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# Educational leadership as a component of professional training for future masters in education

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## Abstract

The article explores the phenomenon of educational leadership as an integral component of the professional training of future master's degree students in education. The study examines key theoretical approaches to defining the concept of "educational leadership" and its role in the modern educational environment. Major leadership models in education, including transformational, distributed, and servant leadership, are analyzed in terms of their effectiveness in improving the management of the educational process. The article discusses the significance of educational leadership in teaching, educational management, and research activities, emphasizing its impact on preparing competent professionals capable of implementing innovations and fostering the strategic development of educational institutions. Particular attention is given to the methods and technologies used to develop leadership competencies in graduate students, including interactive learning methods (such as training sessions, case studies, and debates), the application of digital technologies, and the introduction of specialized leadership programs. The study identifies key barriers to the formation of leadership qualities, such as the insufficient integration of leadership disciplines into curricula, limited opportunities for practical application of acquired knowledge, and the lack of motivation among students to engage in leadership roles. The article outlines promising directions for improving the training of master's students in education, including expanding opportunities for practical training, integrating international best practices, and utilizing advanced educational technologies. Emphasis is placed on the importance of adapting global best practices in educational leadership training to the context of Ukrainian higher education. The study concludes that a comprehensive approach to fostering educational leadership is essential for the professional development of future master's students and for enhancing the overall effectiveness of the education sector.

**Keywords:** educational leadership, professional training, leadership competencies, teacher education, educational management, digital technologies, educational innovations

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# Освітнє лідерство як складова професійної підготовки майбутніх магістрів у галузі освіти

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## Анотація

У статті досліджується феномен освітнього лідерства як невід'ємна складова професійної підготовки майбутніх магістрів освіти. Розглядаються основні теоретичні підходи до визначення поняття «освітнє лідерство» та його роль у сучасному освітньому середовищі. Окреслено ключові моделі лідерства в освіті, зокрема трансформаційне, розподілене та сервісне лідерство, що сприяють підвищенню ефективності управління навчальним процесом. У статті аналізується значення освітнього лідерства у викладацькій діяльності, освітньому менеджменті та науковій сфері, що забезпечує підготовку компетентних фахівців, здатних до впровадження інновацій та стратегічного розвитку закладів освіти. Особлива увага приділена методам і технологіям формування лідерських компетентностей у магістрантів, серед яких інтерактивні методи навчання (тренінги, кейс-стаді, дебати), використання цифрових технологій та впровадження спеціалізованих лідерських програм. Визначено основні бар'єри у процесі формування лідерських якостей, зокрема недостатню інтеграцію лідерських дисциплін у навчальні програми, обмежені можливості практичного застосування набутих знань та недостатню мотивацію студентів до управлінської діяльності. Розглянуто перспективні напрями вдосконалення підготовки магістрів освіти, включаючи розширення можливостей практичного навчання, впровадження міжнародного досвіду та використання новітніх освітніх технологій. Наголошено на важливості адаптації кращих світових практик підготовки освітніх лідерів до умов української вищої освіти. Зроблено висновок про необхідність комплексного підходу до формування освітнього лідерства, що сприятиме професійному розвитку магістрів освіти та підвищенню ефективності освітньої сфери.

**Ключові слова:** освітнє лідерство, професійна підготовка, лідерські компетентності, педагогічна освіта, освітній менеджмент, цифрові технології, освітні інновації

**Statement of the problem.** In the modern educational space, the importance of educational leadership as a key factor in the successful modernization of the education system is rapidly growing. Globalization processes, digital transformation, increasing requirements for the quality of educational services, and the need to train competitive specialists determine the need to form a new type of pedagogical personnel who are able not only to effectively implement educational functions but also to act as initiators of change. Educational leadership is considered a fundamental component of the professional activity of a modern teacher, which involves the ability to manage the educational process,

strategic thinking, adaptability to change, team development, and the introduction of innovations.

The importance of educational leadership is especially relevant in the context of modern reforms in the education sector, which are aimed at democratizing the management of educational institutions, expanding academic autonomy, forming a competency-based approach to teaching, and focusing on high-quality training of future teachers. A modern educational leader is not just an administrator or teacher but an active agent of change who is able to promote the development of an innovative culture in the educational environment and motivate students and colleagues for continuous improvement and self-development.

### **The Analysis of Sources and Recent Research.**

The problem of educational leadership in modern research is considered one of the key factors in ensuring the effective functioning of educational institutions and the professional development of future teachers (Akimova et al., 2024a; Eadens & Ceballos, 2022; Kaufman & Stedman, 2022). The conditions of globalization, digital transformation, and reform of the education system create a need to train specialists who not only possess fundamental knowledge and teaching skills but are also able to perform managerial functions, make strategic decisions, and implement innovations (Fusarelli & Fusarelli, 2024; Nestulya, 2023).

Modern research indicates the growing role of educational leadership in improving the quality of education, forming an innovative environment, and adapting educational processes to new challenges (Hammad & Al-Harhi, 2021; Quinn & Quinn, 2020). Particular emphasis is placed on the fact that future masters of education should be prepared not only for teaching activities but also for the role of leaders who are able to influence educational policy, promote the development of pedagogical teams, and ensure effective interaction between participants in the educational process (Ni et al., 2022; Carson et al., 2023).

The issue of training educational leaders is gaining relevance in the context of international educational standards that provide for the formation of managerial competencies in teachers (Hanhimäki et al., 2023). In world practice, effective programs for training educational leaders focus on the development of strategic thinking, communication skills, change management, and the implementation of educational innovations (Hayes & Irby, 2019; Salem University, 2024).

At the same time, a number of challenges remain related to the insufficient integration of leadership components into the curricula of pedagogical universities, limited opportunities for practical training, and insufficient motivation of students to develop leadership qualities (Sapohov et al., 2023; Akimova et al., 2024b). Therefore, the need to improve the system of training future masters of education, focused on the development of leadership competencies, is an important task of pedagogical science, which requires further research and the development of effective methodological approaches.

**The Purpose of the article** is to analyze the importance of educational leadership as an important

component of the professional training of future masters in the field of education.

**The Results of the Research.** The concept of “educational leadership” is multidimensional and is studied within the framework of various scientific approaches. In modern pedagogical science, it is interpreted as a process of influence aimed at ensuring the development of the educational environment, improving the quality of the educational process and the effectiveness of the management of educational institutions. According to different approaches, educational leadership is defined as the ability to motivate and inspire the teaching staff to achieve common goals (Fusarelli & Fusarelli, 2024), as a managerial function of the head of an educational institution (Hammad & Al-Harhi, 2021), or as a key competence of a modern teacher, which includes strategic thinking, communication skills and the ability to self-reflect (Kaufman & Stedman, 2022).

In pedagogical theory, several main models of educational leadership are distinguished, each of which has its own conceptual foundations and impact on the educational process. One of the most influential is the transformational leadership model, which assumes the ability of a leader to change the educational environment, form a vision of development, and motivate others to professional growth (Eadens & Ceballos, 2022). Within this model, the educational leader does not simply perform managerial functions but also acts as an initiator of deep structural changes. Another important approach is the concept of distributed leadership, according to which managerial functions and responsibilities are distributed among all participants in the educational process, which contributes to the development of teamwork, autonomy, and effective decision-making (Ni et al., 2022). Another approach is service leadership, which emphasizes serving others as the main mission of the educational leader. In this model, the leader or educator acts in the interests of students, teachers, and the community, contributing to the creation of a conducive environment for learning and development (Hanhimäki et al., 2023).

The educational leader plays a key role as an agent of change in the education system. His personal qualities and professional competencies determine the effectiveness of management and the quality of the educational process. Researchers emphasize that for an educational leader, such traits as strategic thinking, emotional intelligence, the ability to innovate, and adaptability are important (Hayes & Irby, 2019). In

addition, in the modern educational environment, communication skills, the ability to work in a team, an orientation to continuous professional growth, and mastery of digital technologies are becoming important (Akimova et al., 2024a). Professional training of educational leaders in higher education institutions should include the development of managerial competencies, strategic planning skills, critical thinking, and the ability to anti-crisis management (Sapohov et al., 2023).

In accordance with modern educational standards, the training of Masters of Education is aimed at forming a set of knowledge, skills, and abilities that ensure their readiness to solve complex professional tasks in educational institutions of various levels. Leadership competencies, in particular, are a component of general and professional competencies that must be formed during the educational process. They include a strategic vision of the development of educational institutions, decision-making ability, communication skills, creativity, responsibility, and emotional intelligence. Scientists note that future Masters of Education must have the skills of effective team management, flexible response to the challenges of the educational environment, and building constructive interaction with students, colleagues, and other participants in the educational process (Akimova et al., 2024a).

One of the key aspects of training Masters of Education is the introduction of leadership competencies into the content of curricula. This is implemented through relevant disciplines, in particular, "Educational Leadership," "Educational Management," "Management Psychology," and other courses aimed at developing management skills, strategic planning, project management, and effective communication (Ni et al., 2022). An important approach to training future educational leaders is the integration of theoretical knowledge with practical experience. This is ensured through internships in educational institutions, student participation in research and management projects, as well as the use of the case method, role-playing games, and other active learning technologies that contribute to the development of decision-making and teamwork skills (Hanhimäki et al., 2023).

Research shows that the effectiveness of developing leadership competencies depends on the methods of their formation and the level of student involvement in the process of practical application of the acquired knowledge (Carson et al., 2023). In

particular, in the international experience of training Masters of Education, significant attention is paid to individual development trajectories, mentoring and coaching methods, which allow students not only to acquire knowledge, but also to develop personal qualities necessary for effective educational leadership (Fusarelli & Fusarelli, 2024).

In educational management, leadership determines the ability to effectively organize the work of an educational institution, strategically plan its development, motivate the teaching staff, and ensure the quality of the educational process. An educational leader as a manager performs the functions of change management, developing organizational culture, and building effective communications. Research shows that effective management in education is based on the concepts of transformational, distributed, and service leadership, which are aimed at cooperation, collective responsibility, and continuous improvement of educational processes (Fusarelli & Fusarelli, 2024).

In teaching, leadership is manifested through the teacher's ability to motivate students, promote their personal and professional development, implement innovative teaching methods, and create a productive educational environment. A teacher-leader not only transfers knowledge, but also acts as a mentor who is able to form critical thinking, creativity, and autonomy in students. The leadership qualities of a teacher play a crucial role in creating a motivational atmosphere that promotes students' involvement in active educational and scientific activities (Ni et al., 2022).

In scientific activities, leadership is realized through the researcher's ability to initiate and conduct innovative research, integrate into the international scientific community, involve students in scientific work, and influence the development of educational policy. Leaders in science contribute to the popularization of educational innovations, the creation of interdisciplinary research, and the implementation of scientific results in higher education practice (Hanhimäki et al., 2023).

Developing leadership skills in future masters of education is an important task of professional training. Effective methods for developing these competencies are project-based learning, problem-based learning, coaching, mentoring, as well as case methods, role-playing games, and simulations. Project-based learning involves students completing complex tasks that require strategic planning, decision-making, and team communication. Problem-based learning allows students to analyze real cases and propose ways to

solve them, developing critical thinking and responsibility skills.

Coaching and mentoring are effective tools for developing leadership qualities, as they involve individual work with future educators, helping them define their own professional goals, develop strategies for achieving them, and realize their own potential. Research shows that the coaching approach contributes to an increase in the level of self-reflection, self-confidence, and responsibility for decision-making (Carson et al., 2023).

Among the technologies for the formation of leadership competencies, digital platforms and interactive educational environments occupy an important place. The use of online courses, webinars, virtual simulations, and collaboration platforms allows students to develop communication skills, strategic thinking, and teamwork skills. A special role is played by integrated educational technologies that contribute to the personalization of learning and the development of management competencies necessary for leadership activities in education (Akimova et al., 2024a).

In general, leadership in education is a multidimensional phenomenon that encompasses management, teaching, and scientific activities. The formation of leadership skills in future masters of education requires an integrated approach that includes interactive teaching methods, digital technologies, coaching strategies, and practical experience. The development of these competencies is a key condition for training specialists who can effectively respond to the challenges of modern education and ensure its high-quality development.

Practical aspects of developing leadership competencies in undergraduates play a key role in preparing future education professionals who have not only deep theoretical knowledge but also the ability to initiate changes, manage educational processes, and communicate effectively in a professional environment. In the modern system of higher education, the development of leadership skills is ensured by introducing interactive teaching methods, using digital technologies, and implementing specialized programs in educational leadership. Interactive teaching methods are an important tool for developing leadership competencies in undergraduates, as they contribute to the development of communication, organizational, and strategic skills necessary for effective management and teaching activities. Among the most effective methods,

trainings, project learning, case studies, and debates should be highlighted. Trainings are aimed at developing decision-making skills, emotional intelligence, conflict management, and teamwork. Project-based learning allows students to work on real or simulated tasks that require leadership initiatives, strategic planning, and effective delegation of responsibilities. Case studies involve the analysis of real-life situations from educational practice and the development of solutions, which stimulates critical thinking and the ability to conduct systematic analysis. Debates, in turn, contribute to the development of reasoned thinking, self-confidence, and persuasive communication skills, which are important components of educational leadership (Hanhimäki et al., 2023).

The use of digital technologies in the training of future educational leaders is another key direction in the development of modern pedagogical education. Educational platforms, virtual simulations, artificial intelligence, and online courses contribute to the personalization of learning, the modeling of management situations, and the development of communication skills. In particular, the use of interactive platforms such as Moodle, Google Classroom, or Microsoft Teams allows for the organization of distance learning, group discussions, and the management of educational projects in an online environment. Virtual simulations allow master's students to model situations of managerial decision-making and practice algorithms for effective interaction in educational institutions. Artificial intelligence tools such as adaptive learning systems and chatbots for educational management help to develop skills in working with large data sets and increase the level of student independence (Akimova et al., 2024a).

A separate direction for the development of leadership competencies is the implementation of specialized leadership programs in pedagogical institutions of higher education. Such programs, as a rule, include courses in educational management, strategic management, communicative leadership, and leadership psychology. The experience of European and American universities indicates the effectiveness of programs that combine theoretical training with practical internships in educational institutions. For example, in Finland and Germany, master's students in pedagogical specialties undergo internships in schools and universities, where they have the opportunity to participate in the development of

educational policies, organize the educational process, and carry out administrative activities (Sapohov et al., 2023).

An important component of such programs is mentoring, where experienced educational leaders accompany students in their professional development, providing recommendations and helping to define personal career trajectories. Mentoring programs at universities in the UK and the US involve regular meetings between students and leaders of educational institutions, where they can discuss challenges and prospects for the development of the educational environment (Carson et al., 2023).

Challenges and prospects for the development of educational leadership in the preparation of masters are important issues for modern pedagogical science and practice. The development of leadership qualities in future educators requires not only the introduction of new methods and technologies but also overcoming certain barriers that are caused by both internal and external factors. One of the main barriers is insufficient attention to the development of leadership competencies in educational programs. Traditionally, most pedagogical faculties are focused on the transfer of professional knowledge, rather than on the development of management skills, strategic thinking, and social responsibility. Many master's programs focus on pedagogical or scientific aspects, leaving management skills out of consideration, which significantly limits the opportunities of future leaders to influence the development of educational institutions and the students themselves. Another barrier is the lack of a sufficient level of practical experience in educational programs. Theoretical knowledge without real management experience limits the development of practical skills that are important for effective educational leadership. Many students do not have the opportunity to participate in management processes or work in real management of the educational environment during their studies. Promising areas for improving educational programs for leadership development in Ukraine include the integration of innovative teaching methods, the use of international experience, and a shift in emphasis on the practical training of future educators. In particular, it is important to develop models that combine theoretical knowledge with real practical situations. These can be project work, trainings, seminars, and internships in pedagogical institutions, where master's students can apply their management and communication skills. Master's programs need to pay

more attention to the development of interdisciplinary skills, such as managerial thinking, teamwork, strategic planning, and technologies to support the educational process, including the use of digital tools for organizing learning. One of the directions is to improve the methods of developing emotional intelligence, which is an important component for an educational leader, as it allows for effective interaction with participants in the educational process, resolving conflicts, and creating a positive atmosphere in the team (Sapohov et al., 2023).

The influence of international experience on the formation of educational leadership in Ukraine is an important aspect in the context of the development of the modern educational system. In particular, the experience of the European Union, the USA, and Canada shows that the high level of training of educational leaders is the result of the integration of academic education with real practical management tasks. In these countries, educational programs include courses in leadership, change management, ethically based decisions, and management of pedagogical teams, which contributes to the development of a holistic approach to the formation of professional leaders. In Ukraine, the experience of such countries can be adapted to national conditions, where it is necessary to take into account the peculiarities of the socio-economic situation, cultural, and educational traditions. The implementation of international approaches, such as internships at leading foreign universities and joint scientific and practical projects, as well as participation in international educational networks, enables Ukrainian master's students to acquire important professional skills and influence the development of educational leadership in the country (Hanhimäki et al., 2023).

One of the important aspects that must be taken into account is the consideration of socio-cultural features that are important for creating a sustainable leadership position in the conditions of the Ukrainian educational reality. In Ukraine, where the experience of educational leadership is only beginning to gain popularity, it is extremely important to preserve and adapt the best practices of international experience to Ukrainian realities, developing the ability of educational leaders to work in conditions of constant change, integrating innovations, and ensuring the sustainable development of the national educational system.

In general, the development of educational leadership in Ukraine is an important component of

the professional training of future master's students, and for this it is necessary to create conditions that will contribute to the formation of leadership competencies through educational programs, the integration of modern teaching methods, and the use of international experience. This will allow us to educate educational leaders capable of effective management and innovative development of educational systems in Ukraine.

**Conclusions.** Thus, educational leadership is a key element in the formation of professional training of future masters in the field of education. The development of leadership competencies in master's students requires the integration of theoretical knowledge and practical skills through the application of modern teaching methods and technologies, such as project-based learning, training, case studies, and debates. The use of digital technologies also plays an

important role in the development of educational leadership, providing new opportunities for interaction, monitoring, and evaluation of the educational process. The problems of forming leadership qualities in future educators are associated with insufficient attention to the practical aspects of learning and the lack of a unified strategy for developing leadership in educational programs. At the same time, there are significant prospects for improving educational programs, in particular through the integration of international experience, which will improve the training of educational leaders in Ukraine. An important component of this process is also the development of interdisciplinary skills and the ability to adapt to changes in the modern educational environment, which will contribute to ensuring the sustainable development of education in the country.

## References

- Abonyi, U. K. (2023). Factors influencing practicing teachers in pursuing educational leadership programmes in Ghanaian higher education institutions. *Deleted Journal*, 12(1), 31-46. <https://doi.org/10.47963/jem.v12i1.990>
- Akimova, O., Sapohov, M., & Hapchuk, Y. (2022). DIGITAL TRANSFORMATION OF THE EDUCATIONAL ENVIRONMENT OF HIGHER EDUCATION INSTITUTIONS IN GERMAN-SPEAKING COUNTRIES. *Innovate Pedagogy*, 2(50), 166-172. <https://doi.org/10.32782/2663-6085/2022/50.2.33>
- Akimova, O., Sapohov, M., Hapchuk, Y., & Salii, R. (2024a). LEADERSHIP QUALITIES IN EDUCATIONAL MANAGEMENT. *Nauka I Tekhnika Sohodni - Science and Technology Today*, 12(40). [https://doi.org/10.52058/2786-6025-2024-12\(40\)-369-380](https://doi.org/10.52058/2786-6025-2024-12(40)-369-380)
- Akimova, O., Sapohov, M., Hapchuk, Ya., & Salii, R. (2024b). LIDERSKI YaKOSTI MAIBUTNIKh MAHISTRIV YaK NAUKOVA KATEHORIa. [LEADERSHIP QUALITIES OF FUTURE MASTERS AS A SCIENTIFIC CATEGORY]. *Perspektyvy Ta Innovatsii Nauky - Perspectives and Innovations of Science*, 11(45). [https://doi.org/10.52058/2786-4952-2024-11\(45\)-109-120](https://doi.org/10.52058/2786-4952-2024-11(45)-109-120) [in Ukrainian].
- Carson, O., McAloon, T., Brown, D., & McIlpatrick, S. (2023). Exploring the contribution and impact of master's education for leadership development in adult general nursing: A scoping review. *Nurse Education in Practice*, 71, 103697. <https://doi.org/10.1016/j.nepr.2023.103697>
- Eadens, D. W., & Ceballos, M. (2022). Educational leadership preparation and professional roles: Are we serving the needs of leadership roles along the leadership continuum? *Journal of Research on Leadership Education*, 18(2), 277-300. <https://doi.org/10.1177/19427751221076416>
- Fusarelli, B. C., & Fusarelli, L. D. (2024). Leadership for the future: Enhancing principal preparation through standards and innovation. *Education Sciences*, 14(12), 1403. <https://doi.org/10.3390/educsci14121403>
- Hammad, W., & Al-Harhi, A. S. A. (2021). Aligning 'International' Standards with 'National' Educational Leadership Preparation Needs: The Case of a Master's Programme in Oman. In *Emerald Publishing Limited eBooks* (pp. 117-138). <https://doi.org/10.1108/978-1-83909-864-220211008>
- Hanhimäki, E., Alho, J., Nuora, P., Risku, M., Fonsén, E., Mäkiharju, A., Smeds-Nylund, A., Autio, P., & Korva, S. (2023). Towards a multi-form professional development of educational leadership. In *Educational governance research* (pp. 61-80). [https://doi.org/10.1007/978-3-031-37604-7\\_4](https://doi.org/10.1007/978-3-031-37604-7_4)
- Hayes, S. D., & Irby, B. J. (2019). Challenges in preparing aspiring principals for instructional leadership: voices from the field. *International Journal of Leadership in Education*, 23(2), 131-151. <https://doi.org/10.1080/13603124.2018.1562102>
- Kaufman, E. K., & Stedman, N. L. (2022). Moving graduate and professional education forward to develop leaders equipped to effectively address wicked problems. *New Directions for Student Leadership*, 2022(176), 9-18. <https://doi.org/10.1002/yl.20526>
- Killeen, T., PhD. (2024, December 10). *Leading through intellectual globalization: a framework for the future*. [www.elsevier.com. https://www.elsevier.com/connect/leading-through-intellectual-globalization-a-framework-for-the-future](https://www.elsevier.com/connect/leading-through-intellectual-globalization-a-framework-for-the-future)
- Lazarenko, N., & Hapchuk, Y. (2023). Current e-learning trends in German and Austrian higher education institutes. *Педевтологія*, 1(2), 7-14. [https://doi.org/10.31652/3041-1203-2023\(2\)-7-14](https://doi.org/10.31652/3041-1203-2023(2)-7-14)
- Nestulya, S. (2023, February 8). *The leadership component for masters-students of the educational program «Higher School Pedagogy» in the professional training system*. <https://archive.interconf.center/index.php/conference-proceeding/article/view/2276>
- Ni, Y., Rorrer, A. K., Xia, J., Pounder, D. G., & Young, M. D. (2022). Educational leadership preparation program features and graduates' assessment of program quality. *Journal of Research on Leadership Education*, 18(3), 457-481. <https://doi.org/10.1177/19427751221094865>
- Quinn, J., & Quinn, J. (2020, November 3). *Why pursue a Master's Degree in Educational Leadership?* | *UT Permian Basin Online*. The University of Texas Permian Basin | UTPB. <https://online.utpb.edu/about-us/articles/education/why-pursue-a-masters-degree-in-educational-leadership/>
- Salem University. (2024, July 9). *Explore the most rewarding career opportunities in educational leadership*. <https://www.salemu.edu/blog/educational-leadership-careers/>
- Sapohov, M., Hapchuk, Y., & Salii, R. (2023). Development of leadership qualities of masters in Germany. *Педевтологія*, 1(2), 65-73. [https://doi.org/10.31652/3041-1203-2023\(2\)-65-73](https://doi.org/10.31652/3041-1203-2023(2)-65-73)
- Tsiuniak, O. (2020). Professional training of future masters of primary education to innovative activities through the prism of a competence approach. *Journal of Vasyl Stefanyk Precarpathian National University*, 7(1), 166-170. <https://doi.org/10.15330/jpnu.7.1.166-170>

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