Environment and Social Psychology (2024) Volume 9 Issue 10
doi: 10.59429/esp.v9i103099

RESEARCH ARTICLE

Enhancing virtual instructional leadership of primary school principals: An assessment and strategy development study

Min Zhong[1], Mat Rahimi bin Yusof [1,*], Nurul Huda binti Ibrahim[1]

Universiti Utara Malaysia, Kedah, 06010, Malaysia

*** Corresponding author:** Mat Rahimi bin Yusof, mrahimiy@uum.edu.my

ABSTRACT

In the context of the informatization reform of education, teachers and principals are faced with new requirements to enhance their teaching abilities and virtual instructional leadership, respectively. This study focuses on primary school principals in Chongqing, aiming to construct a virtual instructional leadership structure model through a comprehensive literature review. A self-designed survey questionnaire was developed to investigate the relationship between primary school principals' virtual instructional leadership and teachers' teaching abilities, in order to accurately assess the current status of virtual instructional leadership among these principals. We collected a total of 210 valid questionnaires. The results revealed that while over 85% of principals excelled in teaching supervision and evaluation, several issues persisted, including 12.9% of principals failing to set and explain school goals effectively, 13.1% demonstrating insufficient proficiency in using information technology equipment, 13.5% being unable to establish incentive systems for teachers and students, and 11.7% struggling to seek support from the external environment. Based on these findings, enhancement strategies were developed to address the identified problems. Overall, this study contributes to effectively enhancing the virtual teaching leadership of primary school principals and provides a theoretical foundation for promoting the development of primary education.

Keywords: primary school principal; instructional leadership; motivation system; enhancement strategy; informatization

1. Introduction

The rapid development and popularization of information technology have led to significant changes in the field of education. Virtual teaching has emerged as a highly anticipated new teaching mode. Within this mode, the role of educational leaders, particularly principals, is crucial. Their virtual instructional leadership has a profound impact on the teaching reform and development of schools[1]. However, facing the emerging issue of virtual instructional leadership, there are still many problems in its application and practice. For some principals, their understanding and recognition of virtual instructional leadership is not deep enough. It is only seen as a supplement to traditional teaching models, without fully realizing its importance and driving force for educational reform[2].

Virtual instructional leadership is a concept that refers to the ability of educational leaders, such as principals or school administrators, to effectively guide and manage instructional practices in a virtual or

ARTICLE INFO
Received: Received: 10 September 2024 | Accepted: 31 October 2024 | Available online: 21 November 2024

CITATION
Zhong M, Yusof MRB, Ibrahim NHB. Enhancing virtual instructional leadership of primary school principals: An assessment and strategy development study. *Environment and Social Psychology* 2024; 9(10): 3099. doi: 10.59429/esp.v9i10.3099

online environment. This type of leadership is characterized by the use of technology and digital tools to facilitate communication, collaboration, and instruction among students, teachers, and administrators[3]. As educators navigate the evolving landscape of education, virtual instructional leadership has emerged as a crucial component in ensuring effective and equitable learning experiences for students[4]. While many principals have recognized the importance of adopting virtual instructional leadership, they continue to confront numerous challenges in its operational implementation. One significant obstacle is the teacher shortage, which exacerbates the complexities of implementing virtual instructional strategies. With an insufficient number of educators, principals struggle to allocate resources effectively and ensure that all students receive the necessary support and guidance. Additionally, the uneven adaptability of students to virtual learning environments poses another layer of challenge. Some students may thrive in this digital setting, while others may struggle due to factors such as limited access to technology, internet connectivity issues, or personal learning preferences[5].

Furthermore, principals must grapple with the misunderstandings and doubts expressed by parents and society regarding virtual instructional leadership[6]. These external pressures can create a hostile work environment and add considerable stress to the principal's responsibilities. Parents may have concerns about the quality of virtual instruction, the potential for student disengagement, or the impact on their child's social development. Similarly, societal perceptions may question the efficacy of virtual learning compared to traditional, in-person instruction. To address these multifaceted challenges, principals must adopt a proactive and strategic approach. This includes fostering a collaborative culture among educators to share best practices and support each other in navigating the nuances of virtual instruction. Engaging parents through regular communication and providing resources to alleviate their concerns is also essential[7]. Additionally, principals should seek ongoing professional development to enhance their understanding of virtual instructional leadership and stay abreast of emerging trends and technologies in education.

In the context of ongoing education reform and development, raising awareness of virtual instructional leadership and enhancing the technical proficiency and resource integration abilities of educators have emerged as pivotal issues. These competencies are crucial for harnessing the full potential of educational technologies and fostering innovative teaching practices[8]. With this in mind, this study focuses on the virtual instructional leadership of primary school principals in Chongqing, China, aiming to contribute to the advancement of primary education and promote the deep integration of educational informatization with teaching practices. Based on the comprehensive analysis of the survey results, this study formulated strategies for improving virtual instructional leadership among primary school principals in Chongqing. These strategies aim to address the identified gaps and challenges, fostering a culture of continuous learning and innovation among educators.

The ultimate goal of this study is to contribute to the development of primary education in Chongqing by enhancing the virtual instructional leadership capabilities of its principals. By promoting the deep integration of educational informatization with teaching practices, this study seeks to empower educators with the skills and resources necessary to leverage technology effectively, ultimately improving the quality of education for students.

2. Materials and methods

2.1. Construction of principal's virtual instructional leadership structure model

Virtual instructional leadership is defined as the behavior of principals integrating mobile device technology and performing leadership functions with the help of social media network applications such as

WeChat, QQ, Ding Talk, E-mobile, etc. On the basis of in-depth research on the concept and connotation of virtual instructional leadership of principals, this study focuses on constructing a virtual instructional leadership structural model of primary school principals. According to the research proposed by Hallinger and Murphy, the instructional leadership of principals includes "three dimensions and ten functions". These three dimensions include defining school goals, managing teaching programs, and creating a positive school atmosphere[9]. In defining the school mission, leaders need to set school goals and communicate these goals to ensure that the entire school has a clear understanding and common pursuit of these goals. In managing teaching projects, leaders need to supervise and evaluate teaching, coordinate course schedules, and closely monitor students' learning progress. In creating a positive school atmosphere, leaders need to protect teaching time, promote teachers' professional development, maintain high visibility, and provide incentives for students and teachers. The study takes virtual instructional leadership as the independent variable and principal instructional management rating scale (PIMRS) as the scale for investigation and evaluation. Given that the research object is the virtual instructional leadership of principals, information and communication technology (ICT) is taken into account. Two new functions, integrated mobile device technology (IMDT) and community engagement (CE), are added to the original model[10]. Due to the unique educational background in China, functions with lower relevance are removed from the model, including coordinating courses and protecting teaching time. In addition, the study removes indicators related to students' academic performance. Seven functions closely related to virtual instructional leadership in the original model are retained, and two new functions are added, forming a virtual instructional leadership variable with three dimensions, nine functions, and forty-nine behaviors. The final model of the principal's virtual instructional leadership structure is shown in **Figure 1**.

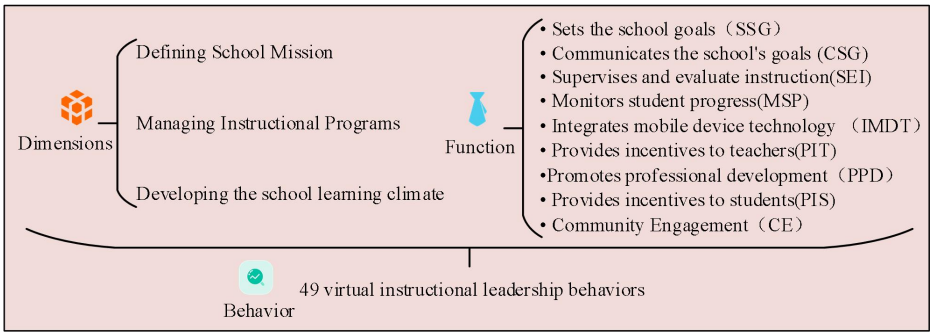

Figure 1. Structural model of principal virtual instructional leadership

2.2. Current status of virtual instructional leadership of primary school principals in Chongqing

In order to comprehensively analyze the current situation of virtual teaching leadership by primary school principals in Chongqing, this study conducted a detailed investigation of the current situation. The investigation process is shown in **Figure 2**.

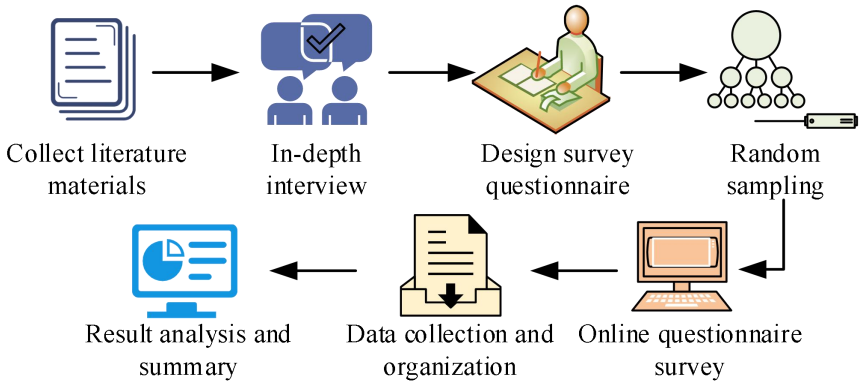

Figure 2. The process of the status quo investigation

The study first collects a large amount of literature on virtual instructional leadership. Based on theory, the research framework and survey indicators are clarified[11]. On this basis, a survey questionnaire is designed that includes basic information about the principal, the current status of virtual instructional leadership, and influencing factors. The questionnaire is modified and improved through expert review and pre-survey. In the actual investigation process, the study adopts a random sampling method and selects primary school teachers and principals within Chongqing as the survey subjects. To ensure the validity and reliability of the survey results, following the scientific principles of questionnaire design, an online questionnaire is adopted to ensure the smooth progress of the survey process[12]. After data collection, the collected data is sorted and analyzed in order to obtain the regularity and characteristics of the current virtual instructional leadership of primary school principals in Chongqing. The survey questionnaire consists of three parts: basic school information, personal network skills, and virtual instructional leadership. The basic information of the school aims to collect basic information about the school and teachers, in order to better understand the current development status of the education industry and the needs of teachers[13]. A series of single choice question questions are designed in the questionnaire, covering personal information such as gender, teaching age, highest education, professional title, and position, as well as basic school information such as the gender of the school principal, whether the school has a social app group, whether the school has an official website, WeChat official account and other online platforms.

Personal network skills include the ability to use mobile devices, the Internet and social media. The questionnaire first asks participants about their usage time of smartphones to understand their familiarity with mobile devices[14]. Next, the questionnaire explores the participants' tendency to use social media apps to understand their preferences in online socializing. In addition, the questionnaire also examines the communication apps commonly used by participants in their work to understand their network communication abilities in the workplace. The setting of personal network skills survey questions is shown in **Figure 3**.

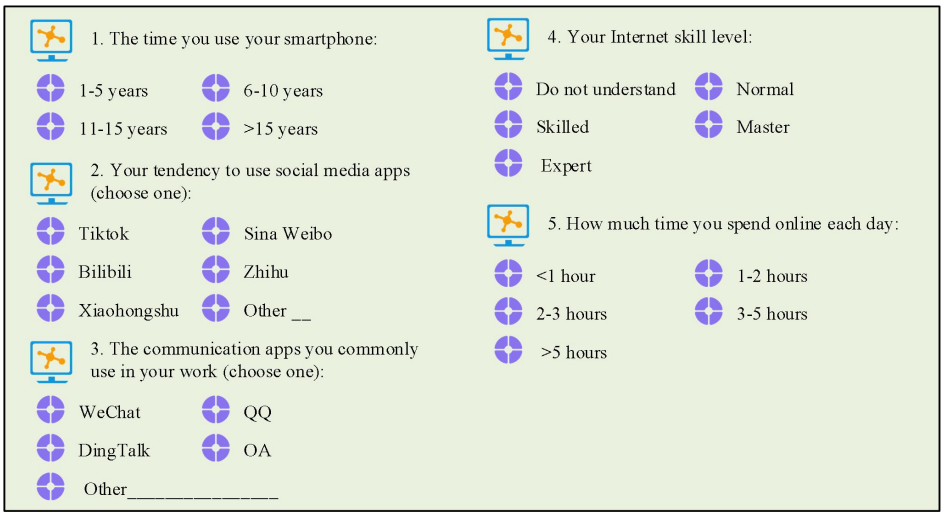

Figure 3. Personal network skills survey question setting

The virtual instructional leadership questionnaire is divided into nine dimensions, covering the behaviors of principals in setting school goals, explaining school goals, supervising and evaluating teaching, monitoring student progress, integrating mobile devices in schools, motivating teachers, promoting teacher professional development, motivating students, and community engagement. In each dimension, the questionnaire includes multiple statements. Participants need to rate the statements based on their actual situation to reflect the principal's performance in the corresponding field. In the questionnaire design, matrix scale questions are used to allow participants to more intuitively evaluate the principal's performance in various aspects[15]. There are a total of 49 behaviors across nine dimensions. The scale evaluation is divided into 5 levels, which are very non compliant, non compliant, average, compliant, and very compliant.

3. Results and discussion

A total of 230 questionnaires were distributed via online surveys. The sample for this study was carefully selected to ensure a representative cross-section of primary schools. Specifically, 10 primary schools were randomly chosen from a larger pool of institutions. Within each selected school, teachers were also randomly selected to complete the questionnaires. This random sampling method aimed to minimize bias and increase the generalizability of the findings.

After the initial distribution of questionnaires, a rigorous screening process was conducted to identify and exclude any invalid responses. A total of 20 questionnaires were deemed invalid due to incomplete answers, inconsistencies, or apparent disregard for the instructions provided. Following this screening, a final tally of 210 valid questionnaires was obtained, representing a response rate of approximately 91.3% (210/230). The collected data were then organized and analyzed to provide insights into the basic situation of the primary schools surveyed. The results of this analysis, specifically pertaining to the basic situation of the schools, are presented in **Table 1**. This table offers a comprehensive overview of key characteristics such as school size, student demographics, teacher-student ratios, and educational resources.

Table 1. Descriptive statistics

Question	Option	Number of people	Proportion of people
1. Your gender:	Male	36	17.14%
	Female	174	82.86%
2. Your teaching experience:	1-5 years	64	30.48%
	6-10 years	44	20.95%
	11-15 years	24	11.43%
	15-20 years	13	6.19%
	>20 years	65	30.95%
3. Your highest educational level:	Junior college and below	5	2.38%
	Undergraduate	187	89.05%
	Master's students	18	8.57%
	Doctoral students	0	0.00%
4. Your professional title:	Unrated	95	45.24%
	Intermediate	101	48.10%
	Deputy Senior	14	6.67%
	Advanced	0	0.00%
5. Your position:	Full time teacher	98	46.67%
	Class teacher	105	50.00%
	Director of teaching and research	3	1.43%
	School leaders	4	1.90%
6. The gender of the principal of your school:	Male	128	60.95%
	Female	82	39.05%
7. Does your school have social app groups such as QQ/WeChat/Ding Talk:	Yes	208	99.05%
	No	2	0.95%
8. Does your school have an official website, WeChat official account and other online platforms:	Yes	210	100%
	No	0	0.00%

In **Table 1**, among the surveyed subjects, women accounted for 82.86% and men accounted for 17.14%. Teachers with 1-5 years of teaching experience were the most common, accounting for 30.48%. The vast majority of teachers had a bachelor's degree, accounting for 89.05%, followed by a master's degree, accounting for 8.57%. The proportion of unrated teachers was relatively high, at 45.24%, with the highest proportion of intermediate title teachers at 48.10%. The proportion of full-time teachers was relatively high, accounting for 46.67%, while the proportion of class teachers was the highest, at 50%. Male principals accounted for 60.95%, while female principals accounted for 39.05%. 99.05% of the schools had social software groups, and 100% of the schools had official websites, WeChat official account and other online platforms. To sum up, the teachers of this survey are mainly women, full-time teachers with undergraduate degrees and intermediate professional titles, and the school has performed well in Internet applications and online platform construction. The results of the personal network skills survey are shown in **Table 2**.

Table 2. Results of the personal network skills survey

Question	Option	Number of people	Proportion of people
1. The time you use your smartphone:	1-5 years	12	5.71%
	6-10 years	57	27.14%
	11-15 years	82	39.05%
	>15 years	59	28.10%
2. Your tendency to use social media apps (choose one):	Tiktok	76	36.19%
	Sina Weibo	20	9.52%
	Bilibili	20	9.52%
	Zhihu	9	4.29%
	Xiaohongshu	74	35.24%
	Other	11	5.24%
3. The communication apps you commonly use in your work (choose one):	WeChat	106	50.48%
	QQ	85	40.48%
	DingTalk	15	7.14%
	OA	1	0.48%
	Other	3	1.43%
4. Your internet skill level:	Do not understand	9	4.29%
	Normal	123	58.57%
	Skilled	70	33.33%
	Master	8	3.81%
	Expert	0	0.00%
5. How much time you spend online each day:	<1 hour	22	10.48%
	1-2 hours	76	36.19%
	2-3 hours	46	21.90%
	3-5 hours	36	17.14%
	>5 hours	28	13.33%

In **Table 2**, in terms of smartphone usage duration, 39.05% of the respondents had 11-15 years of experience, 5.71% had 1-5 years, 27.14% had 6-10 years, and 28.10% exceeded 15 years. In terms of the use tendency of social platforms, Tiktok accounted for 36.19%, Xiaohongshu 35.24%, Weibo 9.52%, Bilibili 9.52%, and Zhihu 4.29%. In terms of communication tools at work, WeChat accounted for 50.48% and QQ accounted for 40.48%, with WeChat and QQ dominating. In terms of online skills, 58.57% of the survey respondents rated themselves as "normal", 33.33% as "proficient", 4.29% as "not familiar", and 3.81% as "proficient". In terms of daily internet usage time, 36.19% of survey respondents spend 1-2 hours online, 21.90% spend 2-3 hours, 10.48% spend less than 1 hour, and 17.14% spend 3-5 hours. The survey results show that primary school educators in Chongqing have shown high maturity and breadth in network skills and applications. However, some problems have been exposed, including the improvement of network skills and the rational planning of online time. The survey results of dimension 1 defining school goals in the virtual leadership survey of principals are shown in **Table 3**.

Table 3. Survey results defining school goals in dimension 1

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
1	4 (1.9%)	2 (0.9%)	27 (12.8%)	60 (28.5%)	117 (55.7%)
2	3 (1.4%)	6 (2.8%)	28 (13.3%)	63 (30.0%)	110 (52.3%)
3	4 (1.9%)	4 (1.9%)	26 (12.3%)	67 (31.9%)	109 (51.9%)
4	3 (1.4%)	4 (1.9%)	27 (12.8%)	68 (32.3%)	108 (51.4%)
5	8 (3.8%)	10 (4.7%)	33 (15.7%)	65 (30.9%)	94 (44.7%)

In **Table 3**, for a clear set of annual teaching goals set by the principal, 55.7% of the respondents stated that it was very consistent, 28.5% of the respondents believed it was consistent, 12.8% of the respondents believed it was average, and 2.8% of the respondents believed it was not consistent or very inconsistent. The goal set by the principal was to facilitate teachers' understanding and implementation, with 52.3% of respondents believing it was very consistent and 30.0% of respondents believing it was consistent. Regarding the fact that principals set goals based on the uniqueness of the school, 51.9% of respondents stated that it was very appropriate, and 31.9% of respondents stated that it was appropriate. Regarding the set school goals based on the responsibilities of teachers, 51.4% of respondents stated that it was very consistent, and 32.3% of respondents stated that it was consistent. Regarding the discussion between the principal and the faculty before setting school goals, 44.7% of respondents stated that it was very consistent, and 30.9% of respondents stated that it was consistent. According to comprehensive analysis, about 8.5% of principals are unable to define school goals effectively. The survey results explaining the school's goals in dimension 2 are shown in **Table 4**.

Table 4. Explanation results of school goals in dimension 2

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
6	2 (0.9%)	2 (0.9%)	21 (10.0%)	74 (35.2%)	111 (52.8%)
7	4 (1.9%)	11 (5.2%)	36 (17.1%)	63 (30.0%)	110 (52.3%)
8	4 (1.9%)	4 (1.9%)	26 (12.3%)	70 (33.3%)	89 (42.3%)
9	1 (0.4%)	4 (1.9%)	30 (14.2%)	66 (31.4%)	109 (51.9%)
10	1 (0.4%)	5 (2.3%)	31 (14.7%)	68 (32.3%)	105 (50.0%)
11	3 (1.4%)	3 (1.4%)	30 (14.2%)	72 (34.2%)	102 (48.5%)

In **Table 4**, regarding the principal's ability to effectively communicate the school's goals and mission to its members, 52.8% of respondents stated that it was very consistent, and 35.2% of respondents believed that it was consistent. Regarding the principal's informal discussion with teachers about the school's academic

goals, 52.3% of respondents believed it was very consistent, and 30.0% of respondents believed it was consistent. Regarding the principal's meeting with teachers to discuss the school's academic goals, 42.3% of respondents believed it was highly relevant.51.9% of the principals believed that the goals of the school would be uploaded to the school's official website, official account or other web pages. Regarding the principal sharing and conveying the school's goals to the community, 50.0% and 32.3% of respondents respectively believed that they were very consistent and consistent. Regarding the issue of the principal and teachers referring to the academic goals of the school when making curriculum decisions together, 48.5% of respondents believed it was very consistent, and 34.2% of respondents believed it was consistent. Overall, about 4.4% of principals cannot explain the school's goals well. The survey results of monitoring and evaluating teaching in dimension 3 are shown in **Table 5**.

Table 5. Supervision and evaluation of teaching in dimension 3

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
12	2 (0.9%)	4 (1.9%)	23 (10.9%)	72 (34.2%)	109 (51.9%)
13	1 (0.4%)	4 (1.9%)	22 (10.4%)	73 (34.7%)	109 (51.9%)
14	1 (0.4%)	4 (1.9%)	26 (12.3%)	73 (34.7%)	106 (50.4%)
15	1 (0.4%)	4 (1.9%)	23 (10.9%)	74 (35.2%)	108 (51.4%)
16	1 (0.4%)	1 (0.4%)	22 (10.4%)	77 (36.6%)	109 (51.9%)
17	1 (0.4%)	1 (0.4%)	27 (12.8%)	75 (35.7%)	106 (50.4%)
18	2 (0.9%)	2 (0.9%)	22 (10.4%)	77 (36.6%)	107 (50.9%)

As shown in **Table 5**, over 85% of principals could effectively supervise and evaluate teaching, about 11.1% of principals basically completed supervision and teaching evaluation, and about 2.8% of principals had inadequate supervision and evaluation of teaching work. The survey results of monitoring student progress in dimension 4 are shown in **Table 6**.

Table 6. Survey results on monitoring student progress in dimension 4

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
19	2 (0.9%)	5 (2.3%)	21 (10.0%)	77 (36.6%)	105 (50.0%)
20	2 (0.9%)	5 (2.3%)	23 (10.9%)	77 (36.6%)	103 (49.0%)
21	2 (0.9%)	4 (1.9%)	22 (10.4%)	79 (37.6%)	103 (49.0%)
22	2 (0.4%)	3 (2.3%)	31 (10.4%)	70 (34.7%)	104 (51.9%)

In **Table 6**, over 85% of principals effectively supervised students' progress, about 10.4% of principals basically supervised students' progress, and about 3.2% of principals couldn't supervise students' progress. The survey results of integrating mobile devices in schools in dimension 5 are shown in **Table 7**.

Table 7. Survey results of mobile device school integration in dimension 5

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
23	2 (0.4%)	1 (2.3%)	19 (10.4%)	72 (34.7%)	116 (51.9%)
24	1 (0.4%)	1 (0.4%)	22 (10.4%)	70 (33.3%)	116 (55.2%)
25	1 (0.4%)	1 (0.4%)	20 (9.5%)	74 (35.2%)	114 (54.2%)
26	1 (0.4%)	1 (0.4%)	22 (10.4%)	74 (35.2%)	112 (53.3%)
27	1 (0.4%)	2 (0.9%)	24 (11.4%)	73 (34.7%)	110 (52.3%)
28	1 (0.4%)	1 (0.4%)	21 (10.0%)	71 (33.8%)	116 (55.2%)
29	1 (0.4%)	1 (0.4%)	23 (10.9%)	73 (34.7%)	112 (53.3%)

In **Table 7**, over 86% of schools had good integration of mobile devices, 10.4% of schools had average integration, and about 2.7% of schools had poor integration of mobile devices. Overall, about 13.1% of principals are not proficient in using information technology. The survey results of motivating teachers in dimension 6 are shown in **Table 8**.

Table 8. Survey results on motivating teachers in dimension 6

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
30	2 (0.9%)	2 (0.9%)	25 (11.9%)	68 (32.3%)	113 (53.8%)
31	1 (0.4%)	4 (2.3%)	25 (10.4%)	66 (34.7%)	114 (51.9%)
32	1 (0.4%)	3 (2.3%)	27 (10.4%)	66 (34.7%)	111 (51.9%)
33	2 (0.4%)	4 (2.3%)	27 (10.4%)	70 (34.7%)	107 (51.9%)
34	3 (1.4%)	2 (0.9%)	23 (10.9%)	75 (35.7%)	107 (50.9%)

In **Table 8**, over 86% of principals were able to motivate teachers well, 10.8% of principals motivated teachers moderately, and about 3.7% of principals couldn't motivate teachers well. The survey results on the promotion of teacher professional development in dimension 7 are shown in **Table 9**.

Table 9. Survey results on promoting teacher professional development in dimension 7

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
35	3 (1.4%)	2 (0.9%)	25 (11.9%)	67 (31.9%)	113 (53.8%)
36	1 (0.4%)	2 (0.9%)	24 (11.4%)	70 (33.3%)	113 (53.8%)
37	1 (0.4%)	5 (2.3%)	23 (10.9%)	69 (32.8%)	112 (53.4%)
38	1 (0.4%)	3 (1.4%)	23 (10.9%)	67 (31.9%)	116 (55.2%)
39	3 (1.4%)	2 (0.9%)	22 (10.4%)	74 (35.2%)	109 (51.9%)

In **Table 9**, over 85% of principals could effectively promote teachers' professional development, 11.1% of principals basically promoted teachers' professional development, and about 3.7% of principals were unable to effectively promote teachers' professional development. The survey results of motivating students in dimension 8 are shown in **Table 10**.

Table 10. Survey results on motivating students in dimension 8

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
40	2 (0.9%)	2 (0.9%)	20 (9.5%)	69 (32.8%)	117 (55.7%)
41	1 (0.4%)	2 (0.9%)	25 (11.9%)	73 (34.7%)	109 (51.9%)
42	1 (0.4%)	3 (1.4%)	21 (10.0%)	74 (35.2%)	111 (52.8%)
43	1 (0.4%)	2 (0.9%)	21 (10.0%)	68 (32.3%)	118 (56.1%)
44	1 (0.4%)	1 (0.4%)	21 (10.0%)	69 (32.8%)	118 (56.1%)

In **Table 10**, over 86% of principals were able to effectively motivate students, 10.2% of principals motivated students moderately, and 2.3% of principals were unable to effectively motivate students. The survey results of community engagement in dimension 9 are shown in **Table 11**.

Table 11. Survey results of community engagement in dimension 9

Question	Very inconsistent	Inconsistent	Commonly	Consistent	Very consistent
45	1 (0.4%)	2 (0.9%)	20 (9.5%)	71 (33.8%)	116 (55.2%)
46	1 (0.4%)	2 (0.9%)	20 (9.5%)	74 (35.2%)	113 (53.8%)
47	1 (0.4%)	3 (1.4%)	22 (10.4%)	74 (35.2%)	110 (52.3%)
48	1 (0.4%)	2 (0.9%)	22 (10.4%)	72 (34.2%)	119 (53.8%)
49	1 (0.4%)	2 (0.9%)	21 (10.0%)	72 (34.2%)	114 (54.2%)

In **Table 11**, over 87% of principals effectively sought community assistance, 9.9% of principals performed average, and 1.8% of principals were unable to effectively seek community assistance.

4. Discussion

4.1. Problem analysis

4.1.1. Principal's own factors

During the investigation, some principals have a certain gap in their understanding and practice of virtual instructional leadership. On the one hand, their acceptance and application ability for emerging educational technologies need to be improved. Meanwhile, they lack training and self-learning awareness in virtual instructional leadership. In addition, the communication and collaboration skills of principals in the process of virtual instructional leadership are particularly important, but in practical situations, some principals show relatively weak performance in this regard[16].

4.1.2. Teacher qualifications of the school

The quality of school faculty is also an important factor affecting virtual instructional leadership. Some school teachers are not proficient enough in virtual teaching technology, which leads to significant difficulties for principals in promoting virtual teaching[17]. In addition, the recognition and execution of new educational concepts by the teaching staff directly affect the implementation effectiveness of virtual instructional leadership[18]. Therefore, enhancing the virtual teaching skills of the teaching staff and transforming educational teaching concepts have become urgent tasks.

4.1.3. External environment

The external environment also has a certain impact on the virtual instructional leadership of principals. Firstly, the leadership and support of policies and regulations for virtual teaching are directly related to the enthusiasm of principals in promoting virtual teaching[19]. The improvement and implementation of policies and regulations can help provide clearer guidance and guarantees for principals. Secondly, social public opinion and parents' cognitive concepts also have a significant impact on the promotion of virtual teaching. Positive social public opinion and parental support can provide a favorable social atmosphere for principals' virtual instructional leadership[20].

4.2. Strategies for enhancing virtual instructional leadership of primary school principals in Chongqing

4.2.1. Self-enhancement of principal's virtual instructional leadership

In the current context of educational informatization, the enhancement of virtual instructional leadership by primary school principals in Chongqing is particularly important. Firstly, the principal needs to enhance their virtual instructional leadership skills. This means that principals need to constantly learn new educational concepts, teaching methods, and information technology in order to better guide teachers and students in conducting virtual teaching. Specifically, principals can participate in relevant training courses, seminars, and online learning platforms to learn about the latest developments and trends in virtual education both domestically and internationally[21]. In addition, principals should also pay attention to the development of educational technology, and master various online teaching tools and platforms to improve the quality of virtual teaching.

4.2.2. External support for principal's virtual instructional leadership

Providing external support to principals is also an important way to enhance virtual instructional leadership. Government departments, educational institutions, and professional organizations should work together to provide principals with abundant resources and services, such as setting up special funds to support principals in conducting virtual education research projects, organizing expert teams to provide virtual instructional leadership training and guidance for principals, building communication platforms to share experiences, interact and learn, and promoting inter school cooperation to learn from each other and make progress together.

5. Conclusion and policy implications

5.1. Conclusion

This study employed quantitative research methods to investigate the current situation of virtual instructional leadership among primary school principals in Chongqing. Data was collected through questionnaire surveys and analyzed using statistical methods. The findings revealed that, while the overall performance of primary school principals in Chongqing in virtual instructional leadership was satisfactory, several issues emerged. Specifically, approximately 8.5% of principals struggled to clearly define school goals, and 4.4% communicated them inadequately. Additionally, 11.1% of principals demonstrated only basic competence in supervision and teaching evaluation, with 2.8% performing poorly. Furthermore, 13.1% of principals lacked proficiency in utilizing information technology, and 1.8% were ineffective in engaging the community. These results highlight the need for targeted enhancement strategies to address challenges in defining school goals, supervising and evaluating teaching, integrating mobile devices, and fostering community engagement among primary school principals in Chongqing.

5.2. Policy implications

5.2.1. Continuous learning and development

Principals should actively seek opportunities to learn new educational concepts, teaching methods, and information technology. This can be achieved by participating in training programs, seminars, workshops, and online learning platforms. By staying updated with the latest educational trends and technologies, principals can improve their virtual instructional leadership skills and better navigate the digital landscape.

5.2.2. Financial support for professional development

Government departments play a pivotal role in supporting the professional growth of principals by allocating special funds dedicated to their development. These funds can be strategically utilized to sponsor a range of capacity-building initiatives aimed at enhancing virtual instructional leadership. Specifically, the funds can be directed towards organizing training programs, workshops, and seminars that focus on integrating technology into instructional leadership practices. By ensuring that principals have access to high-quality, specialized resources, these financial allocations can foster a culture of continuous learning and innovation in educational leadership.

5.2.3. Communication platforms for continuous learning

The establishment of communication platforms, such as online forums or collaborative spaces, serves as a crucial means for principals to share best practices, resources, and ideas. These platforms can facilitate peer-to-peer learning and knowledge sharing, enabling principals to learn from each other's experiences and strategies for virtual instructional leadership. Furthermore, these platforms can serve as a hub for continuous learning and professional growth, offering principals access to a wealth of resources, tools, and support to

enhance their leadership capabilities. By leveraging the power of digital communication, these platforms can help build a stronger, more interconnected community of educational leaders.

5.2.4. Inter-school cooperation for collaborative learning

Promoting cooperation among schools can significantly enhance the virtual instructional leadership capabilities of principals. By facilitating school visits, joint projects, and collaborative initiatives, principals can learn from each other's successes and challenges, sharing strategies and resources that have proven effective in their respective contexts. This cross-pollination of ideas and practices can lead to the development of innovative solutions that address the unique needs of diverse educational environments. Additionally, inter-school cooperation can foster a sense of camaraderie and collective efficacy among principals, encouraging them to work together towards common goals and improving educational outcomes for all students. By embracing a collaborative approach, educational leaders can harness the collective wisdom of their peers to drive innovation and excellence in virtual instructional leadership.

Conflict of interest

The authors declare no conflict of interest.

References

1. Kilag, O. K. T., Uy, F. T., Abendan, C. F. K., & Malbas, M. H. (2023). Teaching leadership: an examination of best practices for leadership educators. Science and Education, 4(7), 430-445. https://openscience.uz/index.php/sciedu/article/view/6190
2. Berkovich, I., & Hassan, T. (2024). Principals' digital instructional leadership during the pandemic: Impact on teachers' intrinsic motivation and students' learning. Educational Management Administration & Leadership, 52(4), 934-954. https://doi.org/10.1177/17411432221113411
3. Hughes, J., & Schwier, R. A. (2012). The impact of virtual learning communities on teacher professional development: Perception from teachers in internet-based K-12 learning environments. Journal of Educational Computing Research, 46(4), 339–356
4. Pashmforoosh R, Irby BJ, Lara-Alecio R and Tong F (2023) Building school leaders' instructional leadership capacity through virtual professional leadership learning communities. Front. Educ. 8:1168734. doi: 10.3389/feduc.2023.1168734
5. Norollahee, S., Nazarzadeh Zare, M., & Mousavi, M. (2022). The role of psychological empowerment in the relationship between ambidextrous leadership, teachers' job satisfaction, and stress in virtual education. Technology of Education Journal (TEJ), 16(3), 511-524. https://doi.org/10.22061/tej.2022.8606.2694
6. Shal, T., Ghamrawi, N., Abu-Tineh, A. et al. Teacher leadership and virtual communities: Unpacking teacher agency and distributed leadership. Educ Inf Technol 29, 15025–15042 (2024). https://doi.org/10.1007/s10639-023-12446-5
7. Azukas, M.E. Leading Remotely: Competencies Required for Virtual Leadership. TechTrends 66, 327–337 (2022). https://doi.org/10.1007/s11528-022-00708-x
8. Ghamrawi, N., Shal, T., & Ghamrawi, N. A. (2024). Exploring the impact of AI on teacher leadership: regressing or expanding?. Education and Information Technologies, 29(7), 8415-8433. https://doi.org/10.1007/s10639-023-12174-w
9. Hallinger, P., & Murphy, J. (1985). Assessing the Instructional Management Behavior of Principals. The Elementary School Journal, 86(2), 217–247. https://doi.org/10.1086/461445
10. Yusof, M. R. B., Ibrahim, M. Y. B., & Rahim, S. B. A. (2017). The relationship between virtual instructional leadership and teaching competency. International Journal of Academic Research in Business and Social Sciences,7(8), 146-156. https://doi.org/10.6007/IJARBSS/v7-i8/3216
11. Peng, B. (2022). Digital leadership: State governance in the era of digital technology. Cultures of Science, 5(4), 210-225. https://doi.org/10.1177/2096608321989835
12. Zhang, X., Wong, J. L., & Wang, X. (2022). How do the leadership strategies of middle leaders affect teachers' learning in schools? A case study from China. Professional Development in Education, 48(3), 444-461. https://doi.org/10.1080/19415257.2021.1895284

13. Dorfsman, M., & Horenczyk, G. (2022). The coping of academic staff with an extreme situation: The transition from conventional teaching to online teaching. Education and Information Technologies, 27(1), 267-289. https://doi.org/10.1007/s10639-021-10675-0
14. Tigre, F. B., Curado, C., & Henriques, P. L. (2023). Digital leadership: A bibliometric analysis. Journal of leadership & organizational studies, 30(1), 40-70. https://doi.org/10.1177/15480518221123132
15. Bektaş, F., Kılınç, A. Ç., & Gümüş, S. (2022). The effects of distributed leadership on teacher professional learning: mediating roles of teacher trust in principal and teacher motivation. Educational studies, 48(5), 602-624. https://doi.org/10.1080/03055698.2020.1793301
16. Adigwe, C. S., Olaniyi, O. O., Olagbaju, O. O., & Olaniyi, F. G. (2024). Leading in a time of crisis: The coronavirus effect on leadership in America. Asian journal of economics, business and accounting, 24(4), 1-20. https://doi.org10.9734/ajeba/2024/v24i41261
17. Krehl, E. H., & Büttgen, M. (2022). Uncovering the complexities of remote leadership and the usage of digital tools during the COVID-19 pandemic: A qualitative diary study. German Journal of Human Resource Management, 36(3), 325-352. https://doi.org/10.1177/23970022221083697
18. Kilcullen, M., Feitosa, J., & Salas, E. (2022). Insights from the virtual team science: Rapid deployment during COVID-19. Human Factors, 64(8), 1429-1440. https://doi.org/10.1177/0018720821991678
19. Walker, A., & Qian, H. (2022). Developing a model of instructional leadership in China. Compare: A Journal of Comparative and International Education, 52(1), 147-167. https://doi.org/10.1080/03057925.2020.1747396
20. Li, L., & Liu, Y. (2022). An integrated model of principal transformational leadership and teacher leadership that is related to teacher self-efficacy and student academic performance. Asia Pacific Journal of Education, 42(4), 661-678. https://doi.org/10.1080/02188791.2020.1806036
21. Alenezi, M. (2023). Digital learning and digital institution in higher education. Education Sciences, 13(1), 88-105. https://doi.org/10.3390/educsci13010088