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A Scale Development of Digital Leadership Attributes among Public School Administrators in the Elementary Schools: The Province of Cotabato in Focus

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ABSTRACT

This study examined the digital leadership attributes of school administrators in the Province of Cotabato, focusing on identifying core competencies and support systems necessary for effective technology integration in elementary education. A quantitative method was utilized—Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). A total of nine latent dimensions were extracted through EFA, explaining 78.01% of the total variance. These include Leadership and Advocacy for Digital Integration, Digital Governance and Ethical Leadership, Strategic Integration, Professional Development, Differentiation and Inclusive Learning, Equity and Security, and Personalized Learning. However, CFA revealed poor model fit for the six-factor structure (CFI = .594, RMSEA = .140) and only moderate fit for a four-factor model (CFI = .815, RMSEA = .130), indicating the need for further model refinement. The study recommends the institutionalization of digital leadership training, improved digital infrastructure, and policy integration to enhance administrators' capacities in leading 21st-century schools.

INTRODUCTION

As educational institutions strive to enhance learning outcomes and adapt to evolving demands, leaders must cultivate an environment that embraces digital tools and practices. Digital leadership encompasses the ability to effectively implement and manage technology to improve teaching and learning, while digital competence refers to the skills and knowledge required to utilize these technologies effectively. Understanding the interface between these two constructs is imperative for improving an educational culture that is both innovative and responsive to the needs of students and educators alike.

Recent studies have shown the significance of digital leadership in shaping school environments that prioritize technology integration. Administrators who exhibit strong digital leadership qualities not only promote the adoption of technology but also empower teachers and staff to enhance their digital skills (Sheninger, 2019). A study by Bastidas et al. (2023) explored the essential qualities of digital leadership in schools. They identified that effective digital leaders not only possess technological proficiency but also demonstrate vision, collaboration, and resilience.

Additionally, many studies tend to focus on specific demographics, such as teachers or technology coordinators, neglecting a diverse range of school administrators across various contexts, such as urban, rural, and under-resourced schools. The experiences of administrators in different environments may significantly differ due to varying levels of access to technology, professional development opportunities (Wu, 2024), and institutional support. By not adequately representing this diversity, existing research may fail to capture the complexities of digital leadership and competence as experienced by all school administrators (Shaheen, 2018). Expanding the population to include a wider variety of educational settings and leadership roles could yield more comprehensive insights into the challenges and strategies relevant to digital leadership in education today (Heintz et al., 2017).

Addressing the digital divide remains a significant concern in many educational contexts. Administrators play a key role in ensuring equitable access to technology and resources for both teachers and students. Researching their perspectives on digital leadership and competence can provide insights into how they can effectively advocate for and implement equitable practices. The development of a scale for school administrators of the Province of Cotabato will serve as an important tool in enhancing their digital leadership.

Statement of the Problem

1. What are the dimensions of digital leadership attributes among the elementary public school administrators in the Province of Cotabato?
2. What scale on digital leadership attributes among the elementary public school administrators in the Province of Cotabato can be developed?

METHODOLOGY

Research Design

This study applied quantitative method particularly the cross-sectional survey research design. Quantitative research is a methodology which utilized statistical tools in the interpretation of the data. Data can be gathered from a large number of school administrators in a relatively short time, providing a comprehensive view of digital leadership practices at a specific moment (Backer et al., 2021). In addition, the researcher used a survey questionnaire in the gathering of the data. The respondents were given enough time to respond to each statement. Various statistical tools were utilized to come up with a model on digital leadership that fits to the context of the school administrators in the Province of Cotabato.

Respondents of the Study

For this study, there were 311 elementary public school administrators as respondents from the Province of Cotabato composed of SDO of Cotabato and SDO of Kidapawan City who answered the survey questionnaire.

Research Instrument

The questionnaire was made up of statements taken from the previous studies which tackled about the school administrators' digital leadership. Using the Likert Scale (5 Strongly Agree to 1 Strongly Disagree) may provide an overview of their agreement or disagreement on the statements.

Data Analysis

To determine the factorability of the domains of digital leadership, the Exploratory Factor Analysis was used (Steiner & Grieder, 2020). And to ensure that adequacy of the measures used, the researcher used the KMO-Bartlett's Test. Moreover, Confirmatory Factor Analysis was used to confirm or validate a pre-specified factor structure based on theoretical foundations (Von Eye et al., 2021).

RESULTS AND DISCUSSIONS

Dimensions of Digital Leadership Attributes among Public School Administrators in the Elementary Schools in the Province of Cotabato

The factor analysis results reveal several distinct dimensions of digital leadership attributes among public school administrators in the elementary schools of Cotabato Province. The loadings of each item onto their respective components suggest a well-structured model encompassing a variety of digital leadership behaviors. Most factor loadings are above the 0.400 threshold, indicating strong correlations between the observed variables and their underlying constructs. The analysis extracted nine dimensions, reflecting a diverse and comprehensive framework for assessing digital leadership in the context of basic education.

The first factor, Leadership and Advocacy for Digital Integration in Education, includes high-loading items such as ADV3 (.719), ADV4 (.659), and ADV2 (.643). These values reflect school leaders' strong commitment to promoting digital literacy and integrating digital tools in instruction. This factor captures the proactive stance of administrators in encouraging innovation and digital transformation within their schools. The second factor, Digital Governance and Ethical Leadership in Education, is composed of governance-related items such as GOV3 (.748), GOV6 (.721), and GOV7 (.699). These strong loadings underscore the administrators' role in setting ethical standards, policy compliance, and responsible digital conduct. This factor emphasizes how administrators ensure digital tools are used with transparency, responsibility, and alignment with ethical and legal standards. The third factor, Digital Leadership and Strategic Integration in Education, includes DC5 (.798), DC9 (.691), and DC1 (.671). These high values reflect the administrators' effectiveness in using digital tools to manage operations and integrate them into strategic school planning. It suggests that administrators who perform well in this domain are visionaries in using digital technologies for long-term improvement. The fourth factor, Promoting a Digitally Engaged School Culture, highlights CULT1 (.531), ADV10 (.467), and DC12 (.447), representing how school leaders create a culture of innovation and shared digital practices among teachers and staff. This factor reflects a supportive school environment that encourages digital resource sharing and fosters professional collaboration. The fifth factor, Digital Literacy and Professional Development, includes items like CULT11 (.771), CULT12 (.755), and CULT10 (.733), pointing to the emphasis placed on teacher capacity building and digital skill improvement. These values indicate that administrators are highly active in facilitating training and ensuring equitable access to tools and resources for teachers. The sixth factor, Digital Differentiation and Inclusive Learning, includes DIF2 (.467), DIF8 (.453), and DIF5 (.527). These items emphasize the importance of using digital tools to cater to diverse learners, indicating that administrators are also champions of inclusivity and equity in learning environments through personalized learning strategies. The seventh factor, Digital Equity and Security in Education, shows strong values in DIF10 (.737), GOV8 (.729), and ADV17 (.685). These figures reflect the importance administrators place on access, security, and data-informed decision-making, suggesting that these leaders are aware of the digital divide and actively address cybersecurity and connectivity concerns. The eighth factor, Digital Integration and Professional Development, includes DC2 (.764), CULT2 (.502), and DC4 (.451). This factor captures the operational and instructional integration of digital tools, showing that administrators lead not only by example but by enabling others through training and modeling. Lastly, the ninth factor, Personalized Learning through Digital Integration, includes DIF7 (.533), CULT14 (.603), and CULT13 (.470). These moderate to high values suggest a focus on using digital tools to personalize learning, allowing teachers and students to co-create learning paths that match individual needs.

Item	Item Statement	Score	Constructs
ADV3	I encourage teachers to include digital competencies in their teaching practices.	.719	Leadership and Advocacy for Digital Integration in Education
ADV4	I actively promote the importance of digital literacy for students to succeed in the 21st-century workforce.	.659	
ADV8	I encourage teachers to adapt to innovative digital tools enhance learning outcomes.	.646	
DIF1	I encourage teachers to use digital tools to create personalized learning experiences for students.	.645	
ADV2	I encourage teachers to incorporate digital skills in their teaching practices.	.643	
ADV12	I advocate for creating a school environment where digital tools are viewed as essential for educational and operational success.	.632	
ADV7	I encourage teachers to explore innovative digital resources to improve teaching and learning.	.611	
ADV9	I advocate for the use of digital learning platforms that support personalized and differentiated instruction.	.605	
CULT15	I lead by example in embracing new digital tools and practices.	.597	
ADV1	I advocate for the integration of digital literacy as a core component of the school's curriculum.	.594	
DIF9	I support the use of technology to bridge gaps in access to educational resources, especially for disadvantaged or underserved students.	.581	
ADV11	I promote the idea that technology can enhance not only learning but also communication, collaboration, and administrative processes.	.577	
ADV14	I promote continuous professional development to help teachers improve their digital literacy.	.569	
DIF13	I encourage teachers to select digital tools that align with their teaching methods.	.564	
GOV14	I provide strong leadership in making decisions related to the adoption of digital technologies.	.549	
DIF2	I ensure that all digital governance policies are communicated clearly to staff, students, and parents.	.537	
GOV15	I ensure that students are educated on the ethical use of digital resources.	.531	
ADV6	I use digital tools to improve learning outcomes.	.523	
ADV16	I advocate for the alignment of digital tools with the school's mission and vision.	.522	
CULT8	I encourage the use of digital communication tools (e.g., email, messaging apps, social media) to improve collaboration among school stakeholders.	.483	
ADV5	I actively promote the use of digital tools and technologies in classroom instruction to enhance student engagement.	.447	
GOV4	I ensure that all digital initiatives align with ethical standards.	.453	
GOV9	I ensure transparency in the decision-making process related to the adoption of digital tools and technologies in the school.	.434	
GOV13	I collaborate with other school leaders to ensure that digital governance supports the school's vision for innovation	.474	
DC3	I use digital platforms to streamline administrative tasks (e.g., scheduling, data management, communication).	.406	

CULT7	I encourage teachers to share digital resources, best practices, and teaching strategies with each other.	.484	
CULT6	I ensure that teachers have the necessary resources and training to develop their digital competencies.	.482	
CULT5	I support ongoing professional development in digital skills for teachers and staff.	.449	
DIF11	I ensure that professional development related to digital tools is customized for different subject areas	.400	
DIF5	I encourage teachers to use digital resources that support different learning styles (e.g., visual, auditory, kinesthetic).	.453	
DIF12	I collaborate with teachers to identify their specific digital needs and offer personalized support.	.482	
CULT2	I encourage the adoption of new digital technologies among teachers and staff.	.447	
ADV8	I encourage teachers to adapt to innovative digital tools enhance learning outcomes.	.400	
ADV12	I advocate for creating a school environment where digital tools are viewed as essential for educational and operational success.	.436	
ADV9	I advocate for the use of digital learning platforms that support personalized and differentiated instruction.	.459	
ADV1	I advocate for the integration of digital literacy as a core component of the school's curriculum.	.526	
ADV11	I promote the idea that technology can enhance not only learning but also communication, collaboration, and administrative processes.	.413	
GOV14	I provide strong leadership in making decisions related to the adoption of digital technologies.	.469	
GOV15	I ensure that students are educated on the ethical use of digital resources.	.415	
ADV16	I advocate for the alignment of digital tools with the school's mission and vision.	.443	
GOV3	I promote ethical digital practices among stakeholders ensuring that digital tools are used responsibly.	.748	Digital Governance and Ethical Leadership in Education
GOV6	I enforce guidelines for appropriate digital conduct for stakeholders emphasizing respect and responsibility.	.721	
GOV7	I ensure that the school's digital governance framework complies with local, national, and international regulations regarding digital tools, data usage, and online safety.	.699	
GOV5	I promote digital citizenship to prevent cyberbullying.	.695	
GOV2	I ensure that all digital governance policies are communicated clearly to staff, students, and parents.	.694	
GOV10	I ensure that digital resources are allocated efficiently to support the school's educational goals and digital initiatives.	.672	
GOV4	I ensure that all digital initiatives align with ethical standards.	.666	
GPV11	I support the creation of online platforms where stakeholders can collaborate on digital initiatives and share best practices.	.657	
GOV1	I lead the development of digital governance policies that align with the school's educational goals.	.569	

GOV12	I actively promote the integration of technology in a way that enhances the school's academic.	.551	
GOV9	I ensure transparency in the decision-making process related to the adoption of digital tools and technologies in the school.	.535	
ADV15	I lead school-wide initiatives to integrate digital technologies into all aspects of school operations.	.513	
DIF6	I support the implementation of multimedia and interactive tools to engage students with different learning preferences.	.498	
GOV13	I collaborate with other school leaders to ensure that digital governance supports the school's vision for innovation	.494	
ADV10	I encourage the development of a school-wide digital culture where technology is seamlessly integrated into daily activities.	.471	
DIF8	I ensure that all students, regardless of their background, have access to the digital tools and resources required for differentiated learning.	.470	
ADV13	I promote the idea that every student should have access to digital resources that support their learning needs.	.460	
DC14	I use data analytics to assess and communicate the school's performance to stakeholders.	.431	
DC10	I rely on digital tools to analyze school performance data and make informed decisions.	.435	
CULT9	I support the use of digital communication tools to maintain transparent and open communication with parents and the community.	.435	
DIF3	I provide guidance on how teachers can differentiate instruction using technology to meet diverse student needs (e.g., students with learning disabilities, gifted students).	.412	
DC5	I am proficient in using educational technologies, such as online teaching tools and digital content.	.798	Digital Leadership and Strategic Integration in Education
DC9	I use online platforms for conducting virtual meetings and conferences with staff and external stakeholders.	.691	
DC1	I regularly use digital tools (e.g., learning management systems, communication platforms) to manage school operations.	.671	
DC11	I lead initiatives to integrate digital technologies into the school's strategic plan.	.662	
DC8	I leverage digital platforms for transparent and efficient communication within the school.	.636	
DC14	I use data analytics to assess and communicate the school's performance to stakeholders.	.631	
DC10	I rely on digital tools to analyze school performance data and make informed decisions.	.625	
DC4	I feel confident in using a wide range of digital tools for administrative purposes.	.615	
DC15	I am quick to adopt new digital tools that can improve the efficiency of school operations	.613	
DC7	I use digital communication tools (e.g., email, social media, messaging platforms) to maintain effective communication with teachers, students, and parents.	.600	
DC12	I have created a vision for how technology should be used to improve the learning environment.	.536	

DC3	I use digital platforms to streamline administrative tasks (e.g., scheduling, data management, communication).	.535	
CULT1	I actively promote a school-wide culture of digital transformation.	.531	
DC13	I monitor and evaluate the implementation of technology initiatives in the school.	.529	
CULT4	I prioritize the development of digital literacy as a key skill for both staff and students.	.510	
CULT3	I create opportunities for staff to explore innovative uses of technology in the classroom.	.438	
CULT8	I encourage the use of digital communication tools (e.g., email, messaging apps, social media) to improve collaboration among school stakeholders.	.430	Promoting a Digitally Engaged School Culture
ADV5	I actively promote the use of digital tools and technologies in classroom instruction to enhance student engagement.	.442	
ADV10	I encourage the development of a school-wide digital culture where technology is seamlessly integrated into daily activities.	.467	
DC12	I have created a vision for how technology should be used to improve the learning environment.	.447	Digital Literacy and Professional Development
CULT4	I prioritize the development of digital literacy as a key skill for both staff and students.	.439	
CULT3	I create opportunities for staff to explore innovative uses of technology in the classroom.	.416	
CULT11	I ensure that technology is used to engage students in meaningful ways that support their learning.	.771	
CULT12	I encourage the use of online tools and social media to create a more connected and engaged school community.	.755	
CULT10	I ensure that all teachers and students have equal access to the necessary digital tools and resources.	.733	
CULT7	I encourage teachers to share digital resources, best practices, and teaching strategies with each other.	.635	
CULT6	I ensure that teachers have the necessary resources and training to develop their digital competencies.	.600	
CULT9	I support the use of digital communication tools to maintain transparent and open communication with parents and the community.	.597	
CULT13	I provide opportunities for teachers to collaborate on digital projects and share best practices.	.498	
CULT5	I support ongoing professional development in digital skills for teachers and staff.	.460	
DIF11	I ensure that professional development related to digital tools is customized for different subject areas	.408	
DIF2	I support the integration of adaptive learning technologies that cater to students' individual learning needs.	.467	Digital Differentiation and Inclusive Learning
DIF8	I ensure that all students, regardless of their background, have access to the digital tools and resources required for differentiated learning.	.453	
DIF5	I encourage teachers to use digital resources that support different learning styles (e.g., visual, auditory, kinesthetic).	.527	

DIF3	I provide guidance on how teachers can differentiate instruction using technology to meet diverse student needs (e.g., students with learning disabilities, gifted students).	.513	
DIF12	I collaborate with teachers to identify their specific digital needs and offer personalized support.	.501	
DIF10	I prioritize providing equitable access to devices and internet connectivity for all students, ensuring that digital differentiation strategies can be implemented effectively.	.737	Digital Equity and Security in Education
GOV8	I oversee risk management strategies to mitigate potential security breaches or data loss related to digital tools.	.729	
ADV17	I advocate for the use of data analytics to inform decisions regarding digital tools.	.685	
DC6	I am able to troubleshoot basic technology issues that arise in the school environment.	.496	
DC8	I leverage digital platforms for transparent and efficient communication within the school.	.438	Digital Integration and Professional Development
CULT5	I support ongoing professional development in digital skills for teachers and staff.	.406	
DC2	I encourage teachers to integrate technology into their teaching practices.	.764	
CULT2	I encourage the adoption of new digital technologies among teachers and staff.	.502	
DC4	I feel confident in using a wide range of digital tools for administrative purposes.	.451	Digital Competence and Collaboration
CULT13	I provide opportunities for teachers to collaborate on digital projects and share best practices.	.470	
CULT14	I ensure that teachers have access to professional development opportunities to improve their digital skills.	.603	
DIF7	I encourage teachers to incorporate various digital platforms that offer personalized learning experiences for students.	.533	Personalized Learning through Digital Integration

Fit Indices of Four-Factor Model of Digital Leadership Attributes among Public School Administrators in the Elementary Schools in the Province of Cotabato

The results for the Four-Factor Model of Digital Leadership Attributes among public school administrators in the elementary schools of Cotabato show a mixed level of model fit. The CMIN (Chi-square Minimum Discrepancy) value is 6.276, which is relatively high, indicating that there may be significant differences between the observed and model-implied covariance matrices. While the Comparative Fit Index (CFI) is .815, and the Tucker-Lewis Index (TLI) is .798, both are below the commonly accepted threshold of 0.90 for good fit, although values above 0.80 may still suggest an acceptable fit depending on model complexity. The Normed Fit Index (NFI) also stands at .788, which further indicates that the model is approaching acceptable but not yet optimal fit. The Root Mean Square Error of Approximation (RMSEA) is .130, which exceeds the acceptable threshold of 0.08, suggesting that the model does not approximate the population well. RMSEA values above 0.10 are typically considered poor, indicating a need for model refinement or respecification. Lastly, the Akaike Information Criterion (AIC) is 2514.485, a value useful primarily for comparison with alternative models; lower values indicate better model parsimony. In summary, while the four-factor model captures some structure in the data, the elevated RMSEA and sub-threshold fit indices (CFI, TLI, NFI) imply that a more complex model (such as the six-factor or seven-factor alternatives) may better capture the underlying dimensions of digital leadership in the study context.

Fit Indices	Obtained Value
CMIN	6.276
Comparative Fit Index (CFI)	.815
Tucker-Lewis Index (TLI)	.798
Normed Fit Index (NFI)	.788
Root Mean Square Error of Approximation (RMSEA)	.130

Akaike Information Criterion (AIC)	2514.485

Four-Factor Model of Digital Leadership Attributes among Public School Administrators in the Elementary Schools in the Province of Cotabato

The path diagram illustrates the validated four-factor model of digital leadership attributes among public school administrators. The model includes: F1 – *Leadership and Advocacy for Digital Integration in Education*, F2 – *Digital Governance and Ethical Leadership in Education*, F3 – *Digital Leadership and Strategic Integration in Education*, and F4 – *Digital Literacy and Professional Development*. Each latent factor is associated with a set of observable variables (e.g., ADV3, GOV12, DC5, CULT11) and corresponding error terms (e.g., e1, e39, e55), with standardized regression weights ranging from 0.67 to 1.04. These weights indicate strong factor loadings, confirming that the measured indicators accurately reflect their respective constructs. Notably, F1 exhibited high loadings on advocacy- and integration-related items (e.g., ADV3, DIF4), suggesting a consistent digital leadership presence across instructional domains. Similarly, F2's loadings—particularly on items GOV3 to GOV12—highlight a strong emphasis on ethical leadership and policy implementation. The inter-factor correlations, indicated by the curved bidirectional arrows, show moderate associations between constructs, ranging from 0.13 to 0.25. For instance, the strongest correlation is observed between F2 (Digital Governance) and F3 (Strategic Integration) at 0.25, implying that administrators who demonstrate ethical leadership tend to also effectively manage strategic digital initiatives. Meanwhile, F4 (Digital Literacy and Professional Development) shares correlations with all other constructs (ranging from 0.13 to 0.20), which reveals its integrative nature and foundational role in supporting other digital leadership domains. The structural interconnectedness of the model demonstrates that digital leadership among administrators is a multidimensional construct requiring simultaneous competence in advocacy, governance, strategic integration, and continuous professional growth. These findings reinforce the importance of holistic capacity-building programs to cultivate digitally capable and visionary school leaders.

Scale on Digital Leadership Attributes among the School Administrators in the Province of Cotabato

Leadership and Advocacy for Digital Integration in Education	**5**	**4**	**3**	**2**	**1**
I use digital tools to improve learning outcomes.					
I promote continuous professional development to help teachers improve their digital literacy.					
I support the use of technology to bridge gaps in access to educational resources, especially for disadvantaged or underserved students.					
I lead by example in embracing new digital tools and practices.					
I encourage teachers to explore innovative digital resources to improve teaching and learning.					
I encourage teachers to incorporate digital skills in their teaching practices.					
I encourage teachers to use digital tools to create personalized learning experiences for students.					
I actively promote the importance of digital literacy for students to succeed in the 21st-century workforce.					
I encourage teachers to include digital competencies in their teaching practices.					
Digital Governance and Ethical Leadership in Education	**5**	**4**	**3**	**2**	**1**
I actively promote the integration of technology in a way that enhances the school's academic.					
I lead the development of digital governance policies that align with the school's educational goals.					
I support the creation of online platforms where stakeholders can collaborate on digital initiatives and share best practices.					
I ensure that digital resources are allocated efficiently to support the school's educational goals and digital initiatives.					
I ensure that all digital governance policies are communicated clearly to staff, students, and parents.					
I promote digital citizenship to prevent cyberbullying.					
I ensure that the school's digital governance framework complies with local, national, and international regulations regarding digital tools, data usage, and online safety.					
I enforce guidelines for appropriate digital conduct for stakeholders emphasizing respect and responsibility.					
I promote ethical digital practices among stakeholders ensuring that digital tools are used responsibly.					
Digital Leadership and Strategic Integration in Education	**5**	**4**	**3**	**2**	**1**
I use digital platforms to streamline administrative tasks (e.g., scheduling, data management, communication).					

I actively promote a school-wide culture of digital transformation.					
I use digital communication tools (e.g., email, social media, messaging platforms) to maintain effective communication with teachers, students, and parents.					
I am quick to adopt new digital tools that can improve the efficiency of school operations					
I lead initiatives to integrate digital technologies into the school's strategic plan.					
I regularly use digital tools (e.g., learning management systems, communication platforms) to manage school operations.					
I ensure transparency in the decision-making process related to the adoption of digital tools and technologies in the school.					
I am proficient in using educational technologies, such as online teaching tools and digital content.					
Digital Literacy and Professional Development	**5**	**4**	**3**	**2**	**1**
I ensure that all teachers and students have equal access to the necessary digital tools and resources.					
I ensure that technology is used to engage students in meaningful ways that support their learning.					
I encourage the use of online tools and social media to create a more connected and engaged school community.					

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

1. The study confirmed the suitability of the dataset for factor analysis, as indicated by the Kaiser-Meyer-Olkin (KMO) value of .888 and a highly significant Bartlett's Test of Sphericity ($p < .001$). Through Exploratory Factor Analysis (EFA), nine dimensions of digital leadership were identified, which collectively explained 78.01% of the total variance in the data. These dimensions include Leadership and Advocacy for Digital Integration, Digital Governance and Ethical Leadership, Strategic Integration, Professional Development, Differentiation and Inclusive Learning, Equity and Security, and Personalized Learning.
2. However, the Confirmatory Factor Analysis (CFA) results revealed that the six-factor model exhibited a poor model fit, as reflected by a CFI of .594 and RMSEA of .140. In contrast, the four-factor model demonstrated a moderately acceptable fit, with a CFI of .815 and RMSEA of .130. These findings suggest that while the construct of digital leadership is multidimensional, the initial model requires refinement for improved theoretical and statistical coherence.

Conclusions

1. Digital leadership among school administrators in the Province of Cotabato is multidimensional, comprising competencies in advocacy, governance, strategic planning, and inclusive digital practices.
2. While administrators exhibit strong individual attributes, the tested models show that the structural coherence of these attributes needs re-specification for improved theoretical alignment.
3. Leadership and advocacy emerged as foundational attributes, significantly correlating with other leadership domains like governance, professional development, and strategic use of digital tools.
4. The poor fit of the six-factor model and moderate fit of the four-factor model indicate the complexity of digital leadership and the necessity for more nuanced models in similar educational settings.

Recommendations

1. Future studies should consider refining and validating a revised factor model, possibly exploring a seven- or eight-factor structure using a larger sample and cross-validation.
2. Ensure equitable digital infrastructure support, especially in geographically disadvantaged areas, to fully enable administrators in executing their digital leadership roles.
3. Develop institutional digital vision plans that include strategic goals, technology timelines, and alignment with learning outcomes to guide school-level implementation.

4. Invest in school-based data systems and provide training for school leaders to interpret and apply learning analytics in technology-related decisions.

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