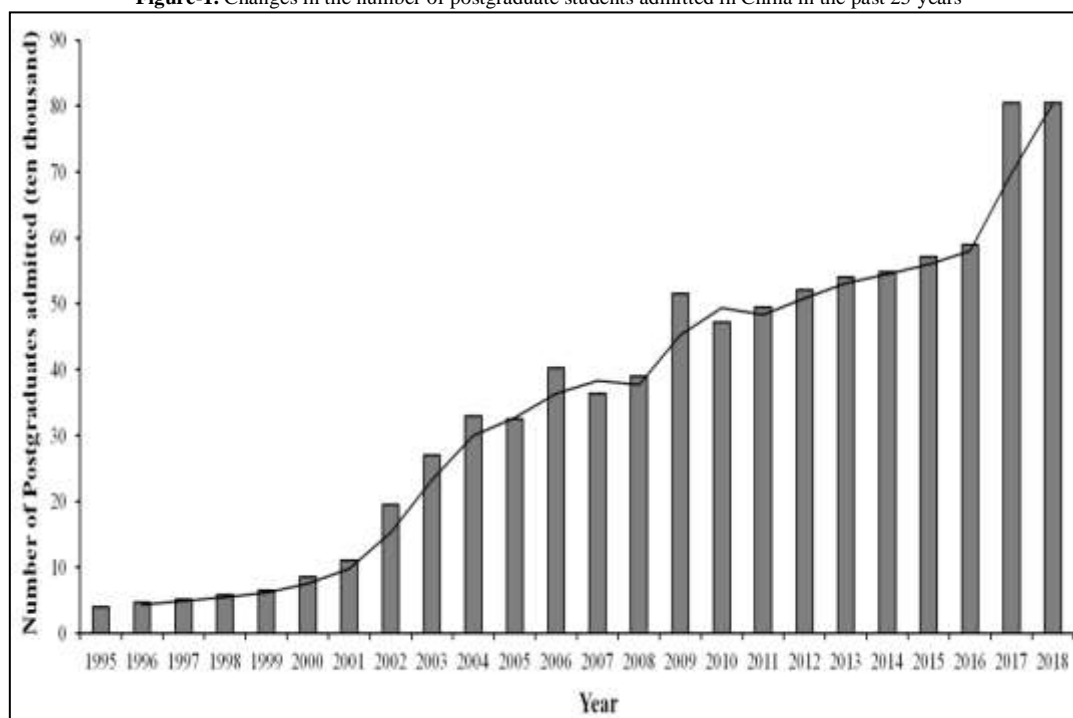
The outline of national medium and long term education reform and development plan (2010-2020) points out that: education is the cornerstone of national rejuvenation and social progress, and the fundamental way to improve national quality and promote the all-round development of human beings. Education is the cornerstone of national rejuvenation and social progress, and the fundamental way to improve national quality and promote the all-round development of human beings. Postgraduate education is the highest level of national higher education in China and the cradle of training high-level professionals (Cao, 2019; Xu *et al.*, 2018). At present, postgraduate students are the new force of scientific research and innovation in various countries at home and abroad, and also the main force of scientific research development and progress in various countries in the future (Li *et al.*, 2018; Wang *et al.*, 2017). Therefore, the quality of postgraduate education is the lifeline of postgraduate education, and determines the potential of the country's future economic and social development and talent competitiveness.

As described in the report of the 19th National Congress of the Communist Party of China, China has entered a "new era", with endless theoretical innovation and endless practice. Scientific and technological innovation is the first driving force leading social and economic development. To further deepen the reform of the scientific and technological system, establish a technological innovation system of "production, learning and research" in-depth integration and coordinated development, cultivate and cultivate a large number of strategic scientific and technological talents with international level, leading scientific and technological talents and young scientific and technological talents, and realize the connotative development of higher education, are the new requirements and new call of the new era (Li *et al.*, 2018). Higher education institutions are one of the main bodies of the national innovation system. Postgraduate education is the highest form of higher education in China (Min *et al.*, 2016; Yu *et al.*, 2013). Its essential purpose is to cultivate high-level talents in line with China's national conditions.

In order to meet and adapt to the requirements of the development law of postgraduate education and the needs of the rapid economic and social development, the scale of postgraduate enrollment in China is gradually expanding. Since the resumption of postgraduate enrollment in 1978, great achievements have been made in China's Postgraduate Education: the system of various disciplines has been improved reasonably, the types of degrees have been diversified comprehensively, the quality of the supervisor team has been improved gradually, and the conditions for training postgraduate students have been improved significantly (Zhang, 2017). Especially since 1999, the scale of postgraduate enrollment in China has expanded year by year, and postgraduate education has entered a stage of rapid development (Figure 1). According to the data of China Education online, from 1999 to 2006, the enrollment scale of master's degree candidates in China kept a rapid growth for seven consecutive years. Among them, the enrollment has increased by 4.99 times, which is very rare in the history of master's education in the world.

According to the data of the national education development statistical bulletin, in 1994, only 41718 postgraduates were enrolled in China, but by 2012, 517200 postgraduates were enrolled in China. In 2019, the enrollment scale of postgraduates is expected to break through 800000 again. Therefore, in 2019, the number of postgraduate students in China will reach a new high of nearly 20 years, which indicates that the scale of postgraduate student enrollment in China is still expanding.

Figure-1. Changes in the number of postgraduate students admitted in China in the past 25 years

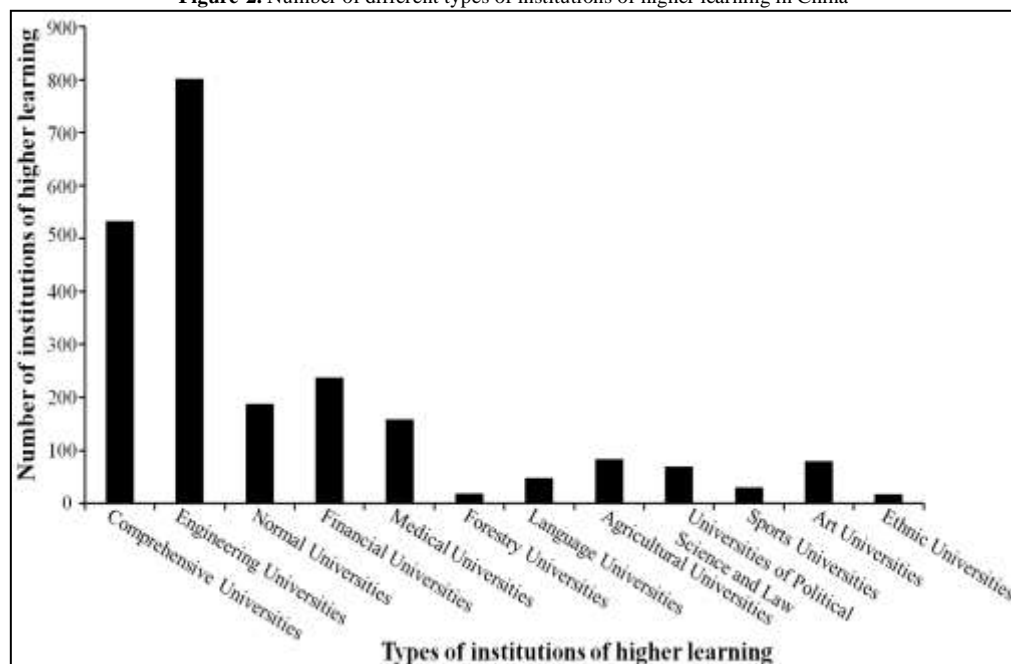


2. Local Normal Universities Play an Important Role in the Process of Postgraduate Training

With the gradual expansion of the enrollment scale of postgraduates in China, the number of postgraduates admitted by various colleges and universities is also increasing year by year, but the quality of postgraduate education has not been improved with the increase of enrollment, on the contrary, it shows a downward trend (Wang and Fan, 2016; Zhou *et al.*, 2010). In the 21st century, the most important thing is the competition of talents. Talents are the first resource. Whoever has high-quality, high-quality and innovative talents can lead the future (Yu *et al.*, 2013). According to the data released by the Ministry of education, as of June 15, 2019, there are 2956 institutions of higher learning in China, including 2688 ordinary institutions of higher learning (including 257 independent colleges) and 268 adult institutions of higher learning. There are 815 postgraduate training institutions in China, including 578 universities and 237 scientific research institutions. It can be seen that colleges and universities are the main positions of postgraduate training in China. Among ordinary colleges and universities, the total number of engineering colleges, comprehensive colleges and financial colleges are ranked in the top three respectively, and the total number of normal colleges and universities is ranked in the fourth (Figure 2). Among the nearly 200 normal universities in China, except for the six normal universities directly under the Ministry of education, the vast majority of other universities are local normal universities (Zhang and Wang, 2017). These large numbers of local normal universities play a very important role in the cultivation of postgraduate talents in China.

In recent years, with the annual expansion of postgraduate enrollment in local normal universities, it is urgent to improve the training quality of normal postgraduate students, adapt to the diversity of social development demand for high-level innovative talents, and avoid the homogenization tendency of postgraduate training in similar normal universities (Xiong, 2007; Yang *et al.*, 2015; Zhang, 2017). At the same time, it is necessary to encourage local normal universities to explore and reasonably build a unique talent training model for postgraduates, actively cultivate high-level and high-quality talents and their teams (Xu *et al.*, 2018), and strive to achieve the goal of using the best tutors to cultivate better postgraduates. Therefore, we should build a new type of postgraduate training model, and cultivate a high-quality postgraduate talent team with strong innovation ability, solid theoretical foundation, outstanding practical ability and the ability to meet the requirements of the current economic and social development, it is one of the main goals of postgraduate training and education in local normal universities.

Figure-2. Number of different types of institutions of higher learning in China



3. The Training Mode of Postgraduates Need to be Improved

Under the guidance of certain educational concepts, the talent training mode of postgraduates adopts specific training mode to achieve specific training objectives (Wang and Xu, 2009; Yu *et al.*, 2013). There are many training processes for postgraduates, including the selection of students, the determination of training objectives, the cultivation of curriculum outline and training program, the opening report, the mid-term assessment, the guidance and evaluation of academic papers, the defense of graduation papers and the award of degrees and other important links (Li and Zhang, 2011; Liu *et al.*, 2017; Wu, 2010; Zhang, 2010). In the process of postgraduate training in China's colleges and universities, the personnel training mode is not the same. Different types of colleges and universities have obvious differences in the emphasis of the training mode in the process of postgraduate training.

At present, the training mode of postgraduates at home and abroad can be divided into "curriculum mode", "apprenticeship mode" and "curriculum + thesis mode" (Isaac *et al.*, 2018; Pacifico *et al.*, 2018; Peng and Lin, 2010; Sun, 2009; Tabin *et al.*, 2018). The postgraduate talent training mode based on the "course mode" is represented by the University of Maryland and other universities in the United States: Western universities such as the University of

Maryland require postgraduate students to obtain master's degree after completing the specified courses and passing the corresponding course examination, instead of writing and reviewing the master's thesis, the master's postgraduates who are really engaged in scientific research ability training are all arranged for training and training in the doctoral stage (Pacifco *et al.*, 2018; Tabin *et al.*, 2018). The "apprentice mode" is a relatively traditional vocational education mode in Western European universities, represented by Western European institutions of higher learning (Coker *et al.*, 2018; Ran *et al.*, 2018), during reading, students are required to participate in the scientific research work such as related topic experiment, data collection, sorting and analysis, and act as assistants for tutors, Under the guidance of the tutor, finish the writing of the graduation thesis, submit the graduation thesis and carry out the expert review, and obtain the corresponding degree through the defense.

On the premise of learning from the experience of foreign excellent universities, Chinese colleges and universities have put forward the current "curriculum + thesis mode" (Chen *et al.*, 2018; Zhao *et al.*, 2012). "Course + thesis mode" requires postgraduates to not only learn several courses of public degree, professional degree and non degree courses, but also participate in scientific research projects for scientific training, collect and sort out data, write graduation thesis, and obtain the degree after the defense of the thesis (Liu *et al.*, 2016; Zhao *et al.*, 2012). Through the comparative analysis of the three postgraduate training modes of "curriculum mode", "apprenticeship mode" and "curriculum + thesis mode" (Hu, 2016; Ma and Liang, 2018; Xiang, 2006), it can be seen that the training mode of "scientific research training" or "scientific research + practice training" is the main mode of domestic postgraduate training, which needs to be improved.

4. Problems in the Cultivation of Biology Postgraduates in Local Normal Universities

The 20th century is an era of rapid development of life science, especially in the last 20 years of the 20th century. The rapid development of life science and its related technologies is remarkable (Ran *et al.*, 2018; Von and Rosander, 2018). The 21st century is the century of life science, which will become the leading discipline of Natural Science (Itziar *et al.*, 2019; Tian *et al.*, 2019; Zhang, 2018). With the rapid development of life science and its related technologies, the demand for biological postgraduates is also changing dramatically, and the scale of cultivation of biological postgraduates in China is also increasing (Fan *et al.*, 2019; Wang *et al.*, 2019). Under the background of "double first-class" construction, how to cultivate high-quality biological professionals to adapt to the development of life science and social needs has become an important issue for the managers and researchers of Higher Education (Guo, 2016; Zhou B., 2008). However, the diversity of social needs and the characteristics of the development of biology discipline determine the importance and urgency of the talent training mode and education reform of biology postgraduate.

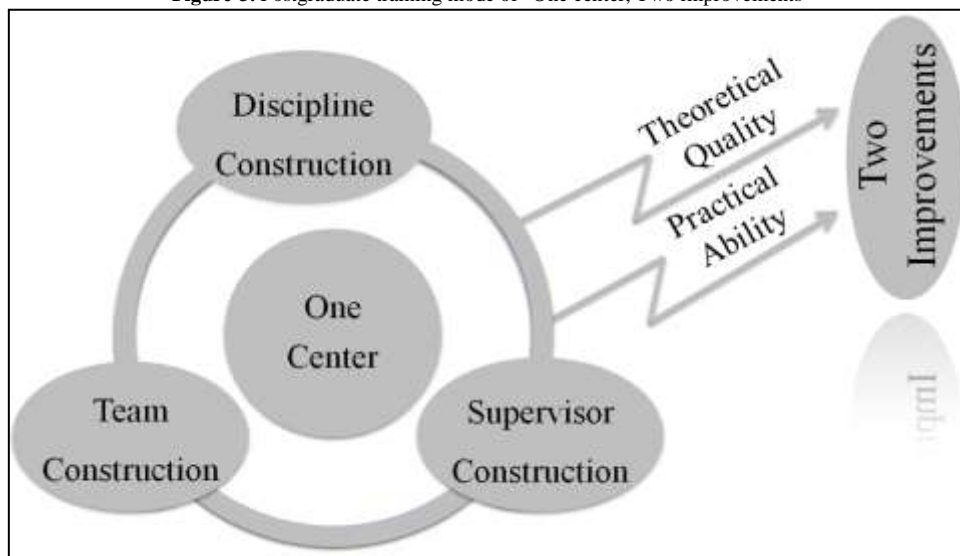
According to the spirit of the Ministry of education's opinions on improving and strengthening the construction of postgraduate courses (JY[2014] No. 5) and notice on the demonstration, implementation and disclosure of relevant information of the pilot work plan for the construction of postgraduate courses (JYSBZ No. 20150302) and other documents, The main problems in the cultivation and education of biology postgraduates in local normal universities are as follows: (1) the cultivation goal of postgraduates is relatively single, and the adaptability of high-level postgraduates is not strong, which is mainly manifested in the lack of innovation ability of postgraduates, which seriously affects the sustainable and healthy development of Biology postgraduates education; (2) In the cultivation mode of biology graduate students, there are some shortcomings in the former single tutor cultivation mode. The time investment of single tutor for postgraduate students is limited, and the opportunities of academic exchange between students are less; (3) Biological postgraduate tutors tend to pay more attention to theoretical research, and lack of specific practical guidance from production enterprise science and technology workers in the process of postgraduate training (Ding and Zhang, 2019; Ding *et al.*, 2019; Li *et al.*, 2019; Ren and Chen, 2019; Zeng and Pan, 2019). The lack of innovation ability of postgraduate students is a common problem in postgraduate education at present, which is manifested in a series of urgent problems to be solved, such as the lack of high-quality academic achievements, the inability to solve scientific problems in scientific exploration, the insufficient participation in scientific practice, the decline in the quality of academic papers and the small number of awards (Gao *et al.*, 2019; He *et al.*, 2019; Liu *et al.*, 2012; Wang and Xu, 2009). These problems are not conducive to the cultivation of theoretical literacy and practical ability of postgraduates, and can not fully meet the needs of postgraduate training (Gao *et al.*, 2019; Liu *et al.*, 2012). The core task of postgraduate education is to cultivate high-level innovative talents. Therefore, in the process of postgraduate training, it is particularly important to innovate the mode of postgraduate training and further strengthen the cultivation of theoretical literacy and practical ability.

5. A New Mode of Cultivating Postgraduates of Biology in Xinyang Normal University

Combined with the work practice of the school of life sciences of Xinyang Normal University in postgraduate training and education management in the past 14 years, the new mode of postgraduate training gradually constructed "One center, Two improvements" postgraduate talent training mode . To explore the construction of "Supervisor-Team-Discipline" as the center, focusing on improving the theoretical quality and practical ability of postgraduate students. The biggest characteristic of the new mode of postgraduate training is that it can combine postgraduate training with subject construction, supervisor team construction and tutor guidance team construction, so that the achievements in subject construction and scientific research can be effectively transformed into resources for postgraduate education and training. At the same time, it improves the teaching methods, the quality of

graduation thesis and teaching practice in the process of postgraduate training, so as to effectively improve the quality of postgraduate training and promote the high-quality postgraduate training.

Figure-3. Postgraduate training mode of "One center, Two improvements"



5.1. Strengthen Discipline Construction and Promote the Quality of Postgraduate Training

In the past five years, the College of life sciences of Xinyang Normal University has achieved a historic breakthrough and leap in discipline construction, with discipline construction as the leader, scientific research as the guide and talent team construction as the key. The overall discipline construction level of the college has been significantly improved. Focusing on the key links such as the introduction of high-level scientific and technological talents, the cultivation of innovative talents, scientific research and scientific research management, the college has continuously strengthened the construction of biology discipline. At present, the college has a provincial key discipline of biology, forming five distinctive discipline directions, including botany, genetics, biochemistry and molecular biology, zoology and microorganism and bioengineering. Based on the advantages of regional resources in Dabie Mountain, the college has organically integrated multiple disciplines and successfully approved the provincial advantageous discipline group of "protection and utilization of agricultural biological resources in Dabie Mountain". The measures taken for the introduction, training and scientific research and development of high-level scientific and technological talents, as well as the summary of specific practices and experience in discipline construction, have effectively promoted the quality of postgraduate training in the past five years in the College of life sciences, which provides important information for the overall improvement of postgraduate training quality in the future.

5.2. Strengthen the Construction of Supervisor and Promote the Quality of Postgraduate Training

The quality of postgraduate education is the lifeline of postgraduate education, and the level of postgraduate supervisor is one of the key factors to determine the quality of postgraduate education. In the past five years, the school of life sciences of Xinyang Normal University has adhered to the selection criteria of postgraduate supervisors, and strictly carried out the selection of postgraduate supervisors. A total of 35 outstanding doctors have been employed as postgraduate supervisors in biology. At the same time, it further standardizes the employment procedure and system of postgraduate supervisors, and provides supervisors for new tutors to help improve their education and teaching methods and constantly improve their teaching quality. Support a group of young tutors to visit and study in key universities or scientific research institutes at home and abroad, update knowledge and education concepts, and promote the steady improvement of tutor guidance level. By comprehensively summarizing the experience in selecting and employing tutors, updating knowledge and education concepts, improving education and teaching methods, and combining the theoretical quality and practical ability of postgraduate students in study, through comparative analysis, it is found that the construction of tutors has a significant role in promoting the theoretical quality and practical ability of postgraduate students, which is of great value to the construction of supervisor team and the improvement of postgraduate students' training quality.

5.3. Strengthen the Construction of Supervisor Team and Promote the Quality of Postgraduate Training

The establishment of the collaborative guidance team of postgraduate supervisors is conducive to opening up the academic vision of postgraduate students, strengthening the academic exchange of postgraduate students, cultivating their sense of team cooperation, innovation ability, innovation thinking and innovation spirit, and promoting the improvement of the comprehensive ability of postgraduate students. In the past five years, the school of life sciences of Xinyang Normal University has taken concrete measures, such as establishing the mechanism of collaborative

innovation and mutual exchange between tutors, building the knowledge structure system of supervisor team, building the platform of exchange and communication, and building a scientific management system, continuously strengthen the construction of postgraduate supervisor team and academic echelon. A comprehensive survey of postgraduate students and postgraduate students is carried out to analyze the effect of supervisor team building on the improvement of theoretical quality and practical ability of postgraduate students, and to find the shortcomings of the current tutor collaborative guidance team. Therefore, it is necessary to further analyze the reasons and propose improvement measures in order to further strengthen the construction of postgraduate supervisor team.

5.4. Build a New Mode of Postgraduate Training of "One center, Two Improvements"

According to the experience of postgraduate training in the past 14 years in the school of life sciences of Xinyang Normal University, combined with the actual situation of "Supervisor-Team-Discipline" construction as the center, which has been explored in the past 5 years, the construction of discipline construction, postgraduate Tutor and tutor collaborative guidance team has been continuously strengthened, Through the combination of questionnaire, in-depth interview, discussion and field visit investigation, the paper makes a multi-dimensional and systematic investigation and Analysis on the cultivation mode of "One center, Two improvements" for biological postgraduate students, further innovating the cultivation mode of postgraduate students, and continuously improving the theoretical quality and practical ability of postgraduate students. Therefore, the new mode of "One center, Two improvements" can make full use of the advantages of discipline, tutor and tutor guidance team, and can promote the cultivation of postgraduate students with characteristics, representativeness, and promotion and application value.

6. Summary

The quality of postgraduate training is the lifeline of postgraduate education. Local normal universities play a very important role in the process of postgraduate training in China. With the continuous expansion of graduate enrollment in China, it is of great theoretical significance and application value to scientifically construct a new mode of high-quality talent training for biological postgraduate students and continuously improve the quality of postgraduate talent training. According to the experience of postgraduate training in the past 14 years in the school of life sciences of Xinyang Normal University, combined with the actual situation of "Supervisor-Team- Discipline" construction as the center, which has been explored in the past 5 years, the construction of discipline construction, postgraduate supervisor and supervisor collaborative guidance team has been continuously strengthened, furthermore, a new talent training mode of "One center, Two improvements" for biology postgraduates is constructed. To some extent, this mode can make up for the deficiencies in the current biological postgraduate training process, and enrich the theoretical system of local biological postgraduate training mode in normal universities. Therefore, under the new mode of "One center, Two improvements" biological postgraduate talent cultivation, further strengthen discipline construction, supervisor and team construction, and promote high-quality postgraduate training, it can provide practical reference for local normal university postgraduate education to go on a standardized and systematic way.

Acknowledgments

This work was financially supported by Postgraduate Education Reform Project of Henan Province (2019SJGLX088Y), The Training Plan of Young Backbone Teachers in Colleges and universities of Henan Province (2019GGJS162), Special Research Project of Teacher Education Linkage Development Community in Southern Henan (2019-GTTYB-01), Research Project of Teacher Education Curriculum Revolution of XYNU (2019-JSJYYJ-10), Research and Practice Project of Education and Teaching Reform of XYNU (2019032) and Postgraduate Research Innovation Project of XYNU (2018KYJJ47).

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