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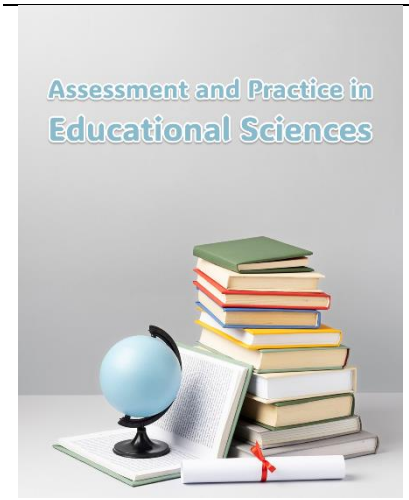

Developing a Model of Teachers' Professional Competencies Based on Digital Leadership Indicators in the Educational System of Iraq

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ABSTRACT

This study aimed to design and validate a comprehensive professional competency model for teachers grounded in digital leadership and transformational leadership indicators within Iraq's educational system. The research adopted a mixed-methods exploratory sequential design, beginning with a qualitative phase using the Delphi technique and followed by a quantitative phase employing Interpretive Structural Modeling (ISM) and MICMAC analysis. In the qualitative phase, fourteen experts in the fields of educational management, digital learning, and teacher development were selected purposefully for in-depth semi-structured interviews. Data were analyzed through thematic coding to identify key competency dimensions. In the second phase, the Delphi process was conducted in two rounds to confirm the validity of themes based on mean scores and expert agreement coefficients. The approved components were then hierarchically structured using ISM to determine their causal relationships and influence levels, while MICMAC analysis classified variables according to their driving power and dependence. The findings revealed a six-level hierarchical model consisting of fourteen interrelated competencies grouped under digital, transformational, and innovation-driven synergy domains. The most influential competencies—management of modern technologies in the classroom, creating interactive and dynamic learning environments, and ensuring cybersecurity and privacy—were positioned as key drivers. Mid-level competencies included professional development, personalized learning, transparency, and justice perception, acting as mediators between digital and transformational dimensions. Motivation, collaboration, and infrastructure improvement appeared as dependent variables influenced by higher-order factors. MICMAC results confirmed the strong interdependence among competencies and identified digital leadership as the primary enabler of transformational growth in education. The proposed model integrates digital and transformational leadership to enhance teachers' professional competencies, emphasizing continuous learning, ethical practice, and technological adaptability as foundations for sustainable educational development in Iraq.

Keywords: Teacher competencies; digital leadership; transformational leadership; Delphi method; interpretive structural modeling; MICMAC analysis; Iraq education system.

Introduction

In the contemporary era of rapid technological, educational, and economic transformation, the professional competencies of teachers have emerged as one of the most vital determinants of educational quality and institutional success. Competencies

not only define an educator's ability to translate knowledge into effective teaching practices but also serve as strategic assets that sustain organizational growth, innovation, and adaptability in uncertain contexts (1). The concept of competency, broadly defined as the integration of knowledge, skills, attitudes, and values required for effective job performance, has evolved over decades into a multidimensional construct encompassing technical, behavioral, and cognitive domains (2). In the field of education, particularly within developing countries, designing a competency-based framework for teachers is both a necessity and a strategic response to the complexities of modern teaching environments (3).

The competency-based approach in management and education emerged in the late twentieth century as an alternative to traditional input-based training systems. It shifted the focus from qualifications and experience to observable, measurable behaviors and results (4). This paradigm emphasizes aligning individual performance with organizational objectives through structured models that define specific competencies at each role level (5). Within educational institutions, competency-based frameworks are increasingly being used for teacher assessment, recruitment, and professional development planning (6). The integration of competencies into human resource and educational management has proven to enhance accountability, improve teaching quality, and foster leadership excellence among educators (7).

Competency models also serve as diagnostic tools for identifying performance gaps and guiding targeted interventions (2). According to Bartram's "Great Eight" model, competencies can be classified into universal clusters that encompass goal orientation, analytical thinking, interpersonal sensitivity, and adaptability (1). In educational contexts, these clusters provide a structured basis for developing teachers' professional identity and pedagogical mastery. In developing countries, however, challenges such as limited access to training, institutional rigidity, and insufficient evaluation mechanisms have hindered the full implementation of competency-based frameworks (8). As a result, contextualized models that incorporate cultural, managerial, and pedagogical dimensions are required to ensure relevance and sustainability (9).

The emergence of digital transformation in education has further expanded the scope of competencies required from teachers. The concept of *digital leadership*—the ability to use technology strategically to improve teaching and learning—has become a critical aspect of modern education systems (10). Digital leadership competencies involve skills in managing online learning environments, integrating educational technologies, and fostering digital citizenship among students (11). They also include emotional and communicative intelligence, which are necessary to navigate the ethical and social implications of technology use in classrooms (12). As global education shifts toward hybrid and technology-mediated learning, teachers must possess competencies that merge pedagogical expertise with digital fluency (13).

Moreover, teacher competency is not limited to technical or instructional proficiency; it encompasses moral and transformational dimensions that shape the broader educational culture. Transformational leadership competencies—those that inspire innovation, shared vision, and collective learning—are increasingly recognized as vital to educational success (14). Such competencies empower teachers to lead change within their institutions, encourage reflective practice, and cultivate collaboration among peers (15). Transformational competencies thus complement digital leadership by ensuring that technology integration aligns with human values, social inclusion, and cultural contexts (16).

In the context of Iraq's educational system, which faces post-conflict reconstruction challenges, competency development among teachers assumes even greater importance. The education sector in Iraq must balance modernization with cultural preservation, necessitating an adaptive competency framework that addresses both structural and pedagogical needs (17). Studies have shown that the gap between current and desired levels of teacher competencies in developing regions is largely due to inadequate training and limited exposure to innovative practices (18). Addressing these gaps requires models that integrate national priorities with global competency standards (19). Such models must also reflect localized cultural and social conditions while remaining flexible enough to incorporate emerging digital and managerial trends (20).

Globally, research has demonstrated that competency frameworks enhance educational outcomes by linking teacher performance with institutional effectiveness. For instance, competency-based training models have improved professional development programs and facilitated evidence-based assessment of teachers' skills (7). In addition, managerial and behavioral competencies are essential for teachers who function as leaders, mentors, and decision-makers (5). The dynamic nature of educational institutions requires teachers to exhibit a blend of strategic thinking, empathy, and ethical decision-making to manage classroom complexities (12). Therefore, designing competency models for teachers is not merely a procedural exercise but a transformational process that redefines professional identity in education (3).

Competency-based education also supports continuous professional growth, which enhances motivation and innovation among teachers (21). In this regard, Liikamaa (2015) emphasizes that professional competency models should not be static but evolve through feedback, reflection, and collaboration (22). The participatory nature of competency development ensures that teachers become active agents of change rather than passive recipients of policy directives. Empirical evidence also suggests that aligning competency development with organizational learning enhances the adaptability and resilience of educational institutions (23).

In the Arab world and other developing contexts, efforts to define teacher competencies have often drawn from Western models while adapting them to local realities (24). However, these adaptations must consider the sociocultural and infrastructural constraints specific to each national system (25). For example, in Iraq, where educational institutions are in a phase of rebuilding and modernization, digital leadership offers a framework for promoting transparency, participation, and innovation in schools (16). The integration of such leadership competencies can empower teachers to play transformative roles in both classroom management and institutional reform (11).

Furthermore, competency frameworks in education have a direct relationship with broader national strategies for human capital development. Countries that have adopted competency-based systems have observed significant improvements in employee performance, accountability, and innovation (4). In educational systems, teacher competencies extend beyond classroom delivery to include research engagement, communication with parents, and collaboration in policy implementation (20). Therefore, comprehensive competency models must encompass cognitive, interpersonal, and digital domains while ensuring alignment with institutional mission and community values (2).

From a managerial perspective, the systematic development of teacher competencies enhances organizational efficiency and leadership succession planning (5). In higher education, competency-based models contribute to aligning academic programs with labor market demands and global standards (6). Similarly, within primary and secondary education, competency models guide recruitment, training, and performance evaluation (14). As global competitiveness and accountability pressures increase, educational organizations must prioritize competency-based frameworks to remain adaptive and effective (1).

At the policy level, governments and educational authorities are recognizing the necessity of creating structured competency models that link national educational standards with teacher performance indicators (8). In Iraq, where modernization efforts are ongoing, competency models based on digital and transformational leadership can serve as tools for rebuilding institutional capacity and improving educational equity. The incorporation of digital skills, data-driven decision-making, and inclusive teaching practices will strengthen teachers' ability to respond to societal needs and global trends (11). Additionally, fostering competencies related to ethics, cultural sensitivity, and innovation will ensure that education remains both progressive and contextually grounded (9).

Prior research on managerial competencies underscores the interconnection between individual capability and organizational performance. For example, Wickramasinghe and Zoyza (2009) demonstrated that effective managers across different functional areas share core competencies related to strategic vision, communication, and adaptability (15). Applying this insight to

educational settings implies that teachers, as classroom managers, require similar leadership competencies to foster productive learning environments. Moreover, continuous assessment and feedback mechanisms must be integrated into professional development systems to ensure that competencies remain relevant and measurable (16).

Despite extensive literature on competency modeling, significant contextual gaps remain in applying these frameworks within the Iraqi education system. Most existing models focus on general managerial or industrial contexts rather than pedagogical leadership (26). The rapid advancement of educational technologies, combined with Iraq's sociopolitical reconstruction, necessitates a hybrid model that combines digital, pedagogical, and transformational competencies (13). This hybrid approach can address challenges such as teacher motivation, curriculum adaptation, and cultural integration, which are critical to achieving educational excellence (21).

Furthermore, designing competency models for teachers requires an understanding of how human and technological systems interact. Theories of emotional intelligence and socio-technical systems suggest that effective teachers must not only master instructional technology but also demonstrate empathy, flexibility, and cultural awareness (12). In Iraq's context, where diverse ethnic and social groups coexist, culturally responsive competencies are essential for maintaining inclusivity and cohesion (25). Integrating these dimensions into teacher development policies ensures the creation of a professional workforce capable of driving national transformation through education (11).

In summary, competency-based management has evolved from an organizational efficiency tool to a transformative educational paradigm that links teacher development with institutional effectiveness and national progress (4). By combining digital and transformational leadership indicators, education systems can prepare teachers to meet 21st-century challenges while remaining responsive to cultural and societal needs (10).

The aim of this study is to design a professional competency model for teachers based on digital leadership and transformational leadership indicators within Iraq's educational system.

Methods and Materials

Considering the objectives proposed in the present study, a mixed-methods approach was employed. Among various types of mixed research designs, the current study adopted a sequential exploratory mixed-methods design with a classification orientation. In this sequential exploratory design, priority is given to the qualitative approach, followed by the quantitative phase, which utilizes the results obtained from the qualitative step.

The first phase of the study, in terms of purpose, is applied, and in terms of nature and method, is descriptive–survey. Initially, by reviewing the theoretical foundations concerning teachers' competencies, the factors contributing to the successful implementation of this style in organizations were identified through thematic analysis. Subsequently, the relationships among the identified dimensions and components were screened and refined by experts and specialists in the field using the Delphi method, and the final list of dimensions was determined. In the next step, the variables were structured and prioritized using the Interpretive Structural Modeling (ISM) technique.

The data collection instrument in this study, aimed at explaining the teachers' competency model, was a researcher-made questionnaire. This questionnaire was designed based on the Delphi technique. Given the purpose of the study, the questionnaire was distributed among experts in the research field. To assess the validity of the data collection instrument, content validity was used. For this purpose, the questionnaire was provided to subject matter experts and several university professors familiar with the research topic. Moreover, the purposive sampling method was applied. In the second phase, during the quantitative part of the research, the Interpretive Structural Modeling method was used to rank the model components and analyze the relevant results.

In the qualitative section, semi-structured interviews were employed for data collection. To conduct the interviews, an interview protocol was developed, and in-depth interviews were performed based on it. The trustworthiness of the results was ensured through the examination of data, detailed documentation of the research process, prolonged engagement in interviews to achieve deep understanding, precise guidance of the interview process, and member participation in data coding. In the quantitative section, the Delphi method was again used to examine the reliability of the questionnaire, and the Interpretive Structural Modeling (ISM) method was applied to prioritize the components of the model.

The statistical population in the first phase included all key informants, specialists, and educational policymakers, who were selected using the purposive sampling method. Sampling continued until data saturation was achieved, as theoretical saturation is considered the most critical indicator in determining the number of participants in qualitative research.

In the second phase, the statistical population consisted of directors and deputy directors of education departments across Iraq. Due to the limited population size, the census method was employed, and all members participated in the study.

The subject scope of this research focuses on teachers' competencies. The spatial scope is the Iraqi Ministry of Education, and the temporal scope covers the research period during the year 2024.

Findings and Results

In total, 14 interviews were conducted with experts in this field, which were deemed suitable for transcription and analysis. The key point coding method was applied. The interview texts (all key points) were examined in order to extract initial codes, and the results of this coding process are presented in the following tables.

To achieve this, the researcher first became familiar with the depth of the data through repeated reading and re-reading. In the next step, initial codes were generated from the data. In the third stage, by screening, removing duplicate codes, and integrating synonymous codes, the themes derived from the interview texts were categorized.

To preserve the confidentiality of participants in the research interviews, each interviewee was represented by the code MIX, in which the letter M indicates the *interview*, the letter I refers to the *interview number*, and the letter X refers to the *number of the initial code* extracted from the interview text.

Table 1. Analysis of Key Points from the Conducted Interviews

Interview Text	Conceptual Codes	Interviewee Code
In my opinion, digital leadership in education requires teachers' ability to use modern technologies to improve the learning process. I believe that teachers should be able to use digital tools effectively in classrooms to prepare students for the future. From my perspective, this requires continuous training and updating of teachers' technological skills.	Effective use of digital tools; continuous teacher training; improving the learning process; preparing students for the future	M1I1
In my opinion, digital leadership in education requires a long-term vision and the ability to create sustainable changes in the educational system. I believe that teachers should transform traditional teaching methods through innovation and creativity. In my view, these transformations must involve the active participation of students and parents to achieve desirable outcomes.	Long-term vision; creating sustainable changes; innovation and creativity; active participation of students and parents	M2I2
I believe that digital leadership in Iraq's education system must be designed considering existing infrastructures and the specific challenges of the country. In my opinion, teachers should be able to achieve maximum efficiency with minimal resources. This requires practical and applied training tailored to the real conditions of Iraqi classrooms.	Designing based on infrastructure; productivity with limited resources; practical and applied training; alignment with real classroom conditions	M3I3
In my opinion, transformational leadership in education should be based on the cultural and social values of society. Teachers should deeply understand Iraqi culture and design teaching methods consistent with these values. This, in my view, enhances community participation in the educational process.	Grounded in cultural and social values; deep understanding of Iraqi culture; culturally aligned teaching methods; increasing community participation	M4I4
I believe that digital leadership in education requires a dynamic and interactive environment where students can actively participate in the learning process. Teachers should use digital platforms to foster greater interaction among students. This enhances students' motivation and interest in learning.	Creating dynamic and interactive environments; active student participation; use of digital platforms; increasing motivation and interest in learning	M5I5

In my opinion, digital leadership in education must be founded on transparency and accountability. Teachers should communicate openly with students and parents regarding their educational goals and methods. This fosters trust and greater collaboration among all stakeholders in the educational system.	Transparency and accountability; open communication with students and parents; building trust and collaboration; stakeholder participation	M6I6
From my perspective, digital leadership in education requires attention to information security and student privacy. Teachers should use digital tools in ways that ensure the protection of students' data. This necessitates specialized training in cybersecurity.	Attention to information security; protection of student privacy; safe use of digital tools; cybersecurity education	M7I7
In my view, digital leadership in education should be grounded in educational justice. Teachers must ensure equal learning opportunities for all students, with special attention to those from disadvantaged backgrounds.	Educational justice; providing equal opportunities; attention to disadvantaged students; supporting underprivileged learners	M8I8
I believe that digital leadership in education must emphasize collaboration and partnership among teachers and other educational staff. Teachers should communicate through digital networks and share their experiences, which improves the quality of teaching and learning.	Collaboration and partnership among teachers; communication through digital networks; sharing experiences; improving teaching quality	M9I9
In my opinion, digital leadership in education requires teachers' ability to create positive changes in students' behavior and attitudes. Teachers should use innovative teaching methods to promote critical thinking and creativity, fostering students' personal and intellectual growth.	Creating positive behavioral and attitudinal changes; innovative teaching methods; critical thinking and creativity; personal and intellectual development	M10I10
I believe that digital leadership in education requires consideration of students' individual differences. Teachers should use digital tools to provide personalized learning experiences, which enhance educational effectiveness and student satisfaction.	Attention to individual differences; personalized learning; increasing teaching effectiveness; student satisfaction	M11I11
From my perspective, digital leadership in education must be based on research and data analysis. Teachers should use educational data to improve their teaching methods, which requires specialized training in data analytics.	Research and data analysis; improving teaching methods; use of educational data; specialized training in data analytics	M12I12
I believe that digital leadership in education requires attention to teachers' professional development. Teachers should continuously update their skills, supported both financially and morally by the educational system.	Teachers' professional development; skills updating; financial and moral support; continuous learning	M13I13
In my opinion, digital leadership in education should be grounded in motivating and inspiring teachers. Motivated teachers have a greater positive impact on students, which requires a supportive and encouraging environment.	Creating motivation and enthusiasm in teachers; positive impact on students; supportive and encouraging environment; teacher support	M14I14

Table 2. Overarching, Organizing, and Basic Themes

Overarching Themes	Organizing Themes	Basic Themes
Digital Competencies in Education	Management of modern technologies in the classroom	Effective use of digital tools; continuous teacher training; improving the learning process; preparing students for the future
	Creating dynamic and interactive learning environments	Dynamic and interactive environment; active student participation; use of digital platforms; increasing motivation and interest in learning
	Cybersecurity and privacy in digital education	Ensuring information security; protecting student privacy; safe use of digital tools; cybersecurity education
	Personalized education using digital tools	Attention to individual differences; personalized instruction; enhanced educational effectiveness; student satisfaction
	Teachers' professional development in the digital era	Teachers' professional development; skill updating; financial and moral support; continuous education
Transformational Competencies in Education	Creating sustainable changes in the educational system	Long-term vision; creating sustainable changes; innovation and creativity; active participation of students and parents
	Competence in educational justice	Educational justice; equal opportunities; attention to disadvantaged students; supporting underprivileged learners
	Transparency and accountability in educational management	Transparency and accountability; open communication with students and parents; trust and collaboration; stakeholder participation
	Innovation in teaching methods through research and data analysis	Research and data analysis; improving teaching methods; using educational data; specialized training in data analytics
	Motivation and enthusiasm in teachers	Motivation and enthusiasm in teachers; positive student impact; supportive and encouraging environment; teacher support
Innovation-Driven Synergy	Digital collaboration and networking among teachers	Teacher collaboration and partnership; communication via digital networks; experience sharing; improving educational quality
	Aligning technology with cultural and social values	Grounded in cultural and social values; deep understanding of Iraqi culture; culturally aligned teaching methods; enhancing community participation
	Transformation in students' behavior and attitudes	Positive behavioral and attitudinal change; innovative teaching methods; critical thinking and creativity; personal and intellectual growth

	Improving infrastructure and efficiency in digital education	Designing instruction aligned with infrastructure; productivity with limited resources; practical and applied training; alignment with real classroom conditions

The interviewees—selected from among individuals with rich experience in the domains of digital education, transformational management in education, and teachers' professional development—provided valuable perspectives that substantially contributed to a better understanding of the competencies required of teachers in this era. This study not only examines the role of technology in education but also places special emphasis on the human, cultural, and transformative dimensions of teaching and learning. In what follows, with reference to the interviewees' statements, the various dimensions of this research are examined in detail.

1. Integrating Technology in Education: From an Auxiliary Tool to an Inseparable Part of the Learning Process

One interviewee stated: "Today's teachers must be able to use technology not as an auxiliary tool but as an inseparable part of the learning process. This requires a change in mindset and the development of digital skills." This view indicates a fundamental transformation in the role of technology in education. In the past, technology was used as an adjunct alongside traditional teaching methods; however, today, technology is recognized as a necessary and integrated component of the learning process. This shift in perspective requires that teachers not only be familiar with digital tools but also be able to use them in ways that facilitate and deepen learning. This, in turn, necessitates the development of digital competencies, including the ability to utilize online learning platforms, interactive tools, and analytical software.

2. Transformational Leadership: Structural and Cultural Change in Education

Another interviewee remarked: "Transformational leadership in education cannot be achieved solely by instituting structural changes; it also requires changes in the attitudes and behaviors of teachers and students. This transformation must begin inside the classroom." This statement highlights the importance of cultural and attitudinal shifts in the process of educational transformation. Transformation in education is not achievable merely through policy reforms or macro-level structural changes; it must begin at the micro level—that is, within classrooms. As transformational leaders, teachers must be able to cultivate students who possess critical thinking skills, problem-solving abilities, and the capacity to adapt to rapid technological change. This presupposes that teachers themselves model change and respond to transformations with a positive and creative mindset.

3. Personalized Education: Balancing Technology and Students' Needs

Another interviewee noted: "To succeed in digital leadership, teachers must be able to balance technology with the real needs of students. This requires a deep understanding of individual differences and students' social conditions." This perspective underscores the importance of personalized instruction and attention to students' diverse needs. Technology enables the design of instruction that aligns with each learner's needs, interests, and learning styles. However, the use of technology must be accompanied by a deep understanding of students' social, cultural, and individual circumstances to prevent the creation of digital divides or the neglect of specific needs.

4. Participation and Collaboration: The Key to Sustainable Transformation in Education

Another interviewee stated: "Transformation in education is impossible without the active participation of teachers and students. Teachers should act as facilitators of change and engage students in the learning process." This statement underscores the importance of participation and collaboration in fostering sustainable educational transformation. Such transformation will only succeed if all stakeholders—including teachers, students, parents, and administrators—participate actively in the process. As facilitators of change, teachers must be able to create environments in which students feel they are part of the learning process and can play a role in shaping it.

5. Cybersecurity and Privacy: A Priority in Digital Education

Another interviewee observed: “The security of information and the privacy of students when using digital technologies must be considered a priority. Teachers must be able to use digital tools in ways that preserve students’ security.” This view emphasizes the importance of cybersecurity in digital education. With the expanding use of digital technologies in education, concerns about information security and student privacy have increased. Teachers must be able to employ digital tools in ways that safeguard data security and students’ privacy. This requires that teachers be familiar with relevant laws and standards and be able to educate students about responsible technology use.

6. Teachers’ Professional Development: Continuous Training in the Digital Era

Another interviewee noted: “Teachers’ professional development must be continuous and aligned with technological developments. This requires the support of educational systems and the provision of practical training.” This statement highlights the importance of ongoing training and support for teachers in the digital era. Rapid technological change necessitates that teachers continuously update their skills. This requires support from educational systems through the provision of training courses, workshops, and learning resources. Teachers’ professional development not only helps improve instructional quality but also enables teachers to use technology more confidently in the teaching process.

7. A Holistic View of Digital and Transformational Competencies

These interviews revealed that integrating digital and transformational competencies in education requires a comprehensive and holistic perspective that attends to both technology and the human and cultural dimensions of education. As transformational leaders, teachers must be able to use technology in ways that not only facilitate learning but also contribute to creating sustainable changes in the educational system. This requires the development of digital skills, changes in attitudes and behaviors, and attention to students’ diverse needs.

By examining the perspectives of experts and specialists in education and technology, this study demonstrates that teachers’ professional competencies in the digital and transformational era require a combination of technical skills, transformational mindsets, and attention to human and cultural aspects. As transformational leaders, teachers must be able to use technology to facilitate and deepen learning while also attending to students’ diverse needs and security. This necessitates continuous professional development, active stakeholder participation, and support from educational systems.

Reliability of the Research Instrument in the Qualitative Section

In this study, a method was used to examine reliability that involves having at least two individuals conduct interviews separately but in parallel and then comparing the findings of two or more researchers. To this end, all stages of interviewing and coding were conducted in parallel by two individuals, yielding identical results.

Re-coding a Portion of the Interview Data by a Second Researcher: For this purpose, approximately 20 percent of the interviews (four interviews) were provided to a second researcher familiar with qualitative methods and knowledgeable about the research topic, and the coding agreement percentage was calculated. This index indicates intra-topic agreement between two different coders.

Table 3. Calculation of Inter-Coder Reliability in the Interview Phase

Interview Number	Total Number of Codes	Number of Agreements	Number of Disagreements	Inter-Coder Reliability
2	37	17	3	91.89
4	31	13	5	83.87
13	34	16	2	94.12
15	38	18	2	94.74
Total	140	64	12	91.43

The Delphi process is an iterative method designed to examine and assess the degree of expert consensus in order to reach an acceptable level of agreement on a complex issue. In this process, participants—while maintaining mutual anonymity—evaluate the subject matter purely from a professional perspective, free from bias or preconceived opinions. A critical aspect of this analytical process is its repetition until theoretical saturation is achieved. Hsu and Sandford (2007), drawing upon Ludwig's (1994) approach, describe the iterative process as follows:

Iterations refer to the feedback process, which is considered as a series of steps in which, at each stage, the researcher seeks to determine the extent of consensus regarding the phenomenon under investigation. The Delphi method serves as a primary tool for developing the final survey required to collect relevant data for evaluation and analysis in support of the research. The following figure illustrates a sample Delphi analysis process in two stages of achieving theoretical adequacy for the studied phenomenon.

Accordingly, the Delphi method can be defined as a structured approach to investigating a phenomenon through the participation of experts and interactive communication processes conducted over several rounds, aimed at achieving conceptual coherence regarding the subject under study. The Delphi technique is one of the group knowledge acquisition methods and is also applicable in decision-making about qualitative issues. This section presents a comprehensive theoretical framework for applying the Delphi technique in qualitative research. The proposed framework clearly outlines the principles of implementation and consensus in Delphi-based qualitative studies.

In this section, to confirm or reject the research components, the participation of experts (panel members) was used, based on two criteria: the mean score and the coefficient of agreement. The components derived from thematic analysis, shown in Table (4), were examined accordingly.

Table 4. Delphi Analysis (Round 1)

Overarching Themes	Organizing Themes	Mean	Agreement Coefficient	Result
Digital Competencies in Education	Management of modern technologies in the classroom	5.20	0.66	Confirmed
	Creating interactive and dynamic learning environments	5.93	0.81	Confirmed
	Cybersecurity and privacy in digital education	5.22	0.62	Confirmed
	Personalized learning through digital tools	6.10	0.79	Confirmed
	Teachers' professional development in the digital era	5.24	0.71	Confirmed
Transformational Competencies in Education	Creating sustainable changes in the educational system	5.28	0.67	Confirmed
	Competence in the perception of justice	6.00	0.80	Confirmed
	Transparency and accountability in educational management	5.50	0.70	Confirmed
	Innovation in teaching through research and data analysis	5.30	0.79	Confirmed
	Motivation and enthusiasm in teachers	5.29	0.75	Confirmed
Innovation-Driven Synergy	Digital collaboration and networking among teachers	5.97	0.67	Confirmed
	Aligning technology with cultural and social values	6.04	0.81	Confirmed
	Transformation in students' behavior and attitudes	5.42	0.72	Confirmed
	Improving infrastructure and efficiency in digital education	5.38	0.67	Confirmed

In the first round of the Delphi analysis, all organizing themes were approved, showing high mean scores and acceptable agreement coefficients (above 0.6). The highest mean score belonged to the theme *"Creating interactive and dynamic learning environments"* with a mean of 5.93 and an agreement coefficient of 0.81, indicating the high importance of creating engaging and participatory learning environments in digital education.

Additionally, the theme *"Aligning technology with cultural and social values"* had a mean of 6.04 and an agreement coefficient of 0.81, reflecting experts' recognition of the necessity of aligning technology with cultural and social contexts. In contrast, the lowest agreement coefficient belonged to *"Cybersecurity and privacy in digital education"* (0.62), indicating the need for further discussion and refinement in this area.

Overall, the results of the first round revealed a relative consensus among experts regarding the importance of digital and transformational competencies in education.

Table 5. Delphi Analysis (Round 2)

Overarching Themes	Organizing Themes	Mean	Agreement Coefficient	Result
Digital Competencies in Education	Management of modern technologies in the classroom	5.45	0.68	Confirmed
	Creating interactive and dynamic learning environments	5.84	0.71	Confirmed
	Cybersecurity and privacy in digital education	5.45	0.68	Confirmed
	Personalized learning through digital tools	6.20	0.84	Confirmed
	Teachers' professional development in the digital era	5.62	0.72	Confirmed
Transformational Competencies in Education	Creating sustainable changes in the educational system	5.50	0.73	Confirmed
	Competence in the perception of justice	6.00	0.80	Confirmed
	Transparency and accountability in educational management	6.10	0.82	Confirmed
	Innovation in teaching through research and data analysis	5.35	0.68	Confirmed
	Motivation and enthusiasm in teachers	5.62	0.77	Confirmed
Innovation-Driven Synergy	Digital collaboration and networking among teachers	5.50	0.78	Confirmed
	Aligning technology with cultural and social values	6.00	0.83	Confirmed
	Transformation in students' behavior and attitudes	6.10	0.82	Confirmed
	Improving infrastructure and efficiency in digital education	5.35	0.71	Confirmed

In the second round of Delphi analysis, both mean scores and agreement coefficients improved for most themes. The highest mean score belonged to the theme *"Personalized learning through digital tools"* with a mean of 6.20 and an agreement coefficient of 0.84, underscoring the growing importance of this concept in digital education. Similarly, the theme *"Transparency and accountability in educational management"* achieved a mean of 6.10 and an agreement coefficient of 0.82, highlighting experts' emphasis on the necessity of transparency in educational systems.

The agreement coefficient for the theme *"Cybersecurity and privacy in digital education"* increased to 0.68, demonstrating progress toward greater expert consensus on this issue. Overall, the results of the second round indicated an enhanced consensus among experts and the final confirmation of all themes.

After confirming the main components of the research, an Interpretive Structural Modeling (ISM) analysis was conducted to identify the most influential professional competencies of teachers based on digital leadership and transformational leadership indicators within Iraq's educational system.

To initiate this process, the components were first **coded** as shown in the following table.

Table 6. Codes Corresponding to Model Components

Component	Code
Management of modern technologies in the classroom	A
Creating interactive and dynamic learning environments	B
Cybersecurity and privacy in digital education	C
Personalized learning through digital tools	D
Teachers' professional development in the digital era	E

Creating sustainable changes in the educational system	F
Competence in the perception of justice	G
Transparency and accountability in educational management	H
Innovation in teaching through research and data analysis	I
Motivation and enthusiasm in teachers	J
Digital collaboration and networking among teachers	K
Aligning technology with cultural and social values	L
Transformation in students' behavior and attitudes	M
Improving infrastructure and efficiency in digital education	N

Based on the coding in this table, the components confirmed through the Delphi analysis were assigned defined symbols and notations for constructing the Structural Self-Interaction Matrix (SSIM). To form this matrix, the mode index was used for pairwise comparisons among indicators. Among the four possible types of relationships between indicators, the relationship that received the highest frequency of agreement among participants was incorporated into the final matrix.

By converting the relationship symbols of the SSIM matrix into zeros and ones according to the following rules, the reachability matrix can be obtained. The rules are as follows: (a) If cell (i, j) in the SSIM matrix has the symbol V, the corresponding cell in the reachability matrix takes the value 1, and its symmetric cell, i.e., cell (j, i), takes the value 0. (b) If cell (i, j) in the SSIM matrix has the symbol A, the corresponding cell in the reachability matrix takes the value 0, and its symmetric cell, i.e., cell (j, i), takes the value 1. (c) If cell (i, j) in the SSIM matrix has the symbol X, the corresponding cell in the reachability matrix takes the value 1, and its symmetric cell, i.e., cell (j, i), also takes the value 1. (d) If cell (i, j) in the SSIM matrix has the symbol O, the corresponding cell in the reachability matrix takes the value 0, and its symmetric cell, i.e., cell (j, i), also takes the value 0.

Table 7. Formation of the Reachability Matrix

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	-	1	0	1	0	-1	1	1	0	0	1	1	1	1
B	-1	-	-1	1	1	1	0	1	0	1	0	1	1	1
C	0	1	-	0	0	1	0	2	1	1	0	1	0	0
D	-1	-1	0	-	2	-1	1	1	1	1	1	2	2	1
E	0	-1	0	2	-	2	0	1	0	1	0	0	2	2
F	1	-1	-1	1	2	-	0	1	2	1	1	1	1	1
G	-1	0	0	-1	0	0	-	0	1	1	1	1	1	1
H	-1	-1	2	-1	-1	-1	0	-	1	1	1	1	1	1
I	0	0	-1	-1	0	2	-1	-1	-	1	1	1	0	1
J	0	-1	-1	-1	-1	-1	-1	-1	-1	-	1	0	0	1
K	-1	0	0	-1	0	-1	-1	-1	-1	-1	-	0	1	0
L	-1	-1	-1	2	0	-1	-1	-1	-1	0	0	-	1	1
M	-1	-1	0	2	2	-1	-1	-1	0	0	-1	-1	-	1
N	-1	-1	0	-1	2	-1	-1	-1	-1	-1	0	-1	-1	-

After obtaining the initial reachability matrix, its internal consistency must be ensured. For example, if variable 1 leads to variable 2 and variable 2 leads to variable 3, then variable 1 must also lead to variable 3. If this condition is not satisfied in the reachability matrix, the matrix must be corrected and any omitted relationships substituted. In the final matrix, corrections are indicated by *1. This relationship was calculated separately for all factors, and wherever a correction was needed, it was applied manually. Accordingly, the final reachability matrix is presented as follows:

Table 8. Formation of the Final Reachability Matrix

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C	1	1	1	1	1	1	0	1	1	1	1	1	1	1

D	0	0	1	1	1	1	1	1	1	1	1	1	1	1
E	1	0	1	1	1	1	1	1	1	1	1	1	1	1
F	1	1	1	1	1	1	1	1	1	1	1	1	1	1
G	0	0	0	1	1	1	1	0	1	1	1	1	1	1
H	0	1	1	1	1	1	0	1	1	1	1	1	1	1
I	1	0	0	1	1	1	0	1	1	1	1	1	1	1
J	0	0	0	0	1	0	0	0	0	1	1	0	1	1
K	0	0	0	1	1	0	0	0	0	0	1	0	1	1
L	0	0	0	1	1	0	1	1	1	1	1	1	1	1
M	0	0	0	1	1	1	1	1	1	1	1	1	1	1
N	0	0	0	1	1	1	0	1	0	1	0	0	1	1

After computing the final reachability matrix, the model levels must be determined. Accordingly, the input and output sets of each factor are identified, and if the outputs and the computed intersection set are identical, that factor belongs to the corresponding level. As noted, outputs are computed by identifying the cells in the first row that contain the value 1. If all factors belong to the same level, the model is single-level; otherwise, one proceeds to the next level. In the next level, the factors and their numbers are removed. For example, if the first factor belongs to Level 1, in the subsequent step this factor is removed and the number 1 is deleted from the input and output sets. The results of the factor stratification are presented below:

Table 9. Determining Level Factors

Level	**Factors Included**
Level 1	A
Level 2	B
Level 3	C
Level 4	D
Level 5	E
Level 6	F, G
Level 7	H, I
Level 8	J
Level 9	K
Level 10	L
Level 11	M
Level 12	N
Level 13	—
Level 14	—

A = Management of modern technologies in the classroom; ; B = Creating interactive and dynamic learning environments; ; C = Cybersecurity and privacy in digital education; ; D = Personalized learning through digital tools; ; E = Teachers' professional development in the digital era; ; F = Creating sustainable changes in the educational system; ; G = Competence in the perception of justice; ; H = Transparency and accountability in educational management; ; I = Innovation in teaching through research and data analysis; ; J = Motivation and enthusiasm in teachers; ; K = Digital collaboration and networking among teachers; ; L = Aligning technology with cultural and social values; ; M = Transformation in students' behavior and attitudes; ; N = Improving infrastructure and efficiency in digital education.

Based on the obtained results, a six-level model is designed as follows:

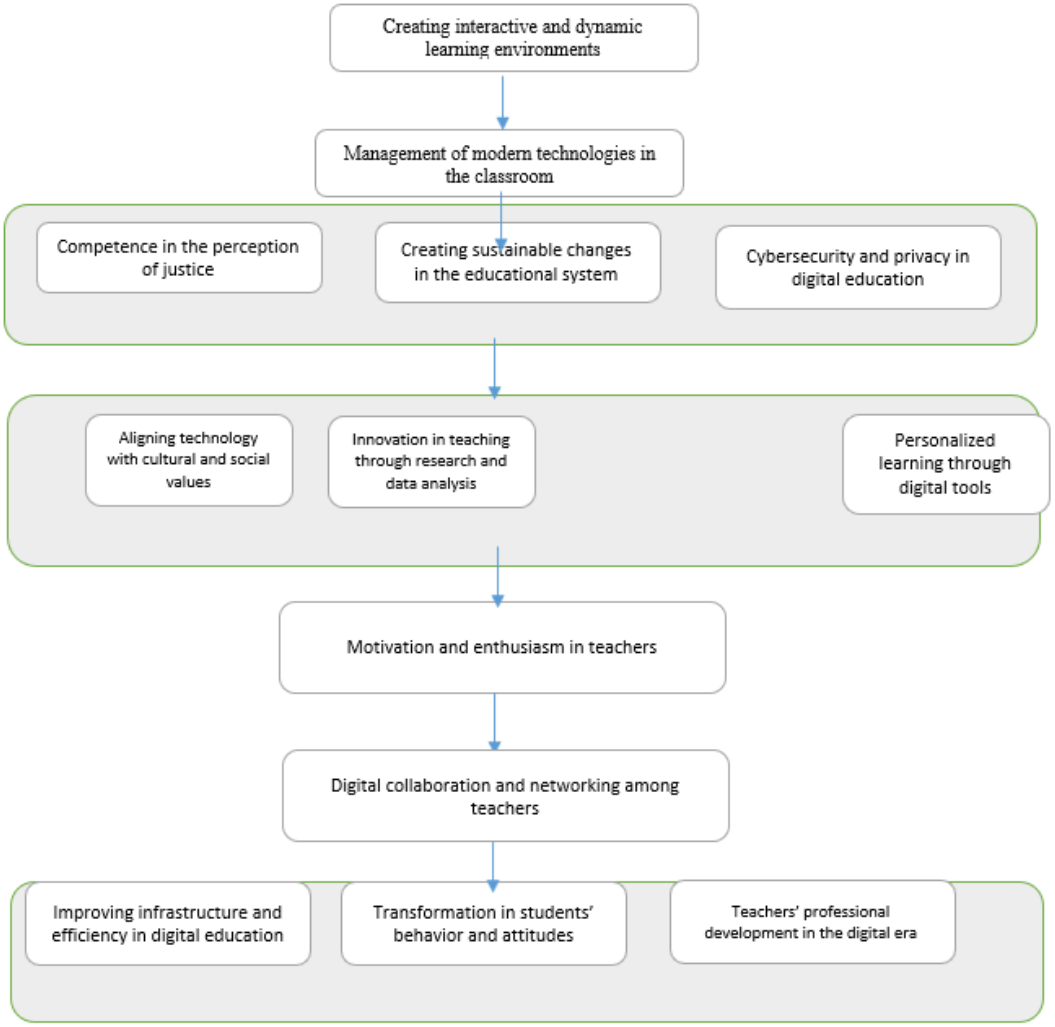

Figure 1. Relationships among the Factors Affecting Teachers' Professional Competencies Based on Digital Leadership and Transformational Leadership Indicators

The purpose of MICMAC analysis is to identify and analyze the driving power and dependence among the factors affecting teachers' professional competencies based on digital leadership and transformational leadership indicators in Iraq's educational system. In this analysis, the model components are divided into four categories according to their driving power and dependence. The first category includes autonomous variables, which have weak driving power and weak dependence. These factors are relatively disconnected from the system and have few and weak links with it. The second category comprises dependent factors, which have low driving power but strong dependence. The third category contains linkage factors, which have both high driving power and high dependence. These factors are non-stationary because any change in them can affect the system, and the system's feedback can, in turn, change these factors. The fourth category includes independent factors, which have strong driving power but weak dependence.

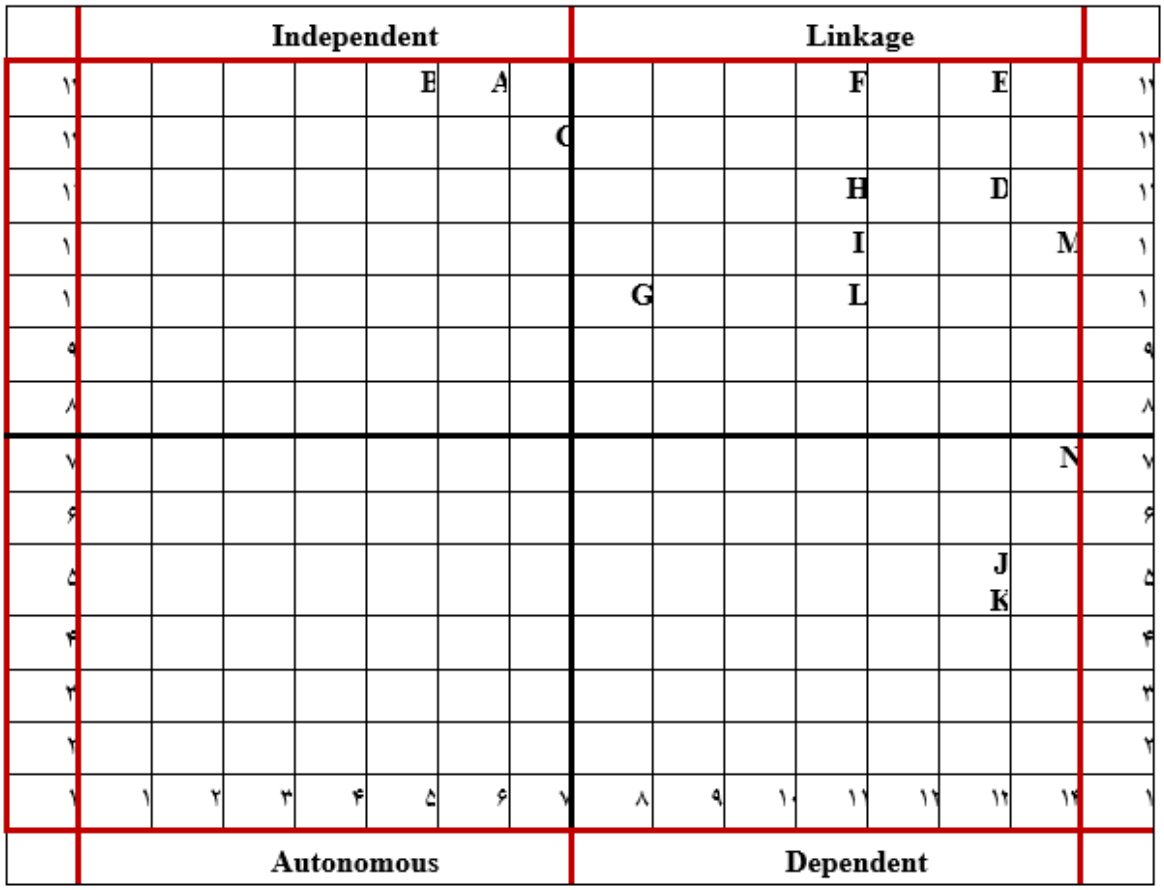

Figure 1. Placement of the Study's Components by Driving Power and Dependence (MICMAC)

As the results indicate, in the first quadrant—i.e., the autonomous quadrant—no components were placed. In the dependent quadrant, three components—*creating motivation and enthusiasm in teachers*, *digital collaboration and networking among teachers*, and *improving infrastructure and efficiency in digital education*—were located; although these have driving power below the desired level, they possess strong dependence. Therefore, these three components are influenced by the variables located in the independent quadrant. In the linkage quadrant, the components *personalized learning through digital tools*, *teachers' professional development in the digital era*, *creating sustainable changes in the educational system*, *competence in the perception of justice*, *transparency and accountability in educational management*, *innovation in teaching through research and data analysis*, *aligning technology with cultural and social values*, and *transformation in students' behavior and attitudes* were placed. Variables situated in the MICMAC linkage quadrant are those with both high influence and high dependence; thus, they require special attention and management to achieve system goals. Finally, in the independent quadrant, three components—*management of modern technologies in the classroom*, *creating interactive and dynamic learning environments*, and *cybersecurity and privacy in digital education*—were identified. These possess very high driving power in relation to teachers' professional competencies based on digital leadership and transformational leadership indicators in Iraq's educational system, and the component *creating interactive and dynamic learning environments* exhibits higher driving power compared with the others.

Discussion and Conclusion

The findings of the present study, which sought to design a professional competency model for teachers based on digital leadership and transformational leadership indicators in the Iraqi educational system, revealed that teachers' professional competencies are multidimensional and interconnected. Through the application of the Delphi technique and Interpretive Structural Modeling (ISM), fourteen core components were identified and hierarchically structured into six levels. The results demonstrated that three components—management of modern technologies in the classroom, creating interactive and dynamic learning environments, and cybersecurity and privacy in digital education—occupy the most influential level within the model, serving as key drivers for other competencies. This finding emphasizes that digital literacy and technological integration form the foundation for professional competency among teachers in the 21st century (10, 11). These components exhibited high driving power but low dependence, suggesting that strengthening these areas can stimulate improvements across other dimensions such as professional development, motivation, and educational innovation.

The results also indicated that competencies related to personalized learning through digital tools, teachers' professional development in the digital era, creating sustainable changes in the educational system, competence in the perception of justice, and transparency and accountability in educational management form a middle-tier cluster characterized by strong interdependence. This interrelation highlights that these competencies operate as mediating mechanisms that bridge digital and transformational leadership. Teachers who effectively integrate technology and adapt their teaching practices based on learners' needs can foster both academic performance and equity within educational institutions (9, 13, 16). The inclusion of justice perception and transparency as central competencies aligns with previous research emphasizing that ethical responsibility, fairness, and accountability are essential attributes of transformative educators (1, 3). In this context, the study reaffirms that professional competence extends beyond technical mastery to encompass moral and relational capacities that sustain trust and collaboration in schools.

In addition, the results revealed that competencies related to teacher motivation, digital collaboration among teachers, and infrastructure improvement in digital education occupy dependent positions within the MICMAC framework. These components possess high dependence but low driving power, suggesting that they are influenced by broader organizational and systemic conditions. When digital management and pedagogical innovation are well established, teachers' motivation and collaborative engagement are naturally enhanced (18, 21). These findings are consistent with Liikamaa's (2015) argument that professional development thrives in environments where technology integration and leadership support are structurally embedded (22). Similarly, Abdullah and Sentosa (2012) emphasized that sustained teacher motivation is a byproduct of competency-based professional ecosystems that prioritize continual learning, equitable opportunities, and psychological empowerment (7).

The hierarchical arrangement of competencies further revealed that digital leadership competencies serve as enablers of transformational leadership qualities. Specifically, the findings demonstrated that the ability to manage technology, ensure cybersecurity, and create digital learning environments directly influences teachers' capacity to implement innovative teaching, foster participatory learning, and drive systemic transformation (14, 20). This relationship supports prior evidence that technological proficiency acts as a catalyst for broader pedagogical change and leadership development (4, 5). In particular, the competency of "creating interactive and dynamic learning environments" emerged as a critical factor, consistent with global findings that emphasize the importance of engagement, collaboration, and learner-centered instruction in digital education (12, 25).

The emphasis on cybersecurity and privacy as a high-impact competency aligns with the growing global recognition of digital ethics and data protection in education (10). Previous studies have highlighted that digital transformation in education requires not only technical skills but also an understanding of privacy protection and responsible technology use (11). The experts in this study similarly stressed that without adequate attention to cybersecurity, the sustainability and credibility of digital education systems are at risk. This finding complements the work of Niroomand et al. (2012), who argued that technical competencies in technology-based organizations must integrate ethical and operational safeguards (9). Therefore, the inclusion of cybersecurity within the upper level of the model reflects a forward-looking approach to digital competency development in Iraq's education system.

Moreover, the results underscore that transformational competencies, including innovation in teaching, reflective thinking, and data-driven decision-making, are central to sustaining educational improvement. The factor "innovation in teaching through research and data analysis" demonstrated a strong relational influence, bridging digital practices with evidence-based pedagogy. This outcome resonates with previous research showing that data literacy enhances teachers' ability to evaluate learning outcomes and tailor instruction to student needs (6, 16). Similarly, Dubois et al. (2004) stressed that competency-based models grounded in measurable evidence foster continuous organizational learning (2). Within this framework, teachers act as reflective practitioners who continuously refine their methods through analysis and feedback.

The identified competency of "perception of justice" as a mediating factor also offers a novel contribution to the literature. It suggests that equity-oriented leadership is integral to the digital and transformational leadership model in education. When teachers perceive fairness in workload distribution, resource allocation, and recognition, their engagement and commitment increase substantially (3, 8). This is consistent with Bartram's (2005) model, which posits that fairness and ethical awareness form essential pillars of performance effectiveness (1). In the context of Iraq, where education systems must navigate cultural diversity and limited resources, justice perception functions as both a moral and practical competency.

The component "transparency and accountability in educational management" showed high dependence and interconnectedness with justice and sustainability competencies. This aligns with global research emphasizing the need for transparency in digital leadership as a mechanism to build stakeholder trust and institutional legitimacy (16, 26). Transparency in educational management is also consistent with the competency-based governance model advocated by Dubois et al. (2004), which integrates accountability mechanisms into human resource frameworks (2). Therefore, the findings affirm that transparent leadership enhances teachers' professional credibility and strengthens collective responsibility within educational institutions.

Furthermore, the results highlighted the significance of teachers' professional development in the digital era, which ranked as a key linking factor between digital leadership and transformational outcomes. The Delphi panel strongly emphasized that continuous professional learning is essential for sustaining innovation and adaptability. This corroborates prior evidence that professional development enhances teachers' cognitive flexibility and self-efficacy (13, 18). Similarly, Gruicic and Benton (2015) argued that emotional intelligence and mind–body awareness training improve teachers' resilience and problem-solving abilities, making professional development a holistic process rather than a purely technical one (12).

The MICMAC analysis further illuminated the systemic interrelations among competencies. The strong positioning of the variables within the linkage quadrant indicates that Iraq's educational transformation requires synchronized development of digital and transformational skills. These findings are consistent with international frameworks, such as the competency-based management systems outlined by Draganidis and Mentaz (2006), which emphasize the interdependency between behavioral and technical competencies (4). Similarly, Dreyfus (2008) demonstrated that managerial effectiveness is predicted by a

combination of cognitive, interpersonal, and strategic competencies (5). In the present model, digital competencies act as catalysts for behavioral change, while transformational competencies sustain long-term educational reform.

The emergence of "motivation and enthusiasm among teachers" as a dependent factor highlights the human dimension of competency-based education. Although motivation itself does not initiate change, it sustains commitment once enabling factors—such as digital readiness and professional recognition—are in place (21). Prior studies have shown that motivational constructs are directly linked to teachers' perceived competence and sense of belonging within the institution (7, 19). Therefore, while motivation depends on structural and cultural support, it remains indispensable for the successful implementation of competency-based frameworks.

Finally, the model validated in this study offers an integrated vision of teacher professionalism grounded in both technological fluency and ethical leadership. It aligns with global shifts toward competency-based human resource management and continuous improvement systems (15, 23). The combination of digital and transformational competencies ensures that teachers are not only equipped with modern tools but also capable of inspiring and guiding change within their institutions. As emphasized by Li (2024), technological engagement must be human-centered, balancing efficiency with empathy and ethical consideration (10). This perspective reinforces the study's finding that the most effective teachers in the digital age are those who combine technical mastery with relational intelligence and a transformative mindset.

Although the study provides valuable insights into the structure and interrelationship of teachers' professional competencies in Iraq's educational system, several limitations must be acknowledged. First, the research was conducted using the Delphi and ISM methods, which rely on expert judgment and may be subject to subjective bias despite methodological controls. The sample size of experts, though adequate for qualitative validity, limits the generalizability of the findings to all educational contexts. Additionally, the study focused exclusively on Iraq's educational system, where contextual variables—such as infrastructure quality, policy implementation, and cultural diversity—may influence competency development differently compared to other nations. Another limitation lies in the exclusion of direct classroom observation data, which could provide empirical validation for the theoretical model. Finally, the rapidly evolving nature of educational technology may render some competencies dynamic, necessitating periodic revision of the model to maintain relevance.

Future studies should employ mixed-method or longitudinal designs to empirically validate and refine the proposed competency model across different educational levels and geographical regions. Comparative analyses between Iraq and neighboring countries could also reveal regional patterns and contextual variations in digital and transformational leadership practices. Quantitative modeling techniques, such as structural equation modeling (SEM), may be used to test causal relationships among the identified competencies. Moreover, future research should explore how gender, teaching experience, and access to digital resources moderate competency development. In addition, investigating students' perspectives on teachers' digital and transformational competencies would provide a more holistic understanding of educational impact. Cross-sectoral studies integrating educational management with public administration and corporate leadership could further expand the theoretical applicability of this framework.

For practical implementation, policymakers and educational administrators should integrate the proposed competency framework into national teacher training and evaluation programs. Teacher education institutions should design curricula that balance digital skills, ethical reasoning, and leadership development. Continuous professional development programs must be institutionalized to ensure that teachers remain adaptive to technological and pedagogical innovations. Educational leaders should also establish mentorship systems and digital collaboration platforms that promote shared learning and knowledge exchange among teachers. Finally, national education authorities in Iraq should align competency-based standards with recruitment, promotion, and reward systems to create a sustainable culture of excellence and accountability in education.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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