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**ICT competencies for educational managers development
on the educational process: a systematic literature review**

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Abstract. *Problem statement.* The rapid advancement of information and communication technology (ICT) has transformed educational landscapes, necessitating effective leadership equipped with essential digital competencies. This research explores the ICT competencies educational managers require to successfully integrate technology into their institutions. This study aims to identify key competencies, explore barriers to ICT adoption, and highlight effective training practices through a systematic literature review of existing research. *Methodology.* Utilizing a comprehensive review methodology, relevant studies were analyzed to distil insights regarding educational leaders' roles in facilitating technology integration. *Results.* The findings reveal that essential ICT competencies include technical proficiency, information literacy, and pedagogical knowledge, which empower educational managers to foster innovative instructional practices. The review also identifies significant barriers, such as insufficient training and resistance to change, which vary in impact across different contexts. Furthermore, effective training practices are emphasized, including tailored programs and ongoing support, which are essential for developing and sustaining these competencies. *Conclusion.* This research contributes to educational management by providing a framework for understanding the necessary ICT competencies for educational leaders. It underscores the importance of addressing barriers to adoption and promotes best practices in professional development. By equipping educational managers with the requisite skills, this study aims to enhance the overall quality of education and prepare students for success in a digital world.

Keywords: digital competencies, educational leadership, technology integration, professional development, barriers to adoption

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Развитие ИКТ-компетенций менеджеров образования в процессе обучения: систематический обзор литературы

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Аннотация. *Постановка проблемы.* Стремительное развитие информационно-коммуникационных технологий (ИКТ) изменило образовательный ландшафт, потребовав наличия более эффективных руководителей, обладающих необходимыми цифровыми компетенциями. Рассматривается проблема развития компетенций в области ИКТ, необходимых руководителям образовательных организаций для успешной интеграции технологий в деятельность вверенных им учебных заведений. Цель статьи – выявление ключевых компетенций, изучение барьеров на пути внедрения ИКТ, выявление эффективных методов обучения посредством систематического обзора литературы, содержащей описания уже проведенных исследований. *Методология.* С помощью всестороннего анализа рассмотрены соответствующие исследования для формирования представления о роли руководителей образовательных организаций в содействии внедрению технологий. *Результаты.* Полученные данные показывают, что основные компетенции в области ИКТ включают технические навыки, информационную грамотность и знания в области педагогики, которые позволяют руководителям образовательных организаций внедрять инновационные методы обучения. Выявлены также значительные барьеры, такие как недостаточная подготовка и сопротивление изменениям, которые по-разному сказываются в различных ситуациях. Кроме того, особое внимание уделяется эффективным подходам к профессиональному развитию, включая индивидуальные программы и постоянную поддержку, необходимые для формирования и совершенствования описываемых компетенций. *Заключение.* Рассматриваемое исследование вносит вклад в развитие систем управления образованием, создавая основу для овладения руководителями образовательных организаций ИКТ-компетенциями. Подчеркивается значимость устранения препятствий на пути внедрения новых подходов, пропагандируется передовой опыт в области профессионального развития работников системы образования. Результаты исследования способствуют общему повышению качества образования, подготовке обучающихся к достижению успеха в цифровизируемом мире, поскольку предлагаемые подходы позволяют руководителям образовательных организаций приобрести необходимые знания и умения.

Ключевые слова: цифровые компетенции, лидерство в образовании, интеграция технологий, профессиональное развитие, препятствия для внедрения

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Problem statement. Integrating information and communication technology (ICT) in the contemporary educational landscape has transformed how educational institutions operate and deliver instruction. As educational managers play an essential role in implementing and overseeing these technological advancements, their competencies in ICT have become increasingly critical. This research focuses on the ICT competencies for educational managers development, exploring how these skills influence the educational process. Digital technologies have revolutionized educational practices, facilitating enhanced communication, collaboration, and resource access [1]. ICT tools have enabled the creation of interactive learning environments, promoting student engagement and personalized learning experiences. For educational managers, understanding and effectively utilizing these technologies is essential for fostering an innovative educational climate and improving institutional performance. Educational managers, including principals and administrators, are tasked with navigating the complexities of integrating ICT into curricula and administrative processes. They must possess technical skills and can lead change, motivate staff, and implement strategic initiatives that align with educational goals. As the demand for digital literacy grows, so does the need for managers to develop robust ICT competencies that can drive successful outcomes in the educational process [2]. Despite the recognized importance of ICT skills, educational managers face challenges in effectively acquiring and applying these competencies. Factors such as inadequate training, limited access to resources, and resistance to change can hinder their ability to leverage technology in educational settings. Consequently, there is a pressing need to explore the specific ICT competencies required for effective educational management and identify best development practices.

Current literature on ICT competencies often focuses on the perspectives of educators and students, with less emphasis on the unique needs of educational managers [3–5]. This gap underscores the necessity for a systematic review that consolidates existing research on ICT competencies for educational managers, highlighting effective practices, barriers to implementation, and the impact of these

competencies on the educational process. Integrating ICT in education can significantly enhance teaching and learning processes. Despite the widespread acknowledgement of ICT's importance, there is a notable gap in the necessary competencies among educational managers to harness these tools effectively. Educational managers may lack the technical skills to implement ICT solutions effectively. This includes understanding how to select appropriate technologies, integrate them into existing curricula, and troubleshoot issues that arise. Without adequate ICT competencies, educational managers may struggle to align technology with pedagogical goals, leading to suboptimal use of educational tools [6; 7]. This misalignment can hinder the overall effectiveness of teaching strategies and student engagement. Educational managers often encounter resistance from staff and stakeholders when attempting to implement new technologies [8]. This resistance can stem from a lack of understanding of the benefits of ICT, which may be exacerbated by the managers' uncertainty or discomfort with technology.

Current professional development programs frequently focus on teachers and students, neglecting the specific needs of educational managers. It was revealed that educational managers lack access to training tailored to their roles and responsibilities in a digital educational environment [9–11]. The inability to effectively integrate ICT can negatively affect student learning outcomes, as educational managers play a critical role in fostering an environment conducive to innovative teaching practices. This competency gap can lead to missed opportunities for enhancing student learning experiences and preparing them for a technology-driven workforce. Given these challenges, it is essential to systematically review the existing literature on ICT competencies for educational managers. This examination will help identify the specific skills needed, the barriers to developing these skills, and effective training practices that can empower managers to lead their institutions in the digital age. By addressing these issues, the study aims to enhance the capacity of educational managers, ultimately improving the educational process and outcomes for students. This systematic literature review seeks to:

- identify the key ICT competencies educational managers need to navigate the digital landscape effectively;
- analyze the barriers and facilitators influencing the development and application of these competencies;
- provide insights into effective training programs and strategies to enhance educational managers' ICT competencies.

By addressing these objectives, the study contributes to understanding how ICT competencies can be integrated into the professional development of educational managers, ultimately enhancing the educational process and outcomes. The findings of this research will provide valuable insights for policymakers, academic leaders, and training institutions. By identifying critical ICT competencies and effective development strategies, the study aims to support the professional growth of educational managers, enabling them to lead their institutions more effectively in an increasingly digital world. This research contributes to the academic discourse

on ICT in education and has practical implications for enhancing the overall quality of education.

Literature Review. Information and communication technology (ICT) competencies encompass a range of skills and knowledge essential for effectively utilizing technology in educational settings [12]. As academic institutions increasingly integrate digital tools into teaching and administrative processes, understanding what constitutes ICT competencies is vital for educational managers. ICT competencies use digital technologies effectively to access, manage, integrate, evaluate, and create information in various contexts [3; 13]. These competencies are technical skills, critical thinking, problem-solving, and the capacity to apply technology in a pedagogical framework. The International Society for Technology in Education (ISTE) defines digital competencies as the skills necessary to navigate and thrive in a digital world, emphasizing the importance of both technical proficiency and cognitive skills [14]. The literature identifies several key components that constitute ICT competencies for educational managers. **Technical Skills** include using hardware (e.g., computers, tablets) and software (e.g., learning management systems, educational apps). Managers must be able to operate various technologies effectively and understand their functionalities to support staff and students. **Information literacy** educational managers should be able to locate, evaluate, and use information effectively [15]. This involves critical thinking skills to assess the credibility of sources and the relevance of information for decision-making processes. **Pedagogical knowledge** that integrates ICT into teaching practices is crucial. Educational managers must know how technology can enhance learning experiences and support different pedagogical approaches, such as collaborative learning and personalized instruction [16–19]. ICT requires strong leadership abilities. Educational managers must be capable of guiding staff in technology adoption, fostering an innovative culture, and addressing resistance to change. They should promote responsible use of technology among staff and students.

The European Framework for the Digital Competence of Educators (DigCompEdu) outlines the competencies educators need to integrate technology into teaching effectively [20]. It emphasizes professional engagement, digital resources, teaching and learning, assessment, and enhancing learners' digital competence. **The UNESCO ICT Competency Framework for Teachers** provides a comprehensive model for understanding the competencies required for effective teaching with ICT [21]. It encompasses three key areas: technology literacy, pedagogical knowledge, and the ability to integrate technology into educational practices. For educational managers, possessing ICT competencies is essential for several reasons: Managers with a strong understanding of ICT can lead initiatives that effectively incorporate technology into curricula, improving teaching and learning outcomes [5]. Competent managers can identify training needs and facilitate professional development opportunities for staff, ensuring that all educators are equipped to use technology effectively [22]. By leveraging ICT competencies, educational managers can streamline administrative processes,

enhance communication, and improve institutional performance. As educational institutions evolve in the digital age, the development and refinement of ICT competencies will remain a priority for academic managers.

The Role of ICT in Educational Management. Integrating Information and Communication Technology (ICT) in educational management has fundamentally transformed how educational institutions operate and deliver services. One of the primary roles of ICT in educational management is to enhance administrative efficiency [23]. Technology facilitates the automation of routine tasks such as scheduling, enrollment, and record-keeping, thus reducing the administrative burden on staff. For example, Learning Management Systems (LMS) allow for streamlined communication between educators and students, enabling efficient course management and resource distribution [24; 25]. Research indicates that using administrative software can significantly reduce time spent on paperwork, allowing educational managers to focus on more strategic tasks [26]. Furthermore, ICT tools can improve data management, making tracking student progress easier, analyzing performance metrics, and generating reports that inform decision-making processes. ICT plays a crucial role in supporting data-driven decision-making within educational institutions. Educational managers can leverage data analytics tools to gather insights from various sources, including student performance data, attendance records, and stakeholder feedback. This data-driven approach enables managers to make informed decisions that enhance institutional performance and address challenges effectively.

Data visualization tools can also help managers present findings to stakeholders, facilitating transparent communication and strategic planning. Effective communication is essential for successful educational management, and ICT significantly enhances communication channels within academic institutions [27–29]. Email, instant messaging, and collaborative platforms (e.g., Google Workspace, Microsoft Teams) enable seamless interaction among staff, students, and parents. Moreover, ICT fosters collaborative learning environments, where educators can share resources, collaborate on projects, and engage in professional development. This collaborative approach enhances teacher effectiveness and promotes a culture of continuous improvement within institutions. ICT's role extends beyond administrative functions, directly impacting teaching and learning processes. Educational managers with ICT competencies can lead initiatives integrating technology into the classroom, enhancing instructional practices and student engagement. Research shows that technology-enhanced learning environments can facilitate personalized learning experiences, allowing educators to tailor instruction to meet diverse student needs [30; 31]. Interactive tools like simulations and gamified learning platforms can make learning more engaging and accessible.

Furthermore, ICT enables access to a wealth of digital resources, including online libraries, educational apps, and open educational resources (OER). This accessibility enriches the curriculum and supports innovative teaching methods. The integration of ICT in educational management also plays a significant role in fostering professional development among educators. Educational managers can utilize

online training platforms, webinars, and virtual workshops to provide ongoing professional development opportunities for staff. Research emphasizes the importance of continuous learning for educators to effectively integrate technology into their teaching practices [32; 33]. By promoting ICT-related professional development, educational managers can empower teachers to enhance their pedagogical skills and adapt to evolving educational technologies. While the benefits of ICT in educational management are substantial, several challenges and barriers persist. Budget constraints, inadequate infrastructure, and resistance to change can hinder effective technology integration. Furthermore, not all educational managers possess the necessary ICT competencies to lead digital transformation initiatives successfully. Educational leaders must address these challenges by advocating for sufficient resources, providing targeted training, and fostering a culture of openness to change. As educational institutions continue to embrace digital technologies, educational managers must develop the necessary competencies to lead these initiatives effectively. By leveraging ICT, educational managers can enhance institutional performance and improve educational outcomes for students, ultimately preparing them for success in a technology-driven world.

ICT Competencies for Educational Managers. The rapid advancement of Information and Communication Technology (ICT) has underscored the need for educational managers to develop specific competencies that enable them to lead and manage technology integration within educational institutions effectively. Research has increasingly recognized the critical role ICT competencies play in enhancing the effectiveness of educational managers. Competencies in this context refer to the skills, knowledge, and attitudes that educational leaders must possess to utilize technology effectively in their administrative and pedagogical practices. Studies have identified various dimensions of ICT competencies, including technical skills, information literacy, pedagogical knowledge, and leadership abilities [3; 34]. It was emphasized that educational leaders must be proficient in using technology and foster a supportive environment that encourages staff and students to embrace ICT [35]. This dual focus on personal proficiency and leadership capacity is essential for effective technology integration.

Several frameworks have been developed to define and categorize the ICT competencies required for educational managers. **The International Society for Technology in Education (ISTE) Standards for Education Leaders** outlines essential competencies for academic leaders, emphasizing the importance of vision, learning culture, and strategic use of technology to enhance teaching and learning. These frameworks are valuable for guiding research and practice, helping clarify the competencies necessary for successful educational management in a digital age. Studies have consistently highlighted the need for educational managers to possess strong technical skills. This includes using various educational technologies, managing digital resources, and troubleshooting technical issues. Raman and Shariff found that educational managers with higher technical proficiency were more effective in leading technology initiatives within their institutions [36]. Research has emphasized the importance of information literacy as a core component

of ICT competencies. Educational managers must be able to evaluate digital information critically, make data-informed decisions, and guide staff in the responsible use of technology. Feng and Jih-Lian found that educational leaders who model effective information literacy practices positively influence the information literacy skills of their staff [37].

Effective educational managers understand how to integrate technology into teaching practices to enhance learning outcomes. It was highlighted that ICT competencies must include pedagogical knowledge, enabling managers to support teachers in utilizing technology to foster student engagement and learning [38; 39]. Davis and Brown indicate that successful technology implementation requires managers to possess change management skills, enabling them to navigate resistance and foster a culture of innovation. Educational managers' report a lack of access to targeted professional development programs focused on ICT competencies. Day and Schoemaker suggest managers may struggle to keep pace with rapidly evolving technologies without ongoing training [40]. Resistance from staff and stakeholders can create challenges for educational managers seeking to implement new technologies. Studies have shown that effective leadership is crucial in overcoming this resistance and fostering a supportive environment for technology adoption [41]. Limited financial and technological resources can hinder the ability of educational managers to develop and maintain ICT competencies. Research indicates that institutions with more robust support systems are better positioned to create the necessary competencies among their leaders [42]. The findings from previous research underscore the importance of developing ICT competencies among educational managers to enhance institutional effectiveness. Providing ongoing training and support tailored to the specific ICT competencies required for educational management can empower leaders to integrate technology effectively. Encouraging a culture that values technology integration and innovation can help mitigate resistance and promote collaborative approaches to using ICT in education. Ensuring educational managers have access to the necessary resources, including training, technology, and support staff, is vital for developing ICT competencies. By understanding the various dimensions of these competencies and the barriers to their development, educational institutions can better equip their leaders to drive successful technology integration and enhance overall educational outcomes.

While some studies have identified barriers to developing ICT competencies, more comprehensive research is needed to explore these barriers in depth. Factors such as institutional culture, resource availability, and professional development opportunities are often mentioned, but the interplay between these factors and their impact on competency development remains underexplored. A deeper understanding of these barriers can inform strategies to support educational managers in overcoming obstacles to technology integration. The dynamic nature of technology necessitates ongoing research to understand how ICT competencies evolve. Existing literature often treats ICT competencies and leadership practices as distinct focus areas, neglecting the potential synergies between the two. Research is needed to examine how ICT competencies can be integrated into broader leadership frameworks and

practices. Understanding this integration can help educational managers leverage technology for administrative efficiency and as a tool for fostering collaborative and innovative educational environments.

Methodology. The research design is a systematic literature review to synthesize existing studies on ICT competencies in educational management. This design enables a comprehensive understanding of the topic by aggregating findings from various studies, identifying trends, and highlighting gaps in the literature. A structured search strategy was developed to identify relevant literature. The following databases were utilized: Google Scholar, ERIC (Education Resources Information Centre), and Scopus. The search terms included a combination of keywords and phrases such as “ICT competencies”, “educational managers”, “informatization”, and “educational process”. Boolean operators (AND, OR) were employed to refine the search and yield precise results. A broad search was conducted to capture a wide range of studies. Identified duplicates across databases were removed to ensure a unique set of articles.

Titles and abstracts were reviewed against predefined inclusion and exclusion criteria to determine the relevance of each study. The following criteria were established to guide the selection of studies. *Inclusion Criteria:* Studies published in peer-reviewed journals, research focusing on ICT competencies relevant to educational managers. Publications from 2015 onward will ensure contemporary relevance. Studies available in English. *Exclusion Criteria:* Articles not addressing educational management contexts. Studies that do not present empirical data or are purely theoretical. Research focusing on primary or secondary education rather than higher education or administrative contexts.

The extracted data were organized into a systematic table for comparison and thematic analysis. A thematic analysis was conducted to identify recurring themes and patterns within the literature. Both a priori and a posteriori coding methods were applied to categorize data based on existing literature and newly identified themes. Key themes such as essential ICT competencies, barriers to adoption, and effective training practices were identified and analyzed for their implications on educational management.

Findings were synthesized to construct a narrative highlighting the current state of research, gaps, and recommendations for practice. While this systematic review aims to provide a comprehensive overview, several limitations were acknowledged: The selection of databases may have excluded relevant studies not indexed in the chosen platforms. Limiting the review to English-language publications may have omitted essential contributions in other languages. The focus on studies published after 2014 may overlook foundational research that is still relevant. This methodology ensures a rigorous and structured approach to understanding the development of ICT competencies among educational managers, providing a clear framework for the subsequent analysis and discussion of findings.

Results and discussion. *Essential ICT Competencies for Educational Managers.* The systematic literature review revealed several key themes related to the essential ICT competencies that educational managers must possess to lead and

innovate within their institutions effectively. These competencies are critical for navigating the complexities of technology integration in education and enhancing overall academic outcomes. One of the most frequently identified competencies is technical proficiency. Educational managers must be adept at using various digital tools and platforms. **Familiarity with Learning Management Systems (LMS)** enables managers to effectively oversee course delivery, student engagement, and resource allocation. Proficiency in data management and analytics tools is crucial for tracking student performance and institutional metrics, facilitating data-driven decision-making. Competence in using communication tools (e.g., email, video conferencing, collaboration platforms) is essential for fostering effective communication among staff, students, and parents. Studies consistently emphasize that technical proficiency enhances the manager's ability to perform administrative tasks and serves as a model for staff and students, promoting a culture of digital literacy [43; 44].

Information literacy emerged as a critical competency for educational managers, encompassing the ability to assess the credibility and relevance of online information sources to make informed decisions. Analyzing data and applying insights to improve educational practices is vital. This includes understanding trends in student performance and using data to inform curriculum development and resource allocation. Research indicates that educational managers with strong information literacy skills are better equipped to guide their institutions in leveraging data for continuous improvement and accountability [45]. Another essential competency identified in the literature is understanding how to integrate technology into pedagogical practices. Educational managers should know about **Effective Teaching Strategies**, including how various technologies can enhance teaching methods. This includes knowledge of collaborative learning, blended learning environments, and personalized instruction. Managers must be able to coach and support teachers in adopting technology in their classrooms, ensuring that technology use aligns with pedagogical goals. Studies highlight that educational leaders who understand pedagogical principles can better facilitate technology integration, improving teaching effectiveness and student engagement [46–48].

Effective leadership in ICT integration is vital, encompassing educational managers who must articulate a clear vision for technology integration that aligns with the institution's goals and values. This vision is critical for garnering buy-in from staff and stakeholders. Managing resistance to change and fostering a culture of innovation is essential. This includes strategies for encouraging staff collaboration, providing professional development, and creating an environment that embraces technological advancements. Research indicates that educational leaders who exhibit strong leadership and change management skills are more successful in implementing technology initiatives and achieving positive outcomes [26; 49]. An increasing theme in the literature is the importance of ethical considerations in the use of technology. Educational managers must advocate for responsible technology use among students and staff, emphasizing privacy, cybersecurity, and respectful online behavior. Competence in addressing digital equity issues is

essential to ensure that all students have access to the necessary technologies and resources, regardless of their socioeconomic background. Studies suggest that educational managers who prioritize ethical technology use contribute to a safe and inclusive learning environment, which is vital in today's digital age [50; 51]. The significant findings of this literature review underscore the essential ICT competencies required for educational managers. These competencies, including technical proficiency, information literacy, pedagogical knowledge, leadership, change management, and ethical technology use, are crucial for effective educational management in a technology-driven landscape. By focusing on these competencies, educational institutions can better prepare their leaders to navigate technology integration challenges and enhance the overall educational experience for students and staff.

Barriers to ICT Adoption. The literature review revealed several significant barriers that hinder the effective adoption of Information and Communication Technology (ICT) in educational management. Understanding these barriers is crucial for developing strategies to overcome them and facilitate successful technology integration. A recurring barrier highlighted in many studies is the lack of adequate training and professional development opportunities for educational managers. Educational institutions do not provide sufficient training programs tailored to the specific ICT competencies managers need. This deficiency often leaves leaders feeling ill-equipped to leverage technology effectively. Existing professional development programs may not keep pace with rapidly evolving technologies, leading to gaps in knowledge and skills among educational managers. One-time training sessions are often insufficient. Continuous professional development that grows with technological advancements is necessary to ensure managers remain competent. Studies emphasize that educational managers may struggle to implement ICT initiatives effectively without adequate training, limiting the potential benefits of technology integration. Resistance to change is another significant barrier identified across various studies. Institutional culture plays a critical role in the adoption of new technologies. If the culture does not support innovation, educational managers may face pushback from staff and stakeholders, hindering ICT implementation. Educators and administrators' express apprehension about adopting new technologies due to uncertainty regarding their effectiveness and potential disruptions to established practices. If educational managers do not effectively communicate the benefits of ICT adoption to their teams, it can lead to a lack of enthusiasm and commitment among staff, further exacerbating resistance. Research indicates that addressing these cultural and psychological barriers through effective communication and involvement of all stakeholders is essential for facilitating change [52; 53].

Limited resources are a significant barrier to ICT adoption in educational institutions. This theme encompasses several critical aspects. Schools and educational organizations face budget constraints that restrict their ability to invest in necessary technology infrastructure, software, and training. Insufficient technological infrastructure, such as unreliable internet access and inadequate

hardware, can severely limit the effectiveness of ICT initiatives. A shortage of qualified personnel to manage and support ICT initiatives can hinder the successful implementation of technology in educational settings. Studies suggest that addressing resource constraints through strategic planning, advocacy for funding, and partnerships can enhance the capacity of educational institutions to adopt and sustain ICT initiatives [54; 55]. A clear vision for ICT integration is essential for successful adoption, yet many educational managers struggle. Without clear technological integration goals, educational managers may struggle to align ICT initiatives with their institutions' overall mission. A lack of coherent strategy can lead to inconsistent ICT implementation across departments, resulting in fragmentation and reduced effectiveness. Engaging relevant stakeholders in the planning and implementation process is critical. When stakeholders are not involved, there can be a disconnection between the technology initiatives and the educational community's actual needs. Research highlights the importance of developing a comprehensive ICT strategy incorporating input from various stakeholders and setting clear, achievable goals to guide implementation [56; 57].

Effective Practices in ICT Training. The literature review highlighted several effective practices in ICT training for educational managers that can enhance their competencies and promote successful technology integration. These practices are essential for developing the skills and knowledge necessary for educational leaders to navigate the complexities of ICT adoption in educational settings. One of the most significant findings is the importance of tailored training programs that align with educational managers' specific needs and contexts. Conducting a thorough needs assessment before training helps identify the particular competencies educational managers require. This assessment ensures that training is relevant and addresses the unique challenges faced in different educational contexts. Training programs should offer customizable content that allows managers to focus on areas most pertinent to their roles, such as technical skills, leadership strategies, or pedagogical integration. Research indicates that training tailored to participants' needs increases engagement and improves skill retention [58]. The use of blended learning approaches, which combine traditional face-to-face instruction with online learning, emerged as an effective practice in ICT training. Benefits of this approach include: blended learning allows educational managers to engage with training materials at their own pace and convenience, accommodating their busy schedules. By incorporating various learning modalities, such as videos, interactive modules, and in-person workshops, blended learning caters to different learning styles and preferences, enhancing the overall training experience. Studies suggest that blended learning not only increases accessibility but also fosters a more engaging and interactive learning environment [19; 59].

Practical ICT training should extend beyond initial workshops, including ongoing support and mentorship. Regular follow-up sessions can reinforce learning and provide opportunities for educational managers to ask questions and discuss challenges encountered in implementing new technologies. Establishing peer mentorship programs allows experienced educational managers to support their colleagues

in navigating technology integration, sharing best practices, and providing guidance. Research indicates that ongoing support significantly enhances the sustainability of ICT training efforts and helps build a culture of continuous improvement among educational leaders [60; 61]. Promoting collaborative learning environments during ICT training is another effective practice identified in the literature. Collaborative tasks and group discussions encourage participants to share experiences, insights, and strategies for ICT implementation, fostering a sense of community among educational managers. Providing opportunities for networking with peers from other institutions can facilitate the exchange of ideas and resources, promoting wider adoption of effective practices. Studies show collaborative learning enhances skill development and strengthens professional relationships, creating a supportive network for ongoing education.

Training programs incorporating real-world scenarios and case studies are particularly effective in preparing educational managers for their practice challenges. Training should include hands-on activities that allow managers to apply their learning to real-life situations, enhancing their problem-solving skills and confidence in using technology. Successful ICT integration in educational settings helps managers understand the strategies and considerations involved in practical implementation. Research indicates real-world applications deepen learning and make training more relevant and impactful for educational managers [62]. By implementing these practices, educational institutions can enhance the competencies of their managers, leading to more successful technology integration and improved educational outcomes. These insights highlight the necessity of investing in comprehensive training programs that empower educational leaders to navigate the challenges of the digital age effectively.

Conclusion. This systematic literature review has synthesized key findings related to ICT competencies for educational managers, revealing several critical insights essential for effective technology integration in academic settings. Educational managers must blend technical proficiency, information literacy, and pedagogical knowledge. These competencies are foundational for leveraging technology to enhance teaching and learning, facilitating data-driven decision-making, and supporting innovative instructional practices. The review identified significant barriers to ICT adoption, including insufficient training, resistance to change, resource constraints, and a lack of clear vision. These barriers vary in severity based on contextual factors, highlighting the need for tailored strategies to address specific challenges faced by educational institutions.

The analysis presented effective practices in ICT training, emphasizing the importance of tailored programs, blended learning approaches, and ongoing support. Continuous professional development is critical to ensure educational managers remain competent and confident in using technology. This review provides a comprehensive framework to guide training programs and professional development initiatives by identifying and synthesizing the essential ICT competencies for educational managers. This framework is vital to ensuring that educational leaders are well-prepared to navigate the complexities of technology

integration. The findings highlight specific barriers to ICT adoption, offering insights that can inform policy and practice. Understanding these barriers allows educational institutions to develop targeted interventions that address their unique challenges, thereby enhancing the effectiveness of technology initiatives.

The review emphasizes effective practices in ICT training, contributing to the discourse on professional development for educational managers. By showcasing successful training models, this research can serve as a resource for institutions seeking to improve their training offerings and foster a culture of continuous learning. In conclusion, integrating ICT in educational management is not merely a technical endeavor but a transformative process that requires educational leaders to be equipped with the right competencies, supported by practical training and professional development. The findings from this literature review underscore the importance of a strategic and context-sensitive approach to technology adoption, recognizing that successful implementation hinges on addressing barriers and fostering a culture of innovation. By prioritizing the development of ICT competencies among educational managers, we can enhance the quality of education and better prepare students for success in an increasingly digital world.

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