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ІННОВАЦІЇ В ПРОФЕСІЙНІЙ ПІДГОТОВЦІ АДМІНІСТРАТОРІВ НАУКОВИХ ДОСЛІДЖЕНЬ У США ТА УКРАЇНІ: ТЕХНОЛОГІЧНИЙ ПІДХІД

Анотація. В останні роки сфера управління науковою роботою в університетах зазнала значних трансформацій шляхом розширення функцій адміністраторів наукових досліджень та включення до їх обов'язків питань стратегічного планування, управління проектами, пошуку джерел фінансування та контролю за дотриманням законодавчих вимог. На цю трансформацію значною мірою вплинули інноваційні технології, які спростили різні аспекти їх обов'язків - від управління інформацією до планування проектів й пошуку фінансування. Більше того, інтеграція технологій в освіту адміністраторів наукових досліджень надала їм можливість брати участь у прийнятті стратегічних рішень та адаптуватись до мінливого дослідницького середовища. Застосування інноваційних навчальних методик змінило підходи до підготовки адміністраторів наукових досліджень. Платформи електронного навчання, симуляції, гейміфікація, віртуальна реальність, доповнена реальність, штучний інтелект та аналіз даних забезпечують отримання здобувачами освіти різноманітного і динамічного навчального досвіду, що задовольняє їх різнопланові професійні потреби. Порівняльний аналіз підготовки адміністраторів наукових досліджень в Україні та США свідчить про глобальне розмаїття підходів до організації їх навчання. Однак очевидним є і виклики, що пов'язані з цифровою грамотністю та ресурсними обмеженнями, що підкреслює необхідність транскордонної співпраці для вирішення цих питань та впровадження найкращих практик в управління науковою роботою. Зроблено висновок, що адміністратори наукових досліджень тепер краще підготовлені до виконання своїх багатограних ролей завдяки технологіям та інноваційним методам навчання. Глобальний контекст підготовки фахівців з управління науковими дослідженнями створює можливості та виклики, які потребують постійної уваги та адаптації. Необхідні подальші дослідження в цій галузі щодо оцінки ефективності різних методик навчання, довгострокового впливу технологій, вивчення успішних моделей транскордонної співпраці, вирішення проблем цифрової грамотності, проведення аналізу стратегій управління змінами та адаптації до безперервного технологічного прогресу. Ці майбутні напрями досліджень спрямовано на поглиблення розуміння, як адміністратори наукових досліджень можуть успішно виконувати свої функції в дослідницькому середовищі, що постійно змінюється.

Ключові слова: вища освіта; адміністрування наукових досліджень; професійна підготовка; адміністратори наукових досліджень; інновації в освіті; технологічний підхід.

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INNOVATIONS IN PROFESSIONAL TRAINING OF RESEARCH ADMINISTRATORS IN THE USA AND UKRAINE: A TECHNOLOGICAL APPROACH

Abstract. The evolving landscape of research management and administration at the universities has seen remarkable transformations in recent years, expanding the role of research administrators to include strategic planning, project management, funding acquisition, and regulatory compliance. This transformation has been significantly influenced by innovative technologies, streamlining various aspects of their responsibilities, from data management to project planning and funding identification. Moreover, the integration of technology has enhanced their ability to contribute to strategic decision-making and adapt to evolving research environments. Innovative training methodologies have reshaped research administrators' education, with e-learning platforms, simulation, gamification, virtual reality, augmented reality, artificial intelligence, and data analytics offering diverse and dynamic learning experiences that cater to the varied needs of research administrators or managers. A comparative analysis of research administration and management training in Ukraine and the United States reveals the global diversity in training approaches. However, challenges related to digital literacy and resource constraints are evident, underscoring the need for cross-border collaborations to address these issues and promote best practices in research administration and management. As a result of these findings, research administrators are now better equipped to excel in their multifaceted roles, thanks to technology and innovative training methods. The global landscape of research administration training presents opportunities and challenges

that require ongoing attention and adaptation. Further research in this field is warranted, focusing on evaluating the effectiveness of various training methodologies, assessing the long-term impact of technology integration, exploring successful cross-border collaboration models, addressing digital literacy challenges, and investigating the adaptation to continuous technological advancements and change management strategies in this field. These future research directions aim to enhance the understanding of how research administrators can thrive in the ever-evolving research landscape.

Keywords: higher education; research administration and management; professional training; research administrators; innovations in education; technological approach.

Introduction. The evolving landscape of research administration and management has witnessed profound transformations in the recent years [13]. In response to these changes, the roles and responsibilities of research administrators have transcended the traditional boundaries of research administration. In the contemporary era, research administrators or managers are entrusted with a diverse range of functions that encompass strategic planning, project management, securing funding from various sources, and adeptly navigating intricate regulatory frameworks [12]. To effectively respond to this multifaceted paradigm, the incorporation of innovative methods and cutting-edge technologies has become instrumental in shaping the professional training of research administrators. The rationale for this study is grounded in the urgency of adapting research administration and management practices to align with the dynamic research landscape, where technology plays a central role. As research administrators face ever-expanding roles and responsibilities, the study recognises the necessity of understanding and implementing innovative approaches to training that empower these professionals with the skills and knowledge essential for success in their evolving roles. The comparative analysis between Ukraine and the United States allows for a comprehensive examination of how these transformative innovations are being adopted and adapted in different settings, providing valuable insights and potentially identifying best practices that can be applied on a broader scale. Ultimately, this study serves as an essential step toward ensuring that research administrators are equipped to thrive in the modern research and development environment.

In the above context, this article **focuses on** identifying these transformative innovations, with a specific examination of the experiences and strategies employed in both Ukraine and the United States. By doing so, it **aims** to provide valuable insights into the evolving nature of research administration and management training within this increasingly technological context.

Analysis of relevant research. The study has uncovered pertinent literature that underscores both the transformative role of research administrators in the technological landscape and the innovative training approaches reshaping research administrator education. It has become evident that in today's context, the role of research administrators has undergone a significant and multifaceted transformation, necessitating them to exhibit versatility and forward-thinking capabilities [1]. This evolution signifies a fundamental shift in the field of research administration and management, where research administrators now find themselves entrusted with a diverse array of responsibilities that extend well beyond traditional research administration [5; 2]. These responsibilities have expanded to encompass a wide range of crucial functions that play a pivotal role in the dynamic world of research and development.

This diversification of roles underscores the need for research administrators to be adaptable, innovative, and well-equipped to address a broad spectrum of tasks. These functions encompass:

1). *Strategic Planning.* Research administrators are now expected not only to formulate but also to execute strategic research plans that align with and contribute to their organization's overarching goals. This entails gaining an in-depth understanding of the organization's strategic vision and the capacity to translate it into actionable research strategies that drive progress and innovation.

2). *Project Management.* Proficiency in project management methodologies is paramount for the successful execution of research initiatives. Research managers need to be well-versed in project planning, execution, and monitoring, ensuring that research projects remain on track, within budget, and meet predefined objectives. Effective project management tools and techniques are indispensable for achieving these outcomes.

3). *Funding Acquisition.* Identifying and securing funding from a diverse range of sources has evolved into a central aspect of research administration. Research administrators are now actively involved in the pursuit of funding opportunities, such as grants, scholarships, and other financial support options. This responsibility necessitates not only identifying these opportunities but also effectively managing the allocation and tracking of research budgets, which is crucial for the sustainability of research projects.

4). *Regulatory Navigation.* Research administrators must adeptly navigate a complex web of regulatory requirements to ensure compliance with established standards and ethical guidelines. This encompasses staying updated with evolving compliance standards, including those related to research ethics and legal requirements. Research administrators need to ensure that research projects align with these standards and operate within a framework of best practices [4; 12].

Overall, this expansion of roles and responsibilities in research administration and management signifies a shift towards a more comprehensive and integrated approach to research and development. Research administrators must possess a holistic skill set that encompasses strategic thinking, effective project

management, resource acquisition, and regulatory acumen, making them pivotal figures in the contemporary research landscape. This adaptability to multifaceted demands is vital for the effective administration of research initiatives and the achievement of organisational objectives.

The role of technology has played a significant and transformative part in the evolution of research administrators' responsibilities. Figure 1 presents some key aspects of how technology has influenced this evolution.



Fig. 1. Technological Impact on the Evolution of Research Administrators' Responsibilities (based on [9])

The Figure 1 illustrates how technology has played an important role in reshaping the responsibilities of research administrators and managers across a spectrum of critical functions. The impact of technology is most notably observed in data management and analysis, wherein research administrators now have the ability to efficiently handle vast quantities of data using advanced tools and analytics software. This capability is vital in a data-driven decision-making era, enabling research administrators and managers to not only collect, store, and process data but also to glean valuable insights from it. The prominence of big data tools and analytics software is indicative of the central role technology plays in optimising research outcomes by leveraging data resources. Project management tools are presented as indispensable in the contemporary research administration and management landscape. These tools enhance the planning, organisation, and monitoring of research projects, ensuring streamlined workflows, effective collaboration, and, most significantly, on-time and on-budget project delivery. This aspect underscores technology's role in enhancing efficiency and project success, crucial for research administrators in fulfilling their multifaceted roles. The revolution in funding identification and management is a testament to technology-driven advancements in this domain. Research administrators now have access to online databases and platforms that simplify the identification of various funding opportunities, ranging from grants to scholarships. This technological

facilitation extends to effective budget tracking and management, ensuring financial resources are optimally utilised. The Figure 1 also highlights technology's role in navigating the complex landscape of regulatory compliance and ethics. Research administrators are aided by technology in monitoring and adhering to multifaceted research regulations. The use of research ethics software is particularly significant as it streamlines the ethical proposal review process, reinforcing the importance of ethical research conduct in the technological era. Strategic planning and decision support, enabled by technology, are critical aspects of the modern research administration and management paradigm. Research administrators have access to strategic planning software and decision support systems, offering insights and data-driven guidance. This technology empowers research administrators to align research strategies with organisational goals and make evidence-based decisions, thereby enhancing the strategic contribution of research in the contemporary setting. Communication and collaboration tools, essential for global interaction, emphasise technology's role in overcoming geographical barriers. The Figure 1 reveals the criticality of video conferencing, project management, and cloud-based collaboration tools, which are fundamental for managing geographically dispersed research teams and enhancing communication. Furthermore, technology has revolutionised the dissemination of research findings. The use of open-access repositories, online journals, and multimedia platforms promotes wider accessibility, fostering knowledge transfer and aligning with modern principles of open science. Lastly, technology's impact is also reflected in training and development, where research administrators and managers can access online training programs and e-learning platforms. This empowers them with the latest skills required in their evolving roles, reaffirming technology's significance in preparing research administrators for the contemporary research landscape. Overall, the Figure underscores the transformative role of technology in research administration, as it permeates every facet of research administrators' responsibilities. Technology enhances efficiency, decision-making, collaboration, and knowledge dissemination, thus defining the modern research administration and management landscape.

This study also found a number of innovative methodologies and technologies that are driving advancements in the training of professionals in this field (see Figure 2).

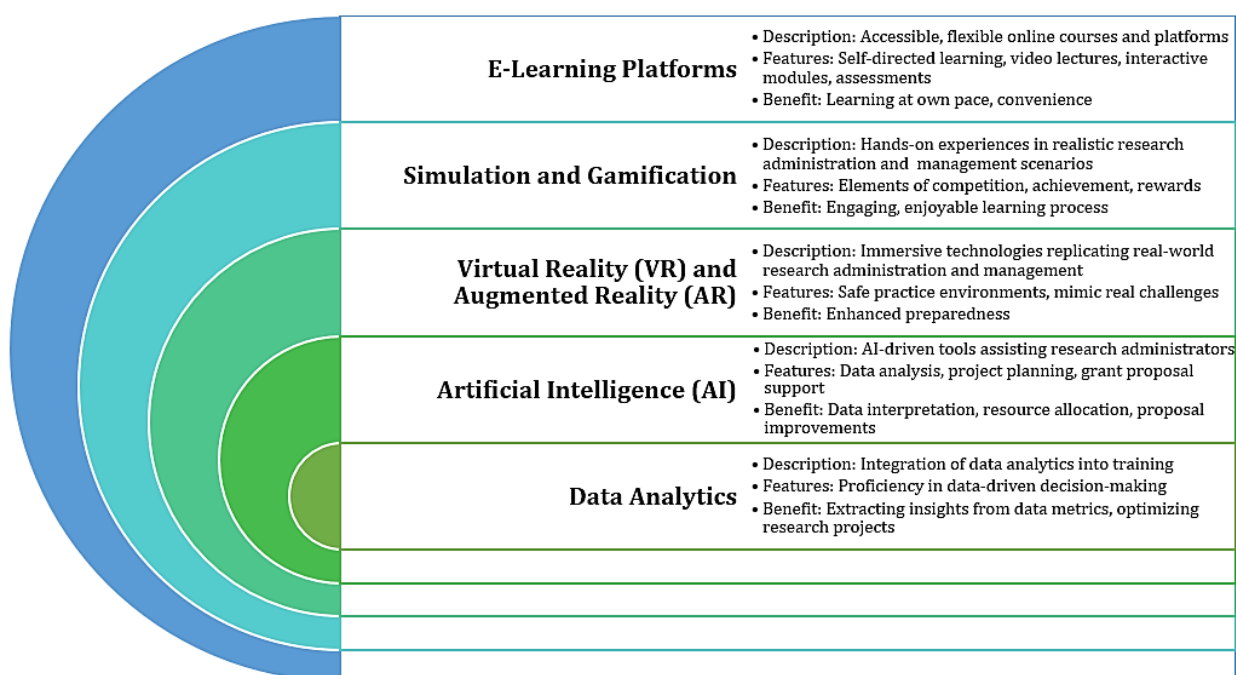


Fig. 2. Innovative Training Methodologies and Technologies for Research Administrators (adopted from [11] and [5])

Analysing the data presented in this Figure 2 reveals several key insights:

E-Learning Platforms: These platforms offer accessible and flexible online courses and resources. They facilitate self-directed learning, provide video lectures, interactive modules, and assessments. The primary benefit is that research administrators can learn at their own pace and convenience. This aligns with the trend of self-directed learning and the utilisation of digital resources for training [11]. It caters to research administrators' individual learning preferences and busy schedules.

Simulation and Gamification: This methodology offers hands-on experiences within realistic research administration and management scenarios. By incorporating elements of competition, achievement, and rewards, it creates an engaging and enjoyable learning process. It is evident that the use of gamification

elements in training is in line with the principles of experiential and active learning, making it more effective and appealing to learners.

Virtual Reality (VR) and Augmented Reality (AR): These immersive technologies replicate real-world research management situations, providing trainees with safe environments to practice and simulate real challenges. The benefits include enhanced preparedness, aligning with the concept of experiential learning and the development of practical skills.

Artificial Intelligence (AI): AI-driven tools offer support in data analysis, project planning, and grant proposal development. They contribute to data interpretation, resource allocation, and proposal improvements. The use of AI aligns with the growing trend of incorporating technology for efficiency in research-related tasks, improving decision-making through data analysis.

Data Analytics: This involves the integration of data analytics into training, fostering proficiency in data-driven decision-making. It equips research administrators with the skills needed to extract valuable insights from data metrics and optimise research projects. The increasing emphasis on data-driven decision-making is evident. Overall, the data in Figure 2 underscores that these innovative methodologies and technologies are making research administrator training more engaging, accessible, and adaptable to the evolving demands of the role. They cater to diverse learning preferences and align with the contemporary trend of using technology to enhance professional development and skill acquisition.

Research Methods. A combination of qualitative research methods was employed to gather data for this study [6]. These methods encompassed the following:

1. *Literature Review:* Initially, a comprehensive literature review was conducted, focusing on the existing body of work related to research administration and management, technological advancements in research, and innovative training methods for research managers. This step aimed to establish the current state of knowledge, identify research gaps, and construct a theoretical framework for the study.

2. *Comparative Analysis:* A comparative analysis was performed to examine the distinctions and commonalities between Ukraine and the United States concerning their approaches to training research administrators and integrating technology.

3. *Case Studies:* The research included in-depth case studies based on document analysis. These case studies were designed to provide profound insights into how technology and innovative training methods are put into practice and their tangible impact in both Ukraine and the United States.

By employing these qualitative research methods, this study was able to capture a nuanced and comprehensive view of the evolving roles of research administrators and the influence of technology on their training and responsibilities.

Results. The research findings provided were drawn from comparative analysis and case study analysis. A comparative analysis of the innovative approaches to training research administrators in Ukraine and the United States shed light on the distinctive strategies adopted in each context.

Ukraine: In Ukraine, there has been a significant emphasis on democratising access to research management training through the utilisation of e-learning platforms [3; 8]. These platforms have played a pivotal role in making training programs more accessible to a broader audience. Both governmental and non-governmental initiatives have contributed to the widespread adoption of e-learning in the country. The Ukrainian government, in collaboration with educational institutions and organisations, has made efforts to develop and promote online resources for research manager training. This approach aligns with the broader goal of enhancing the research administration and management skills of professionals across various regions of Ukraine [2].

The United States: On the other hand, the United States has taken a pioneering stance in integrating advanced technologies like virtual reality (VR) and artificial intelligence (AI) into research administration and management training [7; 10]. These innovative methodologies have been widely adopted, fostering immersive and data-driven learning experiences for research administrators. The U.S. training landscape reflects a collaborative effort involving universities, research institutions, and private organisations, all working collectively to embrace and implement these cutting-edge technologies. This cross-sector collaboration has led to the development of comprehensive training programs that leverage VR for realistic scenario-based learning and AI for data analysis and research optimisation.

The case studies analysis drawn illustrative successful implementations of innovative training approaches for research administrators from both Ukraine and the United States. These case studies offer a practical understanding of the benefits that technology-driven training provides to research administrators and the institutions they serve.

Ukraine Case Study: One illustrative example from Ukraine is the collaboration between the Ukrainian Ministry of Education and Science, local universities, and non-governmental organisations [3]. This partnership has led to the development of e-learning platforms that provide comprehensive training modules for researchers and other professionals involved in research administration and management. These platforms are easily accessible and cater to the varying needs of professionals across different regions of Ukraine. By

offering courses on project management, funding acquisition, and regulatory compliance, these platforms empower researchers and research administrators with the necessary skills to thrive in their evolving roles.

United States Case Study: In the United States, the collaborative efforts between universities, research institutions, and private organizations have resulted in cutting-edge research administration and management training. Virtual reality (VR) and artificial intelligence (AI) have been incorporated into training programs, offering immersive and data-driven learning experiences. Research administrators in the U.S. have the opportunity to engage in realistic, scenario-based training using VR, enabling them to practice decision-making and navigate complex research management situations. AI tools assist research administrators in data analysis, project planning, and grant proposal development. These case studies from the United States highlight the impact of cross-sector collaboration and the integration of advanced technologies in research administration and management training, preparing professionals for the multifaceted demands of their roles [7; 10].

These case studies exemplify how technology-driven training methodologies enhance the capabilities of research administrators, enabling them to excel in their multifaceted roles. By examining the successes of these implementations, we gain valuable insights into the practical advantages of innovative training approaches, contributing to the ongoing evolution of research administration and management training.

The study also specified challenges and opportunities driven by methodologies and technologies implemented in the training of research administrators. The conclusions are mainly based on the experience of training these professionals in the United States, which may be relevant for the domestic context as well. Recognising the challenges and opportunities inherent in the professional training of research administrators is essential for the ongoing enhancement of training programs. This study examined a range of issues and prospects, including challenges related to digital literacy, resource limitations, and adaptability, as well as the potential for cross-border collaborations to foster innovation.

Table 1.

Challenges and Opportunities in Research Administrator Training

Challenge / Opportunity	Description	Key Points
Digital Literacy	Addressing digital literacy issues among trainees is a primary challenge.	Research administrators need advanced digital skills
	Effective research administration and management in the modern era demands proficiency with technologies such as AI and data analytics.	
Resource Constraints	Resource limitations, including funding and access to advanced technologies, pose significant challenges.	Inadequate resources can hinder innovative training
	These challenges are particularly evident in regions with limited access to advanced technology.	
Adaptability	The continuously evolving research administration and management field requires high adaptability from trainers and trainees.	Adaptation to new methodologies and tools is crucial
	Training programs should foster adaptability as research paradigms shift and new technologies emerge.	
Cross-Border Collaborations	Challenges come with opportunities for improvement and innovation.	Collaborations enable resource and expertise sharing
	Collaboration among institutions, governments, and organisations can lead to standardised, globally relevant training programs.	Knowledge exchange and best practices dissemination
	These partnerships bridge resource gaps, ultimately promoting excellence in research administration and management.	

Table 1 provides a concise summary of key challenges and opportunities in the training of research administrators. A critical analysis of this data reveals several noteworthy points:

Digital Literacy. The challenge of addressing digital literacy among trainees underscores the rapidly changing field of research administration and management. The shift towards advanced technologies, such as AI and data analytics, reflects the broader digital transformation in research. The need for proficiency in these areas is critical, as research administrators are expected to handle vast amounts of data and make data-driven decisions. This highlights the essential role of technology literacy in the contemporary role of research administrators.

Resource Constraints. The challenge of resource limitations, particularly funding and access to advanced technologies, is a significant barrier to innovative training. Inadequate resources can impede the adoption of modern training methodologies and tools. This challenge is more stated in regions with limited access to advanced technology.

Adaptability. The adaptability of both trainers and trainees in response to the continuously evolving field of research administration and management is essential. It is emphasised that training programs should

foster adaptability to prepare research administrators for new methodologies and tools as research paradigms shift.

Cross-Border Collaborations. The table highlights the opportunities for improvement and innovation that come with cross-border collaborations. Such collaborations enable the sharing of resources and expertise among institutions, governments, and organisations. They also have the potential to lead to the development of standard training programs with global relevance. The emphasis on knowledge exchange and best practices dissemination is critical for enhancing research management.

Overall, while Table 1 outlines key challenges and opportunities in research administrator training, it could benefit from a more detailed exploration of potential solutions and examples of successful strategies for addressing these challenges and capitalizing on the opportunities. This would provide a more comprehensive and practical perspective for both educators and practitioners in the field of research administration and management.

Conclusion. The role of research administrators at universities has evolved significantly, expanding to encompass strategic planning, project management, funding acquisition, and regulatory compliance. Innovative technologies have played a significant role in this transformation, streamlining various aspects of their responsibilities, from data management to project planning and funding identification. Moreover, the integration of technology has fortified their capacity to contribute to strategic decision-making and adapt to evolving research environments. Innovative training methodologies have revolutionized research administrator education. E-learning platforms enhance accessibility, while simulation, gamification, VR, AR, AI, and data analytics offer dynamic and diverse learning experiences, catering to the varied needs of research administrators. A comparative analysis of training approaches in Ukraine and the United States underscores the global diversity in research administration and management training. However, challenges linked to digital literacy and resource constraints warrant attention. Cross-border collaborations offer the potential to address these challenges and promote best practices in research administration and management.

In light of these findings, further research is needed in assessment of training effectiveness. This research could focus on assessing the effectiveness of innovative training methodologies, such as e-learning, simulation, and AI-driven tools, in preparing research administrators for their evolving roles. Comparative studies could be conducted to determine which training approaches yield the best outcomes in terms of knowledge acquisition, skill development, and preparedness for real-world challenges. One more area for future investigation can be in long-term impact of technology integration. This could involve tracking the career trajectories and achievements of research administrators who have undergone training with a strong technological component. Such research would help in understanding how technology-enhanced training influences career advancement and contributions to research projects. Moreover, successful cross-border collaboration models would be a direction for the further research. Research could focus on partnerships between institutions, governments, and organisations that have effectively bridged resource gaps and enhanced the quality of training programs. Case studies from different regions could be compared to identify best practices. Further research can be also conducted in overcoming digital literacy challenges among research professionals. This could involve the development and evaluation of training programs designed specifically to enhance digital skills. One more area can be investigated which is global benchmarking. Comparative studies could benchmark research administration and management training programs in various countries, considering the unique cultural, regulatory, and technological contexts. This research could help identify the most effective strategies and technologies for different regions, promoting the global advancement of research administration and management. Adaptation of research administrators and higher institutions to the continuous technological advancements is also a relevant topic for the future research.

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