

# Educational Technology Leadership of Rural Elementary and Secondary School Principals: Towards an Enhancement School Information Technology Program

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## Abstract

The research for this study was designed to explore the educational technology leadership of primary and secondary school principals in rural Hunan Province, China. The study adopted a quantitative and qualitative research design, using a questionnaire as the main data collection tool, quantitative evaluation through the Educational Technology Leadership Scale, and face-to-face interviews with some principals. A sample of 190 principals from rural primary and secondary school principals in Hunan Province was selected for the study. By conducting the study among rural primary and secondary school principals in Hunan Province, important insights about educational technology leadership in rural schools can be gained and useful references can be provided for educational organizations in Hunan Province and other similar areas. The study concluded that Rural primary and secondary school headmasters have a higher overall level of educational technology leadership, possess some knowledge and competence in educational technology, have made some achievements in promoting the application and development of educational technology, and have demonstrated a high level of leadership and an attitude of taking responsibility. Educational technology leadership in rural areas faces a number of challenges, including inadequate technological infrastructure and resources, the need for teachers' educational technology knowledge and competence enhancement, difficulties in educational technology integration and innovation, and pressure to make decisions within financial and budgetary constraints, as well as the need to cope with changes in the awareness and attitudes of the parents of teachers and students. They are highlighted as: insufficient technology infrastructure and resources, teachers' educational technology knowledge and competence, educational technology integration and innovation, educational technology assessment and data-driven decision-making, financial and budgetary constraints, and teachers' and students' parents' awareness and attitudes. These challenges require concerted efforts by government, school administrators, and educators to address.

## Keywords

Educational Technology Leadership, Rural Primary and Secondary Schools, Principals, Educational Technology Development, Hunan Province, China.

## 1. Introduction

In today's digital age, the use of educational technology has become an important driving force in educational reform and development. Principals, as school leaders and decision makers, play a key role in the field of educational technology. Their educational technology leadership is crucial to promoting educational technology development in schools, improving teaching quality and fostering students' innovation. However, rural primary and secondary school

principals face unique challenges in educational technology leadership, which require in-depth research and understanding.

The purpose of this study will explore the educational technology leadership and its challenges among rural primary and secondary school principals in Hunan Province, China. Through surveys and observations of principals, the researcher will assess their performance in the areas of educational technology vision and strategic planning, educational technology knowledge and competencies, teacher development and support, educational technology integration and innovation, resource management and engagement, and assessment and data-driven decision making. We will also provide insight into the challenges faced by rural elementary and secondary school principals in educational technology leadership, including inadequate technology facilities, teacher training needs, and lack of resources.

Although some studies will focused on principals' educational technology leadership, there is limited understanding of the specific performance and level of rural elementary and secondary school principals in this area. A comprehensive understanding of rural elementary and secondary school principals' perceptions, attitudes, and skill levels regarding educational technology, as well as their practices in educational technology integration, innovation, and management, has not been obtained [1]. With limited educational resources in rural areas, principals may face special challenges in promoting educational technology development [2]. However, not enough is known about the specific challenges and dilemmas faced by rural elementary and secondary school principals in educational technology leadership. These challenges may include inadequate technology facilities, teacher training needs, and lack of resources. Understanding the needs of rural primary and secondary school principals for educational technology development is key to promoting the integration of technology in rural education[3]. However, there is limited understanding of the needs of rural primary and secondary school principals in terms of educational technology knowledge, training, and support. An in-depth study of principals' expectations and needs for educational technology development is needed in order to develop appropriate support and training programs.

The educational technology leadership of rural primary and secondary school principals has a significant impact on the quality of education and student learning outcomes in their schools [4]. However, not enough is known about the specific impact and effectiveness of rural elementary and secondary school principals' educational technology leadership on school performance. Further research is needed to examine the relationship between principals' educational technology leadership and school performance and to explore effective educational technology leadership development strategies.

To promote educational technology leadership development among rural elementary and secondary school principals, relevant training and support programs are needed. However, there is relatively limited research on educational technology leadership development and enhancement strategies for rural elementary and middle school principals. Effective training models, support measures, and strategies need to be further explored to help rural primary and secondary school principals enhance their educational technology leadership.

This study is important for gaining insight into the educational technology leadership and its challenges among rural primary and secondary school principals in Hunan Province, China. Through a comprehensive analysis of survey and interview data, it will provide insights into the development of educational technology leadership of rural primary and secondary school principals for academics and practitioners, and suggest relevant policy and practice recommendations. This will help promote the digital transformation of rural education, improve the quality of school education, and provide more opportunities and resources for students' development.

## 2. Theoretical Framework

This study is based on the basic principles and tenets of educational leadership theory.

Educational leadership theory refers to a set of concepts and principles about the role of educational leaders in educational institutions. It emphasizes the importance of educational leaders for the management, development, and improvement of schools and their impact on educational reform and improved student learning outcomes.

Educational leaders should have the vision and the vision to be able to set clear goals and directions for their schools. They should be able to see the school's potential for growth and develop strategies and action plans for achieving those goals. Educational leaders should focus on the core mission of the school - student learning and the quality of teaching and learning. They should support the professional development of teachers, provide effective instructional support and resources, and promote innovation and improved teaching and learning practices. Educational leaders should promote a culture of collaboration and teamwork in schools. They should encourage collaboration and sharing among teachers, establish a positive work climate, and promote active collaboration among teachers, students, and parents. Educational leaders should understand educational policies and management principles and be able to apply and implement them effectively. They should have management skills, including resource management, human resource management, decision making, and problem-solving skills.

In this study, educational leadership theory can be applied to the study of rural elementary and secondary school principals. By studying principals' educational technology leadership, the role and role of principals in educational technology integration can be explored in depth. Educational leadership theory can provide a theoretical foundation and framework for the study and help analyze principals' leadership behaviors and practices in the areas of vision and strategic planning, educational technology knowledge and competencies, teacher development and support, educational technology integration and innovation, resource management and input, and evaluation and data-driven decision making. In addition, educational leadership theory can provide guidance and recommendations for research to promote educational technology development and improve student learning outcomes in rural schools.

## 3. Methodology

### 3.1. Research Design

This study utilized descriptive comparative research design. This is because the design can help us gain insight into the educational technology leadership of rural elementary and secondary school principals and their challenges while comparing and analyzing multiple variables. Focusing on describing and comparing phenomena, the descriptive comparative research design can provide a detailed description of the situation and help develop a comprehensive understanding. Second, descriptive-comparative research designs are suitable for exploring the relationships between multiple variables simultaneously. In this study, we addressed multiple dimensions of educational technology leadership, such as vision and strategic planning, educational technology knowledge and competencies, teacher development and support, educational technology integration and innovation, resource management and engagement, and assessment and data-driven decision making. The use of a descriptive-comparative research design allows for a comprehensive description and comparison of these dimensions, helping us to gain a comprehensive understanding of principals' performance and challenges across the different dimensions.

### 3.2. Respondent and Sampling technique

The researcher studied principals of rural primary and secondary schools in Hunan Province, China. The researcher used a proportional stratified random sample of 38 schools from different regional schools to select a random sample of 190 principals from such a population. A proportional stratified random sampling method was used to select 190 principals from rural primary and secondary school principals in Hunan Province as the sample for the study.

In this study, the participants are teachers of rural primary and secondary schools in Hunan Province, China. Principals are the leaders of their schools and have significant influence on educational technology leadership. Principals play a key role in decision making, resource management, and teacher support, making them important participants in the study. The sample was selected from a subset of principals in rural primary and secondary schools in Hunan Province to represent the entire group. The researcher divided Hunan Province into several regions based on the proportion of schools in each region and selected schools in each region according to the proportion of schools in each region.

### 3.3. Data Gathering Instrument

The study used a self-designed questionnaire as the primary data collection tool, confirmed through guided interviews and focus group discussions.

Construction of the questionnaire. The researcher used a self-constructed questionnaire to collect the educational technology leadership of the principals of the schools studied. It was divided into two parts; the first part involved an overview of the school principals' age, sex, educational background, and years of management experience. The second part focused on the educational technology leadership of the school principals, including the dimensions of vision and strategic planning, educational technology knowledge and competencies, teacher development and support, educational technology integration and innovation, resource management and input, and evaluation and data-driven decision making. Consultation with the dissertation advisor and experts in the field was conducted to ensure that no items were similar or duplicative. The primary tools used were presented to a number of experts for comments, suggestions, and recommendations.

## 4. Presentation, Analysis And Interpretation Of Data

### 4.1. Educational technology leadership of the principals

**Table1:** Assessment of principal-respondents as regards their educational technology leadership of the principals

educational technology leadership of the principals	Mean	Qualitative Description	Interpretation
Vision and Strategic Planning	3.25	Agree	Effective
Educational Technology Knowledge and Competencies	3.17	Agree	Effective
Teacher Development and Support	3.30	Agree	Effective
Educational Technology Integration and Innovation	3.29	Agree	Effective
Resource Management and investment	3.21	Agree	Effective
Assessment and Data-Driven Decision Making	3.17	Agree	Effective
Over-all Mean	3.23	Agree	Effective

Legend: 3.51-4.00 Strongly Agree/Very Effective; 2.51-3.50 Agree/Effective; 1.51-2.50 Disagree/Not Effective; 1.00-1.50 Strongly Disagree/Strongly Not Effective

Table 1 shows the principal respondents' assessment of educational technology leadership, where Vision and Strategic Planning had a mean of 3.25 or Effective; Educational Technology Knowledge and Competencies had a mean of 3.17 or Effective; Teacher Development and Support had a mean of 3.30 or Effective; and Educational Technology Integration and Innovation had a mean of 3.29 or Effective; Resource Management and investment had a mean of 3.21 or Effective; and Assessment and Data-Driven Decision Making had a mean of 3.17 or Effective. The overall composite mean of 3.16 was interpreted as being This means that the principals surveyed were overall "effective" on all dimensions of educational technology leadership.

The principals performed well in developing a vision and strategic plan for the development of educational technology in their schools, and they have certain plans and guidelines for the future development of information technology in their schools. However, attention also needs to be paid to further enhancement to ensure that the vision and strategic planning can be more forward-looking, actionable and adaptable to lead the school towards a more informative and innovative educational field (Yan Piaw Chua & Yee Pei Chua, 2019). The interviewed principals have some strengths in educational technology knowledge and competencies to cope with the practical applications and challenges of educational technology in their schools. However, there is a need for more specialized training and learning on educational technology to better support the integration and innovation of educational technology in schools. Interviewed principals performed better in supporting teacher development and providing teacher support. This is an important aspect because teachers are at the heart of IT education and their competence and development in educational technology is crucial for the integration of educational technology in schools. Granić Andrina (2022) study concluded that principals are aware of and value the use of educational technology in classroom teaching and school management and encourage teachers to be innovative in the use of educational technology in teaching and learning. However, there is still a need for sustained efforts to promote deeper integration and exploration of innovative applications of educational technology to inject more vitality into the development of information technology in schools.

Principals have made efforts in ensuring that their schools have appropriate ed-tech equipment and infrastructure, and are able to plan and allocate budgets appropriately to support the development of ed-tech. There is a need to focus more on the optimization and effective use of resources, as well as to find more external support and collaboration to provide more support for the development of educational technology in schools (Chen, L. & Zhu, H.S., 2020). Principals have made some progress in collaborating with teachers on data interpretation and analysis and are able to develop data-based decisions and improvement strategies. However, scores on this dimension were also relatively low, and further strengthening of data analysis skills needed to more scientifically and effectively utilize data to guide the development of educational technology in schools.

#### **4.2. The challenges of educational technology leadership**

**Table 2:** The challenges of educational technology leadership for rural elementary and middle school principals

Theme	Narrative	Source
Inadequate technological infrastructure and resources	“Rural schools usually face problems with unstable and slow network and Internet connections.”	principal1-3
	“Rural schools often do not have sufficient funds to purchase advanced educational technology equipment, such as interactive whiteboards, computer labs, and tablet computers.”	Principal 6
	“Rural schools often lack rich digital educational resources, such as teaching videos, e-textbooks, and online courses.”	principal10
	“Teachers lack the knowledge and skills to use educational technology and do not know how to effectively integrate technology into their teaching.”	Principal 8
Teachers' knowledge and competence in educational technology	“Many teachers in rural areas lack adequate knowledge and competence in educational technology.”	Principal 2-4
	“Teachers are not skilled enough in the application of educational technology.”	Principal 4-6
	“Application of technology tools in actual teaching is not dog skillful.”	Principal 5
	“There is a lack of cooperation and experience sharing among teachers.”	Principal 9-10
	“Most teachers have low digital literacy.”	Principal 1
Educational Technology Integration and Innovation	“Educational technology is difficult to integrate in rural schools.”	Principal 1
	“The infrastructure of the school limits the integration of educational technology.”	Principal 6
	“In my school there is no computer lab etc.”	Principal 2-6
	“Most of the teachers are conservative about new educational technology applications.”	Principal 3
	“There are also no educational technologists within the school.”	Principal 5-9
Educational Technology Assessment and Data-Driven Decision Making	“Educational technology assessment methods are inadequate.”	Principal 4
	“Difficulty in collecting collection.”	Principal 8-10
	“Inadequate data analysis and application skills.”	Principal 7
	“Educational technology assessment application is insufficient.”	Principal 4-8
		Principal 1-2

	<p>“Educational technology does not enable data-driven decision making.”</p> <p>“Not getting attention.”</p> <p>“Disconnect between assessment and decision making.”</p>	<p>Principal 6-7</p> <p>Principal 10</p>
Funding and budget	<p>“Schools are underfunded, with the main source of funding being government grants.”</p> <p>“There are no other sources of income generation.”</p> <p>“Funding for educational technology is not available and is unevenly distributed.”</p> <p>“A large amount of money is needed to invest in educational technology equipment.”</p>	<p>Principal 1-5</p> <p>Principal 6</p> <p>Principal 8</p> <p>Principal 6-9</p>
Awareness and attitudes of teachers, students and parents	<p>“Lack of awareness and cognition in rural areas.”</p> <p>“Traditional concepts of education and teaching methods are more prevalent.”</p> <p>“Parents are skeptical about educational technology.”</p> <p>“Some parents worry that educational technology will affect students' learning and will not help them learn.”</p>	<p>Principal 3</p> <p>Principal 1-3</p> <p>Principal 5-7</p> <p>Principal 6-10</p>

**Theme 1: Inadequate technology infrastructure and resources.**

Inadequate technological infrastructures and resources are a serious challenge for principals in rural primary and lower secondary schools. These deficiencies hinder the effective use of educational technology, affecting the quality of education in schools and the learning experience of students.

Rural areas often lack high-speed and stable Internet connections, which makes it difficult for teachers and students to access online educational resources and platforms. Unstable networks can lead to intermittent problems in the teaching and learning process, affecting the progress and effectiveness of teaching and learning. Lack of advanced educational technology equipment. Rural schools are often unable to purchase expensive educational technology equipment, such as interactive whiteboards, computer labs, and tablet computers. This makes it difficult for teachers to use advanced teaching tools, limiting the variety and interest of teaching. Lack of educational technology training and support. Due to limited resources, rural schools are often unable to provide adequate educational technology training and support for teachers. Lack of relevant knowledge and skills can make teachers unconfident and reluctant to try new teaching methods, thus affecting the effective application of educational technology. Lack of digital educational resources. Compared with urban schools, rural schools often lack rich digital educational resources, such as teaching videos, e-textbooks and online courses. This limits teachers' opportunities to expand teaching content and students' access to diverse educational resources. Difficulty in maintaining and updating equipment. Because rural schools have limited funds, once purchased, it is often difficult to maintain and update educational technology equipment in a timely manner, resulting in aging and reduced efficiency.

**Theme 2: Enhancement of Teachers' Knowledge and Competence in Educational Technology.**

The enhancement of teachers' knowledge and competence in educational technology is another important challenge faced by principals in rural primary and lower secondary schools.

Teachers' knowledge and competencies in educational technology have a direct impact on the effectiveness of the use of educational technology in teaching and learning.

Many teachers in rural areas lack knowledge and training in educational technology. They have not received specialized training in educational technology and do not understand how to use technology effectively to support teaching and learning. Teachers lack basic digital literacy and are unfamiliar with computer operations and common educational technology tools. This can lead to resistance and distrust of digital teaching methods. Educational technology is constantly evolving and updating, and new edtech tools and platforms are emerging. Teachers need to continually learn new things to keep their edtech knowledge at the forefront. Teachers face difficulties in integrating educational technology into their classroom teaching. They need to learn how to integrate educational technology with instructional objectives for effective teaching and learning. Teachers need learning time and resource support to enhance their knowledge and competencies in educational technology; however, rural schools often have limited resources to provide adequate training and support.

Theme 3: Educational Technology Integration and Innovation.

Educational technology integration and innovation is another important challenge facing rural elementary and middle school principals in educational technology leadership. Educational technology integration refers to the organic integration of educational technology into the teaching and learning process to enhance teaching effectiveness and student learning experiences. Educational technology innovation, on the other hand, refers to the continuous exploration and adoption of new educational technology tools and methods to meet the changing and evolving needs of teaching and learning.

The application of educational technology needs to be organically integrated with existing teaching content and teaching methods, and some teachers are not familiar with how to integrate educational technology with curriculum objectives, leading to difficulties in integrating educational technology. The lack of necessary infrastructure in rural schools, such as stable Internet connections and computer labs, can limit the widespread use and innovation of educational technologies. Teachers' digital literacy is critical for the effective integration and innovation of educational technologies. If teachers are not digitally literate, it is difficult to realize the full potential of educational technologies. The lack of an innovation culture in some schools and their reservations about new applications and experimentation with educational technologies have slowed down the process of technological innovation in education.

Theme 4: Educational Technology Assessment and Data-Driven Decision Making.

Educational technology assessment and data-driven decision making is another important challenge facing rural elementary and middle school principals in educational technology leadership. Educational technology assessment refers to the systematic evaluation and analysis of the effectiveness and impact of educational technology to determine its actual effect on the teaching and learning process. Data-driven decision-making refers to making scientific and objective decisions based on collected data and information to promote the effective use and improvement of educational technology.

Evaluation of educational technology requires scientific and comprehensive methods and indicators, but some schools lack the tools and methods to do this, resulting in inaccurate and unreliable results. To make data-driven decisions, a large amount of edtech data needs to be collected, including student learning data and teacher teaching data, but data collection is limited by technical facilities and data privacy issues. EdTech data need to be analyzed and interpreted in complex ways, and some schools lack the capacity to analyze and apply the data, making it impossible to make full use of the data to make effective decisions. Even if the results of an educational technology assessment are available, data-driven decision-making cannot be realized if principals and teachers do not incorporate the results into actual teaching and



management. Sometimes there is a disconnect between assessment results and actual decision-making, and the results are not sufficiently emphasized and applied, thus affecting the improvement and upgrading of educational technology.

Theme 5: Funding and budgetary constraints.

Funding and budgetary constraints are another important challenge faced by rural primary and lower secondary school principals in terms of educational technology leadership. The introduction and application of educational technology requires a lot of investment, including the purchase of equipment, software and teaching materials, teacher training, and maintenance and upgrading of equipment, etc. In rural areas, due to economic conditions and resource constraints.

Primary and junior high schools in rural areas usually rely on limited sources of funding such as government grants and tuition fee income, which restricts the amount and scope of funds that schools can invest in educational technology. Due to limited funds, schools need to invest in a number of areas, including teacher training, teaching resources, and student welfare, resulting in an uneven distribution of funds for educational technology. Educational technology equipment and software are usually expensive, and purchasing and maintaining the equipment requires a large amount of capital investment, which is a greater burden for rural schools. Effective use of educational technology requires teachers and administrators to have relevant technical and pedagogical skills, and therefore requires training and support, the cost of which needs to be included in the budget. The introduction of educational technology is a long-term process that requires sustained funding, and some schools face funding instability that makes it difficult to ensure the sustainable development of educational technology in the long term.

Theme 6: Awareness and Attitudes of Teacher and Student Parents.

The awareness and attitudes of parents of students and teachers have a significant impact on the development and application of educational technology leadership. Due to the relative lack of educational resources in rural areas, the development and application of educational technology has not been sufficiently publicized and popularized, resulting in a lack of awareness and knowledge of educational technology among teachers and parents. In rural areas, traditional education concepts and teaching methods are still common, and teachers and parents tend to favor traditional teaching methods and have reservations about the acceptance and application of educational technology. Parents of teachers and students in rural areas are unfamiliar with and confused about the use and operation of educational technology due to a lack of relevant technical training and experience, which leads to their skepticism towards educational technology. Parents of teachers and students worry that educational technology will affect traditional teaching methods and lead to a decline in the quality of teaching, and are skeptical about the actual effects of educational technology. In some rural areas, where educational resources are limited, teachers and parents are more concerned about learning basic knowledge and test scores, ignoring the importance of educational technology in improving the quality of teaching and students' comprehensive abilities.

## 5. Conclusion

Rural primary and secondary school headmasters have a higher overall level of educational technology leadership, possess some knowledge and competence in educational technology, have made some achievements in promoting the application and development of educational technology, and have demonstrated a high level of leadership and an attitude of taking responsibility.

Educational technology leadership in rural areas faces a number of challenges, including inadequate technological infrastructure and resources, the need for teachers' educational technology knowledge and competence enhancement, difficulties in educational technology

integration and innovation, and pressure to make decisions within financial and budgetary constraints, as well as the need to cope with changes in the awareness and attitudes of the parents of teachers and students.

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