Individual education: Competency-based personalized learning paths

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Abstract

Relevance. A competence-focused strategy in education necessitates the proactive involvement of learners in their professional development, aiming to build essential skills for future challenges. This research is highly relevant due to the importance of forming a competence-based approach in education and implementing personalised learning trajectories in the modern education system.

Purpose. This study aims to assess the feasibility of forming an individual trajectory of education based on a competence-oriented strategy within the contemporary educational framework. It also aims to evaluate the prospects and expected effectiveness of such an approach in the realities of the current education system, which are important in its main trends.

Methodology. The study involved qualitative and analytical analysis of students from the Master's program in Smart City: New Technologies at L. N. Gumilyov Eurasian National University.

Results. One of the study's main outcomes is developing a theoretical model for the individualised learning route based on the competency approach. Additionally, it lays out the prerequisites for developing the unique educational trajectory that is built upon this methodology.

Conclusions. The outcomes of this study are of considerable interest due to their assessment of the real prospects for introducing a competency-based approach into the methodology of forming an individual trajectory in the existing educational system. This research highlights the potential benefits of a competency-based approach in improving the quality of education by making learning more personalised and relevant to individual needs. Implementing these strategies can contribute significantly to the qualitative development of the education system, benefiting both students and educators. The study provides a foundation for future research and practical applications in educational planning and curriculum development.

Keywords: education system; professional competencies; educational institution; personality formation.
Introduction

The modern education system has a pronounced orientation towards achieving results, which is conditioned by the prevailing socio-economic prerequisites. The result in this context should be considered the achievement of a high level of professional and cultural competencies among the subjects of education, their intensive socialisation and the development of individual qualities, which is necessary for full integration into modern society. The competency-based approach to the development of a personal pathway of a modern subject of education involves the creation of a full range of opportunities to ensure the proper quality of training and compliance of young professionals with all the requirements of modern society [1].

This is fully correlated with the urgent need for a modern personality to integrate qualitatively into a modern professional environment, as well as with the needs of society itself in the qualitative use of the personal potential of graduates of educational institutions of various levels. The individual trajectory of education involves carrying out a complex of theoretical and practical scientific developments on the issues of its design and institutional support. The modern stage of society development is characterised by high rates of economic and socio-political development, high intensity of the information environment, as well as the need to form a high degree of responsibility for each decision made by the subject of education. In such a situation, the development of a personal pathway of education is a significant aspect of the social and professional orientation of a modern personality, necessitating its high responsibility for the quality of its education and subsequent socialisation [2].

Individual educational trajectories in the education system presuppose the presence of a developed ability to work in a team that is heterogeneous from a professional point of view and at the same time significantly different in age. This means that the ability to self-organise, creativity, the ability to cooperate and find a common language are extremely important for success in the development of a personal pathway based on a competency-based approach. It should also be considered that the formation of readiness for individual activity in the field of education implies an urgent need for so-called project training, which means a consistent organisation, implementation and coordinated construction of the learning process, the creation of its special, project trajectory [3]. Continuity in education means following the requirements of continuous growth and improvement of educational potential, which is expressed in strengthening the professional and cultural competence of the individual throughout their life. In this context, the development of a personal pathway based on a competency approach requires significant efforts of the subject of education throughout their life in order to maintain a high level of educational activity and the formation of the necessary competencies of all these types.

Continuous education means the steady formation of positive attitudes towards continuous learning and assimilation of new knowledge and skills, as well as the steady motivation of the desire for professional and career development. It should also be considered mandatory to improve the competence of a specialist in narrow professional and personal plans, a constant search for opportunities for development and self-improvement [4]. In addition, individual work is essential to ensure the social and professional preservation of a specialist, the creation and consistent implementation of new standards for one's professional development and norms of professional behaviour. Modern standards of the education system presuppose the search for effective methods of self-development of the student, their constant, purposeful work to master the chosen profession and form the competencies essential for the proficient execution of one's occupational responsibilities [5]. At the same time, the applied methods of self-organisation are not significant, since the cornerstone in this context should be the result, expressed in the creation of competencies necessary for the high-quality performance of their professional duties in real-life conditions. Therefore, the development of a personal pathway of education based on a competency-based approach is a particular task of a certain applicant for modern education, on the timely and effective solution of which depends the success of their professional activities in the future.

The research aims to assess the possibility of the development of a personal pathway of education based on a competency-based approach in the conditions of the modern educational system, as well as to assess the prospects and expected effectiveness of such an approach in the realities of this education system, which are important in the context of its main trends.

Materials and Methods

The research approach employed a blend of qualitative methods to examine challenges in shaping a personal educational pathway in the modern context, paired with an analytical review of the potential of employing a competence-oriented strategy to address all concerns highlighted in the specified subject. The research methods adopted as fundamental in this scientific work provide an objective and high-quality presentation of the material. These methods are optimal in this case because they are based on numerous scientific studies of the core principles of the competence-oriented strategy within the contemporary educational landscape. Additionally, they highlight the significance of constructing a personalized educational pathway in the current educational framework. The study of the features of building an individual trajectory of education in the realities of the contemporary educational framework based on a competency-based approach within the scope of the selected research approach is conducted consistently, highlighting the main significant, key aspects. The theoretical foundation of this study was built upon existing research by various authors, addressing the challenges of developing a personalised educational pathway grounded in a competence-oriented approach.

In this context, the objectivity of scientific research on the declared subject matter is important, which contributes to the creation of a qualitative theoretical basis for subsequent practical developments in the direction of the declared subject of scholarly investigation. To ensure a comprehensive and unbiased representation of scholarly inquiry, and to enhance the qualitative assimilation and presentation of the information, all materials sourced from
foreign authors and cited in this paper have been translated into Russian. This research unfolded in three primary phases.

In the initial phase, a theoretical examination centred on the development of a personalised educational pathway and the significance of the competence-oriented approach was conducted, specifically concerning students of the Master's programme "Smart City: New Technologies" at L.N. Gumilyov Eurasian National University. Utilising the amassed theoretical data, a qualitative assessment of pivotal aspects relevant to crafting a personalised pathway within the prevailing educational framework was undertaken, aligning seamlessly with this study's objectives. During the subsequent phase, the influence of the competence-driven strategy in crafting individual educational paths was explored. This phase also encompassed an analytical juxtaposition of the preliminary findings of this study against outcomes from other researchers on analogous topics, aiming to gauge the degree of congruence between them. In the concluding phase, based on the insights accrued throughout the research, definitive conclusions were drawn, encapsulating the essence of the study. Overall, the outcomes and subsequent conclusions of this study proficiently encapsulate the breadth of the investigation into the proposed research subject, laying a robust foundation for future scholarly pursuits in this domain.

**Results**

The formation of a personalized educational pathway based on a competency-based approach involves a systematic study of the features and realities of the currently existing educational system, as well as the role and place of the subject of education in it. In this context, the modern education system acts as a field for constructing a conceptual model of the individual trajectory of education of a single subject, taking into account all the features and possibilities of learning in modern realities. In the context of the contemporary educational framework, the competence strategy allows for the construction of its model, considering the unique aspects of crafting a personalised educational pathway for an individual learner. A diagram illustrating the model for evolving fundamental learning concepts within the educational system, based on a competence-oriented approach to developing a personalized learning path, is depicted in Figure 1.

![Figure 1](image_url)

**Figure 1.** A framework illustrating the evolution of fundamental learning principles within the educational system, considering a competence-oriented strategy for crafting a personalised educational path

From a perspective of evaluating the quality of training of students studying for a master's degree in the educational program "Smart City: New Technologies" of the L.N. Gumilyov Eurasian National University, the model of continuous learning, which includes continuous vocational training and formal vocational training, deserves special attention. From the point of view of the quality of the formation of an individual trajectory of education, continuous training in a narrow professional orientation forms competencies that are mandatory for subsequent adaptation within the chosen profession, and presupposes the availability of opportunities for their steady development and improvement. In this context, it refers to the professional development of the individual within the chosen field of activity, which implies the sequential completion of all compulsory primary, secondary and higher education programmes, selected taking into account the student's specific professional background. About the characteristics of the continuing education of the group of students acting as an experimental object of research, a group of main factors should be highlighted that are relevant in terms of the educational programme they choose:

1. Definition of the concept of "smart technologies", about the concept of "smart city".
2. Prospects for the introduction of the technological concept of "smart home" from the point of view of a competence-oriented strategy in developing a personalised educational pathway.
3. Building a model of continuing education within the framework of the educational programme "Smart City: New technologies".

Formal vocational training involves the use of narrow-profile vocational education programmes designed for a limited contingent of students in a brief span. This model promotes the expansion of narrowly focused skills within
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From a competence-centric vantage point in devising personalised educational pathways, there's an imperative shift required: transitioning from the conventional knowledge dissemination model, where educators are the primary conduits, towards the design and instatement of a knowledge governance framework. Within this paradigm, all educational participants can garner requisite knowledge contextualised to their chosen vocations and refine pivotal professional competencies in alignment with their prospective occupational roles. This gradual pivot from the prevailing educational concept to a more forward-looking model ought to be cognizant of learners' unique educational aspirations, their vocational inclinations, and overarching trends shaping the educational sector.

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The development of a personalised learning path based on a competency-based approach, as applied to students studying in the Master's degree programme "Smart City: New Technologies" at L.N. Gumilyov Eurasian National University, should be conducted considering the attributes of necessary competencies for the qualitative performance of professional duties within the activities after graduation from an educational institution. These include:

1. Understanding the principles of building a "smart home".
2. Formation of the ability to make timely changes to its structure, if necessary.
3. Formation of the skill of practical management of this technology and its variations.

The individual trajectory of education of Master's students in the Smart City: New Technologies programme is formed in the process of direct mastering of the training programme and the application of the acquired skills in the practical field. Furthermore, the potential for crafting a personalised educational pathway implies that undergraduates can autonomously utilize accessible educational resources to acquire essential materials for their studies. In evaluating the aspects of developing a personal learning path based on the competency-based approach, one should take into account the fact that there is a close connection between the trajectories of courses, the direction of which is possible at any stage of vocational training and in any chosen form, as well as at any stage of professional activity. The model of auxiliary education contributes to the expansion of existing ideas about the possibilities of professional self-realisation in the chosen type of activity and is also aimed at improving narrow competencies in a particular profession. The choice of an individual trajectory of education is determined by the structure of personality building, one's target aspirations and abilities for self-realisation within the chosen profession. Within this framework, an individual's capability to constantly learn and improve professional skills is essential, which is expressed in the desire to learn and expand professional competencies. Figure 2 shows a scheme of the structural relationship of the main elements that directly influence the development of personalised educational pathways grounded in a competence-oriented strategy.

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professional formation in the subject of education and the trajectories of education as such. The formation of both takes place in the context of social and social changes that determine the trends of modern development of society as a whole and the place of an individual in society, in particular. In addition, a wide variety of currently available professional qualifications and activities significantly complicates the final choice of areas of professional development of the individual and creates conditions for uneven development of professional competencies in various activities. Many alternative options often interfere with professional self-determination and contribute to the clash of professional interests of various groups and fields of activity.

The present-day information and communication technologies within the evolving educational framework facilitate the conditions essential for in-depth professional development. This, in essence, sets the foundational prerequisites for sculpting a personalised educational pathway rooted in a competence-oriented strategy. Informational assistance of the modern educational process makes it possible to obtain the most complete information on any issue that concerns the prospects of mastering professional competencies necessary for social adaptation and further professional growth. The model of the modern education system assumes the provision of opportunities for the student to choose the directions of the development of professional skills in the existing information and communication field. At the same time, the individual is responsible for their own choices and the quality of their subsequent education and training, as well as their future professional life. Considering the quality of professional skills obtained and the selected path for professional growth, the subsequent primary competence levels are identified among contemporary higher education institution graduates:

- competence in the search for information necessary to deepen professional skills and search for answers to topical issues of a specific professional field;
- the skill of decision-making to determine the direction of subsequent professional development;
- the ability to constantly learn and improve oneself in the course of one's professional activities.

The learner's academic endeavours in terms of crafting a personalised educational pathway based on a competency-based approach presuppose self-determination, both in terms of the chosen speciality and in terms of key aspects of its qualitative development. In modern market conditions, a specialist who can quickly and correctly make fundamental decisions on the choice of activities and in the prevailing professional situation, and who can quickly navigate changes in the environment has a qualitative advantage. Such qualities are acquired through the individual efforts of the applicant for education and require not only an independent choice of an individual trajectory of education in modern conditions, but also qualitative and, most importantly, sustained efforts towards achieving the required result. The design of the instructional journey following a personalised pathway of education presupposes the personal participation of the student in all the subtleties of this process and the consistent development of all competencies necessary for subsequent social and professional self-realisation.

Discussion
In modern market conditions, there is a constant expansion of professional activities. The application of the competence approach in the modern education system involves laying the foundation for the qualitative solution of the tasks of professional training of upcoming professionals in diverse areas of expertise, as well as the evaluation of the results obtained. The imperative to create new and refresh existing educational programmes within the competence approach determines the need to train qualified specialists of the education system who can make timely decisions that are significant considering enhancing training efficacy and devising novel models for the implementation of the competence-oriented strategy in education [6]. The education system cannot function without its subjects acquiring practical experience in diverse areas that are, in some manner, associated with it. The educational journey ought to embrace contemporary technologies, which can bolster the effective realization of a profession-focused educational approach. The orientation of the competency-based approach to achieving certain results related to the achievement of strategic competencies in the chosen profession implies the need to carry out the educational journey adhering strictly to the norms of the educational framework adopted in the state [7].

Given the unpredictable nature of economic progress in the current phase of the industrial society, there is an imperative to identify efficient methods to enhance vocational education quality. This influences facets of the contemporary educational system like bolstering the efficacy of education by amplifying the autonomy of educational participants in decision-making related to vocational direction and seeking relevant educational content to optimally organize this process [8]. The demand for lifelong learning, in light of current societal evolution, signals the need to discover potent strategies for structuring the learning experience rooted in a competence-centric approach within the prevailing educational framework. The educational trajectory should be considered, first, as a verified direction of development of the subject of education. At the same time, the subject themselves design the direction of their development within the framework of the competencies required for quality adaptation in the future in the social environment and within the realities of their chosen profession. The individual trajectory of education determines the set sequence of activity of each participant in the learning process and the level of mastery of the elements of the taught academic disciplines [9].

The relationship between the categories of the individual trajectory of education and the established educational programme presupposes the existence of a strong relationship based on certain learning standards. This means that the final choice of the individual trajectory of education is completely conscious and the students themselves are fully responsible for the result. The self-directed development of a personalised learning path by a learner places the onus on them to achieve the desired outcome, reflected in attaining a particular degree of professional skills. Yet, such pathways can be executed through curricula tailored specifically for an individual student. The foundational blueprint for crafting a personalised learning journey is the competence matrix of
an aspiring professional [10]. The professional formation of an education applicant's personality involves the consistent passage of several stages that are mandatory considering the development of their skills that align with the demands of the contemporary market framework in the context of the correspondence of the level of competence achieved to the level of qualification of a representative of a particular profession.

Successful adaptation in the conditions of the modern social and economic situation acts as a determining criterion for the quality of the formation of the necessary competencies and a prerequisite for stating the fact of the correctness of the choice of the direction of implementation of the individual educational trajectory [11]. Designing an individual trajectory of education in the context of a competency-based approach is closely related to the influence of external and internal factors on this process, and the special features of their formation and implementation. The mission of the educational institution, its objectives and its development programme, if any, are relevant in this context. In addition, great importance should be paid to the quality of training of employees of the education system, their professional competence and the ability to convey to students the instructional data essential for developing their professional expertise. In the current economic conditions and market system, there are a large number of vocational orientation options for graduates, within the framework of the professions they choose when enrolling [12]. This situation stems from the pronounced diversification of the professional domain and the simultaneous availability of multiple avenues for vocational self-identification among participants in the contemporary educational system.

The proliferation of numerous paths for vocational self-identification is intrinsically tied to the realities of modern economic development and the requirements of the market situation for the competence of professionals in a particular type of activity. Professional self-determination in this context is an individual feature of each individual subject of the education system, in terms of the prospects for their professional development and improvement. The consistent contact of the fundamental factors forming the structure of the educational space, as well as their disequilibrium caused by the complexities of the psychological development of a single individual, can be qualitatively described using the principle of uneven distribution of abilities and personal characteristics of all participants in the modern educational process [13]. Some random circumstances that determine the direction of development of the modern educational space may conflict with individual educational trajectories determined by individual participants in this process, and in this case, the level of contradictions is determined by the individual characteristics of these trajectories in each case. The prospects for the development of the education system are largely determined by the calibre of personalized learning paths of the individual participants in this process.

This means that there is an influence of the characteristic tendencies of building an individual educational process in the existing education system on this entire system as a whole. At the same time, the great difficulty lies in the ability to timely determine the effectiveness of the chosen field of study and the degree of its compliance with the modern realities of the education system and the socio-economic needs of society [14]. The formation of a personality in professional terms may not always proceed steadily and is distinguished by the lack of order in the sequence of changing stages that are mandatory for the full-fledged formation and development of a personality. The stages necessary for professional development should consistently replace each other, but this is not always the case. A contributing factor to the situation could be the inappropriate selection of a model for the personalised educational pathway, especially concerning the requisite progression of developing professional skills for an aspiring expert in a specific domain. The self-organisation of the education applicant does not always play a major role in this context, since much is determined by mistakes made in the process of learning the basics of the chosen speciality at the stage of study at an educational institution [15]. In this case, the situation can be qualitatively changed by re-studying the key points of the curriculum that cause complexity already within the framework of practical professional activity.

The complexity of applying the competence approach in the contemporary system of education lies in the impossibility of practical monitoring of the quality of maintaining a specialist's competencies for a long time after the start of their professional activity. The standards of the modern education system assume the possibility of achieving a given level of professional competence of a student if they pass all the requirements of the curriculum and pass the qualification standards, conditionally confirming the fact that they have achieved a given level of professional competence in the chosen speciality.

However, in the existing socio-economic realities, there are no conditions for verifying the compliance of the competencies of the subject of education sometime after graduation from an educational institution, which to some extent complicates the evaluation of the actual proficiency of gained professional skills [16]. Personalised educational pathways, rooted in a competence-oriented strategy, ought to ensure a sustained correlation between educational quality in the context of the chosen speciality and adherence to every phase of an individual's professional growth, critical when considering the execution of their subsequent professional endeavours. The development of a personal learning path begins at the stage of selecting an educational institution for a particular profession and continues after admission to higher education in all stages of study there.

At the same time, the process of university education presupposes the obligatory independent work of the student, starting from the choice of the direction of study to the consistent implementation of all the tasks facing them throughout the entire course. The very fact of graduating from an educational institution is not yet evidence of the achievement of the required level of professional competence in the subject of education – everything is determined by the quality of subsequent professional activity and the rate of growth in the chosen profession. A high level of professional competence in any type of activity cannot be achieved immediately. To achieve a high-quality level of professional development, a person needs to consistently go through several stages of professional growth and development that contribute to the
development of skills necessary for proficiently executing professional responsibilities in subsequent roles. From this point of view, the ability of a higher education applicant to perceive educational information and process it for practical assimilation is of great importance. Selecting the appropriate personalised educational path, rooted in a competence-oriented strategy, aids in cultivating essential competencies vital for future endeavours, provided the student diligently and effectively engages in this direction [17].

New educational paradigms emerging in recent years within the professional education framework determine the direction of development of both the education system itself and it subjects in the context of their chosen trajectory of individual development. Updating the content of the modern education system in all its manifestations largely depends on how quickly and effectively students and teachers themselves will be able to adapt to the current changes and contribute to the reversal of their consequences for the benefit of the education system as a whole. A significant problem of the situation under consideration may be the lack of elaboration on the concept of the modern education system when evaluating the aspect of professional competence and the significance of the personalised educational pathway it [18]. This issue requires further study using modern methods of assessing the quality of building an individual trajectory of education in the space of a modern educational institution and the role of a higher education applicant in this matter. The educational space of a modern university acts as a broad field for the formation of a complete set of competencies necessary for a student to carry out their subsequent professional endeavours.

Within the academic setting of a tertiary education institution, an individual educational trajectory can be defined as a narrowly focused programme for the development of professional competencies with their subsequent practical consolidation [19]. At the same time, the modern student is provided with complete freedom in choosing the directions of their own development and the methods used for this. The personal potential of the student plays a pivotal function in this scenario since the subsequent integration of the young specialist into the social and professional environment depends on how well it will be realised. The development of a personalised educational pathway because of a competency-based approach is of great importance in terms of the prospects for creating optimal conditions for young specialists to achieve a high level of professional, cultural and personal competencies that are of fundamental importance in terms of their further social and professional integration [20]. Establishing ideal circumstances for the inception and growth of personalised educational pathways stands as a primary objective of the educational framework across all tiers, given the present economic context.

Conclusions

The establishment of a personalized pathway in the system of modern education involves a gradual transition. This transition moves from a typical model of knowledge transfer and practical skills from teacher to student at all stages of training. It shifts towards a model of educational process management, emphasizing the personal self-determination of the student. This self-determination directs them in finding the necessary knowledge for qualitative formation of their professional competencies and conducting further professional activities. The degree of personal involvement of the educational subject, their deliberate choice of profession and learning methods as well as responsibility for the quality of their decisions during the learning process determine one’s subsequent professional self-realisation and development.

The construction of an individual trajectory of education within the framework of the competence-oriented strategy involves an independent search for students necessary for quality education within the chosen speciality and personal responsibility for the effectiveness of the learning process as a whole. At the same time, the formation of core competencies that are important in the context of further professional self-realisation of an individual is also determined by the degree of one’s personal participation and the efforts expended to attain the intended outcome.

Current frameworks that evolve foundational learning principles within the educational system, through a competence-oriented lens, guide the direction of the participant in matters of vocational training and create a broad field for choosing the optimal direction of professional and personal development in the situation prevailing in the modern education system at the current time. Contemporary market dynamics shape the primary trajectories in the evolution of today's educational framework and set the standards for the professional skill levels of educational institution graduates. In the current situation, the final choice of the direction of development and professional orientation of the subject of education is determined by their priorities in training and the number of personal efforts spent on achieving the necessary level of professional competence. The personal trajectory of education in market realities obliges the subject to personal responsibility for the quality of training and subsequent professional activity.

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Conflict of Interest

None.

References

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Індивідуальна освіта: персоналізовані шляхи навчання на основі компетенцій

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Анотація

Актуальність. Компетентнісно орієнтована стратегія в освіті вимагає проактивного залучення учнів до свого професійного розвитку, спрямованого на формування необхідних навичок для вирішення майбутніх викликів. Актуальність дослідження зумовлена важливістю формування компетентнісного підходу в освіті та впровадження індивідуальних траєкторій навчання в сучасній системі освіти.

Мета. Це дослідження має на меті оцінити можливість формування індивідуальної траєкторії навчання на основі компетентнісно орієнтованої стратегії в сучасному освітньому просторі. Воно також має на меті оцінити перспективи та очікувану ефективність такого підходу в реаліях нинішньої системи освіти, які є важливими в її основних тенденціях.

Методологія. Дослідження включало якісне та аналітичне опитування студентів магістерської програми "Розумне місто: Нові технології Євразійського національного університету імені Л. М. Гумільова".

Результати. Одним із головних результатів дослідження є розробка теоретичної моделі індивідуалізованого навчального маршруту на основі компетентнісного підходу. Крім того, він викладає передумови для розробки унікальної освітньої траєкторії, яка побудована на цій методології.

Висновки. Результати цього дослідження становлять значний інтерес завдяки оцінці реальних перспектив впровадження компетентнісного підходу в методологію формування індивідуальної траєкторії в існуючій системі освіти. Це дослідження висвітлює потенційні переваги переваги комунікативного підходу в підвищеній якості освіти шляхом навчання більш персоналізованого характеру та відповідності індивідуальним потребам. Впровадження цих стратегій може зробити значний внесок у якісний розвиток системи освіти, приносячи користь як учням, так і педагогам. Дослідження створює основу для майбутніх досліджень і практичних застосувань у плануванні освіти та розробці навчальних програм.

Ключові слова: система освіти; професійні компетентності; навчальний заклад; формування особистості.