International Journal of Innovative Research and Scientific Studies, 6(2) 2023, pages: 381-388

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Research on the relationship between collective teacher efficacy and teaching innovation as a mediator

Chen, Xi[1], Li, Xianyin[2*]

[1,2]*Krirk University, Bangkok, Thailand.*

Corresponding author: Li, Xianyin (*Email: lixianyin@qfnu.edu.cn*)

Abstract

This study explored a mediation model among teachers of basic education on the Chinese mainland. Knowledge sharing was identified as a mediator between collective teacher efficacy and teaching innovation. 732 valid samples from the Chinese mainland were obtained. Three structured instruments were applied including a scale of collective teacher efficacy, a scale of knowledge sharing and a scale of teaching innovation. The responses were recorded using a 5-point Likert scale. Structural equation models were used to construct measurement and structural models. Collective teacher efficacy has a significant and positive predictive effect on teaching innovation and knowledge sharing. Knowledge sharing has a significant and positive predictive effect on teaching innovation and it plays a partial mediating role on the impact of teachers' collective effectiveness on teaching innovation. The mediating effect accounts for 29.03%. The results show that knowledge sharing can promote the positive impact of collective teacher efficacy on teaching innovation in basic education. This study provides new ideas for schools to improve teaching innovation that will create a new school-based learning environment for teachers to improve their professional learning and teaching practice.

Keywords: Basic education, Chinese mainland, Collective teacher efficacy, Knowledge sharing, Teachers, Teaching innovation.

DOI: 10.53894/ijirss.v6i2.1476
Funding: This study received no specific financial support.
History: Received: 10 January 2023/**Revised:** 14 March 2023/**Accepted:** 23 March 2023/**Published:** 31 March 2023

Authors' Contributions: Both authors contributed equally to the conception and design of the study.
Competing Interests: The authors declare that they have no competing interests.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.
Ethical Statement: This study followed all ethical practices during writing.
Publisher: Innovative Research Publishing

1. Introduction

Innovation depends on talent [1]. High-quality elementary education has a solid foundation for cultivating professional talents with an innovation spirit. When students have a spirit of innovation and the ability to innovate, teaching must be innovative and creative. Scholars examine the notion of teaching innovation from two perspectives: "product" and "process". In the "product" theory of education, teaching innovation focuses on the cultivation of students' creativity [2, 3] while in the "process" theory of education, teaching innovation emphasizes the creativity of teachers in the teaching process [4, 5]. Systematically, teaching innovation, starting with developing students' innovative thinking, organically permeates the innovative consciousness and ability into the whole teaching process [6].

At present, teaching is full of challenges that are complex and changeable. However, when all members of a team believe that they can overcome the challenges and produce the expected results through their efforts, the team will be more efficient [7] and this pattern of human behavior is called "collective efficacy" [8]. To make innovation effective, work must be done collectively [9]. Higher collective teacher efficacy always brings about greater motivation to take risks and achieve challenging innovation goals [10].

Knowledge sharing is crucial for innovation. It is a process in which teachers share their work experience collectively, seek and give advice to each other and are open to new ideas, opinions and suggestions [11]. Without knowledge sharing, innovation is almost impossible [12], so knowledge sharing has a positive impact on employee innovation behavior [13]. Besides, it also often acts as an intermediary bridge [14-16].

In basic education, knowledge sharing can promote teaching innovation and play a mediating role between collective teacher efficacy and teaching innovation.

2. Literature Review

2.1. Collective Teacher Efficacy and Teaching Innovation

Goddard, et al. [17] applied the concept of collective efficacy to teachers' groups and considered that collective teacher efficacy refers to the perception and subjective judgment of school teachers on teachers' groups and that all teachers can organize and implement the action process needed to have a positive impact on students. Active allies often help teachers actively participate in innovation and development and provide resources for them [18, 19]. After schools with high collective teacher efficacy set challenging goals, teachers usually make unremitting efforts to achieve these goals [20]. The collective efficacy perceived by individual teachers encourages all teachers to do their best and prevents them from giving up when they face difficulties Goddard, et al. [17]. Schwabsky, et al. [10] conducted research on academic optimism and school innovation for 1009 teachers from 79 schools in northern Israel and found that teachers with higher collective teacher efficacy often have greater motivation to take action, take risks and achieve challenging innovation goals. When they carry out strong cooperation, they can get better opportunities for cross-application and successful implementation of innovative ideas, thus improving their innovation performance [21]. Based on these points, we propose our first research hypothesis as follows:

H1: Collective teacher efficacy has a significant impact on teaching innovation.

2.2. Collective Teacher Efficacy and Knowledge Sharing

Researchers have studied self-efficacy by paying attention to the cognition related to specific tasks and found that self-efficacy is closely related to knowledge sharing. Tierney and Farmer [22] believed that the establishment of self-efficacy required knowledge related to work through investigation and research on two American enterprises. Yang and Cheng [23] confirmed that industry-related knowledge was positively related to self-efficacy on the basis of investigating 94 information system developers. Runhaar and Sanders [11] also found that there was a positive relationship between teachers' professional self-efficacy and knowledge sharing after a sample survey of 410 teachers in 30 teams. Scholars have discussed the relationship between individual self-efficacy and knowledge sharing but there are few studies on the relationship between collective efficacy and knowledge sharing. Reynolds and Blickensderfer [24] investigated the data of 160 adults playing tennis in pairs and found that there was a significant positive relationship between collective efficacy and knowledge sharing because team cognition is not simply the sum of the cognitions of individual members, researchers need to further verify the relationship between collective effectiveness and knowledge sharing. Thus, we propose our second research hypothesis as follows:

H2: Collective teacher efficacy has a significant impact on knowledge sharing.

2.3. Knowledge Sharing and Teaching Innovation

Cavusgil, et al. [25] found that the greater the amount of tacit knowledge transfer, the higher the innovation ability of enterprises. Huang and Liu [26] found that knowledge sharing had a positive impact on the technological innovation capability of enterprises in their survey of 152 key employees of enterprises in three provinces of China. Carmeli, et al. [27] found that internal and external knowledge sharing were significantly positively related to employees' ability to creatively solve problems through two sampling surveys of full-time employees engaged in knowledge creation and technology solving in different industries. Research on the relationship between knowledge sharing and innovation has received extensive attention from the researchers. There are few studies on teachers' knowledge sharing and innovation in the field of education. McLaughlin and Talbert [28] thought that teachers' sharing of teaching resources and reflection were crucial for teaching innovation. Hogan and Gopinathan [29] once proposed that the knowledge management and innovation system should focus on various forms of knowledge production that can improve the productivity of teaching and keep innovation going for a long time. Therefore, they suggested that the Singapore government should develop a knowledge management and innovation system with teaching guidance to improve the possibility of realizing sustainable and innovative development of teaching in Singapore. Runhaar and Sanders [11] thought that when teachers exchange experiences in solving students' problems or share teaching methods, they can inspire each other, and the resulting discussion may lead to teaching innovation. In the knowledge transformation model based on group interaction proposed by Dai and Wang [30], the original state of knowledge also realized knowledge innovation through knowledge sharing and knowledge interaction in group interaction, thus realizing the innovation reform of teacher training. Based on the above points, we propose our third research hypothesis as follows:

H3: Knowledge sharing has a significant impact on teaching innovation.

2.4. The Mediating Role of Knowledge Sharing

From the perspective of cognitive psychology, cognition plays an important role in shaping individual behavior [31]. As a process of metacognitive processing in the process of generating collective efficacy, team members evaluate the relationship between their abilities and the tasks they face according to the sources of efficacy belief-shaping information and then take certain actions [32]. To handle difficult tasks and achieve goals, collective-level cognition requires all members to share some tasks and team cooperation knowledge learned from task experience and team familiarity [24] because knowledge is carried by individuals, it needs to be shared among team members to establish new procedures and mental processes that help them solve problems [33]. Knowledge sharing can provide a more effective way to solve problems through formal channels and the exchange of invisible knowledge, thereby improving and accelerating the generation of innovation [34]. According to the above literature, we propose our fourth research hypothesis:

H4: Knowledge sharing mediates the relationship between collective teacher efficacy and teaching innovation.

2.5. Hypothesis Model

A hypothetical model was constructed based on previous research and theory. In this model, collective teacher efficacy was taken as an independent variable, teaching innovation as a dependent variable and knowledge sharing was proposed as a mediator. The model is shown in Figure 1.

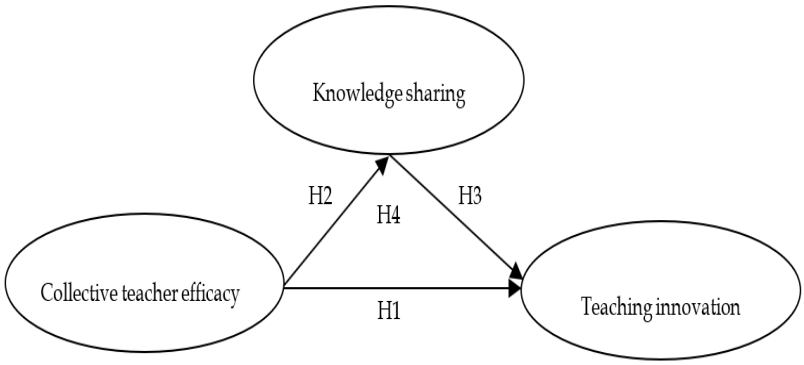

Figure 1.
Hypothetical model.

3. Method

3.1. Procedure

This study adopted a two-stage sampling method. In the first stage, stratified sampling was used. First of all, referring to the statistics released by the Ministry of Education of the People's Republic of China [35], the 31 provinces, autonomous regions and municipalities directly under the Central Government in mainland China were divided into three levels according to the indicators of comprehensive education development namely, educationally developed areas, educationally medium developed areas and educationally under-developed areas. Then, among the provinces, cities and autonomous regions at three levels, two provinces were selected as representatives of each. In the second stage, 916 questionnaires were collected from primary schools and junior high schools in six provinces and cities by random sampling. As a result, 732 valid samples were obtained and the effective recovery rate was 80%. Considering the convenience of data collection, these questionnaires were all electronic. To ensure the convenience and authenticity of the questionnaire as much as possible, the people who handed out the questionnaires should be responsible for the supervision and recovery of the school questionnaires.

3.2. Measurement Instrument

Collective teacher efficacy was measured with the collective teacher efficacy scale which revised the scale developed by Goddard [36]. It has nine items and two dimensions: group competence and task analysis. The overall Cronbach's alpha value of the scale is 0.833.

Knowledge sharing. Knowledge sharing was measured by the scale revised by Cao and Xiang [37] which is a revised version of the knowledge sharing scale developed by Chennamaneni [38]. Among those, the language habits and expressions are more suitable for the cultural context on the Chinese mainland. The scale includes four measurement indexes and the Cronbach's alpha value is 0.83.

Teaching innovation. Based on the analysis of teaching content, teaching methods, teaching interaction, teaching sharing and other contents, a questionnaire of teaching innovation was compiled in this study. The questionnaire has 11 items and 2 dimensions: teaching contents and methods, problem solving and sharing. The overall Cronbach's alpha value of the scale is 0.914 and it has good structural validity.

All questionnaires were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.3. Analytical Method

The model fit was measured by eight fit indices: χ^2/df, RMR (root mean square residual), RMSEA(root mean square error of approximation), GFI (goodness of fit index), AGFI (adjusted goodness of fit index), CFI (comparative fit index),

NFI (normed fit index) and PNFI (parsimonious normed fit index) [39]. Moreover, Cronbach's alpha coefficient was used for confirming the reliability and composite reliability (CR) and average variance extracted (AVE) were used to confirm the convergent validity. The non-parametric bootstrap method of deviation correction was used to verify the mediating effect [40].

4. Data Analysis and Results

4.1. Reliability and Validity

As shown in Figure 2, the factor load of each factor exceeds 0.45 which meets the reasonable standard [41]. Cronbach's alpha coefficient was used to evaluate the consistency of variables. The overall Cronbach's alpha value of the collective teacher efficacy scale was 0.833, the knowledge sharing scale was 0.879 and the teaching innovation scale was 0.914. All of which were greater than 0.8. These findings indicated a high degree of consistency in measuring results [42]. As shown in Table 1, the CR values ranged from 0.707 to 0.913 and the AVE values ranged from 0.382 to 0.638 indicating that the model had good convergent validity [43, 44]. The pairwise correlation coefficients ranged from 0.281 to 0.741, all of which were significant ($p<0.01$). The squared correlations from two variables were all less than the corresponding AVE. These results further revealed that there was discriminant validity between the variables.

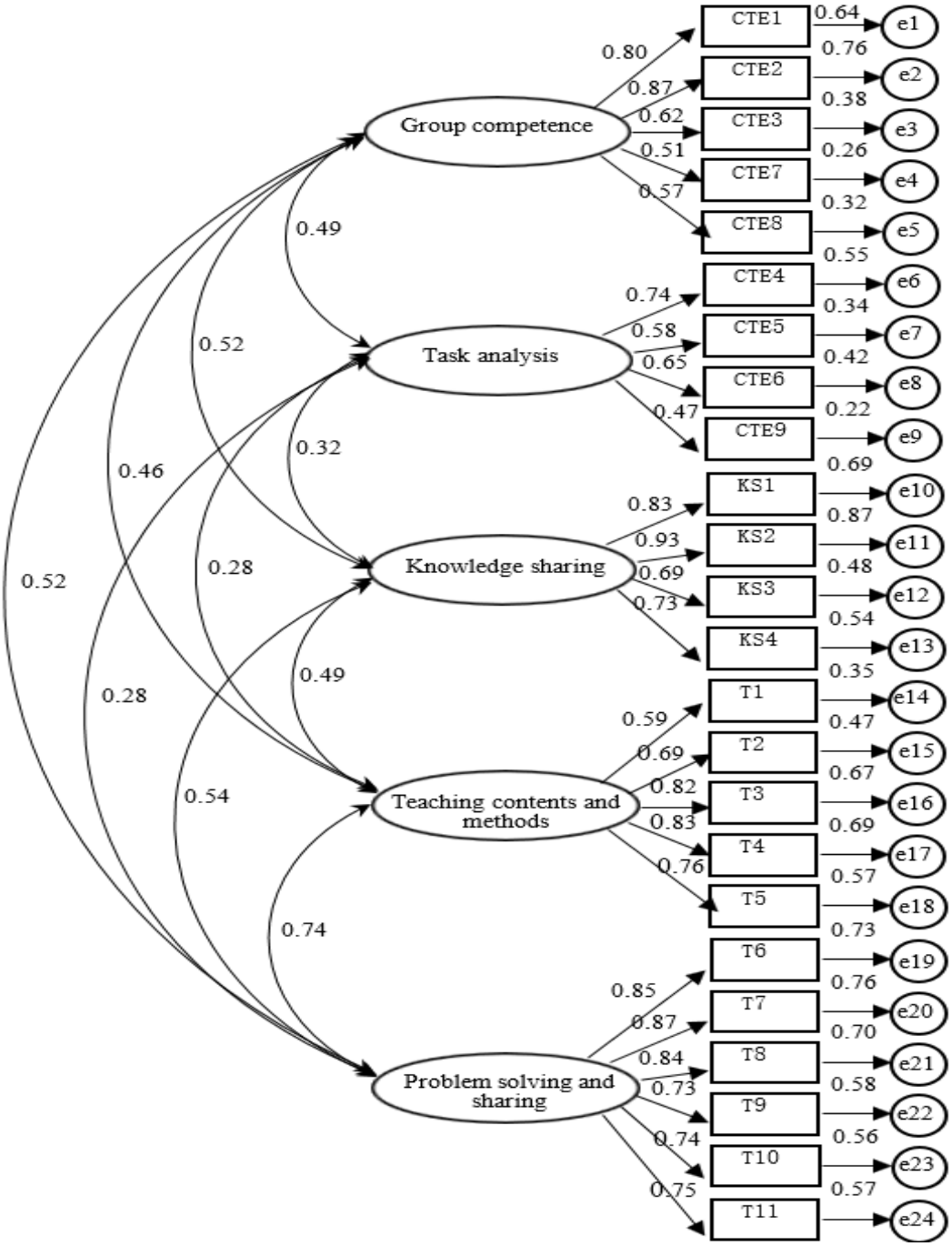

Figure 2.
Measurement model.

Table 1.
CR and AVE from measurement model and correlation matrix of variables.

Variable	Group competence	Task analysis	Knowledge sharing	Teaching contents and methods	Problem solving and sharing
Group competence	0.805(0.475)				
Task analysis	0.493(0.243)	0.707(0.382)			
Knowledge sharing	0.518(0.268)	0.317(0.100)	0.874(0.638)		
Teaching contents and methods	0.463(0.214)	0.281(0.079)	0.489(0.239)	0.859(0.553)	
Problem solving and sharing	0.515(0.265)	0.282(0.079)	0.538(0.289)	0.741(0.548)	0.913(0.638)

Note: CR = Composite reliability; AVE = Average variance extracted. The numbers on diagonal are CR(AVE). The numbers on lower diagonal are correlation coefficients of two variables and square numbers of correlation coefficients.

When the questionnaire was designed, the order effect of items was excluded, the reverse questions were set and neutral expression was adopted in the design of guidelines and questions to control common method variance (CMV) as much as possible. In addition, Harman's single-factor analysis was used to evaluate the variance of the common source. For the two multidimensional variables of collective teacher efficacy and teaching innovation, exploratory factor analysis was carried out without rotation. The results showed that the variance explained by the first factor of collective teacher efficacy was 35.123% that explained by the first factor of teaching innovation was 38.973%, both of which did not exceed 40% indicating that there was no serious CMV in the study.

4.2. Main Effect

We found that the main effect had a reasonable result: χ^2/df=2.893, RMR=0.020, RMSEA=0.051, GFI=0.940, AGFI=0.921, NFI=0.944, CFI=0.962, PNFI=0.785 [45, 46]. The standardized path coefficient between collective teacher efficacy and teaching innovation was 0.620 (t=11.997, p<0.001) (see Figure 3) which showed that collective teacher efficacy had a significant impact on teaching innovation. Therefore, hypothesis 1 was supported.

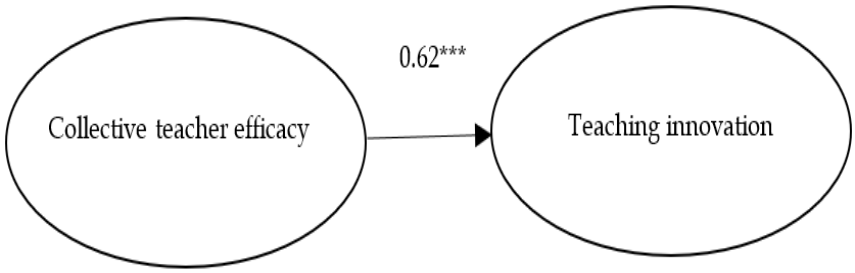

Figure 3.
The main effect.
Note: *** p<0.001.

4.3. Structural Model

As shown in Figure 4, the model fit of the structural model was acceptable: χ^2/DF=2.962, RMR=0.023, RMSEA=0.052, GFI=0.924, AGFI=0.903, NFI=0.932, CFI=0.954, IFI=0.954, PNFI=0.800 [45, 46]. As shown in Table 2, the standardized path coefficient between collective teacher efficacy and knowledge sharing was 0.608 (t=11.883, p<0.001) which showed that the positive effect of collective teacher efficacy on knowledge sharing was statistically significant. Therefore, hypotheses 2 was supported. The standardized path coefficient was 0.296 (t=6.125, p<0.001) which showed that the positive effect of teachers' knowledge sharing on teaching innovation was statistically significant and hypotheses 3 were supported.

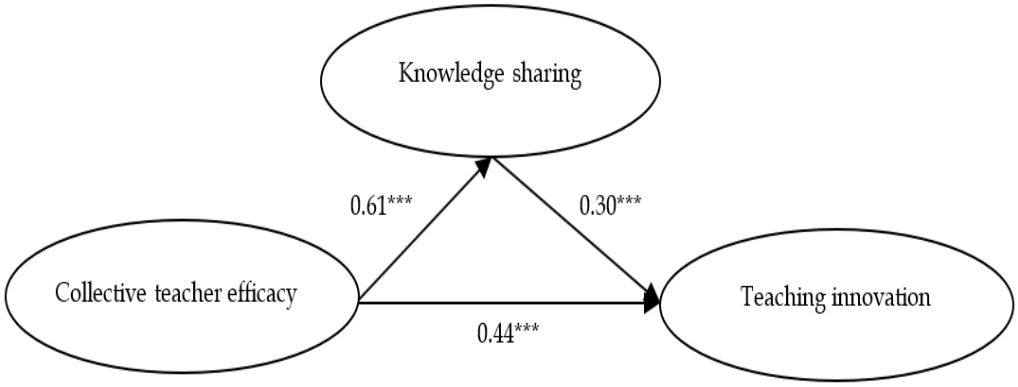

Figure 4.
Structural model.
Note: *** p<0.001.

Table 2.
Standardized regression coefficients and parameter estimations of structural model.

Variable	Estimate	S.E.	C.R.	p
KS←CTE	0.608	0.058	11.883	***
TI←KS	0.296	0.038	6.125	***
TI←CTE	0.438	0.048	8.076	***

Note: *** p<0.001.
CTE: Collective teacher efficacy
KS: Knowledge sharing
TI: Teaching innovation

4.4. Mediating Effect

In this study, the non-parametric bootstrap method of deviation correction was used to calculate the 95% confidence interval after repeated sampling for 5000 times and the mediation test results were obtained as shown in Table 3. According to the structural model, the confidence interval of the total effect between collective teacher efficacy and teaching innovation was [0.513, 0.702] which did not include 0. The confidence interval of the indirect effect between collective teacher efficacy and teaching innovation was [0.103, 0.263] which did not include 0 indicating that knowledge sharing had a significant mediating effect on collective teacher efficacy and teaching innovation and hypotheses 4 were supported. However, the confidence interval of the direct effect between collective teacher efficacy and teaching innovation was [0.329, 0.555]. If 0 was not included, it indicated that the direct effect also existed. At this time, the mediating effect was partially accounted for at 29.03%.

Table 3.
Mediating effect analysis.

Path	Standardized coefficient	Two tailed significance	95% Confidence interval		Proportion (%)
			Lower	Upper	
Total effect (CTE → TI)	0.618	0.000	0.513	0.702	100
Indirect effect (CTE → TI)	0.180	0.000	0.103	0.263	29.03
Direct effect (CTE → TI)	0.438	0.000	0.329	0.555	70.87

5. Discussion

The results verified H1 illustrated in Figure 3 confirming that collective teacher efficacy has a significant positive impact on teaching innovation. This is consistent with the results of Schwabsky, et al. [10] and Liu, et al. [21]. For teachers in the elementary school, their individual perceived collective efficacy can be regarded as the normative expectation to achieve their goals [17]. Although higher expectations will produce certain pressures, these work stresses will turn into motivation encouraging them to take actions to achieve challenging innovation goals, thus realizing teaching innovation.

The structural model verified H2, H3 and H4. Collective teacher efficacy has a significant and positive impact on knowledge sharing. This is consistent with the results of Reynolds and Blickensderfer [24]. The collective teacher efficacy is the sum of the beliefs of individual teachers about their collective abilities and this assessment of collective abilities affects their course of action and effort in pursuit of goals [17]. To achieve instructional goals, collective-level cognition requires teachers to share task and team cooperation knowledge from task experience and team familiarity. At the same time, knowledge sharing has a significant and positive impact on teaching innovation which is consistent with the results of McLaughlin and Talbert [28]; Hogan and Gopinathan [29] and Runhaar and Sanders [11]. When faced with similar opportunities and constraints, observation and learning from successful experiences make it easier to achieve similar goals [17]. Through knowledge sharing, organizations can create opportunities to generate new ideas and develop innovations [47]. By capturing, organizing and transmitting experience-based information by team members, organizations can build competitive advantage, enhance innovation and improve efficiency [34]. Knowledge sharing helps to generate more effective problem-solving methods and through experiences among colleagues and existing knowledge with new ideas, teachers can promote teaching to a new level of innovation. Besides, knowledge sharing and teaching innovation promote each other dynamically and Gloet and Samson [48] developed a knowledge and innovation management model.

The structural model proved that knowledge sharing plays a mediating role between collective teacher efficacy and teaching innovation. At this time, the mediating effect was partially accounted for at 29.03%. The research results and previous theories reasonably explain the function of knowledge sharing as a mediating mechanism. Teachers' beliefs about collective capabilities influence their behaviors. This collective-level cognition requires them to share experiences in achieving goals. By obtaining, reorganizing and delivering experience-based information, the level and speed of instructional innovation can be improved. Therefore, schools and stakeholders can directly promote teaching innovation by improving collective teacher efficacy and indirectly promote teaching innovation by improving the level of knowledge sharing.

6. Conclusion

This study explored the relationship between collective teacher efficacy, knowledge sharing and teaching innovation in basic education on the Chinese mainland. The research found that knowledge sharing has great potential to affect collective teacher efficacy and teaching innovation. The conclusion of the study indicates that knowledge sharing can promote collective teacher efficacy in basic education. Teachers' common belief in effective teaching ability has a positive and

significant connection with teaching innovation and effective knowledge sharing among teachers can further strengthen this connection. Therefore, the positive influence of collaboration and cooperation, openness and communication, values and beliefs have practical significance for educational practice. This provides new ideas for schools and relevant departments to improve the level of teaching innovation and the change of ideas will create a new school-based learning environment for teachers to improve their professional learning and teaching practice. This research connects collective teacher efficacy, knowledge sharing and teaching innovation through relevant theories of cognitive psychology and management and is no longer an isolated study of a certain teaching practice.

7. Research Suggestions and Limitations

7.1. Research Suggestions

There are two suggestions provided in this study. First, from the perspective of social exchange theory [49], teachers' responsibilities and social rewards in the process of knowledge sharing should be clarified. Social rewards include internal rewards such as appreciation and gratitude and external rewards such as money and honor. Besides, teachers' expected benefits should be satisfied so that they can get the satisfaction of their interests and emotional support.

Second, we should strive to shape an organizational culture of dynamic knowledge development, sharing and teaching innovation. By improving collective teacher efficacy, the values of teachers' knowledge sharing can be cultivated and an organizational culture system conducive to teachers' knowledge sharing can be established. In addition, it is acceptable to promote teaching innovation by improving teachers' initiative and practical level of knowledge sharing. Schools must assign importance to the cooperation and collaboration between teachers and encourage teachers to open the classroom. The successful experience gained in the process of teaching innovation will become the new content of knowledge sharing. Every teacher tries his best to challenge teaching and learning.

7.2. Limitations and Future Directions

In this study, only online questionnaires were used to collect samples so in the follow-up investigations, face-to-face investigations can be added to obtain more open content. This study only used the data of teachers in the elementary education stage to construct the research model which may not be appropriate for teachers in other education stages. Therefore, the model should be verified before being applied to teachers at other educational stages.

References

[1] J. P. Xi, "To be strong depends on innovation, and innovation depends on talents," *People's Daily, March13*, p. 7, 2018.

[2] Y. Y. Luo, "A study on the relationship between elementary school principals' knowledge leadership, learning community and innovative teaching effectiveness," Ph.D. Dissertation. University of Taipei, 2011.

[3] A. J. Starko, *Creativity in the classroom: Schools of curious delight*, 3rd ed. New Jersey: Lawrence Erlbaum Associates, 2005.

[4] R. Borasi and K. Finnigan, "Entrepreneurial attitudes and behaviors that can help prepare successful change-agents in education," *The New Educator*, vol. 6, no. 1, pp. 1-29, 2010. https://doi.org/10.1080/1547688x.2010.10399586

[5] C. C. Xie and M. X. Li, "A study on the relationship between principals' turnover leadership, teachers' professional learning community and teachers' teaching innovation in elementary schools," *Education Policy Forum*, vol. 20, no. 2, pp. 151-184, 2017. https://doi.org/10.3966/156082982017052002005

[6] C. Lin, *Researches into creative talents and creative education*. Beijing: Economic Science Press, 2009.

[7] J. Donohoo, J. Hattie, and R. Eells, "The power of collective efficacy," *Educational Leadership*, vol. 75, no. 6, pp. 40-44, 2018.

[8] A. Bandura, *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company, 1997.

[9] P. Serdyukov, "Innovation in education: What works, what doesn't, and what to do about it?," *Journal of Research in Innovative Teaching & Learning*, vol. 10, no. 1, pp. 4-33, 2017. https://doi.org/10.1108/jrit-10-2016-0007

[10] N. Schwabsky, U. Erdogan, and M. Tschannen-Moran, "Predicting school innovation: The role of collective efficacy and academic press mediated by faculty trust," *Journal of Educational Administration*, vol. 58, no. 2, pp. 246-262, 2020. https://doi.org/10.1108/jea-02-2019-0029

[11] P. Runhaar and K. Sanders, "Promoting teachers' knowledge sharing: The fostering roles of occupational self-efficacy and human resources management," *Educational Management Administration & Leadership*, vol. 44, no. 5, pp. 794-813, 2016. https://doi.org/10.1177/1741143214564773

[12] H. Kremer, I. Villamor, and H. Aguinis, "Innovation leadership: Best-practice recommendations for promoting employee creativity, voice, and knowledge sharing," *Business Horizons*, vol. 62, no. 1, pp. 65-74, 2019. https://doi.org/10.1016/j.bushor.2018.08.010

[13] J. B. Li and S. Q. Tang, "Research on the relationship among knowledge sharing, employee innovation behavior and innovation performance in new enterprises," *Social Science Front*, vol. 267, no. 9, pp. 246–250, 2017.

[14] J. Li, N. Wu, and S. Xiong, "Sustainable innovation in the context of organizational cultural diversity: The role of cultural intelligence and knowledge sharing," *Plos One*, vol. 16, no. 5, p. e0250878, 2021. https://doi.org/10.1371/journal.pone.0250878

[15] Y. B. Sun and J. Y. Liu, "Research on the influence of inter-enterprise interaction factors and knowledge sharing on enterprise innovation performance," *Journal of Commercial Economics*, vol. 798, no. 11, pp. 137–139, 2020.

[16] H. Xu, P. B. Guo, and L. Y. Bao, "The influence of organizational support on the innovation behavior of researchers—based on the chain intermediary effect of innovation self-efficacy and knowledge sharing," *Science and Technology Management Research*, vol. 474, no. 8, pp. 124–131, 2021. https://doi.org/10.3969/j.issn.1000-7695.2021.08.017

[17] R. D. Goddard, W. K. Hoy, and A. W. Hoy, "Collective efficacy beliefs: Theoretical developments, emirical evidence, and future directions," *Educational Researcher*, vol. 33, no. 3, pp. 3-13, 2004. https://doi.org/10.3102/0013189X033003003

[18] G. Messmann and R. H. Mulder, "Innovative work behaviour in vocational colleges: Understanding how and why innovations are developed," *Vocations and Learning*, vol. 4, no. 1, pp. 63-84, 2010. https://doi.org/10.1007/s12186-010-9049-y

[19] A. F. Siagian, M. Ibrahim, and Z. A. I. Supardi, "Creative-scientific decision-making skills learning model for training creative thinking skills and student decision making skills," *Nurture*, vol. 17, no. 1, pp. 10–17, 2023. https://doi.org/10.55951/nurture.v17i1.141

[20] E. M. Skaalvik and S. Skaalvik, "Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout," *Journal of Educational Psychology*, vol. 99, no. 3, pp. 611–625, 2007. https://doi.org/10.1037/0022-0663.99.3.611

[21] J. Liu, J. Chen, and Y. Tao, "Innovation performance in new product development teams in C hina's technology ventures: the role of behavioral integration dimensions and collective efficacy," *Journal of Product Innovation Management*, vol. 32, no. 1, pp. 29-44, 2015. https://doi.org/10.1111/jpim.12177

[22] P. Tierney and S. M. Farmer, "Creative self-efficacy: Its potential antecedents and relationship to creative performance," *Academy of Management Journal*, vol. 45, no. 6, pp. 1137-1148, 2002. https://doi.org/10.5465/3069429

[23] H. L. Yang and H. H. Cheng, "Creative self-efficacy and its factors: An empirical study of information system analysts and programmers," *Computers in Human Behavior*, vol. 25, no. 2, pp. 429-438, 2009. https://doi.org/10.1016/j.chb.2008.10.005

[24] R. Reynolds and E. Blickensderfer, "The impact of task skill and team familiarity on shared knowledge and collective efficacy," *Proceedings of the Human Factors & Ergonomics Society Annual Meeting*, vol. 58, no. 1, pp. 1332-1335, 2014. https://doi.org/10.1177/1541931214581278

[25] T. Cavusgil, S. Calantone, and Y. Zhao, "Tacit knowledge transfer and firm innovation capability," *Journal of Business & Industrial Marketing*, vol. 18, no. 1, pp. 6-21, 2003. https://doi.org/10.1108/08858620310458615

[26] Y. Huang, J. and D. R. Liu, "An empirical study on the influence of knowledge management on the core competence of enterprises," *Studies in Science of Science*, vol. 28, no. 7, pp. 1052-1059, 2010. http://dx.doi.org/10.16192/j.cnki.1003-2053.2010.07.013

[27] A. Carmeli, R. Gelbard, and R. Reiter-Palmon, "Leadership, creative problem-solving capacity, and creative performance: The importance of knowledge sharing," *Human Resource Management*, vol. 52, no. 1, pp. 95-121, 2013. https://doi.org/10.1002/hrm.21514

[28] M. W. McLaughlin and J. E. Talbert, *Professional communities and the world of high school teaching*. Chicago, IL: University of Chicago Press, 2001.

[29] D. Hogan and S. Gopinathan, "Knowledge management, sustainable innovation, and pre-service teacher education in Singapore," *Teachers and Teaching: Theory and Practice*, vol. 14, no. 4, pp. 369-384, 2008. https://doi.org/10.1080/13540600802037793

[30] Y. Dai and D. Q. Wang, "Construction and practice of teacher training model from the perspective of group knowledge sharing and innovation," *China Educational Technology*, vol. 365, no. 6, pp. 131-136, 2017. https://doi.org/10.3969/j.issn.1006-9860.2017.06.020

[31] A. Bandura, "Self-efficacy: Toward a unifying theory of behavioral change," *Psychological Review*, vol. 84, no. 2, pp. 191-215, 1977. https://doi.org/10.1037/0033-295X.84.2.191

[32] M. Tschannen-Moran, A. W. Hoy, and W. K. Hoy, "Teacher efficacy: Its meaning and measure," *Review of Educational Research*, vol. 68, no. 2, pp. 202-248, 1998. https://doi.org/10.3102/00346543068002202

[33] D. Hislop, *Knowledge management in organisations*, 3rd ed. UK: Oxford University Press, 2013.

[34] B. Hu and Y. D. Zhao, "Creative self-efficacy mediates the relationship between knowledge sharing and employee innovation," *Social Behavior and Personality*, vol. 44, no. 5, pp. 815–826, 2016. https://doi.org/10.2224/sbp.2016.44.5.815

[35] Ministry of Education of the People's Republic of China, "Education statistics 2020," Retrieved: http://www.moe.gov.cn/jyb_sjzl/moe_560/2020/. 2021.

[36] R. Goddard, "A theoretical and empirical analysis of the measurement of collective efficacy: The development of a short form," *Educational and Psychological Measurement*, vol. 62, no. 1, pp. 97-110, 2002. https://doi.org/10.1177/0013164402062001007

[37] Y. Cao and Y. Xiang, "Study on the relationship among knowledge governance, knowledge sharing and employee innovation based on the mediating of social capital and the moderating of absorptive capacity in enterprises," *Studies in Science of Science*, vol. 32, no. 1, pp. 92-102, 2014. https://doi.org/10.16192/j.cnki.1003-2053.2014.01.004

[38] A. Chennamaneni, "Determinants of knowledge sharing behaviors: Developing and testing an integrated theoretical model," Ph.D. Dissertation. University of Texas, 2007.

[39] R. E. Schumacker and R. G. Lomax, *A beginner's guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum Associates, 2004.

[40] A. F. Hayes, *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press, 2013.

[41] B. G. Tabachnick and L. Fidell, S., *Using multivariate statistics*, 5th ed. New York: Allyn and Bacon, 2007.

[42] R. F. DeVellis, *Scale development: Theory and applications*. Newbury Park, CA: Sage Publications, 1991.

[43] Z. L. Yan and Z. P. Zheng, *Statistical guide for thesis writers: Even fools can run statistics I*, 3rd ed. Taipei: Wu-Nan Book Inc, 2021.

[44] J. F. J. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate data analysis*, 7th ed. Upper Saddle River: Pearson Education Limited, 2014.

[45] X. Y. Li, *The innovative behavior and academic achievement of college students: Concept, measurement and influencing factors*. Beijing: Economy & Management Publishing House, 2021.

[46] M. L. Wu, *Structural equation model: Operation and application of AMOS*. Chongqing: Chongqing University Press, 2009.

[47] G. Krogh, I. Nonaka, and L. Rechsteiner, "Leadership in organizational knowledge creation: A review and framework," *Journal of Management Studies*, vol. 49, no. 1, pp. 240-277, 2012. http://dx.doi.org/10.1111/j.1467-6486.2010.00978.x

[48] M. Gloet and D. Samson, "Knowledge and innovation management: Developing dynamic capabilities to capture value from innovation," in *Proceedings of the Hawaii International Conference on System Sciences (HICSS), Hawaii*, 2016.

[49] P. Blau, M., *Exchange and power in social life*, 2nd ed. New York: Routledge, 2017.