The Impact of Social Capital and Teacher InnovationSupporting on University Students' Innovation Performance

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Abstract.

Innovation plays a vital role in driving scientific development and civilization progress, and cultivating the innovative ability of college students is a primary task of university education. To develop their innovative ability, students must cultivate rational thinking, good judgment, critical thinking skills, and be encouraged to break through existing rules and regulations while building on the achievements of human civilization.

This paper investigates the effects of social capital and teacher innovation support on college students' innovation performance based on social networks.Through the study of related literature review, we found that both college students' social capital and teachers' innovation support have a positive influence on students' innovation performance. Moreover, college students' innovation cognitive style and innovation self-efficacy play a mediating role in the influence of college students' social capital on students' creative performance. At the same time, students' innovation cognitive style and innovation self-efficacy also mediate the positive influence of teachers' innovation support on students' creative performance. The theoretical and practical implications of these findings will also be discussed in this paper.

Keywords: social capital, Innovation performance, teacher innovation support

Introduction

Innovation plays a vital role in driving scientific development and civilization progress, and cultivating the innovative ability of college students is a primary task of university education. To develop their innovative ability, students must cultivate rational thinking, good judgment, critical thinking skills, and be encouraged to break through existing rules and regulations while building on the achievements of human civilization. They should question existing knowledge, dare to be original, discover and innovate scientific knowledge, and promote the continuous development of society.

“Shuangchuang", the promotion of innovation and entrepreneurship in China, has received unprecedented attention in recent years. Innovation is a key driver of productivity performance (Cainelli et al., 2006; Love & Roper, 2015) , sustained economic growth (Zhi & Shudan, 2015), and firm performance and outcomes (Hou et al., 2019) . Creativity has a direct positive impact on employees' innovation performance(Baer et al., 2003). However, the innovation process has become increasingly complex, expensive, and high-risk ((Dziallas & Blind, 2019) , with implications for the level of social capital on college campuses. Understanding the factors and mechanisms that influence college students' innovation is crucial to cultivating innovative talents, and exploring these factors and mechanisms can help educational authorities formulate relevant educational policies and universities reform their cultivation systems. This study focuses on the effects of social capital and faculty innovation support on college students' innovation performance, and explores the mediating roles of innovation cognitive style and innovation self-efficacy.
Understanding the factors and mechanisms that influence college students' innovation is crucial for cultivating innovative talents, and exploring these factors and mechanisms can help educational authorities formulate relevant educational policies and universities reform their cultivation systems. This study focuses on the influence of social capital and teachers' innovation support on college students' innovation performance, exploring the mediating role of innovative cognitive style and innovation self-efficacy.
This study focuses on the innovation performance of college students in the actual research or innovation practice in universities, distinguishing it from the innovation in the actual work of corporate employees. The aim is to solve problems and challenges and gain novel and special insights through knowledge accumulation and the development of competencies in problem-solving, resulting in visible and valuable innovation outcomes.

Research Objectives

1. To investigate the conceptual meanings of social capital, innovation performance, teacher innovation support, creative cognition style, and innovative self-efficacy, and their measurement dimensions in the context of this study conducted under the "Education for All" project.
2. To explore the direct impact of social capital and teacher innovation support on college students' innovative performance.

Literature review and Hypotheses

2.1 Definitions of Key Term

Social capital: According to Nahapiet and Ghoshal's (1998)three-factor structural theory of social capital, social capital is defined from the perspective of different social contexts, which include the structural dimension, relational dimension, and cognitive dimension. The structural dimension emphasizes social networks' breadth and strength of ties. The relational dimension highlights the

personification aspect of social relationship networks, which refers to the interpersonal relationships generated during interactions over a certain period. Trust is the core element of social capital relationships, which mainly describes the implicit relationships generated through interpersonal interactions from emotional and rational aspects. The cognitive dimension of social capital is a resource for common understanding and expression among different actors in the network. It uses a common visionary goal and a common language to operationalize the definition.

Creative teacher support: Teacher support behaviors refer to the verbal, behavioral, emotional, and attitudinal aspects of teachers' support for students in the daily learning process. This study focuses on four dimensions of the Teacher Innovation Support Behavior Scale: material support, interpersonal support, teacher support for creative characteristics, and spiritual support.

Creative cognitive style: It refers to individual differences in the way people organize and process information consistently. It influences the way people understand and process problems and is divided into two dimensions: adaptive and creative. This study uses the adaptive innovation scale (KAI inventory) developed by M. Kirton(1976) to measure employee cognitive style.

Creative self-efficacy: It is an individual's self-evaluation of their ability and beliefs about their ability to produce creative work when performing a specific task. Studies have shown that creative self-efficacy is significantly and positively related to creative performance and explains most of the variance in creative performance when controlling for job self-efficacy.

Innovation performance: It aims to solve problems and challenges in actual scientific research or innovation activities through the accumulation of knowledge, the acquisition of novel and special insights, the development of competencies possessed by problem-solving, and the provision of visible and valuable innovation results. From the subjective and objective performance perspectives, the innovation performance of an individual is divided into two components(Amabile, 1997): intrinsic ability and innovation outcome. Intrinsic

ability refers to the individual physiological function, intellectual quality, and thinking ability factors inherent in college students that can stimulate innovation generation. It mainly exists in individual college students' creative motivation, personality, and thinking. Innovation outcomes are novel and practical results that can be recognized by instructors, universities, and society through the accumulation and development of students' innovative skills. They are mainly expressed in the results such as being able to publish papers, exchange in conferences, invent patents, and achieve titles in competitions.
These outcomes can be recognized by teachers, universities, and society, mainly in the form of papers, conference presentations, academic results such as inventions and patents, and good results in innovation competitions and practice(McWilliam, 2009) .

2.2 Conceptual model and Hypotheses

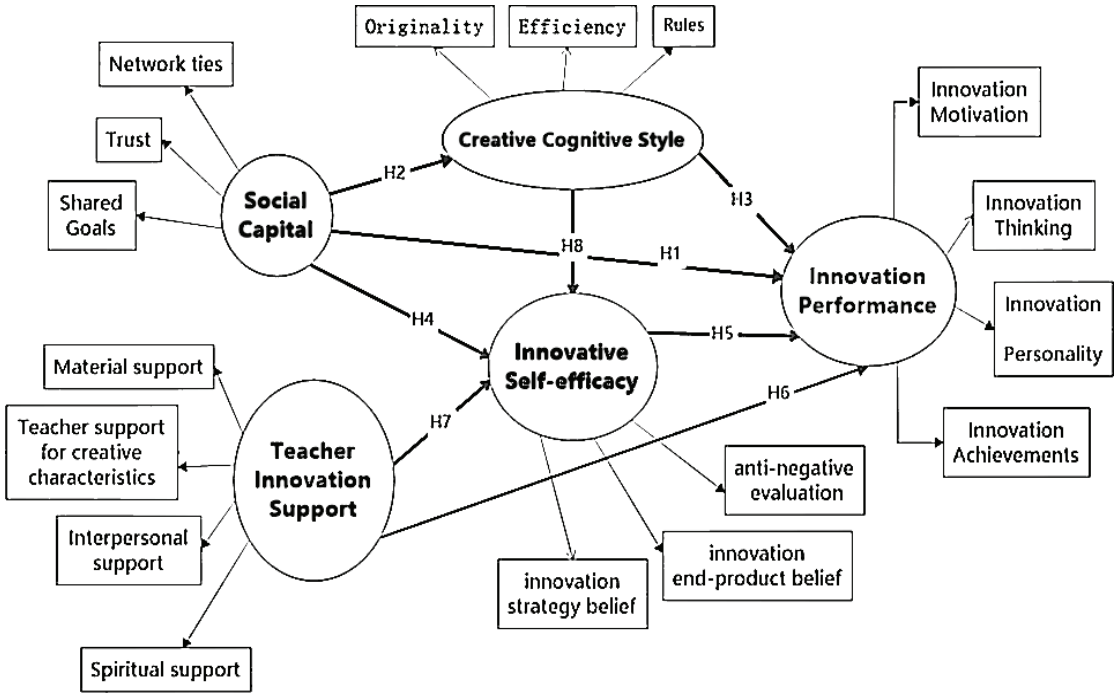

Figure Conceptual Framework: The influence of social capital and faculty innovation support on college students' innovation performance

In the era of the knowledge explosion, innovation means staying competitive, and innovation performance becomes a representation of the outcome of innovation and isincreasingly valued by knowledge-intensive team organizations. Individual innovation performance is the basis for embodying the ability to generate innovation and actual innovation(Amabile, 1997). Existing research has been conducted on the individual innovation characteristics of individuals, as well

as the contextual factors that enhance innovation, and the interaction between the two.

Hanna Rydehell(2019) uses the number of patents, product differentiation to refine and finally explore the close relationship between innovation performance and external financing ability. measure and eventually also explored the influencing factors of innovation performance in high-tech field. Wu Bohong(2018) scholars extracted indicators to measure innovation inputs and outputs in Huai'an City based on relevant data of high-tech enterprises in the statistical yearbook, and conducted multi-model construction and analysis to discover ways to improve innovation performance based on empirical results. Based on the theories of information asymmetry, smile curve and R&D management, Yang X. (2019) studied the problems related to innovation performance in terms of inputs and outputs based on the specific case of DT Company, following a deep progression of proposing, analyzing and solving problems. Wang Y. (2020) scholars take Haier Group as an example to study Haier's innovation performance between six years in terms of both innovation process and innovation output, and discover its change trend through industry comparison.

College students' social capital has a twofold impact on innovation performance. On the one hand, college students' social capital is conducive to the formation of innovation motivation, the development of innovative personality and thinking, and helps to produce corresponding innovation results, thus improving the level of innovation performance. The important social network formed among college students or before the college student group is a small social form within a certain range, which is conducive to the cultivation of innovation ability and the exchange and sharing of innovation thinking, and plays an extremely important role in the improvement of innovation motivation, innovation personality and innovation thinking, as well as the promotion of the output of results. Therefore, we assume that

H1: The social capital of university students has a significant impact on their innovation performance.

Creative cognitive style, defined as an individual's unique approach to gathering, processing, and solving problems (Kirton, 1994), has been shown to be an important factor in promoting creativity, new idea generation, and innovation, especially among entrepreneurs(Chen et al., 2018; Lomberg et al., 2017) . The learning behavior of a team is influenced by the creative cognitive styles of its members. (Geng et al., 2020) found that employees with higher creative cognitive styles tended to focus not only on developmental learning but also on exploratory learning, whereas employees with lower creative cognitive styles tended to spend more time on developmental learning.

Openness to experience is a key predictor of innovative performance (Fichter et al., 2020), reflecting characteristics such as curiosity and creativity, which are also associated with innovativeness. Employees who are open to experience are more likely to innovate at work (Abou-Shouk et al., 2022). Recent research suggests that innovation cognitive style moderates the relationship between information proactivity motivation and open innovation and firm operational performance (Naseer et al., 2021).

H2: The innovation cognitive style of university students has a significant effect on their innovation performance.

Creativity has been shown to have a direct positive impact on employees' innovation performance, but the ability to transform new ideas into implemented innovations is also crucial (Baer et al., 2003; Baer, 2012). We suggest that the effect of social networks on innovation performance depends on the cognitive style of university students. Our hypothesis is based on the logical principle of "complementary adaptation"(Ostroff et al., 2013), which suggests that individuals perform best when their strengths complement their environment's weaknesses, and vice versa(Muchinsky & Monahan, 1987) .

Our hypothesis is that complex networks will effectively complement the weaknesses of innovators, while simple networks will best complement the weaknesses of adapters.

According to adaptive innovation theory, the effectiveness of mediated or closed networks in improving innovation performance depends on the cognitive style of the employee. Carnabuci and Diószegi (2015) find that individuals with innovative cognitive styles are most innovative when embedded in tightly interconnected closed networks. Moreover, cognitive style is an important factor in explaining the relationship between social network status and innovation performance. Studies have shown that social networks rich in structural holes enhance the innovative performance of employees with adaptive cognitive styles.

H3: Social capital of university students has a significant effect on their innovative cognitive style.

According to Bandura (2003), innovation involves a new way of thinking and synthesis of knowledge. Innovation requires an unshakable sense of efficacy and perseverance in the face of frustratingly slow progress, uncertain outcomes, or social stigmatization.West (2003) adds that innovative ideas are more likely to emerge in tolerant and inclusive environments, while implementation and execution require passion and perseverance. Oldham and Silva(2015)argue that innovative ideas stem from re-configuring knowledge and integrating new ways of thinking. However, resistance from members can hinder their impact on the organization.

Social cognitive theory suggests that self-efficacy is the result of the interaction between an individual's cognition, behavior, and external environment.

In analyzing the impact of social capital on college students' innovation performance, we propose that social capital can positively influence innovation self-efficacy. Similarly, improving college students' innovative performance can maintain and enhance their social capital. In order to improve innovation performance, college students should interact and collaborate with team members, peers, and mentors, and participate in team knowledge sharing to form a positive feedback loop and increase innovation self-efficacy. This will lead to positive innovation motivation, personality traits, and better outcomes.

H4: Social capital has a significant effect on college students' innovation self-efficacy.

Given the close relationship between self-efficacy and innovation performance, it can be hypothesized that innovation self-efficacy will have a positive impact on university students' innovation performance. This suggests that by providing students with innovation support, teachers not only help to improve their level of self-efficacy, but also their overall innovation performance.

H5: Innovation self-efficacy has a significant effect on innovation performance of university students.

Studies have found that improving teaching styles and creating a creative atmosphere through words and actions can have a positive impact on student creativity. Although most of these studies were conducted in primary and secondary schools, in China, master's and doctoral education provide students with specialized mentors who can have a significant impact on students' creative performance. For example, a study of graduate nursing students found a positive correlation between mentors' sense of organizational support and students' creative behaviors(Liu et al., 2022). Supervisor academic support has the greatest effect on improving doctoral students' academic ability, but interpersonal support has no effect on improving doctoral students' academic ability. This suggests that mentor support behaviors are an overlay of multiple supports, indicating that just the right amount of interpersonal support and grounding can better assist doctoral students in their academic research.

While undergraduate students are not as deeply involved as elementary, middle, and high school teachers, nor are they as focused and accountable asmaster's and doctoral supervisors for their guidance and support, facultyinnovation support is more loosely distributed among undergraduate students. Asa result, there is little research in the literature in this area. However, the purposeof this study was to examine the relationship between faculty innovation supportand undergraduate innovation performance.

H6: Faculty innovation support has a significant effect on undergraduate students' innovative performance.

Li Jinde and Yu Jiayuan (2011) found that providing support and guidance for students' creativity significantly increased their level of creativity self-efficacy, which was consistent with Wang and Zhang's(2022) findings. Subsequently, Zhang (2022) found that creating a relaxed atmosphere for creativity through words and actions enhanced students' confidence in their own creativity, which in turn enhanced their creativity more strongly.

According to social cognitive theory, self-efficacy is the cognitive variable most distant from one's motivation, emotion, and action, and is an important mediating variable in transferring environmental influences to behavior. Teachers' innovation support affects students' self-concept, achievement motivation, and expectation levels, and students' coping styles are adjusted in response to changes in innovation self-efficacy.

H7: Teachers' innovation support behavior has a significant effect on college students' innovation self-efficacy.

A review of the literature reveals that there are few studies on the relationship between the two, and few studies on the relationship between the upper cognitive styles of the two and self-efficacy, with the vast majority of studies examining students' cognitive styles and academic performance.Chen et al. (2015), through a study of college students, demonstrated that there are significant differences in college students' cognitive styles across disciplines.

Meng(2012) found that first-year students' academic, social, and psychological adjustment levels were significantly predicted by social self-efficacy, and students with high social self-efficacy also had higher levels of adjustment in these three areas. The relationship between creative self-efficacy and creativity can be moderated by cognitive style(Meng & Wei, 2012). An empirical study on the relationship between cognitive style, creative self-efficacy and creativity among college students showed that creative self-efficacy can be used as a mediating variable to modulate the relationship between cognitive style and individual creativity (Zhang Q., 2013).

Xie Qin (2018), in a study with college students as the target of psychological support, concluded that cognitive style as an independent variable affects general self-efficacy, and the effect of the independent variable on the dependent variable is more significant.

According to the cognitive regulation mechanism in social cognitive theory, external feedback promotes cognitive regulation and indirectly affects individual behavior (Geng et al., 2020).

Through previous research on the relationship between cognitive style and academic performance, and the relationship between academic performance and self-efficacy, self-efficacy is crucial in helping people navigate challenging situations, as self-efficacy can influence an individual's goals, thinking patterns, persistence, and responses in the face of stress (Bandura, 1977). Therefore, the author can try to logically speculate that there is a link between creative cognitive style and creative self-efficacy, and that the way of thinking and behaving guided by creative cognitive style influences an individual's ability to innovate to a certain extent.

H8: Creative cognitive style has a significant effect on creative self-efficacy.

2.3 Methods

The mixed method research will be used in this study. In this study, data was collected using closed and open-ended questionnaires, and a probability-based sampling method was employed. To ensure accurate data collection, this study used a multi-step process that included preparing semi-structured interview questions, conducting in-depth interviews, and recording conversations (Cleary et al., 2014).

4. Conclusion

This paper provides an in-depth explanation of the core concepts of social capital, such as innovative cognitive style and innovative self-efficacy, and explores the intrinsic influence mechanisms of different dimensions of social capital, such as network structure, intrinsic relationships, and perceptions, on motivation, thinking, personality, and innovation outcomes.

The study answers the influential relationship between college students' social capital, teachers' innovation support and innovation performance, and explores the influence mechanism with innovation cognitive style and innovation self-efficacy as mediators.

The findings will enrich the research on the impact of social capital on college students' innovative performance by exploring the direct and indirect effects of faculty innovation on college students' innovative performance support from the outside.

The research results seek to enrich the theoretical system of college students' education and deepen the understanding of existing research on the role mechanisms of social capital and innovation cognitive styles in the development of college students' innovation ability.

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