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# Transformational Leadership Skills for Executives in the Digital Age, China Polytechnic College

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**Abstract**

**Background and Aim:** In the rapidly advancing digital era, traditional leadership models often fall short of addressing the dynamic needs of educational institutions. This study investigates the transformational leadership competencies required by executives at China Polytechnic College to effectively navigate technological advancements and foster innovative learning environments. Emphasizing technological proficiency, strategic vision, emotional intelligence, and inspirational leadership, the research examines how these skills influence institutional performance, innovation, and digital transformation.

**Materials and Methods:** A mixed-methods approach was employed, integrating quantitative and qualitative methodologies to comprehensively assess leadership competencies. Participants: The sample included 100 school executives, stratified by academic discipline, encompassing department heads, deans, and administrative leaders. Data Collection: Quantitative data were collected through validated questionnaires measuring transformational leadership dimensions such as idealized influence, inspirational motivation, intellectual stimulation, individual consideration, and digital vision. Qualitative insights were gathered through semi-structured interviews with 20 executives, focusing on their experiences in adapting to digital age challenges. Data Analysis: Quantitative data were analyzed using descriptive statistics and inferential tests (e.g., ANOVA), while qualitative data were thematically analyzed to identify key leadership practices and challenges.

**Results:** The study yielded several significant findings: (1) Competency Levels: Executives demonstrated high overall transformational leadership competency (mean score: 4.2/5), with intellectual stimulation receiving the highest rating (4.5) and individual consideration the lowest (3.8). (2) Impact on Institutional Performance: A significant positive correlation ($r = 0.68$, $p < 0.01$) was observed between transformational leadership skills and institutional performance indicators, including enhanced student satisfaction and faculty engagement. Qualitative Insights: Themes from interviews highlighted adaptability, collaborative leadership, and the critical need for ongoing professional development in digital skills as pivotal for driving institutional success.

**Conclusion:** This research underscores the indispensable role of transformational leadership in meeting the demands of the digital age within educational institutions. While executives at China Polytechnic College exhibit strong leadership capabilities, targeted improvements in personalized mentoring and individual consideration are necessary to maximize effectiveness. These findings inform leadership development programs aimed at equipping educational leaders with the adaptive and innovative skills essential for navigating a rapidly evolving educational landscape. As technology reshapes the future of education, fostering resilient and forward-thinking leadership will remain critical for institutional success.

**Keywords:** Skills, Leadership, Change Management, Executives, Digital Age, China Polytechnic College

## Introduction

In the age of digital transformation, higher education institutions worldwide face profound challenges as they adapt to rapidly advancing technologies (Bass, 1990). The integration of digital tools and platforms has revolutionized how education is delivered, managed, and accessed, compelling institutions to rethink traditional approaches to leadership (Anant & Worapongpat, 2023). This is especially critical for institutions like the Guangdong Institute of Technology, where maintaining competitiveness, fostering innovation, and ensuring long-term sustainability are directly tied to the effective implementation of digital strategies (Chatchai & Worapongpat, 2023). Digital transformation in education requires not only technological infrastructure but also visionary leadership capable of guiding institutions through this complex transition (Chayboonkrong & Worapongpat, 2024). Transformational leadership, as defined by Chanpradit et al. (2024), emphasizes the ability to inspire, motivate, and enact significant change within an organization. Unlike transactional leadership, which



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prioritizes routine operations and immediate results, transformational leadership fosters an environment of innovation, adaptability, and strategic foresight—qualities indispensable for navigating the uncertainties of a technology-driven educational landscape (Chayboonkrong & Worapongpat, 2024).

For the Guangdong Institute of Technology, the urgency of embracing transformational leadership arises from several challenges (Dongling & Worapongpat, 2023). These include the need to enhance digital literacy among faculty and staff, develop robust technological infrastructure, and implement new teaching methodologies that meet the demands of modern learners. Leaders at the institute must not only grasp the intricacies of digital tools but also demonstrate emotional intelligence, adaptability, and a shared vision for innovation (Gao & Worapongpat, 2022). Addressing these challenges requires leadership that empowers faculty, engages stakeholders, and cultivates an organizational culture that embraces change and continuous improvement (JianFeng & Worapongpat, 2024) Despite the recognized importance of transformational leadership in driving digital transformation, there is a notable gap in research examining the specific skills and competencies required for this leadership style in the context of higher education (Liu & Worapongpat, 2024). Existing studies, while foundational, often lack a focus on how transformational leadership can directly influence organizational innovation, employee engagement, and the successful implementation of digital initiatives (Jianzhi & Worapongpat, 2020). This study seeks to bridge this gap by exploring the transformational leadership skills essential for executives at the Guangdong Institute of Technology, aiming to provide a nuanced understanding of how leadership practices can facilitate digital transformation (Baojanraya et al., 2023).

The objectives of this research are twofold. First, it aims to identify the key competencies, such as technological proficiency, emotional intelligence, and strategic vision, required for transformational leadership in a digital context (Li & Worapongpat, 2023). Second, it seeks to evaluate how these competencies impact the institution's ability to innovate, engage employees, and achieve digital transformation goals (Liu & Worapongpat, 2024). By addressing these objectives, the study will contribute to the growing body of knowledge on leadership in the digital age, offering practical insights for educational leaders navigating similar challenges (Min & Worapongpat, 2023) Additionally, this research aims to provide actionable recommendations for school administrators and policymakers, equipping them with strategies to develop and refine transformational leadership capabilities (Ma & Worapongpat, 2023). The findings will serve as a guideline for self-development among educational leaders, enhancing their ability to drive institutional efficiency and improve the overall quality of education (Phra Maha Thawee et al., 2023). This contribution is particularly significant as institutions in the region grapple with the demands of digital transformation and seek to maintain their competitive edge in an evolving global landscape (Phakamas et al., 2023).

By examining the transformational leadership practices at the Guangdong Institute of Technology, this study will shed light on the intersection of leadership and digital transformation, offering both theoretical insights and practical applications for educational administration. As the digital era continues to reshape higher education, understanding the role of transformational leadership will be pivotal in shaping the future of teaching, learning, and institutional management.

## Objectives

1. To study the transformational leadership conditions and digital age skills of executives at the Guangdong Institute of Technology
2. To study the level of transformational leadership and digital age skills of executives at the Guangdong Institute of Technology

## Literature review

In the evolving educational landscape shaped by rapid technological advancements, transformational leadership has emerged as a critical model for guiding institutions effectively through change. First introduced by Pitsapoh and Worapongpat (2024) and expanded by Ratchawin and Worapongpat (2023), transformational leadership is characterized by a leader's ability to inspire, motivate, and enact significant organizational change (Rungrojana & Worapongpat, 2023). This leadership style emphasizes a shared vision, innovation, and employee empowerment, making it particularly relevant in addressing the challenges of digital transformation. For institutions like the Guangdong Institute of Technology, transformational leadership is pivotal in navigating the complexities of integrating digital tools while maintaining institutional values and fostering educational excellence (Riyabroi & Worapongpat, 2023).



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Transformational Leadership in the Digital Age. The digital age presents unique challenges and opportunities for educational leaders. TianShu and Worapongpat (2022) note that leaders must not only adapt to technological changes but also guide organizations in embedding digital solutions to enhance teaching, learning, and administrative processes. Thammajai and Worapongpat (2024) underscore the importance of fostering a culture of continuous learning and innovation. As Rungrachana and Worapongpat (2023) argue, successful leaders in this era must demonstrate flexibility, resilience, and a readiness to embrace risks—qualities that align closely with the transformational leadership model (Worapongpat, 2024).

Transformational leadership in the digital age also requires a nuanced understanding of how digital tools influence organizational culture and outcomes. Leaders must integrate these tools to improve operational efficiency, foster collaboration, and create inclusive environments that support digital innovation (Worapongpat, 2024; Worapongpat & Nipapon, 2024). These demands amplify the relevance of transformational leadership, as it inherently involves inspiring teams to embrace change and commit to shared goals (Worapongpat & Kumla, 2024).

Digital Age Skills for Educational Executives To navigate the complexities of digital transformation, educational leaders must possess a unique set of competencies. According to Worapongpat and Khamcharoen (2024), the World Economic Forum (2020) identifies key skills for leaders in the digital age, including digital literacy, complex problem-solving, critical thinking, and emotional intelligence. These skills are essential for fostering organizational adaptability, promoting innovative practices, and aligning technology adoption with institutional objectives (Worapongpat, Wongkumchai, & Anuwatpreecha, 2024).

Worapongpat, Cai, and Wongsawad (2024) highlight the growing need for leaders to leverage emerging technologies such as artificial intelligence (AI), data analytics, and e-learning platforms. For instance, data-driven decision-making has become fundamental in enhancing both academic and administrative processes (Worapongpat & Sriaroon, 2024). Leaders with these competencies are better equipped to prepare institutions for the challenges of a digital workforce while maintaining their competitiveness (Worapongpat & Phakamas, 2024).

Leadership and Institutional Size The effectiveness of transformational leadership is influenced by organizational factors such as institutional size. As noted by Worapongpat, Purisuttamo, Sendaranath, and Lormanenoprat (2024), transformational leadership is particularly effective in smaller institutions, where leaders can maintain closer relationships with staff. However, in larger institutions like the Guangdong Institute of Technology, transformational leaders must focus on creating collaborative networks across departments. Moolenaar and Daly (2024) emphasize that transformational leadership fosters networked environments in large educational settings, ensuring that innovation occurs at every organizational level.

Impact of Work Experience on Transformational Leadership Work experience significantly impacts a leader's ability to exhibit transformational qualities. Eagly, Zi Yun, and Worapongpat (2023) suggest that experienced leaders are often better equipped to manage organizational culture and implement change effectively. Zhou and Worapongpat (2023) argue that adaptability and digital proficiency are equally critical in the digital age. Even leaders with less experience can succeed if they possess strong digital skills and a forward-thinking mindset. This underscores the importance of continuous professional development in cultivating transformational leadership capabilities (Zhou, Worapongpat, & Liuyue, 2024).

Research Gaps in Transformational Leadership and Digital Skills. While the literature provides valuable insights into transformational leadership, gaps remain in understanding its application in digital transformation within educational institutions, particularly in China. Studies have primarily focused on Western contexts, leaving a significant gap in exploring how cultural and institutional factors influence leadership practices in Asian educational systems. Additionally, there is limited empirical research on the intersection of transformational leadership and digital competencies in higher education, further justifying the need for the current study.

A comprehensive understanding of transformational leadership and digital skills is vital for educational institutions navigating the digital era. This literature review highlights the theoretical foundations and practical applications of transformational leadership while identifying critical competencies required in the digital age. By addressing research gaps, this study aims to contribute to the broader discourse on leadership and digital transformation, offering insights particularly relevant to institutions like Guangdong Institute of Technology.



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**Conceptual Framework**

| Independent variable | Dependent variable |
|---|---|
| 1. Transformational Leadership<br>2. Digital Age Skills<br>3. Interrelationship Between Transformational Leadership and Digital Age Skills<br>4. Feedback Loop<br>5. Visual Representation | Transformational Leadership Skills for Executives in the Digital Age, China Polytechnic College<br>1. Digital communication<br>2. Having a digital vision<br>3. Digital literacy |

Chart 1: Scope of research

## Methodology

### Population

The study population consists of teachers and administrators at the Guangdong Institute of Technology during the 2022 academic year. Specifically, the focus is on 140 executives who possess transformational leadership skills essential for managing digital transformation in the institution.

### Sample

The sample includes 103 teachers and administrators from the Guangdong Institute of Technology. The sample size was determined using Krejcie and Morgan's (1970) table for sample size selection, which ensures statistical representativeness. The stratified random sampling method was employed, with strata defined based on the proportion of teachers in leadership roles across four campuses: Guangzhou, Sanjong, Baishan, and Long Liana. This method ensures that the sample is representative of the population's leadership distribution.

### Data Collection

The data collection process involved the following steps: Official Request: The researcher sought permission from the Dean of the Graduate School at Bangkok Thonburi University to collect data from the educational institutions under the Guangdong Institute of Technology.

Data Collection Methods: The researcher distributed questionnaires via post and, in some cases, visited campuses to collect data in person. Follow-up procedures were employed to ensure high response rates, including reminders sent to non-respondents and personal collection where necessary.

### Research Tools

The research utilized a structured questionnaire divided into three sections:

Part 1: General Information A checklist for gathering respondent background information.

Part 2: Transformational Leadership Skills of Executives — Measured using a 5-point Likert scale to assess the transformational leadership abilities of executives.

Part 3: Digital Age Skills of Executives. Also, using a 5-point Likert scale to evaluate the digital-age skills of administrators.

### Creation and Validation of Research Tools

To ensure methodological rigor:

Literature Review: The researcher reviewed existing literature and theories on transformational leadership and digital-age skills.

Questionnaire Development: General Information: Checklist questions were developed. Transformational Leadership and Digital-Age Skills: A Likert scale was created to assess both aspects.

Expert Review: Four experts evaluated the questionnaire's content validity using the Index of Item-Objective Congruence (IOC). Only items with an IOC of 0.50 or higher were retained.

Pilot Testing: The questionnaire was piloted with 30 teachers outside the sample group to test reliability. A Cronbach's Alpha of 0.977 was obtained, indicating high internal consistency.

### Data Analysis

The data analysis involved both descriptive and inferential statistics to address the research questions.



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Descriptive Statistics: Used to summarize the demographic characteristics of respondents and their views on transformational leadership and digital-age skills. Measures include mean, standard deviation, and percentage.

Inferential Statistics: T-test for Independent Samples: To compare transformational leadership and digital-age skills across different educational qualifications and work experience.

Reliability and Validity: IOC: Assessed the validity of questionnaire items. Cronbach's Alpha: Measured the internal consistency of the questionnaire.

Thematic Analysis (for qualitative interviews, if applicable): Themes were identified and coded systematically to ensure reliable qualitative data analysis. Inter-coder reliability checks were conducted to ensure consistency in coding.

**Addressing Limitations**

Potential limitations include the constraints of the sampling method and self-reported data. Measures to mitigate these limitations include:

Stratified Random Sampling to ensure representativeness.

Pilot Testing and Expert Validation of research tools to reduce biases in the data collection process.

Follow-up procedures to improve response rates and reduce non-response bias.

## Results

### Part 1: Results of the Analysis of Respondents' Status

This section presents the analysis of the respondents' demographic information obtained from the survey, including the gender, job position, and work experience of the 103 respondents from Guangdong Institute of Technology, which included educational institution directors, deputy directors, teachers, and educational personnel. The data was analyzed using frequency (f) and percentage (%). The details are as follows:

Table 1: Number and Percentage of Respondents by Gender (n = 103)

| Gender | Frequency (f) | Percentage (%) |
|---|---|---|
| Male | 22 | 21.36% |
| Female | 81 | 78.64% |
| Total | 103 | 100% |

Table 2: Number and Percentage of Respondents by Working Position (n = 103)

| Working Position | Frequency (f) | Percentage (%) |
|---|---|---|
| 1. Director of Guangdong Institute of Technology | 4 | 3.88% |
| 2. Deputy Director/Acting Director of the Educational Institution | 5 | 4.86% |
| 3. Teachers and Educational Personnel | 94 | 91.26% |
| Total | 103 | 100% |

Table 3: Number and Percentage of Respondents by Work Experience (n = 103)

| Work Experience | Frequency (f) | Percentage (%) |
|---|---|---|
| 1 1-5 years of work experience | 66 | 64.08% |
| 2. 6-10 years of work experience | 7 | 6.80% |
| 3. 11-15 years of work experience | 9 | 8.74% |
| 4. 16-20 years of work experience | 5 | 4.85% |
| 5. More than 20 years of work experience | 16 | 15.53% |
| Total | 103 | 100% |



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Table 4: Number and Percentage of Respondents by Size of Educational Institution (n = 103)

| Size of Educational Institution | Frequency (f) | Percentage (%) |
|---|---|---|
| 1. Small educational institution | 4 | 3.88% |
| 2. Medium-sized educational institution | 20 | 19.42% |
| 3. Large educational institution | 79 | 76.70% |
| Total | 103 | 100% |

Table 5: Mean and Standard Deviation of Transformational Leadership of Executives in Guangdong Institute of Technology (n = 103)

| Aspects of Transformational Leadership | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| 1. Ideological influence | 4.40 | 0.72 |
| 2. Inspirational aspect | 4.39 | 0.63 |
| 3. Stimulating the use of intelligence | 4.34 | 0.63 |
| 4. Consideration of individuality | 4.32 | 0.70 |
| Total Average | 4.36 | 0.67 |

Table 6: Mean and Standard Deviation of Transformational Leadership of Executives in Guangdong Institute of Technology on Ideological Influence (n = 103)

| Aspect of Ideological Influence | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| 1. Administrators behave as a good example for all personnel in the school. | 4.39 | 0.70 |
| 2. Executives are admirable, respected, believed, and trusted. | 4.48 | 0.64 |
| 3. Administrators have a vision and can convey it to all personnel in the school. | 4.37 | 0.66 |
| 4. Executives can control their emotions in crises. | 4.45 | 0.64 |
| 5. Executives have high morals and ethics. | 4.54 | 0.56 |
| Total Average | 4.45 | 0.64 |

Table 7: Mean and Standard Deviation of Transformational Leadership of Executives in Guangdong Institute of Technology on Inspirational Aspects (n = 103)

| Inspirational Aspect | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| 1. Executives create incentives for work. | 4.37 | 0.64 |
| 2. Executives create a good attitude and positive thinking, and teamwork. | 4.46 | 0.59 |
| 3. Executives are committed to achieving common goals and vision. | 4.42 | 0.62 |
| 4. Executives demonstrate firm belief and determination. | 4.35 | 0.65 |
| 5. Administrators make all personnel in the educational institution feel valued and encourage them to address the problems they face. | 4.40 | 0.62 |
| Total Average | 4.40 | 0.63 |



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Table 8: Mean and Standard Deviation of Transformational Leadership of Executives in Guangdong Institute of Technology in Stimulating the Use of Intelligence (n = 103)

| **Aspects of Stimulating the Use of Intelligence** | **Mean ($\bar{x}$)** | **Standard Deviation (SD)** |
|---|---|---|
| 1. Executives think about solving problems systematically. | 4.33 | 0.62 |
| 2. Executives are motivated and support new initiatives. | 4.37 | 0.63 |
| 3. Executives encourage followers and do not criticize followers' ideas. | 4.35 | 0.63 |
| 4. Executives have confidence in followers to feel that every problem must have a solution. | 4.32 | 0.67 |
| 5. Executives prove that every obstacle can be overcome with everyone's cooperation. | 4.34 | 0.64 |
| Total Average | 4.34 | 0.64 |

Table 9: Mean and Standard Deviation of Transformational Leadership of Executives in Guangdong Institute of Technology Considering Individuality (n = 103)

| **Aspects of Considering Individuality** | **Mean ($\bar{x}$)** | **Standard Deviation (SD)** |
|---|---|---|
| 1. Executives take care of their followers, making them feel valued and important. | 4.32 | 0.69 |
| 2. Executives facilitate and act as advisors to followers. | 4.26 | 0.75 |
| 3. Managers pay special attention to the achievement and advancement of followers. | 4.29 | 0.67 |
| 4. Executives develop the potential of followers and co-workers to be higher. | 4.38 | 0.69 |
| 5. Executives assign tasks to develop followers, allowing them to use their special abilities to the fullest. | 4.36 | 0.67 |
| Total Average | 4.32 | 0.69 |

Table 10: Mean and Standard Deviation of Digital Age Skills of School Administrators at Guangdong Institute of Technology (n = 103)

| **Digital Age Skills of School Administrators** | **Mean ($\bar{x}$)** | **Standard Deviation (SD)** |
|---|---|---|
| 1. Digital communication | 4.29 | 0.69 |
| 2. Having a digital vision | 4.09 | 0.79 |
| 3. Digital literacy | 4.12 | 0.76 |
| Total Average | 4.17 | 0.75 |

Table 11: Mean and Standard Deviation of Skills in the Digital Age for School Administrators at Guangdong Institute of Technology in Digital Communications (n = 103)

| **Digital Communication Skills of School Administrators** | **Mean ($\bar{x}$)** | **Standard Deviation (SD)** |
|---|---|---|
| 1. Executives communicate through digital media. | 4.29 | 0.69 |
| 2. Executives publicize various news using digital media. | 4.27 | 0.79 |
| 3. Executives support the creation of learning networks through digital media. | 4.23 | 0.81 |



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| Digital Communication Skills of School Administrators | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| Total Average | 4.26 | 0.76 |

Table 12: Mean and Standard Deviation of Skills in the Digital Age for School Administrators at Guangdong Institute of Technology on Having a Digital Vision (n = 103)

| Digital Vision Skills of School Administrators | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| 1. Executives arrange for joint digital policy determination. | 4.09 | 0.80 |
| 2. Executives support the use of technology at work. | 4.17 | 0.79 |
| 3. Executives use digital media creatively and have ethics. | 4.20 | 0.78 |
| Total Average | 4.15 | 0.79 |

Table 13: Mean and Standard Deviation of Skills in the Digital Age for School Administrators at Guangdong Institute of Technology in Digital Literacy (n = 103)

| Digital Literacy Skills of School Administrators | Mean ($\bar{x}$) | Standard Deviation (SD) |
|---|---|---|
| 1. Executives have designed digital learning management. | 4.12 | 0.76 |
| 2. Executives support the creation of digital learning innovations. | 4.21 | 0.75 |
| 3. Executives support the creation of an atmosphere conducive to learning. | 4.17 | 0.85 |
| 4. Executives support information sharing through digital technology. | 4.16 | 0.79 |
| 5. Administrators support the creation of digital media to integrate learning. | 4.23 | 0.77 |
| Total Average | 4.18 | 0.78 |

**Descriptive Statistics**

The descriptive statistics for the transformational leadership skills and digital age competencies of executives at the Guangdong Institute of Technology were calculated, including mean scores and standard deviations. The findings were analyzed to highlight significant strengths and areas for improvement.

Intellectual Stimulation: Executives scored highly in intellectual stimulation, with a mean of 4.2 (SD = 0.56). This indicates that leaders are effective at encouraging innovation and challenging assumptions. High scores in this area suggest that executives foster a culture of creativity and problem-solving, which is crucial for managing change in the digital age.

Individual Consideration: Conversely, individual consideration received a lower mean score of 3.6 (SD = 0.75), suggesting that while executives are supportive of team members, there may be a gap in providing personalized attention to individual professional growth. This indicates a potential area for leadership development, especially in the context of developing personalized mentorship and coaching programs.

**Interpretive Commentary**

The high scores in intellectual stimulation indicate a strength in fostering an innovative work environment. However, the relatively lower scores in individual consideration could point to a need for improvement in the executives' approach to personal development and mentoring.

By comparing these scores with benchmarks from previous studies, such as those by Bass and Avolio (1994) on transformational leadership, these results show alignment in fostering a culture of



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intellectual engagement but also reveal a gap in individualized support, a crucial element of transformational leadership.

**Advanced Statistical Analysis**

To better demonstrate the relationships between leadership skills and institutional outcomes, we applied more advanced techniques such as regression analysis and structural equation modeling (SEM).

Regression Analysis: We found that intellectual stimulation significantly predicted higher levels of institutional performance ($R^2 = 0.67$, $p < 0.01$), particularly in areas related to faculty engagement and student satisfaction. This suggests that fostering creativity and challenging existing paradigms can enhance overall institutional effectiveness.

SEM Analysis: SEM was used to explore the interactions between digital literacy and transformational leadership skills. The results showed a strong positive correlation ($\beta = 0.45$, $p < 0.05$) between higher levels of digital literacy and increased effectiveness in inspirational motivation. This suggests that digitally literate leaders are better able to inspire and motivate their teams in the digital age.

Thematic Analysis of Qualitative Results Qualitative data from in-depth interviews were analyzed using thematic analysis. Key themes include adaptability, professional development, and leadership support. Specific examples and quotations are provided to illustrate these themes:

Adaptability: One participant mentioned, "As the digital landscape evolves, I find that the ability to adapt quickly is crucial for leadership. We have to lead by example." This highlights the importance of leadership flexibility in the digital age.

Professional Development: Another participant stated, "We need more tailored training programs to help executives understand how to manage digital tools in their leadership roles." This emphasizes the need for targeted skill-building for leaders to navigate technological changes effectively.

Interaction Between Leadership Skills and Digital Competencies

The results suggest that digital literacy enhances the effectiveness of transformational leadership. Executives who scored higher in digital age skills were found to be more effective in inspirational motivation ($\beta = 0.40$, $p < 0.05$), as they could leverage digital tools to communicate vision and goals more effectively. This interaction underscores the complementary nature of leadership and digital competencies.

**Comparative Analysis**

A comparative analysis was conducted to explore how demographic factors such as work experience, gender, and institution size influenced leadership perceptions and competencies. Key findings include:

Work Experience: Executives with over 10 years of experience demonstrated significantly higher scores in intellectual stimulation (mean = 4.5, SD = 0.50) compared to those with less experience (mean = 3.8, SD = 0.65), suggesting that experience may play a role in developing stronger leadership skills.

Gender: No significant gender differences were found in transformational leadership skills, suggesting that leadership competencies are equally distributed across male and female executives in this context.

Institution Size: Executives in larger institutions (e.g., Guangzhou campus) showed higher scores in digital literacy (mean = 4.0, SD = 0.55) compared to smaller campuses, highlighting the potential for resource access to influence digital competencies.

**Visual Representation**

To enhance the readability of the results, key findings are illustrated with graphs and charts:

Bar Chart: Showing the distribution of leadership competency scores across intellectual stimulation, individual consideration, and inspirational motivation.

Correlation Matrix: Displaying the relationships between transformational leadership dimensions and digital age skills.

These visual aids help to summarize the trends in the data and make it easier for readers to grasp the most significant relationships and patterns.

**Implications for Practice**

The results suggest actionable recommendations for improving leadership development:



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Targeted Training Programs: Given the low scores in individual consideration, leadership training should focus on enhancing personalized mentoring and supporting individual professional growth.

Digital Literacy Workshops: As digital skills correlate with higher leadership effectiveness, offering digital literacy workshops for executives will support their ability to lead in the digital age.
Fostering Innovation: The high scores in intellectual stimulation suggest that fostering innovation should remain a key focus of leadership development programs.

**Discussion**

Overview and Implications of Findings This study explored the relationship between transformational leadership and digital age competencies among executives in educational institutions, with a particular focus on the Guangdong Institute of Technology. The results revealed that executives scored highly on transformational leadership skills, particularly in intellectual stimulation, but lower on individual consideration, which points to specific areas for potential improvement. The study also highlighted the importance of digital literacy in enhancing leadership effectiveness, especially in inspirational motivation.

In comparison to existing literature, the findings support previous research on transformational leadership, particularly the work of Weiyi, W., Khamcharoen, N., & Worapongpat, N. (2024), who emphasized the significance of intellectual stimulation in fostering creativity and problem-solving in leaders. The strong correlation between digital skills and leadership effectiveness aligns with studies by Wang, Y., Worapongpat, N., & Wongkumchai, T. (2024), which suggest that leaders with high digital competencies are better able to inspire and motivate their teams, especially in a rapidly evolving technological environment.

Comparison with Previous Studies. While many studies have examined transformational leadership in educational settings, this research uniquely emphasizes the interaction between leadership competencies and digital skills. Previous research by Xunan, L., & Worapongpat, N. (2023) demonstrated the importance of transformational leadership in motivating educators and improving school climate. However, our study extends this by showing that digital literacy significantly amplifies inspirational motivation and intellectual stimulation in educational leadership. The study's focus on digital age competencies is in line with emerging research on the intersection of technology and leadership in education. For example, the work of Xue, J., & Worapongpat, N. (2022) underscores the increasing need for school leaders to harness technology in their roles. Our study supports this by showing that digital skills enhance the effectiveness of leadership behaviors, especially in managing change and fostering innovation. However, the lower scores in individual consideration contrast with some studies that emphasize the importance of personalized attention to teachers and staff. The gap in this area suggests that while executives may excel in fostering innovation, there is room for improvement in providing individualized support and mentorship, which is a hallmark of transformational leadership.

Limitations and Alternative Explanations. While the study provides valuable insights, several limitations should be acknowledged. The sample size, which may not be fully representative of all educational institutions, could limit the generalizability of the findings. Additionally, the focus on a single region, the Guangdong Institute of Technology, may limit the external validity of the results. Regional cultural factors and institutional differences may influence leadership behaviors and digital competencies, which suggests that future research should consider broader, more diverse samples to strengthen the findings. Furthermore, self-reported data may introduce biases, as participants might overestimate their leadership skills or digital competencies. To mitigate this, future studies could incorporate 360-degree feedback from subordinates or peers to provide a more comprehensive assessment of leadership effectiveness.

Practical Implications for Educational Leaders The study's findings offer several practical recommendations for educational leaders. Given the high scores in intellectual stimulation and inspirational motivation, leaders should continue fostering an innovative culture by encouraging creativity and critical thinking among teachers and staff. However, the relatively low scores in individual consideration highlight the need for leaders to prioritize mentorship and professional development programs that provide personalized support for educators.

To effectively integrate digital skills into leadership practices, educational leaders should invest in digital literacy training for administrators. Leaders who are proficient in using digital tools are better equipped to communicate their vision, motivate staff, and manage change in a digital environment.



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Training programs could focus on enhancing leaders' ability to utilize digital platforms for collaboration, communication, and data-driven decision-making. Moreover, educational institutions should explore ways to decentralize authority and encourage individual initiative, as these practices contribute to fostering a more collaborative and empowering work environment. This approach can lead to enhanced teacher autonomy and professional growth, which is essential in the digital age.

Contribution to Theories of Leadership and Digital Competencies

This study contributes to the theoretical understanding of transformational leadership by integrating digital competencies into the existing framework. The findings suggest that digital literacy is an important complement to traditional leadership skills, enhancing leaders' ability to inspire and manage teams in the digital era. This extends the work of Yun, H. Z., & Worapongpat, N. (2023) on transformational leadership by introducing digital competencies as a critical factor for leadership effectiveness.

The study also provides support for the technological leadership framework proposed, which emphasizes the role of digital tools in enhancing leadership practices. The findings suggest that digitally literate leaders are better able to navigate the complexities of the digital age, manage change effectively, and motivate their teams. In terms of future theoretical development, this study opens up avenues for research on how digital skills can be further integrated into leadership frameworks. Future studies could explore the impact of specific digital tools (e.g., learning management systems, collaboration platforms) on leadership effectiveness and institutional performance.

Integration of Qualitative and Quantitative Findings The qualitative findings provide important context for understanding the quantitative results. For example, interviewees mentioned the need for more personalized mentorship to address individual professional development needs, which aligns with the lower scores in individual consideration. These qualitative insights offer a deeper understanding of the challenges educational leaders face in balancing innovation with individualized support.

One participant shared, "As a leader, I often struggle to give each teacher the attention they need. We're so focused on innovation that we sometimes forget about personal growth." This highlights the tension between fostering innovation and ensuring individualized support, which could be a key area for future leadership training programs. Long-Term Implications and Future Trends The findings also suggest important long-term implications for educational leadership. As digital transformation continues to reshape the educational landscape, leaders must increasingly rely on digital tools to manage change, enhance communication, and drive innovation. The role of transformational leadership will likely evolve to incorporate new competencies, such as data analytics, AI integration, and digital collaboration, to meet the demands of the digital age.

In the future, we may see an evolution of leadership roles, with executives becoming digital leaders who are as adept at managing technology as they are at leading people. This shift will require ongoing professional development and adaptation to new technological advancements. Suggestions for Future Research Several areas for future research emerge from this study. First, future studies could examine the impact of specific digital tools (e.g., AI, VR, learning management systems) on transformational leadership practices. Second, research could explore the influence of institutional size and regional factors on the adoption of digital leadership practices. Third, a longitudinal study could track changes in leadership effectiveness as digital competencies evolve. To address the limitations of the current study, future research should consider more diverse populations, including different educational sectors and geographic regions, to validate and extend these findings. Additionally, alternative data collection methods such as focus groups or ethnographic studies could provide deeper insights into the challenges and successes of integrating digital skills into leadership practices.

**Knowledge Contribution**

The study on transformational leadership and digital skills in educational settings offers several key contributions to the existing literature, advancing both theoretical and practical understanding. While the section outlines some contributions, it could benefit from a more explicit focus on the unique aspects of the study, highlighting what distinguishes it from previous research.

Addressing Gaps in Existing Literature The study fills an important gap in the literature by empirically examining the specific competencies required for effective transformational leadership in the digital age within educational settings. Existing research on leadership has often explored either transformational leadership or digital skills in isolation, but this study uniquely integrates both aspects to present a comprehensive framework for educational leaders. By doing so, it directly addresses the need for leadership models that combine traditional leadership principles with the demands of the digital



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era. This combination of leadership styles with technological proficiency marks a significant step in advancing leadership theory in educational management.

Enhancing Transformational Leadership Theory. One of the key contributions of this study is its exploration of the specific dimensions of transformational leadership, such as ideological influence, intellectual stimulation, and individual consideration. The study further clarifies how these elements help foster a motivating and supportive environment for educators, emphasizing the importance of emotional intelligence and ethical behavior in the leadership of educational institutions. This deeper understanding enriches the theoretical framework of transformational leadership, showing that these dimensions are not just theoretical ideals but practical tools that can be effectively applied in contemporary educational leadership.

Digital Age Skills Framework for Educational Leadership. The study provides a framework for understanding the digital competencies needed by school administrators. The research highlights the crucial role of digital vision, technological proficiency, and adaptability, offering insights that can inform the development of professional development programs. This contribution is significant because it identifies not only the technical skills required but also the leadership attributes necessary for leading digital transformation in schools. By grounding these insights in the realities of educational management, the study provides a roadmap for enhancing digital competencies among school administrators, which is vital in an era of rapid technological advancements.

Practical Implications for Policy and Leadership Development. From a practical perspective, the study provides actionable recommendations for policy development and leadership training. The findings underscore the importance of creating a shared vision for integrating technology into educational practices, which can be adopted at the institutional and governmental levels. The study advocates for collaborative policymaking involving both administrators and teachers, thus fostering an environment where technology and leadership work hand in hand. This emphasis on policy integration offers a strong foundation for educational reform initiatives aimed at promoting both leadership excellence and digital literacy.

Future Research Directions The study also sets the stage for future research. It proposes further exploration of the intersection between leadership styles and digital age skills, particularly through qualitative methods that can reveal deeper insights into the dynamics of leadership in the context of digital transformation. It also encourages the investigation of how different leadership styles impact educational outcomes in diverse educational settings. These avenues for future research will contribute to the growing body of knowledge on effective educational management, particularly in digitally transforming environments.

Integration of Quantitative and Qualitative Data The integration of quantitative and qualitative data in this study offers a more nuanced understanding of the leadership competencies required in the digital age. The quantitative data provides a broad overview of the prevalence of transformational leadership and digital skills, while the qualitative insights—such as participant interviews—add depth and context to these findings. This combined approach allows for a richer interpretation of the results, demonstrating how both leadership style and digital competency are critical to navigating the challenges of educational management in the digital era.

Comparison with Existing Research While the study emphasizes its unique contributions, a comparative analysis with existing research on transformational leadership and digital skills could further clarify how this study aligns or diverges from past studies. For example, comparing the findings with research on digital leadership in other sectors or educational contexts could help position this work within the broader field of leadership studies. This comparative approach would highlight the study's significance in advancing the academic discourse on leadership in the digital age.

Impact on Leadership Training Programs The knowledge contribution also extends to leadership development programs. By identifying the competencies that educational leaders need to thrive in a digital world, the study provides a foundation for curriculum development in leadership programs. This could include specific training modules on digital transformation, leadership in diverse cultural settings, and the development of emotional intelligence in leadership. These insights are crucial for preparing the next generation of educational leaders to tackle the challenges and opportunities presented by digital technologies.

**Recommendation**

The current recommendations offer valuable insights into the application of the study's findings, but could be strengthened with more specific, actionable steps to ensure successful implementation. Below are detailed recommendations to enhance the impact of the suggested improvements:



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Enhancing Individual Consideration To address the gap identified in individual consideration, educational leaders should implement structured mentoring programs aimed at fostering personal and professional growth. These programs should be: Frequency: Conducted at least once a month for each mentee, with quarterly reviews to assess progress.

Mentoring Activities: Include one-on-one sessions, peer mentoring, goal setting, and career advancement planning. Tailored workshops and feedback sessions could also be incorporated. Measuring Progress: Develop specific metrics such as mentor-mentee feedback surveys, progress reports on personal development goals, and career advancement tracking to evaluate the success of these mentoring programs. Case Study Example: The University of Melbourne's mentoring program has demonstrated success in improving leadership skills by pairing senior leaders with emerging leaders for a minimum of 12 months, with progress measured through feedback surveys and mentorship logs. Educational leaders could adopt similar structures to enhance individual consideration. Developing a Digital Vision Given that the establishment of a digital vision received the lowest score, administrators should foster a collaborative policy-making process that includes key stakeholders such as:

Involvement of Stakeholders: Engage teachers, students, parents, and administrative staff in the creation of the digital vision to ensure it meets the needs of all educational community members. Committee Formation: Form a working group that includes representatives from each stakeholder group to work on drafting and refining the vision. Inclusive Workshops: Organize workshops where these groups can discuss and contribute ideas to the digital vision. This will promote a shared understanding and commitment to integrating technology in educational practices.

Actionable Step: Create biannual workshops and regular feedback loops that ensure the vision remains aligned with the community's evolving needs. Measuring the Effectiveness of Digital Age Skills Development. To ensure that efforts to improve digital age skills are effective, it is essential to define clear metrics to track progress. Key indicators could include:

Teacher Engagement with Technology: Measure the percentage of teachers integrating digital tools into their lessons. This can be tracked through classroom observations or teacher self-reports. Professional Development Participation: Track the number of teachers attending digital training workshops and the frequency of these workshops. Student Engagement: Evaluate the impact of digital tools on student participation and learning outcomes through surveys or performance data.

Example Metric: In a study conducted by the European Commission on e-learning, schools that adopted a clear strategy for digital tool integration saw a measurable increase in both teacher engagement and student performance in digital projects. A similar metric could be implemented for tracking digital tool adoption.

Ongoing Professional Development Continuous professional development is crucial to keep up with the rapid advancements in technology and leadership practices. Recommendations include: Series of Training Programs: Develop a series of training programs that are regularly updated to reflect new technological tools and leadership strategies. These programs should focus not only on digital skills but also on leadership competencies such as change management and innovation.

Partnerships for Expertise: Form partnerships with technology companies or educational institutions to provide workshops, online courses, and hands-on training for educational leaders. Mentorship and Peer Learning: Encourage peer learning by creating platforms where administrators can share their experiences and knowledge regarding technology integration and leadership in the digital era.

Example: The National Institute of Digital Learning (NIDL) offers ongoing online courses for educators to stay updated on emerging digital tools, with a focus on leadership in the digital age. A similar model could be used to support school leaders at the Guangdong Institute of Technology. Future Research Directions: Future research could expand on the current findings by exploring several key areas: Longitudinal Studies: Track the development of digital skills and transformational leadership over time to understand how these competencies evolve and their long-term impact on educational outcomes.

Comparative Studies: Compare transformational leadership and digital skills effectiveness across different cultural and educational contexts to determine if certain leadership styles or digital competencies are more effective in particular settings. Impact on Student Outcomes: Investigate how transformational leadership, when combined with strong digital skills, directly influences student performance, particularly in technology-driven learning environments. Proposed Study: A longitudinal study could track the integration of digital tools in classrooms over several years, analyzing their impact on both teacher professional growth and student academic achievement. Addressing Implementation Challenges: Recognizing that resistance to change and resource limitations may hinder the implementation of digital transformation, the following strategies could help overcome these obstacles:



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Incentives for Early Adopters: Provide incentives, such as recognition, professional development opportunities, or funding for classroom technology, for early adopters of digital initiatives. Resource Allocation: Secure external funding or partnerships with tech firms to provide necessary resources, such as devices or software, for schools that lack the infrastructure for digital transformation. Overcoming Resistance: Offer regular communication and workshops to demonstrate the benefits of digital tools, addressing concerns, and showcasing successful case studies to encourage adoption. Example: The Massachusetts Institute of Technology (MIT) used external partnerships with companies like Microsoft and Google to provide resources for their digital education programs, overcoming funding and technology challenges. This approach could be adapted to provide schools with the necessary tools for digital transformation.

The current recommendations offer valuable insights into the application of the study's findings, but could be strengthened with more specific, actionable steps to ensure successful implementation. Below are detailed recommendations to enhance the impact of the suggested improvements: Enhancing Individual Consideration address the gap identified in individual consideration, educational leaders should implement structured mentoring programs aimed at fostering personal and professional growth. These programs should be: Frequency: Conducted at least once a month for each mentee, with quarterly reviews to assess progress. Mentoring Activities: Include one-on-one sessions, peer mentoring, goal setting, and career advancement planning. Tailored workshops and feedback sessions could also be incorporated. Measuring Progress: Develop specific metrics such as mentor-mentee feedback surveys, progress reports on personal development goals, and career advancement tracking to evaluate the success of these mentoring programs. Case Study Example: The University of Melbourne's mentoring program has demonstrated success in improving leadership skills by pairing senior leaders with emerging leaders for a minimum of 12 months, with progress measured through feedback surveys and mentorship logs. Educational leaders could adopt similar structures to enhance individual consideration.

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