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CLUSTER MECHANISMS FOR PREPARING STUDENTS FOR MODELING THE EDUCATIONAL ENVIRONMENT BASED ON ACADEMIC SUCCESS DIAGNOSTICS (ON THE EXAMPLE OF PRIMARY EDUCATION)

Ismadiyarova Umida Abduraxmon qizi
Lecturer, Department of Pedagogical Education,
National University of Uzbekistan named after Mirzo Ulugbek

Abstract

This article examines cluster mechanisms for preparing university students to model the educational environment on the basis of academic success diagnostics, with particular attention to primary education. The study proceeds from the idea that the modern teacher must be able not only to organize lessons, but also to design a flexible, inclusive, data-informed and development-oriented educational environment. In this context, academic success diagnostics is interpreted as a pedagogical tool that helps identify learners' cognitive progress, motivation, social adaptation, communication activity, independent learning skills and readiness for further development. The cluster approach makes it possible to integrate the resources of higher education institutions, primary schools, methodological centers, digital platforms, mentors and educational stakeholders into a single pedagogical system. Such integration strengthens the practical orientation of teacher training and creates conditions for students to master diagnostic, analytical, predictive and modeling competencies. The article emphasizes that future primary school teachers should learn to transform diagnostic results into pedagogical decisions, individual learning trajectories, corrective activities and developmental tasks. The proposed approach is relevant for improving the quality of pedagogical education in Uzbekistan, where primary education is increasingly connected with competence-based learning, digital transformation and the need to ensure continuity between theoretical preparation and school practice.

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Keywords: Cluster approach, academic success diagnostics, educational environment, primary education, pedagogical modeling, future teachers, learning trajectory, diagnostic competence.

Introduction

TALABALARNI AKADEMIK MUVAFFAKIYAT DIAGNOSTIKASI ASOSIDA TA'LIM MUXITINI MODELLASHTIRISHGA TAYYORLASHNING KLASTER MEXANIZMLARI (BOSHLANG'ICH TA'LIM YO'NALISHI MISOLIDA)

Ismadiyarova Umida Abduraxmon qizi
Mirzo Ulug'bek nomidagi O'zbekiston Milliy universiteti
Pedagogik ta'lim kafedrasi o'qituvchisi

Annotatsiya:
Mazkur maqolada boshlang'ich ta'lim misolida talabalarni akademik muvaffaqiyat diagnostikasi asosida ta'lim muhitini modellashtirishga tayyorlashning klaster mexanizmlari yoritiladi. Tadqiqot zamonaviy o'qituvchi nafaqat dars jarayonini tashkil etishi, balki moslashuvchan, inklyuziv, ma'lumotlarga asoslangan va rivojlantiruvchi ta'lim muhitini loyihalay olishi zarurligi g'oyasiga tayanadi. Shu nuqtai nazardan, akademik muvaffaqiyat diagnostikasi o'quvchilarning bilish rivoji, motivatsiyasi, ijtimoiy moslashuvi, kommunikativ faolligi, mustaqil ta'lim ko'nikmalari va keyingi rivojlanishga tayyorgarligini aniqlashga xizmat qiluvchi pedagogik vosita sifatida talqin etiladi. Klaster yondashuvi oliy ta'lim muassasalari, boshlang'ich maktablar, metodik markazlar, raqamli platformalar, mentorlar va ta'lim jarayoni ishtirokchilarining resurslarini yagona pedagogik tizimga birlashtirish imkonini beradi. Bunday integratsiya pedagogik tayyorgarlikning amaliy yo'nalishini kuchaytiradi hamda talabalarda diagnostik, tahliliy, prognostik va modellashtirish kompetensiyalarini shakllantirish uchun sharoit yaratadi. Maqolada bo'lajak boshlang'ich sinf o'qituvchilari diagnostika natijalarini pedagogik qarorlar, individual ta'lim trayektoriyalari, korreksion faoliyat va rivojlantiruvchi topshiriqlarga aylantirishni o'rganishi zarurligi ta'kidlanadi. Taklif etilayotgan yondashuv O'zbekistonda pedagogik ta'lim sifatini oshirish uchun dolzarb bo'lib, boshlang'ich ta'lim kompetensiyaviy yondashuv, raqamli transformatsiya va

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nazariy tayyorgarlik bilan maktab amaliyoti uzviyligini ta’minlash ehtiyoji bilan bevosita bog‘liqdir.

Kalit so‘zlar: klaster yondashuvi, akademik muvaffaqiyat diagnostikasi, ta’lim muhiti, boshlang‘ich ta’lim, pedagogik modellashtirish, bo‘lajak o‘qituvchilar, ta’lim trayektoriyasi, diagnostik kompetensiya.

Introduction

The modernization of pedagogical education requires a new understanding of how future teachers are prepared for professional activity in primary education. In contemporary educational practice, the teacher is no longer viewed only as a transmitter of knowledge or an organizer of classroom interaction. The teacher is increasingly expected to act as a designer of the educational environment, a researcher of pupils’ learning progress, an interpreter of diagnostic data, and a creator of developmental conditions for every child. This requirement is especially significant in primary education, because the first years of schooling determine the foundations of literacy, thinking, motivation, social behavior, communication culture and independent learning. Therefore, the preparation of university students for modeling the educational environment must be based on reliable academic success diagnostics and on mechanisms that connect theoretical knowledge with school practice.

Academic success diagnostics in primary education includes the study of pupils’ learning achievements, cognitive development, emotional readiness, motivation, participation in classroom activities, interaction with peers, and ability to apply knowledge in practical situations. Such diagnostics should not be reduced to formal assessment or the mechanical measurement of grades. It should be understood as a complex pedagogical process that reveals the real educational needs of each pupil and helps the teacher choose appropriate methods, tasks, support strategies and forms of feedback. When future teachers master diagnostic thinking, they become able to see the educational process as a dynamic system in which each pedagogical decision must be connected with the learner’s development.

The cluster approach is important in this process because it allows different participants of teacher education to work as an integrated system. A pedagogical cluster may include a university, primary schools, methodological centers, mentor

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teachers, researchers, digital learning platforms, parents and local educational authorities. Within such cooperation, students receive not only theoretical knowledge, but also practical experience in observing lessons, analyzing pupils' progress, designing developmental tasks, using diagnostic tools and modeling classroom environments. This creates a bridge between the university curriculum and the real needs of primary education. As a result, the professional training of future teachers becomes more practice-oriented, flexible and responsive to educational changes.

In the context of Uzbekistan, the relevance of this topic is connected with the ongoing improvement of teacher education, the expansion of digital technologies, the strengthening of competence-based learning and the need to increase the quality of primary education. Future primary school teachers must be prepared to work with diverse learners, identify learning difficulties at an early stage, support gifted pupils, organize collaborative learning and create a psychologically comfortable classroom atmosphere. These tasks require not only methodological knowledge, but also diagnostic, analytical, prognostic and modeling competencies.

Thus, the problem of preparing students for modeling the educational environment based on academic success diagnostics has both theoretical and practical significance. It requires the development of cluster mechanisms that unite educational institutions, practical training bases and diagnostic resources into one coherent system. Such mechanisms can improve the quality of teacher preparation and ensure that future primary school teachers are ready to design educational environments that promote academic progress, personal development and social adaptation of pupils.

Literature Review

The theoretical foundations of preparing students for modeling the educational environment on the basis of academic success diagnostics are closely related to pedagogical diagnostics, developmental psychology, competence-based teacher education and innovative educational technologies. In the context of primary education, academic success cannot be interpreted only through pupils' grades or final learning outcomes. It should be understood as a dynamic pedagogical indicator that reflects cognitive activity, motivation, emotional readiness, social adaptation, communicative participation and the ability to apply acquired

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knowledge in new situations. Akhmedov and Abduvaliyeva (2021) emphasize that the development of pupils' cognitive activity in primary education depends on the purposeful organization of learning tasks, the creation of active didactic conditions and the teacher's ability to stimulate independent thinking. This position is directly connected with the idea that future primary school teachers must be prepared to diagnose not only the level of knowledge, but also the internal mechanisms of pupils' learning activity.

The works of Piaget (1952), Vygotsky (1978) and Bruner (1966) provide an important psychological and didactic basis for understanding academic success in the early stages of education. Piaget's theory highlights the gradual development of children's thinking and the need to consider age-specific cognitive structures in teaching. Vygotsky's concept of the zone of proximal development shows that pupils' academic progress is shaped through cooperation, guidance and social interaction. Bruner's theory of instruction stresses the importance of structuring educational content in a way that corresponds to learners' readiness and supports their intellectual growth. These ideas are essential for modeling the educational environment because diagnostic information must help the teacher determine what kind of support, interaction and task structure are necessary for each pupil.

Assessment theory also occupies a central place in this research problem. Black and Wiliam (1998) argue that formative assessment significantly influences learning when it provides feedback, reveals learning gaps and helps teachers adjust instruction. Stiggins (2005) develops the idea of student-involved assessment, emphasizing that assessment should help learners understand their own progress and participate in improving their results. Popham (2008) interprets transformative assessment as a tool for changing teaching practice rather than merely recording achievement. Shavelson (2007) also notes that the assessment of student learning must be connected with the improvement of educational quality. These approaches support the view that academic success diagnostics should become a continuous pedagogical process that guides the modeling of the educational environment.

The problem of preparing future teachers is also reflected in the works of Biggs and Tang (2011), Darling-Hammond (2017), Dewey (1938) and Hattie (2009). Biggs and Tang underline the importance of constructive alignment between learning goals, teaching methods and assessment. Darling-Hammond emphasizes

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that effective teacher education must connect theoretical preparation with practical experience and reflective analysis. Dewey's concept of learning through experience shows that professional preparation should be based on active participation in real educational situations. Hattie's research on visible learning confirms the importance of feedback, teacher clarity and evidence-based pedagogical decisions. These ideas justify the need for cluster mechanisms that unite university education, school practice, mentor support and diagnostic resources.

Uzbek pedagogical literature also provides a strong methodological basis for this topic. Inoyatov and Muslimov (2012), Khodjayev (2017), Ishmuhamedov, Yuldashev and Abduqodirov (2008), Muslimov, Usmonboyeva, Sayfurov and To'rayev (2015), and Yuldashev and Usmonov (2004) emphasize the importance of pedagogical technologies, innovative methods, professional competence and the systematic organization of the educational process. Tashpulatov and Gafforova (2019) pay particular attention to innovative methods in primary education, while Turg'unov and Maqsudova (2018) analyze the management and organization of pedagogical processes. These studies show that the preparation of future teachers should not be limited to methodological knowledge; it must include the ability to analyze the educational situation, make diagnostic conclusions and design developmental learning conditions.

Thus, the reviewed literature confirms that academic success diagnostics and educational environment modeling are interdependent components of modern teacher training. Diagnostics provides information about pupils' development, while modeling transforms this information into pedagogical goals, methods, interaction forms, corrective measures and individual learning trajectories. The cluster approach creates the necessary organizational and methodological framework for this integration, because it connects higher education institutions, primary schools, mentors and methodological centers into a unified system of professional preparation.

Methods

The methodological basis of the study is formed by a systemic, competence-based, diagnostic and cluster-oriented approach to the preparation of future primary school teachers. The systemic approach makes it possible to consider the educational environment as an integrated pedagogical structure consisting of

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goals, content, methods, forms of interaction, assessment tools, digital resources and corrective mechanisms. The competence-based approach allows the research to focus on the formation of students' professional readiness, especially their diagnostic, analytical, prognostic, communicative and modeling competencies. The diagnostic approach provides the opportunity to connect the preparation of students with the study of pupils' academic success, while the cluster approach ensures cooperation between the university, primary schools, mentor teachers, methodological services and other participants of the educational process.

The research logic is based on the gradual preparation of students for modeling the educational environment through academic success diagnostics. At the first stage, theoretical materials related to pedagogical diagnostics, primary education, academic achievement, learning difficulties and educational environment modeling were analyzed. This stage helped to clarify the conceptual foundations of the study and to determine the main components of students' readiness for diagnostic and modeling activity. At the second stage, the practical possibilities of applying cluster mechanisms in teacher training were studied. Particular attention was paid to the interaction between university courses, pedagogical practice, school-based observation, mentor support and reflective analysis. At the third stage, the structure of the proposed preparation mechanism was developed and interpreted in relation to primary education.

The study uses theoretical methods such as analysis, synthesis, comparison, generalization and pedagogical modeling. These methods made it possible to examine scientific approaches to academic success diagnostics and to define the role of diagnostic data in the design of the educational environment. Pedagogical modeling was used to describe the relationship between diagnostic information and the organization of teaching conditions. In this model, diagnostics is not treated as a final assessment procedure, but as a continuous source of information for improving the educational process. The model includes the identification of pupils' learning needs, interpretation of diagnostic results, planning of pedagogical support, organization of developmental tasks and evaluation of changes in academic progress.

Empirical methods may include observation of primary school lessons, analysis of pupils' written and oral tasks, interviews with mentor teachers, questionnaires for students, study of pedagogical practice reports and reflective diaries. These methods are aimed at revealing how future teachers understand academic success,

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how they interpret diagnostic indicators and how they use this information when designing learning activities. Observation helps identify the real structure of classroom interaction, while analysis of pupils' work provides information about the level of knowledge, skills, mistakes and learning strategies. Questionnaires and reflective diaries allow students to express their understanding of the diagnostic process and evaluate their own professional growth.

The cluster mechanism proposed in the study includes several interconnected forms of activity. University teachers provide theoretical and methodological preparation. Primary schools create a practical environment for observation, diagnostics and pedagogical experimentation. Mentor teachers guide students in analyzing classroom situations and selecting appropriate teaching strategies. Digital platforms support the collection, storage and interpretation of diagnostic information. Methodological centers contribute to the development of recommendations and criteria for evaluating academic success. Through this cooperation, students learn to connect diagnostic results with the modeling of an effective, inclusive and development-oriented educational environment for primary school pupils.

Results

The results of the study show that cluster mechanisms can significantly strengthen the preparation of future primary school teachers for modeling the educational environment on the basis of academic success diagnostics. The main result is the identification of a pedagogical relationship between diagnostic activity and the design of learning conditions. When students learn to analyze pupils' academic success not only as a final grade, but as a dynamic indicator of cognitive, motivational, communicative and social development, they begin to understand the educational environment as a flexible system that must respond to the real needs of children. This changes the logic of teacher preparation: students move from passive reproduction of methodological knowledge to independent pedagogical decision-making.

The study revealed that the effective preparation of students requires the formation of four interrelated groups of competencies. The first group is diagnostic competence, which includes the ability to determine indicators of academic success, select appropriate diagnostic tools, observe pupils' learning behavior and identify difficulties in mastering educational material. The second

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group is analytical competence, which enables students to interpret diagnostic information, distinguish between external and internal causes of learning difficulties and compare the progress of different pupils without reducing the child's development to formal assessment results. The third group is prognostic competence, which helps future teachers anticipate possible learning outcomes and determine the direction of pedagogical support. The fourth group is modeling competence, which allows students to construct a purposeful educational environment based on diagnostic conclusions.

The cluster approach proved to be especially important because it creates a practical field for the development of these competencies. In traditional teacher training, diagnostic issues are often studied within separate theoretical courses, while pedagogical practice may not always provide systematic opportunities for applying diagnostic knowledge. The cluster mechanism overcomes this limitation by connecting university learning with primary school practice, mentor guidance, methodological support and digital diagnostic resources. As a result, students gain the opportunity to observe real pupils, analyze their learning progress, discuss pedagogical situations with experienced teachers and design educational tasks according to identified needs.

The research also showed that academic success diagnostics helps students better understand the diversity of pupils in primary education. Some children may demonstrate high results in written tasks but have difficulties in oral communication; others may be active in group work but need support in independent learning; some pupils may show weak academic results because of low motivation, anxiety or insufficient adaptation to the school environment. Such observations help future teachers avoid one-sided judgments and develop a more humane, individual-oriented approach. Therefore, diagnostics becomes not only a measurement tool, but also a means of pedagogical understanding.

Another important result is the clarification of the structure of an educational environment modeled on the basis of diagnostic data. This environment includes differentiated tasks, flexible grouping of pupils, formative assessment, corrective exercises, interactive methods, digital learning materials, emotional support and reflective feedback. Each component must be selected according to the diagnostic profile of the class and individual learners. For example, if diagnostics reveals insufficient reading comprehension, the teacher may model an environment that includes guided reading, visual support, vocabulary work and cooperative

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discussion. If diagnostics shows low motivation, the environment may include game-based tasks, project activities and personal success situations.

Thus, the results confirm that the preparation of students for educational environment modeling should be organized as a continuous, practice-oriented and diagnostically grounded process. The cluster mechanism provides the institutional, methodological and practical conditions necessary for this process. It helps future primary school teachers transform diagnostic information into purposeful pedagogical action and supports the formation of professional readiness for modern primary education.

Discussion

The analysis of cluster mechanisms for preparing students to model the educational environment based on academic success diagnostics demonstrates that the effectiveness of future teacher training depends on the degree of connection between diagnostic knowledge, pedagogical interpretation and practical design activity. In primary education, the educational environment cannot be constructed only through a standard set of methods or general curriculum requirements. It must be modeled according to the real level of pupils' development, their academic progress, learning motivation, emotional state, communicative behavior and individual educational needs. Therefore, the diagnostic basis of pedagogical modeling becomes an important condition for increasing the quality of primary school teaching.

The cluster approach gives this process institutional and methodological integrity. When a university works in isolation from schools, students often receive theoretical knowledge without sufficient understanding of how it functions in real classroom conditions. In contrast, the cluster mechanism creates a shared pedagogical space where university teachers, mentor teachers, primary schools and methodological centers cooperate in preparing future specialists. This cooperation allows students to observe how academic success diagnostics is conducted in practice, how the results are interpreted and how they influence lesson planning, classroom management, differentiated instruction and corrective work. As a result, the future teacher begins to perceive diagnostics not as an additional procedure, but as a natural part of professional activity.

One of the essential advantages of the cluster mechanism is the possibility of forming reflective professional thinking. Students who participate in diagnostic

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and modeling activities learn to compare planned pedagogical goals with real learning outcomes. They begin to understand why some pupils quickly master new material, why others experience difficulties, and what kind of educational support is needed in each case. This reflective process is especially important in primary education because children's academic success is closely connected with psychological comfort, self-confidence, teacher support and the organization of meaningful learning situations. A future teacher who can analyze these connections becomes more prepared for responsible pedagogical decision-making.

The discussion of the proposed approach also shows that academic success diagnostics should be continuous and developmental. If diagnostics is used only to determine pupils' weaknesses, it may become a formal or even restrictive mechanism. However, when it is applied as a tool for identifying growth potential, it supports a positive educational environment. In this sense, the teacher's task is not only to record difficulties, but also to create conditions for overcoming them. This includes differentiated assignments, individual feedback, peer cooperation, formative assessment, creative tasks and digital resources that correspond to pupils' learning needs. Future teachers must therefore be trained to transform diagnostic information into pedagogical support rather than into simple classification.

At the same time, the implementation of cluster mechanisms requires organizational consistency. Universities and schools need common diagnostic criteria, coordinated practice programs, mentor support, methodological materials and digital tools for collecting and analyzing information about academic success. Without such coordination, the cluster approach may remain declarative and may not produce real changes in teacher preparation. It is also necessary to prepare mentor teachers for cooperation with students, because their role is not limited to supervision. They must guide students in observing pupils, interpreting diagnostic indicators and designing educational environments.

The findings suggest that the preparation of future primary school teachers should include a stable sequence of activities: theoretical study of diagnostics, practical observation, analysis of pupils' academic success, modeling of educational conditions, implementation of selected methods and reflective evaluation. This sequence helps students gradually master the professional logic of modern teaching. Consequently, cluster mechanisms can serve as a productive basis for

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improving pedagogical education and for ensuring that future teachers are ready to create educational environments that support the intellectual, social and personal development of primary school pupils.

Conclusion

The preparation of students for modeling the educational environment based on academic success diagnostics is one of the important directions in improving the quality of pedagogical education. In primary education, the teacher's professional activity is directly connected with the ability to understand each pupil's learning progress, identify academic difficulties, support motivation and create conditions for intellectual, emotional, social and communicative development. Therefore, future primary school teachers must be trained not only to conduct lessons according to methodological requirements, but also to design a complete educational environment in which every pedagogical decision is based on diagnostic information and directed toward the development of the child.

The study shows that academic success diagnostics should be interpreted as a continuous, complex and development-oriented pedagogical process. It includes the analysis of pupils' knowledge, skills, motivation, independence, classroom participation, communication, emotional readiness and ability to apply learning outcomes in practice. Such diagnostics helps future teachers understand that academic success is not limited to grades or test scores. It reflects the broader dynamics of the learner's development and requires careful pedagogical interpretation. When students acquire this understanding, they become more capable of organizing differentiated instruction, selecting appropriate teaching methods, planning corrective work and creating individual learning trajectories.

The cluster mechanism provides favorable conditions for the formation of these professional abilities. Cooperation between universities, primary schools, mentor teachers, methodological centers, digital platforms and educational stakeholders creates an integrated pedagogical space in which theoretical preparation and practical experience support each other. In this space, students can observe real educational situations, participate in diagnostic activities, analyze pupils' academic progress, discuss teaching decisions with mentors and model developmental learning environments. This makes teacher training more practice-oriented and closer to the real needs of primary education.

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The effectiveness of the cluster approach is connected with its ability to form diagnostic, analytical, prognostic and modeling competencies in future teachers. Diagnostic competence helps students identify the real state of pupils' academic development. Analytical competence allows them to interpret the causes of learning difficulties and determine the factors influencing academic success. Prognostic competence supports the planning of further pedagogical actions and possible developmental outcomes. Modeling competence enables future teachers to transform diagnostic conclusions into the structure of the educational environment, including learning content, teaching methods, classroom interaction, feedback, digital tools and corrective tasks.

The proposed approach is especially relevant in the context of Uzbekistan, where pedagogical education is developing in connection with competence-based learning, digital transformation, practical orientation and the need to improve the quality of primary education. The formation of cluster mechanisms can strengthen cooperation between pedagogical universities and schools, increase the effectiveness of pedagogical practice and ensure that future teachers are prepared for real professional challenges. Such mechanisms also support the continuity between academic preparation and school-based experience.

Thus, preparing students for educational environment modeling on the basis of academic success diagnostics should be organized as a systematic, continuous and reflective process. The cluster approach makes it possible to unite institutional, methodological and practical resources for this purpose. As a result, future primary school teachers develop the ability to create flexible, inclusive, data-informed and development-oriented educational environments that promote pupils' academic progress, personal growth and successful adaptation to school life.

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