



Research on the Impact of COVID-19 on Postgraduate Cultivation

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Abstract. The paper mainly studies the impact of the COVID-19 on the process of cultivating postgraduate and the teaching mode of postgraduate courses. Through research, it is found that 80.58% of the postgraduate's learning and research were greatly affected during the COVID-19. The main reasons for the impact are insufficient communication, poor learning and research conditions, and poor psychological state. Based on the research on the teaching mode of postgraduate courses during the COVID-19, 68.97% of the students approved the online and offline mixed teaching mode, and the rest 31.03% chose to complete independent learning.

Keywords: COVID-19, Postgraduate Cultivation, Teaching Mode.

1 Introduction

Postgraduate education bears the critical responsibility of cultivating high-level talent and innovating knowledge systems. It serves as a vital cornerstone for national development and societal advancement, and forms the foundation for addressing global talent demands [1]. Moreover, by enhancing innovation capabilities, postgraduate education indirectly fosters national economic growth [2]. Given China's demand for postgraduate talent and the pace of scientific and technological advancement, enhancing the cultivating postgraduate process and promoting high quality graduate education have become focal points for scholars involved in graduate training and education [3,4]. The cultivating postgraduate process encompasses academic discussions, coursework, scientific research, scholarly exchanges, professional practice, and environmental adaptation. Master's students' self-assessment, personal experiences, and educational journey are pivotal elements of their training. The COVID-19 pandemic, which began in 2019 and concluded at the end of 2022, posed significant challenges to the cultivating students from the 2017 to 2022 cohorts, particularly those in engineering disciplines requiring extensive practical instruction.

2 The Impact of the Covid-19 on the Cultivation Process of Postgraduate

In the process of graduate training, from academic discussions to professional practice, and even adapting to the learning and working environment, mentor guidance is indispensable. During the 2020-2022 period, interactions between postgraduate and mentors relied on remote communication tools, fundamentally altering the mentor's guidance methods. However, online communication via remote tools lacks nonverbal cues such as facial expressions, body language, and tone, as well as direct interpersonal contact. This can lead to misunderstandings or incomplete understanding of information on one hand, and on the other hand, it is challenging to establish trust and deep interpersonal relationships. Meanwhile, during the graduate training period, first-year and second-year students relied heavily on their mentors' guidance for research content and direction. Therefore, we conducted a survey among 139 first-year and second-year master's degree students and found that 97.84% of them believed that the COVID-19 pandemic had varying impacts on their learning and research. The statistical data is presented in Table 1.

Table 1. The impact of the COVID-19 on learning and research.

Impact level	Serious	Significant	Some	Minor
Number of people	38	74	24	3
Percentage%	27.34	53.24	17.27	2.16

In order to investigate the reasons for the impact of COVID-19 on learning and scientific research, and to further investigate how to minimize the impact of COVID-19 on postgraduate training, we further surveyed 139 students about the specific factors affecting their research and learning. The results are shown in Table 2.

Table 2. Factors affecting post postgraduate s' learning and research during the COVID-19 epidemic.

Impact Factor	Ineffective communication and discussion with the advisor	Lack of communication among classmate	Unable to perform scientific experiments	An unfavorable learning environment	Poor psychological state
Number of people	54	49	61	92	57
Percentage%	38.85	35.25	43.88	66.19	41.01

There are many factors that affect the academic achievement of master's students. Research indicates that the frequency and quality of mentor guidance significantly impact the cultivation of postgraduate [5]. Adequate communication and guidance are instrumental in fostering high-level postgraduate. Mentors, as the primary interaction partners for postgraduate during their studies, play a critical role in their cultivation. As revealed in Table 2, 39.85% of students report that the COVID-19 pandemic has impacted their communication with their mentors. On the other hand, during their training

postgraduate frequently engage in academic exchanges, sharing research methodologies, materials, and viewpoints. When confronted with academic pressures and challenges, they offer mutual support and encouragement, fostering personal growth, including the development of academic, professional, and social skills. However, during the COVID-19 pandemic, interactions among postgraduate was restricted, with 35.25% feeling that insufficient peer communication had an adverse impact on their research and learning. These findings clearly illustrate that online communication, lacking non-verbal cues such as facial expressions, body language, and tone, as well as direct personal interactions, can lead to misunderstandings or incomplete comprehension of information. They also demonstrate that, during their training, postgraduate can achieve self-identification and professional engagement in research by interacting with their mentors and peers, and participating in diverse academic exchange and discussion activities, thereby fostering interest in research and enhancing their research capabilities.

Baker and Siryk define academic adaptation as students' positive learning attitude in an academic setting, their ability to effectively fulfill academic requirements, their commitment to achieving academic goals, and their attainment of success [6]. The academic adaptation of master's students is influenced by factors such as the students themselves and the academic support they receive. Academic adaptation fundamentally impacts the learning and research status of post-graduate. On the other hand, master's students face significant academic and research pressures, and academic challenges and research setbacks are more likely to leave them feeling helpless academically, resulting in poor psychological states. Therefore, a questionnaire survey was conducted among 139 students, as shown in Table 2, revealing that during the COVID-19 pandemic, factors such as "inability to conduct scientific research experiments", "poor learning environment", and "poor psychological state" impacted the learning and research of the postgraduate, accounting for 43.88%, 66.19%, and 41.01% respectively.

3 The Impact of the COVID-19 on the Teaching Model of Postgraduate Courses in the Future

During the COVID-19 pandemic, in order to minimize the impact on the postgraduate education, most universities adopted an online teaching model for their graduate courses. This necessitated that the postgraduate adapts to new learning methods and also placed new demands on teachers' teaching approaches. On the other hand, the online teaching model implemented during the pandemic provided both teachers and students with ample experience, laying a solid psychological foundation for blended online and offline teaching models. To investigate the impact of online teaching models on student perspectives during the pandemic, we first conducted a survey among 98 first-year and second-year postgraduate who had completed their coursework, regarding their satisfaction with the offered courses. The survey results are presented in Table 3. Table 3 reveals a high correlation between the courses offered to postgraduate and their research studies, thus justifying the study of teaching methods for these courses.

Table 3. The relevance of professional courses to postgraduate studies and research.

Relevant degree	Serious	Significant	Some	Minor
Number of people	25	38	32	3
Percentage%	25.51	38.78	32.65	3.06

In order to study the research of COVID-19 on students' cognition of curriculum teaching mode, we conducted a survey on 29 students who are about to graduate from the fourth year of undergraduate education who have been admitted as postgraduate of our university. The topic of the survey is: How do you think the courses offered during the graduate period should be carried out? The survey results are shown in Table 4. From Table 4, we can see that the undergraduate graduates who have passed the online teaching of the COVID-19 epidemic have different expectations for the teaching methods of the courses offered during the postgraduate period. They have realized the advantages and disadvantages of online teaching methods and have their own clear tendencies. From Table 4, it can be seen that for courses using offline models, 44.83% of students still hope to continue the traditional teaching method during undergraduate studies, and 55.16% of students believe that learning during graduate studies only requires the teaching teacher to provide phased learning tasks. For courses that adopt a blended online and offline teaching mode, 68.97% of students believe that combining offline and online teaching by teachers is a better way, and 31.06% of students believe that they can fully learn independently. By comparing the two teaching modes, it can be seen that after the epidemic, online teaching resources have become more abundant, and students with strong self-learning ability can complete the course learning without relying on the teaching teacher. On the other hand, students have high expectations for the blended online and offline teaching mode, which fully demonstrates that students have the ability to accept the blended online and offline teaching mode. In order to study the research of COVID-19 on students' cognition of curriculum teaching mode, we conducted a survey on 29 students who are about to graduate from the fourth year of undergraduate education who have been admitted as postgraduate of our university. The topic of the survey is: How do you think the courses offered during the graduate period should be carried out? The survey results are shown in Table 4. From Table 4, we can see that the undergraduate graduates who have passed the online teaching of the COVID-19 epidemic have different expectations for the teaching methods of the courses offered during the postgraduate period. They have realized the advantages and disadvantages of online teaching methods and have their own clear tendencies. From Table 4, it can be seen that for courses using offline models, 44.83% of students still hope to continue the traditional teaching method during undergraduate studies, and 55.16% of students believe that learning during graduate studies only requires the teaching teacher to provide phased learning tasks. For courses that adopt a blended online and offline teaching mode, 68.97% of students believe that combining offline and online teaching by teachers is a better way, and 31.06% of students believe that they can fully learn independently. By comparing the two teaching modes, it can be seen that after the epidemic, online teaching resources have become more abundant, and students with strong self-learning ability can complete the course learning without relying on the teaching teacher. On the other hand, students have high expectations for

the blended online and offline teaching mode, which fully demonstrates that students have the ability to accept the blended online and offline teaching mode.

Table 4. The selection of teaching methods for postgraduate courses.

teaching method	Offline mode		Hybrid mode	
	Teacher provides the entire lecture	Teacher assigns phased learning tasks	Teachers integrate offline and online	self-study
Number of people	13	16	20	9
Percentage%	44.83	55.17	68.97	31.03

4 Thoughts on Postgraduate Education in the Post-Pandemic Era

Due to the COVID-19 pandemic, universities adopted a hybrid training mode for graduate and under postgraduate s from the 2019 to 2022 cohorts during the three-year period from early 2020 to late 2022. During this process, to maximize the quality of graduate training, mentors replanned the academic and research work of postgraduate s to accommodate the ongoing inability to conduct scientific experiments. On the other hand, to mitigate the potential negative impact of prolonged home isolation and uncertainty on postgraduate s' mental health, mentors frequently guided or supervised their online learning and research, seeking to foster their self-learning and self-management skills. Thanks to the persistent efforts of educators, the quality of graduate training was largely maintained. However, during the pandemic, both teachers and students fully appreciated the strengths and weaknesses of the online mode. Reflections on the future training models for postgraduate may inspire the educational community and students to explore ways to enhance graduate education, thereby leveraging the insights and lessons learned from the pandemic to drive its development.

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