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# A qualitative study on the components of teacher leadership based on the perspective of teacher behaviour

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## Abstract

Exploring the constituent elements of teacher leadership is an important research direction for bringing innovation and entrepreneurship within teacher leadership research. However, there are very few studies on the components of teacher leadership based on the perspective of innovative teacher behaviour. This paper uses the method of grounded theory and the three-level coding technology of the qualitative analysis software Nvivo12.0 to code and analyse 33 Chinese core journal texts about teacher leadership in the CNKI database. In these texts, teaching students in an innovative and entrepreneurial way is the fundamental element, leading colleagues and assisting leaders to represent higher-level relationship elements, serving society is the highest-level element, and developing oneself is the driving force that runs through the entire process. A deep understanding of the constituent elements and structural dimensions of teacher leadership can help promote innovation and entrepreneurship through teachers' independent development, mutual assistance, and cooperation, improve teachers' leadership performance, and promote the development of students and schools.

**Keywords:** Teacher leadership, Components, Qualitative research, Grounded theory

## Introduction

“Teacher leadership” was used as a research construct in the American education movement in the 1980s by Lieberman and others for the first time to introduce innovation and entrepreneurship in teaching and it was found under triple helix concepts that teacher leadership is a vital element to connect the institutional practices with the market trend and government policies. Teacher leaders are the only way to facilitate innovative practices as per the needs for making an innovative economy (Huggins & Daly, 2008). So, the role of teacher leadership under the triple helix concept exists more in education teaching reform and school long-term development rather than in teachers' teaching ability and has a wider range of influence. The concept of teacher leadership has received increasingly widespread attention (Lieberman et al., 1988). In reform practice, teachers not only need to have teaching ability, but also need to have the ability to use innovative and entrepreneurial ways to lead school teaching reform (Zhao, 2015). Through the

concept of quadruple helix, the teacher leadership can work on teaching policy reform by shaping the decisions based on interdisciplinary research and industry professionals to drive the innovative economy also the bringing changes in the teaching reforms (Kippenberger & Gray, 2020).

In China, in 2008, the scholar used the word “teacher leadership” (Wu, 2008) for the first time in the literature collected in CNKI. In recent years, Chinese scholars have cited and analysed the development of teacher leadership in Canada, Australia, the United States and other countries (Chen & Long, 2009; Wang et al., 2014) and conducted typical studies from different perspectives based on the actual situation in China. For example, Zhao (2021) summarized the leadership of young teachers in universities into four dimensions: moral leadership, innovative and entrepreneurial teaching, teaching leadership, scientific research leadership and teaching leadership. Sun (2021) challenged the traditional teacher leadership architecture, given that the work reflects the focus of teacher leadership. Teacher leadership can be divided into teachers who pursue excellence in teaching organization cooperation, teachers who participate in school internal management decision-making advice, and teachers who plan coordination with external contacts (Sun, 2021). Nie (2019), studying the connotation development of college teacher leadership, proposed that the leadership of university teachers is composed of many core elements, such as curriculum, teaching, scientific research, governance and inheritance. Peng (2017) proposed that teacher leadership corresponds to the main elements in bringing innovative teacher leadership activities. Its core elements include four aspects: “self-development, teaching students, guiding peers, and advising leaders”.

Since 2008, the quantity of papers in the field of innovative teacher leadership research in China has been increasing year by year, showing a trend of multiple fields, perspectives and methods. However, currently, the definition of innovative teacher leadership has not been accepted and unified. There is also a lack of localized systematic research on the components of teacher leadership, especially on those components based on the perspective of teacher behaviour (Peng, 2017). It is crucial to define teacher leadership and look at the factors that affect innovation and entrepreneurship in teacher leadership and its value utility because ambiguity in the definition of teacher leadership may result in a divergence between research and practice.

To further and comprehensively analyse the elements of teacher leadership, this paper used the (CNKI) database of the Chinese core journals for exploring teacher leadership through Nvivo12.0 software for tertiary coding. The results summarized the composition of teacher leadership and structure dimensions, provided a basis for teachers to improve their leadership performance, and provided theoretical support for subsequent related research (Marilyn & Gayle, 2001; Yu, 2018).

## **Literature review**

Teacher leadership emerged in the 1980s. Its root cause lies in the needs of national education and teaching reform. Based on the superimposed relationship between teachers' teaching and leadership roles and the assumption that leadership is widely distributed within innovation and entrepreneurship, Lieberman and others first proposed the concept of “teacher leadership”. Since then, many researchers have provided many

definitions of teacher leadership from various perspectives, mainly including the following three: power, behaviour (also called process) and ability (Li, 2009a).

In addition, it is very important to review previous review articles on teacher leadership. York-Barr and Duke (2004) reviewed 100 empirical studies on teacher leadership over the past 24 years (from 1980 to 2004). They came to the conclusion that innovative teacher leadership is inadequately defined and presented a framework for further research. Wenner and Campbell (2017) reviewed the articles on innovative teacher leadership that were published between 2004 and 2013. Studies have looked at teacher leadership, impact, conditions, and theories, stressing the challenges of defining teacher leadership, the significance of principals, the importance of institutions, and norms in attaining effective teacher leadership, as well as the common challenges of time constraints and a heavy workload (Wenner & Campbell, 2017). Nguyen et. al. (2019) studied 150 empirical studies published between 2003 and 2017 to reveal contextual and methodological considerations in teacher leadership. They adopted a broader concept of teacher leadership, where teachers lead not only beyond the classroom as defined by Wenner and Campbell (2017), but also within the classroom. Nguyen et. al. (2019) examined 150 empirical publications that were released between 2003 and 2017 in order to comprehend the background and research methodology of teacher leadership. It is difficult to define innovative teacher leadership, and small-scale qualitative research continues to dominate this field of study, they concluded after looking at the indirect relationship between teacher leadership and student learning. The definitions, causes, effects, and methodological quality of 93 studies on teacher leadership that were released between 2014 and 2018 were analysed by Schott et. al. (2020). They thought that teacher leadership was still up for debate. They highlighted the limitations of innovative teacher-led research, which frequently only examines one site and makes use of a single approach (Schott et al. 2020). A recent bibliometric analysis of 49 publications on middle-level leadership that were published between 2003 and 2017 was just completed by Harris et. al. (2019), which included a study on middle-level leadership that covered a larger range of research topics. According to their findings (Harris et al., 2019), there has been an increase in interest in empirical research on innovative leadership since 2003, with the majority of articles utilizing qualitative techniques.

There is no clear unified statement on the definition and connotation of the concept of teachers' leadership along with no clear findings about understanding teacher behaviour. A limited studies have reported the understanding of teacher leadership from the perspective of teacher behaviour through five different components (Leithwood et al., 2004). The quintuple helix model highlighted the educational system as the main source for promoting an innovation-based economy and teacher behaviour is one of the most critical roles in that system (Nair & Williams, 2017). So there has been a strong need to align teacher behaviour with teacher leadership from the quintuple helix model as teacher behaviour has been an important perspective for understanding the teacher leadership aspect (Reynolds et al., 2020). Teacher behaviour refers to looking for potential ways of growth, effective planning, engagement in the development process for the support of workplace and students, so all of these are somehow can better define the teacher leadership (Leithwood et al., 2004). Regarding the connotation of innovative teacher leadership, different schools and different scholars have described it differently

from different perspectives. York-Barr and other scholars have said that “almost no one can give an accurate definition of teacher leadership” (Fullan, 1998), which may also be the reason for the expanding field of teacher leadership research.

Additionally, over the years, innovative teacher leadership research methodologies have evolved steadily, focusing on the integration of qualitative and quantitative research. Schott et al. (2020) analysed the methodology of teacher leadership research and pointed out that research on teacher leadership can be achieved through field experiments, natural experiments, variable methods or, more generally, causal models. Of the 84 empirical studies, 59 articles (70%) proposed only qualitative methods. Most of the time, interviews were the method used, for example (Chukowry, 2018; Hite & Milbourne, 2018; Jacobs et al., 2016); in some cases, they used document analysis (e.g., Lowery-Moore et al., 2016). To a lesser extent, observation and focus groups were used (e.g., Jacobs & Crowell, 2018). Other methods include diaries, field notes, reflection, and open-ended surveys. Twelve articles (14%) were entirely quantitative, and they mainly used survey studies (e.g., Li, 2015; Menlo, 2015). Finally, 13 articles (15%) used mixed methods (e.g., Boyce & Bowers, 2018; Tsai, 2017). Based on an analysis of 150 empirical documents from 2003 to 2017, Nguyen et al. (2019) found that 71% of the documents used qualitative data, 16% used a quantitative study design, and 13% used combined qualitative and quantitative data. It is evident that qualitative research continues to predominate in the field of teacher leadership research, despite a minor increase in the proportion of people employing quantitative and mixed research methods.

The above studies collectively reviewed the literature from 1980 to 2020 and provided an important understanding of innovative faculty leadership, with previous studies highlighting the definition, theoretical framework, and impact of innovative faculty leadership. However, none of these studies are based on empirical studies on teacher leadership from the perspective of teacher behaviour, and therefore, this deficiency is also the focus of this study.

## **Research methodology**

### **Study design**

Qualitative research is a broad research orientation for studying social phenomena. It uses many methods of interaction and humanism and emphasizes the complex process of deduction and induction arguments to obtain an explanatory understanding of the behaviour and meaning of such phenomena through interaction with the research object (Catherine & Rossman, 2019). Grounded theory is regarded as a more scientific method in the field of qualitative research and was proposed by Strauss and Glaser (1967). Grounded theory is usually used before the beginning of the research without theoretical assumptions but with research problems, directly from the actual analysis, comparison, analysis and induction of concepts and categories from the original data, and then rises to a theoretical method to establish substantive theory from bottom to top. The difference between grounded theory and other qualitative research methods is that researchers do not assume a point of view in advance and then make an argument but first choose a field to study and then summarize and refine concepts, categories and theories in this field (Luo & Chen, 2011). The data analysis process is divided into three-level coding processes according to grounded theory. For the coding process, the

researchers used the tool from the research and development of the Australian company QSR, Nvivo12.0 software, as an auxiliary analysis tool. Through the initial arrangement of text data, the original statement was extracted to establish a free node, form the initial concept, refine the initial category, form the main category, establish the core category of the induction process, and finally form the subordinate from bottom to top with all levels of the node and structure model.

### **Research materials**

To obtain the raw data of the components of teacher leadership, the literature in this paper takes the China CNKI database as the data source, supplemented by a manual search. The literature collected by CNKI has a long time span, large quantity and high quality, which can maximize the integrity of the data. The search strategy was teacher leadership OR teacher leadership, and the manual search scope covered important journals in management disciplines and related fields, including psychology, management review, soft science, and scientific research management. The search covered all the core Chinese journals from January 2007 to December 2021, including literature that was not officially published until December 2021 but is online.

The peer-reviewed journal papers published in Chinese form the basis of the literature used in this study. The research is school-based, and the presented findings are from the original, in-depth research that was written in Chinese and focused on teacher leadership behaviour. After multiple screening of the research literature, 33 articles were kept, which represent teacher leadership research in China. A list of these articles is available in the supplementary file. A list of these articles is shown in Table 1.

### **Data analysis**

#### ***Data analysis process***

This study is based on grounded theory for data analysis and theoretical constructs. Grounded theory analysis includes preliminary analysis and genus analysis. The preliminary analysis includes logging and open coding of primary data, and the genus analysis involves spindle coding and selective coding based on the preliminary analysis. The construction of the theory is a bottom-up inductive summary, contrary to the top-down validation analysis logic of quantitative research (Zhang & Yang, 2018) (see Fig. 1).

#### ***Open coding***

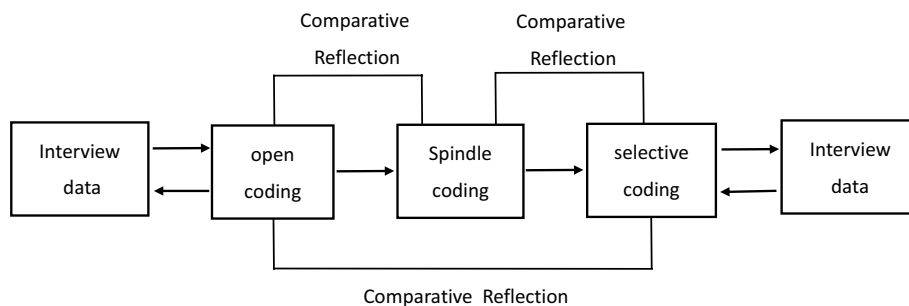
This paper uses the coding analysis software Nvivo12, to first define the phenomenon, and then, according to the requirements of open coding, review the original 33 literature texts sentence by sentence, each line of each paragraph, to perform an initial sorting, and extract relevant original representative statements from the teacher leadership elements, and decompose them into different independent information units. This process is followed by the development step; using the concept of the initial coding number and semantic cross, through continuous comparison, the key statements are gradually put into a theory class. Then, after analysis and induction, it is made clear how the abstract can reflect or influence the key information of teacher leadership components, and the inductive abstract is categorized into initial concepts. Finally, the category is refined

**Table 1** General profile of the included literature

No.	Title
1	Research on teacher leadership construction in colleges and universities (Xiao & Yuan, 2011)
2	The development and verification of the leadership effectiveness scale for college teachers (Lai & Zhao, 2018)
3	Research on the leadership model construction of college young teachers (Zhao, 2021)
4	Role positioning and connotation construction of ideological and political course teachers in colleges and universities (Zhang, 2009)
5	Vocational teachers' leadership: connotation, value and development path (Shao, 2018)
6	Sharing, collaboration and reconstruction: the new trend of foreign teachers' leadership research (Sun & Cheng, 2020)
7	An empirical study of leadership influencing factors among backbone teachers (Wang & Sally, 2017)
8	Review on teacher leadership research based on distributed leadership (Yuan & Peng, 2011)
9	Research on teaching ability model of college music teachers based on the Gfee leadership model (Liu, 2017)
10	An analysis of the research framework of teacher curriculum leadership (Wang, 2020)
11	The connotation and implementation strategy of teacher leadership (Ren, 2010)
12	How can teacher leadership be possible? (Jin, 2010)
13	Teacher leadership education: the new trend of contemporary American teacher education (Brother & Liu, 2007)
14	Teacher leadership: to give every ordinary teacher influence (Chu, 2020)
15	Teacher leadership: towards the research agenda (Du, 2010)
16	The core elements and improvement path of teacher leadership (Peng, 2017)
17	The role change and the path exploration of teacher leadership
18	Three-dimensional model design of teachers' leadership: construct formation, connotation characteristics and model construction (Sun, 2021)
19	Progress and foresight of teacher leadership research (Wang & Zhu, 2020)
20	The connotation, role and implementation strategy of teacher leadership (Zhou, 2009)
21	The concept, connotation and theoretical model of teachers' information technology leadership (Sun & Zhang, 2015)
22	In-depth analysis of teachers and information leadership (Li & Yang, 2016)
23	On the leadership connotation of teachers' leadership (Li, 2009c)
24	On the leadership of teachers (Jin, 2007)
25	On the value, connotation and cultivation of teachers' leadership in educational collaborative reform (Ye & Zhu, 2018)
26	On the leadership improvement of university teachers in the connotative development (Nie, 2019)
27	Analysis and reference of three main teacher leadership models in the United States (Fan & Xiong, 2021)
28	American primary and secondary schools "teacher leadership demonstration standard" review (Zhang & Zhang, 2013)
29	Progress of teacher leadership in European and American countries and its enlightenment for China's education reform (Liang, 2010)
30	Research on teacher leadership in a web environment (Han, 2012)
31	An investigation into the current state of teacher leadership in China and its affecting elements—taking Guangdong Province as an example (Hu & Gu, 2012)
32	Construction and application of an information leadership model for primary school teachers (Li, 2020)
33	The "eight-dimensional behaviour mode" exploration of school curriculum leaders (Wen & Yang, 2024)

further. The concept is condensed further and made more directional and selective to form a category.

Through open coding, 13 initial categories were obtained: professional knowledge, moral accomplishment, teaching ability, improvement ability, improvement, updating channels, updating ideas, colleague cooperation, leading communication, assisting in



**Fig. 1** Flowchart of data analysis based on grounded theory

management, providing advice, coordinating personnel, serving organizations and serving society.

***Axial coding***

Because the initial categories formed by open coding are scattered and broad, the correlation between categories is not immediately obvious. On the basis of in-depth analysis of the logical relationship between categories and according to the internal causal relationship between different categories, a more systematic and generalized main category is formed. This paper includes five main categories, including teaching students, self-development, leading colleagues, assisting leaders and serving society.

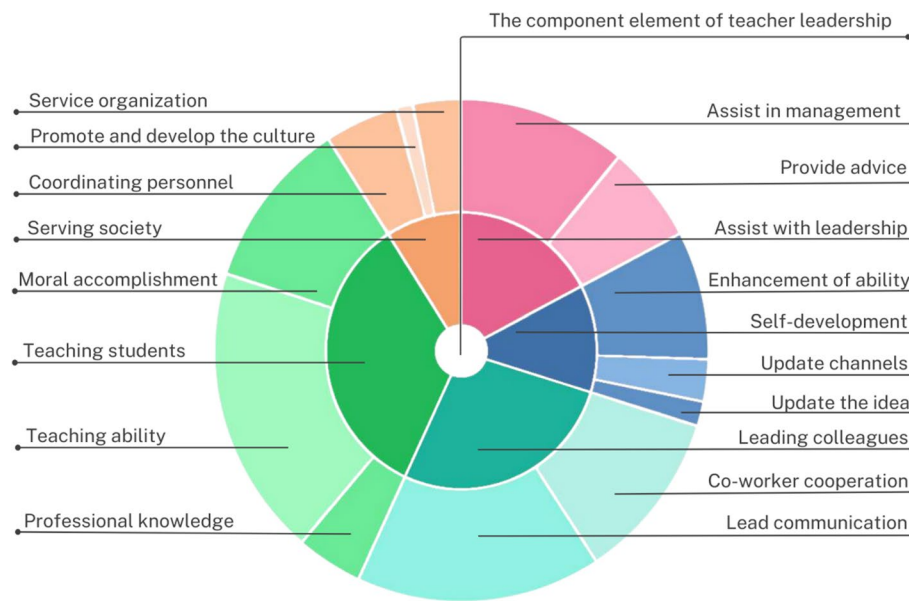
***Selective coding***

From the perspective of the main category, the relationship between the main categories shows a relatively clear context, which covers the basic elements of the establishment of the core category. According to the topic of this study, it is found that “components of teacher leadership” can be used to control all other categories, so it is defined as the core category.

***Model construction***

After open coding, spindle coding and selective coding of 33 texts, a structural model of teacher leadership components was generated through the qualitative analysis software Nvivo12 (see Fig. 2).

The model is a ring structure spreading from the centre to the periphery. The core theme of the model is the elements of teachers’ leadership. It shows the specific hierarchical structure of the elements of teachers’ leadership with multilayer rings, and the internal nodes of each ring are divided into the dimensional categories of the elements of teachers’ leadership. From the structural model, the components of teacher leadership are composed of 5 first-level nodes (the main category formed by the spindle code) and 13 second-level nodes (the category formed by the open code). The longitudinal structure of the ring in each sector area reflects the hierarchical relationship of the components of teacher leadership. Because of the quantity of tertiary nodes (concepts produced for encoding), the diagram only includes the first and second-level nodes obtained by Nvivo12 software coding. The area of each ring is determined



**Fig. 2** Structure model diagram of teacher leadership components

by the number of encoded reference points and symbolizes the quantity of studies performed at that node. It reflects an element’s influence on all the elements in this layer.

**Results**

The components of teacher leadership include five categories: teaching students, self-development, leading colleagues, assisting leaders and serving society.

**Teaching students**

The category of teaching students has the largest number of reference points in all the level nodes and occupies the most important position in the components of teacher leadership by the quantity of coding reference points, teaching students includes three secondary nodes of teaching ability, moral accomplishment and professional knowledge, with a grand total of 83 reference points, as shown in Table 2.

**Leading colleagues**

The category of leading colleagues includes two secondary nodes of leading communication and colleague cooperation, with a grand total of 69 reference points, as shown in Table 3. The leading and communication nodes include five third-level nodes, including demonstration leading and support, training of new teachers, promoting learning exchange, peer review and sharing of teaching experience, with a grand total of 41 reference points. The colleague cooperation nodes include five third-level nodes, including cooperating to solve problems, building excellent teams, building trust with colleagues, make decisions and help solve difficulties, with a grand total of 28 reference points.



**Table 2** Teaching students: nodes of all levels and the number of encoded reference points

Secondary node	Level 3 node	Code number of reference points	Secondary node	Level 3 node	Code number of reference points
Teaching ability (48)	Organize education and teaching	35	Moral accomplishment (24)	Ideological and moral guidance	8
	Stimulate the passion of learning	4		Personality charm infection	5
	Novel teaching method	3		Promote healthy development	3
	Superb teaching methods	2		Improve the relationship between teachers and students	2
	Subject characteristics attract students	2		Solve students' difficulties	2
	Implement student evaluation	2		Clear concept of education	2
	Professional knowledge (11)	Extensive knowledge and experience		7	Improve the quality of teaching
Combination of scientific research and teaching		4			

The numbers in the parentheses of the secondary nodes indicate the number of the secondary encoded reference points, which is the sum of all, and the encoded reference point numbers of the tertiary nodes. The following tables are in the same format

**Table 3** The number of nodes and coding reference points

Secondary node	Level 3 node	Code number of reference points	Secondary node	Level 3 node	Code number of reference points
Lead communication (41)	Demonstration, guidance and support	23	Coworker cooperation (28)	Work together to solve problems	10
	Train new teachers	6		Create an excellent team	9
	Promote learning and communication	5		Create colleague trust	5
	Review between peers	4		Work together to make decisions	3
	Share teaching experience	3		Help solve difficulties	1

**Assist with leadership**

The assist with leadership node includes 2 secondary nodes for assist in management and advice, with a grand total of 44 reference points. The assist in management node includes three third-level nodes: maintaining campus order, assisting in daily management and assisting in the management of the class, with a grand total of 28 reference

**Table 4** Number of nodes at all levels and coding reference points included in the assist with leadership node

Secondary node	Level 3 node	Code number of reference points	Secondary node	Level 3 node	Code number of reference points
Assist in management (28)	Maintain the campus order	15	Provide advice (16)	Build a system for improvement	6
	Assist with the daily management	9		Participate in teaching reform	5
	Assist in class management	4		Provide teaching information	3
				Participate in school decision-making	2

**Table 5** Number of nodes and coding reference points included in the self-development node

Secondary node	Level 3 node	Code number of reference points	Secondary node	Level 3 node	Code number of reference points
Enhancement of ability (21)	Improve one's ability	13	Update channels (7)	Expand learning channels	5
	Develop teaching courses	4		Industry training and learning	2
	Update one's knowledge	2	Update concepts (4)	Develop professionalism	3
	Innovate teaching methods	2		Cultivate academic literacy	1

points. The suggestion nodes include four third-level nodes: building the improvement system, participating in teaching reform, providing teaching information and participating in school decision-making, with a grand total of 16 reference points, as shown in Table 4.

**Self-development**

Self-development includes three secondary nodes: improvement ability, update channels and update concept, with a grand total of 32 reference points. The ability improvement node includes four third-level nodes, including improving one's own ability, developing teaching courses, updating one's own knowledge and innovating teaching methods, with a grand total of 21 reference points. The updated channel node includes two third-level nodes, namely, expanding learning channels and industry training and learning, with a grand total of 7 reference points. The updated concept nodes include two third-level nodes of professional development and academic cultivation, with a grand total of 4 reference points, as shown in Table 5.

**Serving society**

Serving society includes three secondary nodes, namely, coordinating personnel, service organization and promotion culture, with a grand total of 23 reference points. The coordination node includes two third-level nodes of communicate and lead parents and

service-related personnel, with a grand total of 12 reference points. The service organization node includes two third-level nodes of community organization cooperation and service enterprise company, with a grand total of 8 reference points. The promotion of cultural nodes includes 2 third-level nodes of spreading excellent culture and exploring academic research, with a grand total of 3 reference points, as shown in Table 6.

**Discussion**

As the results from the extraction of papers shows that teacher leadership can be define through the perspective of innovative teacher behaviour as it as crucial role of knowledge producing as per the triple helix theory (Sindelar et al., 2006). The teacher behaviour that was previously found limited association in defining innovative teacher leadership has almost the same aspects (Leithwood et al., 2004). The results suggest that teacher leadership from the perspective of teacher behaviour has the dimensions based on teaching students with planning, self-development, leading colleagues, assisting leaders, and serving society which is linking with the quadruple helix theory as well (Hartzell et al., 2019).

So, teaching with planning is not only the dimension for being a leadership ability in teacher, but also it reflects their behavioural aspect too as supported by the previous researchers (Sergiovanni, 2007). Similarly other scholars reported that teaching ability refers to the ability of teachers to teach in an innovative and entrepreneurial way; this is the necessary basic ability that belongs to the behavioural aspect of teachers to complete their own work (Menlo, 2015). But some of authors did report that if teaching ability is under teacher behaviour, then it should be properly organized (Leithwood et al., 2004).

Leading colleagues is mainly manifested from the teacher behaviour who learn and imitate excellent teachers with an active and positive attitude to enhance their professional quality and educational ability in order to become more innovative and entrepreneurial-oriented (Menlo, 2015). In order to link this dimension with innovative teacher leadership previous researcher reported the need of professional development community because it can promote the members or young teachers to obtain the corresponding level of professional development to take full advantage of their leadership role (Leithwood et al., 2004).

**Table 6** Number of nodes at all levels and coding reference points included in the serving society nodes

Secondary node	Level 3 node	Code number of reference points	Secondary node	Level 3 node	Code number of reference points
Coordination personnel (12)	Communicate and lead parents	9	Promote and develop culture (3)	Spread an excellent culture	2
	Service related personnel	3			
Service organization (8)	Community organization cooperation	6		Explore academic research	1
	Service enterprise company	2			

Assisting leaders is a term from innovative teacher behaviour that refers to a formal leader in school administration or business (Wu, 2008). In terms of assisting leadership, teacher leadership can easily be linked to the teacher behaviour as teachers follow the rules of the school regulations and code of conduct for the better implementation of effective class management and teaching. So, by linking it with the behavioural aspect can provide teaching information and suggestions to participate in school decisions and promote teaching reform and the development of the school (Leithwood et al., 2004).

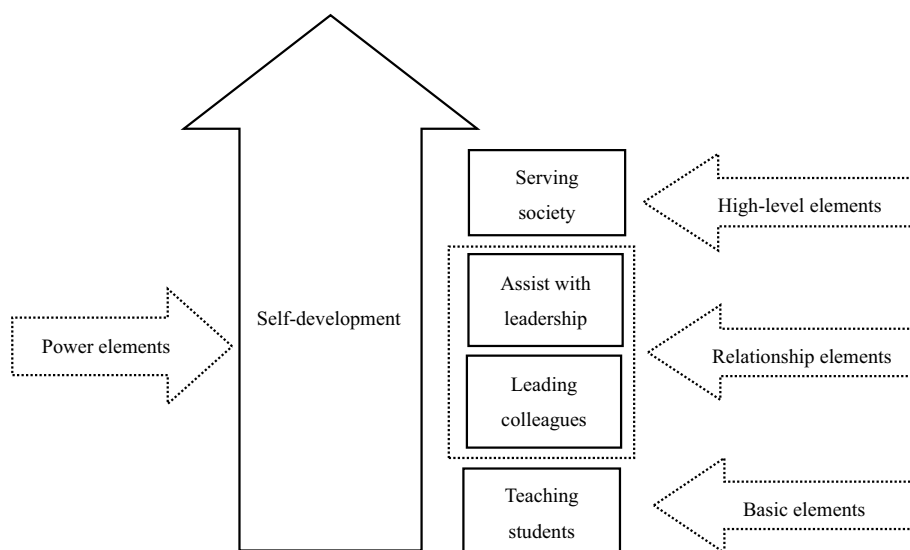
Self-development means that individual teachers shape themselves according to the relevant requirements of teacher professional standards so that they become qualified and even excellent teachers (Peng, 2017). However, the development of teachers is not only an issue of timely importance but can be part of the teacher behavioural aspect which is missing previously in the literature about innovation in education (Liu, 2017). So, the current study not only provides the support, but also fills the gap about linking self-development as part of teacher behaviour. To link self-development as teacher behaviour in the perspective of teacher leadership the teachers should realize the importance of self-development and make reasonable self-development plans, including clear development goals and practical implementation plans; second, teachers should make full use of their daily time to carry out activities such as learning, thinking and research. Teachers should be firm in their will, constantly force themselves to carry out corresponding activities according to the plan step-by-step, slowly solidify updating one's knowledge and improving one's ability into unconscious and conscious behaviour and then establish the concept of "never too old to learn" and be a model of lifelong learning (Du, 2010). Currently, in the era of knowledge, the internet allows teachers to expand their learning channels, but also requires teachers to adopt correct education thought and update education concepts under the premise of continuous learning. From the original "bucket of water" of knowledge as the source, teachers may supplement and adjust their learning, so it eventually forms into a river and then into a sea, which students may then "dive" into. This provides the necessary guarantee for the development of students (Peng, 2017).

Lastly serving society as teacher behaviour in the perspective of teacher leadership includes coordinating personnel, serving organizations, and promoting culture (Leithwood et al., 2004). Teacher leadership activities are not only reflected in the school, but also often extend outside the school, such as cooperation with the community, establishing contact, participating in regional teacher evaluation committees or curriculum teams for the school, or providing intellectual output and consulting services for some enterprises. In terms of academic research, teachers enjoy the freedom to explore, participate in academic activities, express academic opinions and conduct academic discussions. For the promotion of the Chinese culture of excellence, teachers should actively spread the relevant achievements beneficial to the current social development with a scientific attitude, they should especially use the rational and objective academic analysis at the heart of this culture to complete the historical mission of spreading the Chinese culture of excellence in academic exploration.

According to the elements of refining and analysis, this paper can clearly draw that teachers' leadership mainly depends on teacher behaviour; it depends on teachers' professional power, knowledge, ability, emotion and other factors, with students,

colleagues and parents of different group interactions producing a comprehensive influence based on the influence on school education teaching and other related problems (Li, 2009b). The five components of teacher leadership as part of teacher behaviour are both interdependent and closely related to each other. Among them, the four elements of “teaching students, leading colleagues, assisting leaders and serving society” have relationships that progress step-by-step, and self-development is a dynamic factor throughout. The relationship of each component is shown in Fig. 3.

Among the elements of teacher leadership, teaching students is the basic element and the leadership skill that every teacher must have; leading peers and staff leaders are the relationship elements, characteristics of the leadership of excellent teachers, and a sign that distinguishes excellent teachers from other general teachers. The relationship element is cooperative relationships between people, which are represented by the cooperation among teachers and the cooperation between teachers and students. Good cooperation and unity in interpersonal relationships can ultimately contribute to the harmony of the campus (Song, 2014).” Serving society is at the highest level of teacher leadership components. Serving society is the continuation and performance of the three elements of teaching students, leading colleagues and assisting leaders. It is an effective way for teachers to combine theory with practice and the highest embodiment of teachers’ moral quality. Self-development should be the driving factor throughout the components of teachers’ leadership and the driving force for teachers to change themselves and improve themselves. However, in the existing discussion of teacher leadership elements, there is little emphasis on the development of teachers. In fact, in self-development under teachers’ leadership, it is crucial for teachers to understand and identify with the requirements of the public. By constantly improving themselves through their own efforts, teachers will achieve the corresponding self-development.



**Fig. 3** Plot of teacher leadership components

## Conclusions

In view of the lack of previous systematic research on the components of teacher leadership from the perspective of teacher behaviour. This study fills the gap by linking five components of teachers' leadership with teacher behaviour. In order to link the teacher behaviour with teacher leadership the study suggested focusing on instructional factors of students' learning, which can be improved through effective teaching and management. Secondly, teachers should be promoted to improve teaching levels and enhance professional competence. Thirdly, teachers should conscientiously uphold the school's regulations and behaviour standards. Fourthly, pay close attention to leading peers and lastly keep serving society as their main priority. Apart from the five elements of teacher leadership behaviour that this study has identified, it is imperative to acknowledge the cross-connection between teacher behaviour, innovation, and entrepreneurship. First, encouraging an innovative and entrepreneurial culture in the classroom through teacher behaviour can motivate students to grow in their capacity for original thought and problem-solving. Second, teachers' leadership behaviour based on innovation and entrepreneurship can act as role models for their students, inspiring them to take chances, investigate novel concepts, and follow their passions. Thirdly, students' motivation and involvement can be increased by implementing cutting-edge teaching techniques and projects that are connected to entrepreneurship. Fourthly, in today's world of rapid change, instructors who are open to unconventional ideas and include entrepreneurial concepts in their lessons can foster in their students an entrepreneurial attitude, which is becoming more and more crucial.

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## Author contributions

YJ was responsible for the theoretical framework, research design, survey investigation, data assessment, and analysis. HB proofread the entire manuscript. HB deals with the correspondence with the journal.

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## Availability of data and materials

Data will be available on request.

## Declarations

### Competing interests

Authors have no competing interests.

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