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INFORMATION LEADERSHIP MODEL FOR THE PRINCIPALS OF HIGH SCHOOLS IN PINGDINGSHAN CITY UNDER HENAN PROVINCE

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Abstract

The objectives of this research were: (1) To determine the components and indicators of information leadership for principals of high schools in Pingdingshan City, Henan Province; and (2) To propose information leadership model for principals in high schools in Pingdingshan City, Henan Province. The research was the mixed methodology both qualitative and quantitative method. The study's population comprised 6,146 principals and teachers from high schools in Pingdingshan City, Henan Province, the People's Republic of China. A stratified random sampling method was employed, resulting 515 samples. Using computer software, we employed descriptive statistical indicators (such as percentages, arithmetic averages, and standard deviations) as well as confirmatory factor analysis to conduct the data analysis. The research findings revealed: (1) the components and indicators of information leadership for principals of high schools in Pingdingshan City, it consisted of 5 components and 17 indicators namely: Information Evaluation Capability, Information Organization and Management Capability, Information-based design ability, Information-based Pedagogical Reform Capability, and Information Literacy; (2) The information leadership model for principals of high schools in Pingdingshan was fit with the empirical data the value of Relative Chi-square (χ^2/df) = 4.57, Comparative Fit Index(CFI) = 0.98,Tucker-Lewis Index (TLI)=0.97,Normed Fit Index (NFI) = 0.97,Incremental Fit Index(IF1)=0.98,and Root Mean Square Error of Approximation (RMSEA) = 0.08, all in line with specified criteria. And the key factors had the weight between .982 - 0.998.

Keywords: Information leadership model, principals, high Schools in Pingdingshan City

Introduction

The rapid advancement of digital technologies has transformed education worldwide, making information leadership an essential competency for school principals. In the era of educational digitalization, principals are expected to integrate technology into teaching, school management, and organizational innovation. Dede (2007) emphasized that effective school leaders require competencies in strategic planning, technology integration, and evaluation to improve school performance and promote sustainable educational development.

International studies have proposed various frameworks for information leadership. However, their implementation differs across countries because of variations in technological infrastructure, educational policies, and resource allocation. While developing countries focus primarily on infrastructure and technology adoption, developed countries emphasize digital innovation and advanced technology integration (Zhao, 2012). Similarly, Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework highlights the integration of technology, pedagogy, and content knowledge as a foundation for effective educational leadership.

In China, educational informatization has become a national priority. The *National Education Science Eleventh Five-Year Plan* identified principals' information leadership and educational technology competencies as key areas for educational development (Wu Jian, 2006). Despite these initiatives, substantial regional disparities remain. In Henan Province, differences in digital infrastructure, principals' understanding of information-based school development, and financial investment have resulted in uneven levels of information leadership and digital transformation among high schools.

Against this background, this study develops and validates an Information Leadership Model for High School Principals in Pingdingshan City, Henan Province. Specifically, it identifies the key dimensions and indicators of principals' information leadership and examines their structural relationships. The proposed model is expected to provide both theoretical and practical guidance for strengthening principals' information leadership, promoting educational informatization, and supporting the sustainable development of digitally enabled schools in Henan Province.

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Research Objectives

1. To determine the components and indicators of the information leadership for principals of high schools in Pingdingshan city, Henan Province.

2. To propose the information leadership model for principals of high schools in Pingdingshan City, Henan Province.

Literature Reviews

International research consistently highlights the critical role of principals' information leadership in advancing educational digital transformation. Effective information leadership encompasses strategic planning, technology integration, teacher professional development, and organizational support, enabling schools to respond to the challenges of globalization and digitalization (Dexter, 2011; Schrum & Levin, 2016). Studies further indicate that successful technology leadership depends on effective leadership practices, teacher engagement, continuous evaluation, and a supportive school culture (Flanagan & Jacobsen, 2019; Ertmer & Ottenbreit-Leftwich, 2021).

From a theoretical perspective, Fullan (2013) emphasized that sustainable educational change requires the integration of technology, pedagogy, and change knowledge. Similarly, Anderson (2005) conceptualized information leadership as comprising five core dimensions: leadership vision, technology advocacy, technology-based decision-making, teacher support, and evaluation and feedback. Together, these studies provide a solid theoretical foundation for understanding principals' information leadership.

In China, information leadership has become increasingly important within the national educational informatization agenda. Previous studies have shown that principals' leadership influences school effectiveness through strategic planning, organizational management, instructional innovation, and the development of information-oriented school culture (Huang & Zhao, 2017; Zhang, 2015; Zhao & Dai, 2016; Sun, 2014) In addition, Hua and Yang (2010) proposed a multidimensional framework that includes information literacy, information systems planning, instructional guidance, information management and evaluation, communication and coordination, and information infrastructure planning.

Although previous studies have identified the competencies and dimensions of principals' information leadership, most have focused on conceptual frameworks or competency assessment. Empirically validated models tailored to specific regional contexts remain limited, particularly in Henan Province. This research gap highlights the need to develop a context-specific Information Leadership Model to better support educational digital transformation in high schools.

Conceptual Framework

This study aims to identify and develop an Information Leadership Model for principals of high schools in Pingdingshan City, Henan Province. The framework focuses on defining the core components and indicators of information leadership and integrating them into a systematic leadership model appropriate for the contemporary digital and information-driven educational context.

Research Variables

Independent Variable:

Components of Information Leadership (IVP, IMD, ITU, HRD, IES)

Dependent Variable:

Information Leadership Model for High School Principals

Methodology

Research Design, the research methodology was mixed methodology, including qualitative and quantitative research. The overall and sample consist of two parts. The first stage involves all the research materials on the leadership skills of high school principals from China and abroad, as well as interviews with key information providers or education experts in the People's Republic of China through a sampling survey. The second stage involves the overall study of the principals and teachers of 19 high schools in Pingdingshan City, Henan Province, totaling 6,146 people. The sample group was selected using the proportional stratified random sampling method with the computer software (set for chi-square test, degrees of freedom: df = 135, significance error probability: α err prob = 0.05, effect size w = 0.3, power: power = 0.8), and at least 515 people were required in total.

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By using five-level rating scale questionnaire and managing it on a professional platform, data collection was conducted through online methods (the Chinese website Questionnaire Star). Have five senior experts conduct the IOC test. In this study, the Cronbach's alpha coefficient was greater than 0.90. A total of 515 questionnaires were distributed, and 515 responses were received, with a response rate of 100%. Multiple statistical software for data management and analysis were used, and computer analysis was conducted on categorical variables to perform data analysis, through these steps, researchers can comprehensively analyze demographic variables and information leadership variables, while verifying and ensuring the consistency of the developed information leadership model with the empirical data, thereby enhancing the credibility and interpretability of the research results.

Research Result

Components and Indicators of the Information Leadership Model

A systematic literature review, semi-structured interviews with seven key informants, and content validation by five experts were conducted to develop the Information Leadership Model for High School Principals in Pingdingshan City, Henan Province. The findings identified five components, 17 indicators, and 78 observed variables, all of which achieved expert consensus exceeding 50% (Table 1).

The five components of the model are:

1. Information-based Design Ability (IDA), including information vision planning, information environment planning, information-based instructional planning, and information development.

2. Information Organization and Management Capability (IOMC), including information organization, implementation, and systematic information management.

3. Information-based Pedagogical Reform Capability (IPC), including leadership for information-based teaching, instructional implementation, and teachers' technology competency development.

4. Information Evaluation Capability (IEC), including evaluation of information planning, instructional technology application, human resource development, and implementation outcomes.

5. Information Literacy (IL), including information cognition, information technology application, and information communication.

Together, these five components provide a comprehensive framework for assessing and strengthening principals' information leadership. The instrument demonstrated excellent internal consistency, with an overall Cronbach's alpha coefficient of 0.988, indicating a high level of reliability. Details of the components, indicators, and observed variables are presented in Table 1

2. Research results on the model of information leadership for high school principals in Pingdingshan City, Henan Province.

Table 2 The Important Statistical of First Order CFA Model of Information Leadership Model for High School Principals in Pingdingshan City, Henan Province

Path of variable in the model			Maximum Likelihood Estimates Un-standardized Regression Weights:		
			Estimate (λ)	S.E.	P
IVPC	<---	IDA	1.000		
IEPC	<---	IDA	.990	.026	***
PC	<---	IDA	1.302	.031	***
TDC	<---	IDA	1.100	.025	***
IOC	<---	IOMC	1.000		
IIC	<---	IOMC	.950	.020	***
SIM	<---	IOMC	.826	.017	***
PDS	<---	IPC	1.000		
TI	<---	IPC	1.024	.023	***
TSAC	<---	IPC	1.024	.022	***
PD	<---	IEC	1.000		
HR	<---	IEC	.988	.025	***
IOE	<---	IEC	.904	.021	***
ICC	<---	ILL	1.000		
TAC	<---	ILL	1.042	.026	***
CC	<---	ILL	.921	.022	***

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Path of variable in the model			Maximum Likelihood Estimates Un-standardized Regression Weights: Estimate (λ)	S.E.		P
Path of variable in the model			Standardized Regression Weights Estimate (λ)	CR.	AVE	R2
Information-based design ability (IDA)			-	0.871	0.863	-
IVPC	<---	IDA	.941	-	-	0.885
IEPC	<---	IDA	.905	-	-	0.819
PC	<---	IDA	.930	-	-	0.865
TDC	<---	IDA	.940	-	-	0.884
Information Organization and Management Capability(IOMC)			-	0.965	0.904	-
IOC	<---	IOMC	.941	-	-	0.885
IIC	<---	IOMC	.955	-	-	0.912
SIM	<---	IOMC	.957	-	-	0.916
Information-based Pedagogical Reform Capability(IPC)			-	0.962	0.893	-
PDS	<---	IPC	.943	-	-	0.890
TI	<---	IPC	.944	-	-	0.891
TSAC	<---	IPC	.946	-	-	0.900
Information Evaluation Capability(IEC)			-	0.966	0.878	-
PD	<---	IEC	.935	-	-	0.874
IME	<---	IEC	.951	-	-	0.904
HR	<---	IEC	.924	-	-	0.854
IOE	<---	IEC	.937	-	-	0.878

Information Literacy(ILL)			-	0.951	0.867	-
ICC	<---	ILL	.933	-	-	0.870
TAC	<---	ILL	.928	-	-	0.861
CC	<---	ILL	.933	-	-	0.870

Table 2 presents the results of the first-order Confirmatory Factor Analysis (CFA) for the Information Leadership Model of High School Principals in Pingdingshan City, Henan Province. The findings demonstrate strong convergent validity for all latent constructs. Composite Reliability (CR) values ranged from 0.871 to 0.966, exceeding the recommended threshold of 0.70 (Fornell & Larcker, 1981; Hair et al., 2010). Specifically, the CR values were 0.871 for Information-based Design Ability, 0.965 for Information Organization and Management Capability, 0.962 for Information-based Pedagogical Reform, 0.966 for Information Evaluation Capability, and 0.951 for Information Literacy.

Similarly, the Average Variance Extracted (AVE) values ranged from 0.863 to 0.904, all exceeding the recommended criterion of 0.50. These results indicate that the measurement model possesses satisfactory convergent validity, with each latent construct explaining a substantial proportion of the variance in its observed indicators. Furthermore, the high CR values demonstrate strong internal consistency and reliability across all constructs.

Following the satisfactory results of the first-order CFA, a second-order Confirmatory Factor Analysis (Second-order CFA) was conducted to validate the overall Information Leadership Model for High School Principals in Pingdingshan City, Henan Province. The analysis was performed using AMOS, and the results are presented in Figure 2 and Table 3.

Table 3 The Important Statistical Value of Second Order CFA Model for the Information Leadership Model for High School Principals in Pingdingshan City, Henan Province

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Path of variable in the model			Maximum Likelihood Estimates Regression Weights: Unstandard	Standard	R^2
1.Information-based design ability	<---	Information Leadership	.856	.991	0.982
IVPC	<---	IDA	1.000	.944	0.891
IEPC	<---	IDA	.989	.908	0.824
PC	<---	IDA	1.297	.928	0.861
TDC	<---	IDA	1.102	.945	0.893
2.Information Organization and Management Capability	<---	Information Leadership	1.000	.996	0.992
IOC	<---	IOMC	1.000	.934	0.872
IIC	<---	IOMC	.956	.957	0.915
SIM	<---	IOMC	.832	.955	0.912
3.Information-based Pedagogical Reform Capability	<---	Information Leadership	.968	.988	0.976
IOC	<---	IOMC	1.000	.951	0.904
IIC	<---	IOMC	1.020	.948	0.898
SIM	<---	IOMC	1.014	.942	0.887
4.Information Evaluation Capability	<---	Information Leadership	.972	.998	0.996
PD	<---	IEC	1.000	.937	0.878
IME	<---	IEC	1.087	.951	0.904
HR	<---	IEC	.986	.924	0.853
IOE	<---	IEC	.904	.938	0.880
5.Information Literacy	<---	Information Leadership	.960	.982	0.964

Path of variable in the model			Maximum Likelihood Estimates Regression Weights: Unstandard	Standard	R^2
ICC	<---	ILL	1.000	.934	0.872
TAC	<---	ILL	1.043	.932	0.870
CC	<---	ILL	.921	.938	0.880

From table 3 showed that the information leadership model High School Principals in Pingdingshan City, Henan Province were the components of Information Evaluation Capability, Information Organization and Management Capability, Information-based design ability, Information-based Pedagogical Reform Capability, and Information Literacy respectively

Discussion

The findings of this study provide important insights into the development of information leadership among high school principals in Pingdingshan City, Henan Province. The validated model comprises five interrelated dimensions: Information-based Design Ability, Information Organization and Management Capability, Information-based Pedagogical Reform Capability, Information Evaluation Capability, and Information Literacy Together, these dimensions provide a comprehensive framework for understanding and strengthening principals' information leadership in the context of educational digital transformation.

First, Information-based Design Ability emerged as the foundation of effective information leadership. The findings suggest that principals who are able to formulate a clear digital vision, develop strategic plans, and align information initiatives with school development goals are more capable of leading sustainable digital transformation. This finding supports previous studies emphasizing the importance of strategic vision in educational technology leadership (Anderson, 2005; Dede, 2000; Becker, 2001; Wang Shuhua, 2022).

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Second, Information Organization and Management Capability highlights the importance of effectively organizing digital resources, coordinating technology implementation, and establishing systematic information management practices. These competencies enable principals to transform strategic plans into practical actions and are consistent with previous research that identifies organizational management as a critical component of successful technology leadership (McLeod & Richardson, 2013; Zhao Leilei, 2017).

Third, Information-based Pedagogical Reform Capability emphasizes that digital transformation extends beyond technology adoption to the redesign of teaching and learning. Principals play a central role in promoting innovative instructional practices, supporting teachers' professional development, and fostering technology-enhanced learning environments. This finding is consistent with the work of Fullan (2013), Ertmer and Ottenbreit-Leftwich (2010), and Afshari et al. (2009), who argued that educational transformation depends on the integration of leadership, pedagogy, and technology.

Fourth, Information Evaluation Capabilitywas identified as an essential dimension for ensuring the effectiveness and sustainability of digital initiatives. Continuous evaluation enables principals to monitor implementation, assess educational outcomes, optimize resource allocation, and support evidence-based decision-making. This finding reinforces previous studies highlighting the importance of evaluation and feedback within information leadership (Anderson & Dexter, 2004; Tondeur et al., 2022).

Finally, Information Literacy represents the fundamental competency underlying all other dimensions. Principals' abilities to understand digital technologies, apply information effectively, and communicate within digital environments provide the basis for successful leadership in technology-rich schools. This finding supports previous research identifying information literacy as the cornerstone of educational leadership in the digital era (Hua & Yang, 2010; Wang Shuhua, 2022).

Overall, the proposed Information Leadership Model extends previous studies by integrating these five dimensions into a single empirically validated framework tailored to the educational context of Pingdingshan City, Henan Province. Unlike earlier studies that primarily focused on individual competencies or conceptual discussions, this study provides a comprehensive structural model that explains the relationships among the key

dimensions of principals' information leadership. The model therefore contributes both theoretically, by enriching the literature on educational leadership and digital transformation, and practically, by providing educational administrators and policymakers with a systematic framework for assessing and strengthening principals' information leadership.

Recommendations

1. Policy Recommendations

First, educational authorities should establish a regionally differentiated implementation mechanism for educational informatization policies to address disparities in digital infrastructure and school development across different regions. Second, a sustainable funding and supervision mechanism should be developed to ensure adequate financial support and effective monitoring of school informatization initiatives. Third, standards for principals' information leadership should be incorporated into leadership competency frameworks, accompanied by systematic professional development programs that strengthen digital leadership competencies. Finally, policymakers should promote a more equitable allocation of educational information resources to reduce regional inequalities and support the balanced development of digitally enabled schools.

2. Practical Recommendations

School principals should develop and communicate a shared digital vision that aligns information technology initiatives with school development goals. In addition, principals should continuously enhance their own information literacy and digital leadership competencies through ongoing professional learning. Schools should also strengthen principals' capacity to lead information-based pedagogical reform by encouraging innovative teaching practices, supporting teachers' professional development, and promoting the effective integration of digital technologies into classroom instruction.

3. Recommendations for Future Research

Future studies should examine the practical implementation and long-term effectiveness of the proposed Information Leadership Model in different educational contexts. Researchers are also encouraged to develop comprehensive assessment instruments for measuring principals' information leadership and to validate the model

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across different regions and educational levels in China. Comparative studies involving other provinces or countries would further strengthen the model's generalizability. In addition, longitudinal research is recommended to evaluate the sustainability of the model and to provide evidence for its continuous refinement and improvement.

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