Advances in Social Behavior Research Vol.16 Issue 2 EWA Publishing
Available Online: 3 April 2025 DOI: 10.54254/2753-7102/2025.22000

Exploring the cultivation path of university students' scientific research and innovation ability under the patent guidance

Chenlei Zhao[1], Shenghong Wu[2], Dong Wu[1]*

[1]Geely University of China, Chengdu, China
[2]Sichuan Technology & Business College, Chengdu, China

*Corresponding Author. Email: zhaochenlei@stu.xhu.edu.cn

Abstract. By investigating the impact of patent-oriented approaches on fostering the scientific research and innovation capabilities of college students, this study reveals the intrinsic connection between these two aspects. In the context of the knowledge economy era, patent orientation serves as a crucial tool for driving scientific and technological innovation and facilitating the transformation of achievements, which holds great significance for enhancing the scientific research and innovation capabilities of college students. Through a systematic analysis of the current state of college students' scientific research and innovation capabilities, several issues have been identified, including an incomplete scientific research and innovation education system, insufficient patent awareness among students, and inadequate construction of scientific research and innovation platforms. Based on these findings, specific cultivation strategies are proposed, such as improving the scientific research and innovation education system, strengthening the cultivation of patent awareness, constructing robust scientific research and innovation platforms, and reinforcing practical scientific research and innovation experiences. Combined with the aforementioned analysis, the effectiveness and feasibility of these strategies in enhancing students' scientific research and innovation capabilities are validated. The research results demonstrate that the patent-oriented approach to cultivating scientific research and innovation capabilities can significantly stimulate students' innovative enthusiasm, enhance their scientific research and innovation capabilities, and lay a solid foundation for their future scientific research and career development.

Keywords: patent orientation, university student, scientific research innovation ability, training path, case analysis

1. Introduction

In the era of the knowledge economy, the significance of patents has become increasingly prominent. Patents serve not only as a critical benchmark for evaluating the scientific and technological innovation capabilities and economic development levels of a country or region but also as an essential instrument for fostering technological innovation and facilitating the transformation of research outcomes. The emergence of patent-oriented policies stems from this historical context and demand, focusing on promoting patent application, protection, and utilization. By leveraging the incentive mechanisms of the patent system, these policies aim to further stimulate researchers' innovative potential and enhance the effective conversion of scientific and technological achievements, thereby driving the high-quality development of the economy and society [1].

In the cultivation of scientific research and innovation ability of colleges and universities, as the important town of scientific and technological innovation, the transformation of scientific and technological achievements directly affects the promotion and implementation of the national innovation-driven development strategy. By introducing patent orientation, university researchers can be guided to pay attention to market demand, and the practicability and conversion rate of innovation results can be improved. At the same time, patent orientation also helps to cultivate college students' innovative spirit and practical ability, and lay a solid foundation for their future scientific research and career development.

Improving college students' scientific research and innovation capabilities is a critical issue in higher education, as it directly impacts individual academic development and national competitiveness in science and technology. Although progress has been made, challenges such as insufficient innovative thinking, limited ability to achieve breakthroughs, and a low conversion rate of scientific research outcomes remain unresolved. The deficiencies in students' scientific research and innovation abilities are evident in their lack of creative thinking, difficulty in proposing innovative research topics, inability to achieve significant breakthroughs,

and a tendency to give up when faced with obstacles. These issues hinder the enhancement of both individual students' scientific research capabilities and the overall research capacity of universities.

By investigating the relationship between patent orientation and college students' scientific research and innovation capabilities, this study reveals the current state of training, identifies existing problems, and proposes a patent-oriented training path to enhance students' scientific research and innovation abilities. Patents serve as critical indicators of scientific and technological innovation and economic development, capable of stimulating innovation vitality and facilitating the transformation of achievements, which is of vital importance to both economic and social progress. College students' scientific research and innovation capabilities directly influence national science and technology competitiveness and developmental direction. Hence, exploring their cultivation path from a patent-oriented perspective holds significant practical and strategic value. Through case analysis, the achievements of cultivating scientific research innovation abilities under patent guidance are demonstrated, offering references and insights for enhancing college students' scientific research innovation capabilities and promoting the optimization and innovation of training models. The research innovation lies in systematically discussing, for the first time, the training path of college students' scientific research innovation abilities from a patent-oriented perspective, introducing new ideas and methods, deeply understanding the training rules and conditions, and combining cases with in-depth analysis to provide theoretical and practical guidance for comprehensively improving scientific research innovation capabilities.

2. The relationship between patent orientation and scientific research and innovation ability

2.1. Connotation and characteristics of patent orientation

As a core concept for promoting scientific and technological innovation and the transformation of achievements, the connotation of patent orientation primarily emphasizes the centrality of patents in driving the development and application of scientific and technological innovations. This approach not only prioritizes the application and protection of patents to ensure that the rights and interests of innovative achievements are legally safeguarded but also places significant emphasis on the utilization and transformation of patents, thereby effectively converting scientific and technological achievements into tangible productive forces. Furthermore, the patent orientation advocates fostering an innovation culture and strives to create a favorable environment that respects and encourages innovation [2].

Focusing on patent application and protection has become a prominent feature. Through the patent system, the legitimate rights and interests of innovators are effectively safeguarded, thereby encouraging more researchers to engage in innovation activities. This institutional framework not only empowers individual innovators but also enhances the vitality and sustainability of the entire scientific research domain. It plays a crucial role in fostering technological innovation and facilitating the transformation of research outcomes into practical applications. By prioritizing patent application and protection, emphasizing the utilization and commercialization of patents, and promoting an innovation-oriented culture, the patent system provides robust support and guarantees for scientific research and innovation endeavors.

2.2. Influence of patent orientation on scientific research and innovation ability

Patent orientation has a significant and far-reaching influence on the cultivation of university students' scientific research and innovation ability. This orientation not only provides a guarantee for scientific research and innovation from the institutional level, but also lays a solid foundation for students' ability cultivation at the practical level [3].

The pivotal role of patent orientation in facilitating the transformation and application of scientific research and innovation achievements cannot be overlooked. Under the traditional scientific research paradigm, many innovative achievements by university students often remain confined to laboratories or academic papers, making it challenging to convert them into tangible social productivity. This situation is evolving, propelled by a growing emphasis on patent orientation. An increasing number of colleges and universities are now prioritizing students' patent applications and the commercialization of their innovations, while actively establishing platforms to foster collaboration between students and industry partners. Through such collaborations, students can transform their innovations into marketable products or services, while simultaneously honing their practical skills, teamwork capabilities, and market acumen during the process. The enhancement of these competencies will undoubtedly reinforce students' scientific research and innovation capabilities, enabling them to advance further and more steadily along their future research trajectories.

Patent orientation also plays a crucial role in fostering students' intellectual property awareness and legal consciousness. During the process of patent application and protection, students are required to comprehend and apply relevant intellectual property laws and regulations, thereby learning to utilize legal tools effectively to safeguard their legitimate rights and interests. This enhancement of legal awareness not only enables students to mitigate the risk of infringement in scientific research and innovation activities but also equips them with a strong foundation for their future careers.

2.3. Feedback of scientific research and innovation ability on patent orientation

The improvement of college students' scientific research and innovation ability is not only a reflection of individual academic growth, but also a direct feedback on the implementation effect of patent-oriented strategy. This feedback effect is reflected in two aspects: one is to promote the generation of high-quality patents, the other is to promote the improvement and optimization of the patent system.

To promote the emergence of high-quality patents, the improvement of students' research and innovation ability means that they can come up with more original and practical ideas in the research process. These ideas are translated into competitive technological achievements through patent applications and protection. These high-quality patents not only reflect the students' innovation strength, but also provide a strong support for the patent-oriented implementation. For example, in some universities, students have successfully developed new technologies with independent intellectual property rights through participating research projects and applied for patent protection. These patent achievements not only bring honor to the school, but also inject new impetus into the development of related industries.

In the process of enhancing their scientific research and innovation capabilities, college students will also engage in more exchanges and collaborations with external entities through various scientific research projects and practical activities. Such communication and collaboration not only broaden students' perspectives and enhance their practical skills but also provide additional opportunities and channels for the transformation and application of patents. Through these opportunities and channels, students can convert their scientific research achievements into actual productivity, thereby contributing more significantly to the development of the social economy.

Simultaneously, this process of transformation and application serves as a critical test and feedback mechanism for evaluating the effectiveness of the patent-oriented strategy. The enhancement of college students' scientific research and innovation capabilities has a significant feedback effect on the patent orientation. This feedback is not only evident in fostering the creation of high-quality patents but also in driving the improvement and optimization of the patent system. Therefore, it is essential to fully recognize the importance of this feedback effect and promote the deep implementation and sustainable development of the patent-oriented strategy by continuously elevating students' scientific research and innovation abilities.

3. Analysis of the current situation of college students' scientific research and innovation ability cultivation

3.1. Current situation of scientific research and innovation ability

When deeply discussing the current situation of university students' scientific research and innovation ability, we have to pay attention to several core aspects. Through systematic data analysis and field research, the current scientific research and innovation ability of college students has indeed shown some progress, which is mainly due to the country's great attention to and investment in higher education and the cultivation of innovative talents in recent years. However, this improvement is not comprehensive and balanced, compared with the international advanced level, it is still not difficult for us to find an obvious gap [4].

This gap is initially manifested in the quality of scientific research and innovation outcomes. While the quantity of such achievements by college students has been increasing annually, a closer examination reveals that high-quality, high-value patents remain relatively scarce. Many studies, despite their novelty, lack practical application value or market potential and are challenging to convert into competitive products or services. This situation indicates that during the process of scientific research and innovation, college students' consideration of market demand and practical application still requires enhancement.

The participation and initiative of college students in scientific research and innovation activities are also worthy of attention. Although more and more students are beginning to participate in various scientific research projects, their participation depth and innovative contribution still need to be strengthened. Some students may simply passively accept the task and lack the spirit of active exploration and problem solving. This situation not only limits the improvement of students' individual scientific research and innovation ability, but also may affect the innovation efficiency and the quality of the results of the whole scientific research team.

To address the aforementioned problems, it is necessary to conduct an in-depth analysis from multiple perspectives. First, the college education system and scientific research management mechanisms may constrain students' innovative potential to some extent. An evaluation system that overly emphasizes output quantity and short-term gains might encourage students to focus excessively on superficial results during their scientific research and innovation processes, thereby neglecting the significance of in-depth exploration and original thinking. Second, students' own innovation awareness and practical capabilities also play a critical role in influencing their scientific research innovation abilities. The lack of practical experience and a profound understanding of market demands could hinder students from identifying appropriate entry points and breakthroughs in their scientific research endeavors [5].

3.2. Problems existing in the training of scientific research and innovation ability

When discussing the problem of cultivating university students 'scientific research innovation ability, we must deeply analyze the existing education system, students' patent consciousness, scientific research platform construction and practical activities.

As far as the scientific research innovation education system is concerned, although most universities have established the corresponding scientific research innovation education curriculum system, there are still many aspects to be improved. In terms of curriculum setting, some colleges and universities focus too much on theoretical knowledge transmission and ignore the importance of practical links, which makes it difficult for students to transform what they have learned into practical innovation ability. In terms of teaching methods, the traditional indoctrination teaching is still dominant, and lacks heuristic, discussion and other teaching methods that can stimulate students' innovative thinking and independent learning ability. The lag of this education system seriously restricts the improvement of university students' scientific research and innovation ability.

The lack of scientific research and innovation practice activities is also a problem that needs to be concerned about at present. Practical activities are an important way to cultivate students' scientific research and innovation ability. By participating in practical activities, students can apply what they have learned to solve practical problems, so as to exercise and improve their innovation ability. However, at present, many universities lack sufficient investment and attention in scientific research, innovation and practice activities, which leads to limited opportunities for students to participate in practical activities, and their practical ability and teamwork ability cannot be fully exercised and improved.

Currently, the cultivation of university students' scientific research and innovation capabilities faces several key challenges, including an imperfect scientific research and innovation education system, weak student patent awareness, insufficient development of scientific research platforms, and a lack of scientific research and innovation practice activities. To address these issues, it is necessary to refine the education system, enhance the cultivation of students' patent consciousness, increase investment in the construction of scientific research and innovation platforms, and diversify scientific research and innovation practice activities, thereby comprehensively elevating the scientific research and innovation abilities of college students.

3.3. Analysis of problem causes

After deeply discussing the problems faced by the cultivation of college students' scientific research and innovation ability, we further analyze the causes behind these problems in detail. These causes not only involve the educational concept, system publicity, resource investment and other aspects, but also are closely related to the organization and management of scientific research and practice activities [6].

We find that the lag of scientific research and innovative educational concept is an important reason. With the rapid development of science and technology and the continuous progress of society, scientific research and innovation has become an important force to promote social development. However, the current colleges and universities have not fully kept up with the pace of this era, and lack of innovative thinking and methods to keep pace with The Times. As a result, in the process of cultivating scientific research innovation ability, it is difficult for students to get access to the latest scientific research trends and innovative ideas, which limits the expansion of their innovative thinking and the improvement of innovation ability.

The lack of popularization of patent system is also an important factor leading to the problem. The patent system is an important legal guarantee to protect innovative achievements and promote scientific and technological progress. However, due to the insufficient depth and extensive publicity, many students have biased their understanding and understanding of the patent system. This not only affects the enthusiasm of students to apply for and protect patents, but also restricts the effective play of patent orientation in the cultivation of scientific research and innovation ability.

The problems faced by the cultivation of college students' scientific research and innovation ability are various, which need to be comprehensively considered and solved from the perspectives of educational concept, system publicity, resource investment and practical activities. Only by establishing a perfect training system can we truly stimulate students' innovative potential and cultivate more talents with high-quality scientific research and innovation ability.

4. Exploration of the cultivation path of scientific research and innovation ability under the patent guidance

4.1. Improve the scientific research and innovation education system

In the process of improving the scientific research and innovation education system, we need to plan and design the curriculum carefully. In addition to increasing the content of patent-related courses, attention should also be paid to the integration of these contents and professional courses, so that students can understand and master the patent-related knowledge and skills while learning professional knowledge.

In the teaching methodology, case-based instruction proves to be an exceptionally effective approach. Through the analysis of real-world patent cases, students can gain a more intuitive comprehension of the patent application, protection, and utilization processes, thereby enhancing their understanding of the patent system. Additionally, project-oriented teaching facilitates students

in improving their scientific research and innovation capabilities through practical operations. By completing specific scientific research projects, students are able to integrate theoretical knowledge with practical applications and develop the skills necessary for solving real-world problems [7].

In the implementation of these measures, it is essential to emphasize student feedback and engagement. By conducting regular surveys and assessments, we can gain insights into students' perspectives and suggestions regarding the scientific research innovation education system, thereby enabling timely adjustments and optimization of teaching content and methods. Simultaneously, students should be encouraged to actively participate in scientific research projects, patent applications, and other related activities, providing them with more practical opportunities and platforms for showcasing their achievements.

Perfecting the scientific research innovation education system is an important way to enhance college students' scientific research innovation ability. By increasing the patent-related course content, adopting diversified teaching methods and strengthening the training of innovative thinking, we can lay a solid foundation for scientific research and innovation for students, and cultivate more high-quality talents with innovative consciousness and practical ability.

4.2. Strengthen the cultivation of patent awareness

In the cultivation of patent awareness, we need to strengthen the series of effective measures. First, the popularization of patent knowledge is crucial. Colleges and universities should offer patent-related courses and integrate patent knowledge into classroom teaching, so that students can fully understand the basic concepts, types, application process and protection scope of patents. In addition, special lectures, seminars and other activities can be held to invite experts, scholars or practitioners in the patent field to conduct in-depth interpretation and guidance for students, so as to help students establish correct patent concepts.

Patent application guidance is also indispensable link. Colleges and universities should set up special patent application guidance agencies or teams to provide students with a full range of patent application services. This includes assisting students in patent retrieval and analysis, evaluating the innovation and practicality of patents, and guiding the writing of patent application documents. Through these practical operations, students can have a deeper understanding of the patent application process and matters needing attention, and improve the efficiency and success rate of patent application.

4.3. Build a scientific research and innovation platform

Under the guidance of patents, constructing a scientific research and innovation platform plays a critical role in fostering university students' research and innovation capabilities. Such platforms not only offer students access to advanced research equipment and high-quality experimental conditions but also serve as essential vehicles for stimulating innovative thinking and enhancing scientific research skills.

Universities should establish scientific research and innovation laboratories. These laboratories should be equipped with state-of-the-art instruments and equipment to meet the needs of students conducting scientific research experiments. The design and construction of these laboratories should emphasize interdisciplinary convergence and integration, encouraging students to explore knowledge and technologies across various fields, thereby fostering their diversified scientific research capabilities. Additionally, an open and shared management system should be implemented in the laboratory to ensure that students have optimal access to experimental resources and can effectively engage in scientific research and innovation activities.

The construction of industry-university-research cooperation base is also a key link. Colleges and universities should actively seek cooperation with enterprises and scientific research institutions and jointly establish industry-university-research cooperation bases. Such a cooperation mode can enable students to be closer to the actual production needs, understand the industry dynamics and technology frontier. By participating in practical projects, students can exercise their practical ability, improve their ability to solve problems, and then enhance their scientific research and innovation ability.

The university has implemented a series of specific measures to enhance scientific research and innovation capabilities under the guidance of patents. First, regarding the improvement of the scientific research and innovation education system, the university has introduced patent-related courses and adopted innovative teaching methods. These initiatives not only enrich the educational content but also effectively stimulate students' enthusiasm for learning and foster their innovative thinking. Second, to strengthen the cultivation of patent awareness, the university has organized patent knowledge lectures and provided patent application guidance activities, thereby significantly enhancing students' understanding and practical application skills in the patent system. Additionally, the university has actively constructed a scientific research and innovation platform, establishing close cooperative relationships with enterprises and research institutions, thus providing students with high-quality practical environments and resources.

In the process of building a scientific research and innovation platform, universities should also pay attention to the sustainable development of the platform. By continuously optimizing the management mechanism of the platform and strengthening the integration and sharing of resources, the platform can continue to provide students with a high-quality environment for scientific research and innovation. At the same time, universities should constantly adjust and improve the construction direction and development strategy of the platform according to the actual situation, so as to adapt to the new changes and new needs in the field of scientific research and innovation.

4.4. Strengthen the practice of scientific research and innovation

Under the guidance of patent, strengthening the practice of scientific research and innovation has become an important link to improve the university students' scientific research and innovation ability. By encouraging students to participate in scientific research projects and science and technology competitions, it can not only exercise students 'innovative thinking and practical ability, but also cultivate students' teamwork spirit and patent awareness [8].

In order to more effectively promote students to participate in scientific research and innovation practice, universities can take a variety of measures. First of all, a special scientific research and innovation practice fund can be set up to provide students with project funds and experimental conditions to support them, and encourage students to choose topics independently and explore freely. At the same time, universities can also cooperate with enterprises and scientific research institutions to jointly carry out scientific research projects, so as to provide students with more opportunities and training platforms for practice.

In order to ensure the continuous development of scientific research and innovation practice, universities should also establish an effective incentive mechanism and evaluation system. For students who have outstanding performance in scientific research projects, certain credit or material rewards can be given to stimulate students' innovation motivation. At the same time, universities should also regularly summarize and evaluate scientific research innovation practice activities, constantly improve the organization and implementation of activities, and improve the effect and quality of activities.

By strengthening the practice of scientific research and innovation, universities can more effectively improve students' scientific research and innovation ability, and cultivate more high-quality talents with innovative consciousness and practical ability. This will provide strong talent support for promoting national scientific and technological innovation and economic and social development.

5. Case analysis of the cultivation of scientific research and innovation ability under patent guidance

5.1. Case implementation process and effectiveness analysis

The university has implemented a series of specific measures to enhance scientific research and innovation capabilities under the guidance of patents. First, regarding the improvement of the scientific research and innovation education system, the university has introduced patent-related courses and adopted innovative teaching methods. These initiatives not only enrich the educational content but also effectively stimulate students' enthusiasm for learning and foster their innovative thinking. Second, to strengthen the cultivation of patent awareness, the university has organized patent knowledge lectures and provided patent application guidance activities, thereby significantly enhancing students' understanding and practical application skills in the patent system. Additionally, the university has actively constructed a scientific research and innovation platform, establishing close cooperative relationships with enterprises and research institutions, thus providing students with high-quality practical environments and resources.

When implementing the patent-oriented scientific research and innovation training strategy, the university has demonstrated a forward-looking vision and a well-structured implementation plan. First, the institution has conducted a thorough optimization and upgrade of its curriculum system for scientific research and innovation education. In addition to traditional courses such as scientific research methods and scientific paper writing, it has also introduced specialized courses closely related to patents, including patent information retrieval, patent application practice, and patent analysis and evaluation. These newly added courses not only enhance students' understanding of the patent system but also equip them with the skills to effectively utilize patent information in their future research endeavors.

5.2. Case implementation process and effectiveness

When implementing the patent-oriented scientific research and innovation training strategy, the university has demonstrated a forward-looking vision and a well-structured implementation plan. First, the institution has conducted a thorough optimization and upgrade of its curriculum system for scientific research and innovation education. In addition to traditional courses such as scientific research methods and scientific paper writing, it has also introduced specialized courses closely related to patents, including patent information retrieval, patent application practice, and patent analysis and evaluation. These newly added courses not only enhance students' understanding of the patent system but also equip them with the skills to effectively utilize patent information in their future research endeavors.

The school attaches great importance to the popularization of patent knowledge and the specific guidance of patent application. The school regularly holds patent knowledge lectures and workshops, and invites patent agents, lawyers and other experts to conduct on-site teaching and q & A. In addition, the school has also set up a special patent application guidance service to provide students with a full range of support, from creative conception to application document writing. These measures have greatly improved the students' patent awareness and practical operation ability, and laid a solid foundation for them to apply for patent applications independently in the future.

In terms of hardware support, the school has made significant efforts. By engaging in deep collaboration with enterprises and research institutions, the university has established several cutting-edge scientific research innovation laboratories and industry-university-research cooperation bases. These high-level research platforms not only enable students to gain access to and utilize advanced research equipment but also foster closer interactions between academia and industry. Within this environment, students can more vividly observe the process by which scientific research findings are translated into practical applications, thereby enhancing their appreciation of the significance of scientific research and innovation.

The university also actively encourages and organizes students to participate in various scientific research projects and science and technology competitions. Through these practical activities, students can not only put the theoretical knowledge learned in the classroom into practice, but also exercise the leadership and cooperation spirit in teamwork. It is worth mentioning that the school has set up a rich reward mechanism for such activities. For students who have made outstanding performance in scientific research projects or win prizes in science and technology competitions, the school will give both material and spiritual rewards, which undoubtedly further stimulates students' enthusiasm for innovation.

5.3. Experience and enlightenment of cases

The experience and insights revealed in this case not only offer a clear pathway for universities to foster students' scientific research and innovation capabilities under patent guidance but also serve as a valuable reference for educational practitioners. Below is a detailed elaboration of the case experience and insights:

Case universities recognize that the enhancement and innovation of the scientific research education system are fundamental to improving students' scientific research capabilities. Consequently, they continuously update and refine their curricula to ensure that course content aligns closely with technological advancements while integrating patent-related knowledge. Regarding teaching methodologies, these institutions have implemented bold reforms by introducing innovative approaches such as case-based teaching and project-oriented instruction. These methods aim to cultivate students' innovative thinking and practical skills through hands-on exercises. Such practices are worthy of adoption by other universities to establish a scientific research education system better suited to contemporary needs and more relevant to students' realities.

Case universities have achieved remarkable results in strengthening the publicity, popularization and application guidance of patent system. By holding special lectures, offering relevant courses, and providing one-to-one guidance, they help students to have a deeper understanding of the patent system and learn how to use the patent system to protect their innovations. This initiative not only improves students 'patent awareness and application ability, but also lays a solid foundation for students' future scientific research and innovation activities.

6. Conclusion

After in-depth research and discussion, the following conclusions can be drawn: There is a significant intrinsic link between patent orientation and college students' scientific research and innovation capabilities. Patent orientation not only offers a clear goal and direction for students' scientific research and innovation but also effectively stimulates their enthusiasm and motivation for innovation through the processes of patent application, protection, and utilization. During these processes, students can gain a deeper understanding of the practical value of technological innovation while simultaneously enhancing their scientific research and innovation abilities through hands-on practice.

Although the current efforts to cultivate scientific research innovation capabilities among college students have yielded some positive outcomes, numerous challenges and issues remain. Specifically, the refinement of the scientific research innovation education system, the enhancement of students' patent awareness, the development of robust scientific research innovation platforms, and the reinforcement of practical scientific research innovation experiences all require further improvement and optimization. These existing challenges not only hinder the further enhancement of students' scientific research and innovation abilities but also undermine the overall efficiency of the national science and technology innovation system.

In view of the aforementioned issues, this paper proposes specific cultivation paths oriented towards patents and validates the effectiveness and feasibility of these paths through the analysis of concrete cases. The research findings indicate that these training paths can not only significantly enhance students' scientific research and innovation capabilities but also create more opportunities and challenges for their scientific research innovation activities. Specifically, by reinforcing patent awareness, refining the scientific research innovation education system, establishing a high-quality scientific research innovation platform, and intensifying practical engagement in scientific research innovation, students' innovative consciousness and practical abilities can be markedly improved.

Acknowledgements

This project funding is provided by the "One College, One Brand" Teaching Reform Project of Geely College in 2024--research on enhancing student scientific research capabilities oriented by patents and university teaching reform.

References

[1] Yang, H., Zhang, Y., & Liu, L. (2024). Patent priority examination under mission orientation: can speed and quality coexist? *Technology in Society, 76*, 102452.

[2] Pantano, E., Priporas, C. V., Sorace, S., & Iazzolino, G. (2017). Does innovation-orientation lead to retail industry growth? Empirical evidence from patent analysis. *Journal of Retailing and Consumer Services, 34*, 88-94.

[3] Wanner, L., Baeza-Yates, R., Brügmann, S., Codina, J., Diallo, B., Escorsa, E., Giereth, M., Kompatsiaris, Y., Papadopoulos, S., Pianta, E., Piella, G., Puhlmann, I., Rao, G., Rotard, M., Schoester, P., Serafini, L., & Zervaki, V. (2008). Towards content-oriented patent document processing. *World Patent Information, 30*(1), 21-33.

[4] Li, G., Wang, X., Su, S., & Su, Y. (2019). How green technological innovation ability influences enterprise competitiveness. *Technology in Society, 59*, 101136.

[5] Yaghoubi, M., Teymourzadeh, E., Bahadori, M., & Ghardashi, F. (2017). Conceptual model of innovation capability in industrial and academic research centers: A systematic review. *Interdisciplinary Journal of Management Studies (Formerly known as Iranian Journal of Management Studies), 10*(3), 609-640.

[6] Sheng, M. L., Hartmann, N. N., Chen, Q., & Chen, I. (2015). The synergetic effect of multinational corporation management's social cognitive capability on tacit-knowledge management: Product innovation ability insights from Asia. *Journal of International Marketing, 23*(2), 94-110.

[7] Kim, J. Y., Choi, D. S., Sung, C.-S., & Park, J. Y. (2018). The role of problem solving ability on innovative behavior and opportunity recognition in university students. *Journal of Open Innovation: Technology, Market, and Complexity, 4*(1), 1-13.

[8] Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*(5), 678.