THE DEVELOPMENT OF TRAINING PROGRAM ENHANCING INSTRUCTORS’ ICT LEADERSHIP FOR PRIVATE UNIVERSITIES IN JINAN, CHINA

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The purpose of this study was to develop a training program to improve ICT leadership among instructors at private universities in Jinan, China. The study included 405 instructors from four private universities in Jinan. Various statistical methods, such as frequency, percentage, mean, paired sample t-test, and multiple regression, and were used to develop the training program. The results showed that factors such as instructors’ ICT leadership, ICT attitudes, self-efficacy, school culture, leadership support, and training had a significant impact on instructors’ ICT leadership. Based on these factors, an ICT leadership training program was developed. The study also found a significant difference in instructors’ ICT leadership before and after participating in the training program, indicating the effectiveness of the program. The researchers suggested that private universities in Jinan should implement this training program to enhance instructors' ICT leadership in the future.

Keywords: instructors' ICT leadership; factors; training program; private universities

Introduction

The rapid development of information and communication technologies like the Internet, big data, cloud computing, and artificial intelligence has brought significant changes to various economic and social sectors. In the field of education, the development of

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information and communication technology (ICT) has become crucial for promoting educational reform and strengthening education (Lawrence & Tar, 2013).

Instructors' ICT leadership is an essential aspect of promoting the construction of school ICT leadership in the process of smart campus development. Developing instructors' ICT leadership is vital for their professional development and adapting to the digital transformation of education and teaching (Anderson & Dexter, 2000; Çetinkaya, 2022).

However, research on ICT leadership, especially instructors’ ICT leadership, is still limited, with most studies focusing on CIO research and IT leadership research. There is a lack of research on ICT leadership's impact and application in the Chinese context (Zhang et al. 2021).

Studies on instructors' ICT leadership mainly concentrate on external mechanisms such as the institutional structure of schools, principal support, and the information atmosphere on campuses. However, research on promotion strategies and training for instructors' ICT leadership is scarce (Sun & Liu, 2015; Zhao & Zhang, 2019).

Improving instructors' ICT leadership is crucial for addressing the ICT development challenges faced by private universities in Jinan. Teachers need to better adapt to educational reforms in the ICT era to achieve professional growth in this new historical context.

Research objectives
This study aims to achieve the following research objectives:
1. Explore the components of university instructors' ICT leadership.
2. Examine the factors influencing university instructors' ICT leadership.
3. Evaluate the current level of university instructors' ICT leadership in private universities in Jinan.
4. Determine the essential factors affecting university instructors' ICT leadership in private universities in Jinan.
5. Develop a training program to enhance university instructors' ICT leadership in private universities in Jinan.
6. Measure the effects of attending the leadership training program on university instructors' ICT leadership and compare the differences before and after the training in the selected private university.

Literature review

ICT Leadership
ICT leadership is the result of the interconnectedness of leaders in the context of changes in the ICT landscape.

These changes have influenced the nature and structure of leadership within the field of information technology (Avolio et al., 2000).

In a comprehensive study, Huo (2008) explored the concept, scope, role, and framework of ICT leadership. Huo proposed that ICT leadership involves a change in the nature and structure of leaders, followers, stakeholders, organizational goals, and leadership within the ICT context.

Huang (2018) defines ICT leadership as the ability and process systems of leaders to attract and influence followers and stakeholders using network information technology and personal charisma to achieve goals in the information age.
Instructors’ ICT Leadership

There is limited research available on ICT leadership in higher education (Jameson, 2013).

The role also includes designing IT infrastructure and emphasizing the critical importance of IT training. CIOs in higher education are required to be technology advocates aligned with strategic goals and able to measure and report outputs (Chester, 2006).

ICT leadership for college instructors encompasses a range of abilities in the digital age (Wang, 2022). It involves the combined influence of instructors on leaders in the information age through their own information attitudes and awareness, skills and practical abilities, and interactions with leadership situations in the age of information and communication technologies (Sun & Zhang, 2016).

Xiao (2008) summarizes ICT leadership in education as the ability of school technology leaders to plan ICT development, create an ICT environment, establish technology usage standards, and successfully promote the effective use of technology in schools. Instructors’ ICT leadership refers to their ability to stimulate students’ enthusiasm for learning, create a tolerant and free learning atmosphere, improve ICT teaching and learning, and achieve school training goals through ICT classroom activities.

The factors of instructors’ ICT leadership

Several studies have shown that instructors’ use of technology in the teaching process is influenced by their technical knowledge and skills (Çetinkaya, 2022; Lawrence & Tar, 2018). Instructors who have the capacity to use ICTs tend to incorporate technology into their curricula (Sipilä, 2014). They often use ICT for information, organizational, and lesson planning purposes (Brun & Hinostroza, 2014; Kim & Shin, 2015; Wikan & Molster, 2011). Educators with higher levels of skills, knowledge advantages, and tools exhibit higher levels of technology-integrated instruction in the classroom (Christensen & Knezek, 2000).

Instructors’ attitudes towards technology have a significant impact on their acceptance of its usefulness and integration into teaching (Agbo, 2015; Elstad & Christopherson, 2017). A positive attitude can have a positive and direct impact on the intention of their behavior, leading to the use of ICT in innovative and creative ways (Macaulay et al., 2020).

Leadership support is another powerful determinant of instructors’ inclusion of ICT in their teaching (Basargekar & Singhavi, 2017; Japhet & Usman, 2018). The success or failure of ICT implementation in schools depends on the support provided by school leaders (Schiller & Worthing, 2011; Chang et al., 2012).

Principals play a crucial role in creating supportive environments, arranging instructor training, providing advice, and facilitating, monitoring, and evaluating ICT integration. By building online communities and promoting communication and information sharing, principals can create work environments for professional learning and enable instructors to develop themselves in response to technological changes (Gurr et al., 2005; Haughey, 2006).

The training strategies of instructors’ ICT leadership

School leaders should develop long-term mechanisms and training systems for ICT learning to develop the skills of school administrators and instructors to use technology effectively (Wei et al., 2017).
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To find solutions and overcome barriers to implementation, training must focus on various aspects of the case, such as basic skills training for instructors and ICT in teaching and learning, to help instructors improve their experience implementing ICT in their teaching (Admiraal et al., 2017). The initial phase of training should be focused on the basic ICT skills of instructors and the extensive use of software and hardware (Snoeyink & Ertmer, 2001). Once instructors have reached the necessary level of proficiency, they can continue their ICT training.

Training programs need to be appropriately designed and implemented based on instructors’ proficiency in using technology, age group, work experience, and subjects taught. With the use of ICTs and the consequent increase in self-directed learning, pedagogical approaches need to change. Training programs should also focus on changing instructors’ mindsets to build positive attitudes towards the use of ICTs in the classroom (Basargekar & Singhavi, 2017).

**Conceptual framework**

This study aimed to determine the factors affecting instructors’ ICT leadership in private universities in Jinan, and then designed a training program for instructors.

![Figure 1 - Research conceptual framework](image)

The independent variables of this study were factors including ICT leadership ability, ICT usage attitude, self-efficacy, school culture, leadership support and training, and the independent variable was instructors’ ICT leadership which included ICT capability, ICT teaching leadership, information communication capability, ICT professional development leadership, ICT culture leadership and curriculum reform leadership. The conceptual framework of this study is shown in Fig. 1.
Methodology

Population and sample
This research involved full-time instructors from four private universities in Jinan city, Shandong Province of China. The total sample size was determined to be at least 338 instructors. Finally, 60 instructors from the School of Humanities at a private university were selected for a paired t-test to measure the training effect and compare the differences in ICT leadership before and after the instructors participated in the training.

Questionnaire design
The questionnaire consisted of two parts: instructors' ICT leadership and factors that may influence instructors' ICT leadership. The questionnaire contained a total of 48 questions. Part I focused on ICT leadership and was divided into six dimensions to analyze instructors' ICT leadership. Part II focused on factors that may influence instructors' ICT leadership.

Reliability and validity
To ensure the validity of the questionnaire content, the Item Objective Congruence (IOC) system was applied. The reliability of the questionnaires was analyzed using Cronbach's alpha. A pilot test was conducted with 41 instructors from Jinan private university to validate and revise the questionnaire. The overall alpha of the questionnaires was found to be 0.88.

Results

Research objective one: to explore the components of University instructors' ICT leadership
The researcher selected relevant research articles by conducting a search using keywords such as ICT leadership, instructors' leadership, and ICT leadership for instructors. A total of 88 relevant sources published between 2000 and 2022 were reviewed and analyzed. Through a systematic literature review, the researcher concluded that the components of instructors' ICT leadership consisted of six parts, including ICT capability, ICT teaching leadership, information communication capability, ICT professional development leadership, ICT culture leadership, and curriculum reform leadership.

Research objective two: to examine the factors of University instructors' ICT leadership
The researcher reviewed literature on the factors influencing ICT leadership, including books, research articles, and online resources. A total of 121 relevant sources published between 2000 and 2022 were reviewed and analyzed.
Through a systematic literature review, the factors affecting instructors' ICT leadership were divided into two parts: internal factors, including technology use attitude, ICT leadership ability, and self-efficacy, and external factors, including school culture, leadership support, and training.
Research objective three: to assess the current level of University instructors' ICT leadership in private universities of Jinan

A total of 450 questionnaires were collected, out of which 405 were deemed valid, accounting for 90% of the valid questionnaires. Tab. 1 presented the six components of instructors' ICT leadership, with two of them showing positive mean scores above 3.51. The lowest mean scores were observed for ICT teaching leadership and curriculum reform leadership, indicating a need for improvement in these areas.

The highest mean score was for information communication capability, indicating that instructors possessed strong ICT communication skills. Overall, the level of ICT leadership among instructors in private universities in Jinan was not high, suggesting the need for further actions to improve instructors' ICT leadership.

Table 1 - The level of ICT leadership capabilities of instructors (made by co-authors)

<table>
<thead>
<tr>
<th>Components</th>
<th>M</th>
<th>SD</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT Capability</td>
<td>3.48</td>
<td>.78</td>
<td>Moderate</td>
</tr>
<tr>
<td>ICT Teaching Leadership</td>
<td>3.40</td>
<td>.81</td>
<td>Moderate</td>
</tr>
<tr>
<td>Information Communication Capability</td>
<td>3.59</td>
<td>.64</td>
<td>High</td>
</tr>
<tr>
<td>ICT Professional Development Leadership</td>
<td>3.58</td>
<td>.73</td>
<td>High</td>
</tr>
<tr>
<td>ICT Culture Leadership</td>
<td>3.50</td>
<td>.76</td>
<td>Moderate</td>
</tr>
<tr>
<td>Curriculum Reform Leadership</td>
<td>3.47</td>
<td>.74</td>
<td>Moderate</td>
</tr>
<tr>
<td>Total</td>
<td>3.50</td>
<td>.75</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

For research objective four: to determine the important factors affecting University instructors' ICT leadership in private Universities of Jinan

The linear regression model fitted well, with an R-value of 0.708, indicating a correlation of 0 between factors and instructor’s ICT leadership was 0.708. R²= 0.704.

According to the data analysis results in the third part of Tab. 2, factors significantly affected instructors’ ICT leadership level.

Since the p-value was less than 0.05, the extent to which the factors affect instructors’ ICT leadership. ICT usage attitude can significantly positively influence instructors’ ICT leadership (β =.150, p =.001), ICT leadership ability can significantly positively influence instructors’ ICT leadership (β =.365, p =.000), self-efficacy can significantly positively influence instructors’ ICT leadership (β =.171, p =.002), school culture can significantly positively influence instructors’ ICT leadership (β =.068, p =.021), leadership support can significantly positively influence instructors’ ICT leadership (β =.085, p = .014), training can significantly positively influence instructors’ ICT leadership (β = .167, p = .000).
Table 2 - Multiple regression results of the survey data related to the factors of instructors' ICT leadership
(made by co-authors)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.708</td>
<td>.704</td>
<td>.21068</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>1.652</td>
<td>.072</td>
<td>23.092</td>
<td>.000*</td>
</tr>
<tr>
<td>ICT Leadership Ability</td>
<td>.173</td>
<td>.027</td>
<td>.365</td>
<td>6.500</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.078</td>
<td>.025</td>
<td>.171</td>
<td>3.157</td>
</tr>
<tr>
<td>Training</td>
<td>.093</td>
<td>.022</td>
<td>.167</td>
<td>4.119</td>
</tr>
<tr>
<td>ICT Usage Attitude</td>
<td>.076</td>
<td>.023</td>
<td>.150</td>
<td>3.368</td>
</tr>
<tr>
<td>Leadership Support</td>
<td>.051</td>
<td>.020</td>
<td>.085</td>
<td>2.471</td>
</tr>
<tr>
<td>School Culture</td>
<td>.036</td>
<td>.016</td>
<td>.068</td>
<td>2.317</td>
</tr>
</tbody>
</table>

Predictors: (Constant), ICT Leadership Ability, ICT Usage Attitude, Self-efficacy, School Culture, Leadership Support, Training
Dependent Variable: Factors of Instructors' ICT leadership

*For research objective five: to develop a training program for improving University instructors' ICT leadership in private universities of Jinan*

The training program was developed based on data obtained from research by instructors at a private university in Jinan, China.

The training program included six important projects that influenced the results of data analysis of instructors' ICT leadership factors, including ICT leadership ability, self-efficacy, training, ICT usage attitude, leadership support, school culture.

According to the mean score and standard deviation of the six influencing factors analyzed above, the item with the lowest mean of each influencing factor is summarized as Tab. 3.

Table 3 - The lowest item of each factor
(made by co-authors)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Item</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT Leadership Ability</td>
<td>ICT teaching leadership</td>
<td>3.43</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Competencies of ICT experts</td>
<td>3.42</td>
</tr>
<tr>
<td>Training</td>
<td>Creating digital learning community</td>
<td>3.24</td>
</tr>
<tr>
<td>ICT Usage Attitude</td>
<td>Awareness of attending ICT training</td>
<td>3.81</td>
</tr>
<tr>
<td>Leadership Support</td>
<td>ICT teaching assessment mechanism</td>
<td>3.37</td>
</tr>
<tr>
<td>School Culture</td>
<td>Creating culture of ICT</td>
<td>3.31</td>
</tr>
</tbody>
</table>

The item with the lowest mean for each influencing factor was the most in need of improvement, according to the six influencing factors and mean, the final training model of this study was modified as shown in Fig. 2.
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According to the training model, this study developed a detailed training program, the training content was shown in Fig. 3.

The training program for ICT leadership of instructors conducted by one of the private universities in Shandong, the program had been verified by ten experts in the field of educational leadership.
**For research objective six: to measure the effects and compare the differences of university instructors’ ICT leadership capacity before and after instructors attend leadership training program in the selected private university**

A paired-sample t-test was used to compare the means of pre- and post-training tests with the ICT leadership of instructors. Tab. 4 showed the descriptive statistics collected by the pre- and post-test results of the ICT leadership test for instructors. On mean, the instructors’ score after training (m = 3.71) was higher than pre-test (m = 3.41). It showed that after three months of ICT leadership training, the ICT leadership level of instructors had been greatly improved.

<table>
<thead>
<tr>
<th>Table 4 - Paired sample statistics (Pre-Test and Post-Test) Instructors’ ICT leadership (made by co-authors)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pair 1 Pre-Test</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Pre-Test</td>
</tr>
<tr>
<td>Post-Test</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5 - The results of pre and post tests by paired t-Test (made by co-authors)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pair 1</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Pre-Test-Post-Test</td>
</tr>
</tbody>
</table>

**Discussion**

In this study, the components of instructors' ICT leadership were obtained through a literature review. The researcher extracted key ideas from research and theories related to instructors' ICT leadership, analyzed and sorted them, and summarized the components of instructors' ICT leadership. These components include ICT capability, ICT teaching leadership, information communication capability, ICT professional development leadership, ICT culture leadership, and curriculum reform leadership. It was found that ICT capability was the most commonly researched aspect of instructors' ICT leadership. The study also analyzed the results of 405 instructors' questionnaires and found that the average level of instructors' ICT leadership was 3.50, indicating a relatively low level. This finding was consistent with previous research.

The study identified several factors that impact instructors' ICT leadership. The findings showed that factors such as instructors' ICT usage attitude, ICT leadership ability, self-efficacy, school culture, leadership support, and training significantly influence instructors' ICT leadership. This finding aligns with previous research.
The development of instructors' ICT leadership is affected by a combination of factors, and each factor has a synergistic effect. Schools play a crucial role in supporting and promoting instructors' ICT leadership through awareness-raising and integrating leadership development into daily work. At the individual level, instructors need to awaken their leadership awareness, identify with leadership behaviors, and improve their ICT capabilities to enhance ICT leadership.

Based on the identified factors, the study proposed a training program for instructors' ICT leadership. The initial phase of the training focuses on basic ICT skills and extensive use of software and hardware. Once instructors reach a necessary level of proficiency, they can continue with ICT training. The program also aims to change instructors' mindsets and build a positive attitude towards ICT use in the classroom. Scholars have emphasized the importance of strengthening training, standardizing systems, allocating resources, and creating a cultural atmosphere to improve instructors' ICT leadership.

In terms of education models, the study suggests incorporating the training model of Wang (2022) and incorporating self-directed learning methods in team learning to encourage instructors to use technology to design, implement, and evaluate teaching projects.

Conclusions

This study examined the components, current situation, factors, and training programs of ICT leadership among instructors in private universities in Jinan. The results showed that instructors' ICT leadership in these universities was moderate. The study confirmed that factors such as ICT leadership ability, ICT usage attitude, self-efficacy, school culture, leadership support, and training significantly impacted instructors' ICT leadership, with ICT leadership ability having the greatest impact.

A training program for instructors' ICT leadership in Jinan private universities was proposed, focusing on six training topics related to the identified factors. The study found a significant improvement in instructors' ICT leadership after participating in the training.

References


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