PEDAGOGICAL CONDITIONS FOR DEVELOPING THE METACOMPETENCIES OF PROSPECTIVE TEACHERS THROUGH MODULAR EDUCATION

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Abstract. The article examines how modular education can be organized so that it deliberately fosters the metacompetencies of prospective teachers, that is, the higher-order capacities which enable a professional to plan, monitor, evaluate and redirect his or her own activity under changing conditions. Based on a theoretical analysis of research on competence, metacognition, self-regulated learning, reflective practice and modular instruction, the study conceptualizes teacher metacompetence as an integrative construct comprising metacognitive, self-regulatory, reflective, communicative-collaborative and adaptive-creative components. Five pedagogical conditions are substantiated under which a modular course turns into an environment for metacompetence growth: outcome-oriented module design with explicit metacompetence indicators; systematic reflective activity embedded in every learning element; problem- and project-based methods that confront students with uncertainty; formative, criteria-based assessment involving self- and peer evaluation; and tutorial support combined with the professional development of teacher educators. Criteria, indicators and levels for diagnosing metacompetence are proposed, and a design for experimental verification is outlined. The results can be applied when updating credit-module curricula in pedagogical higher education institutions.

Keywords: modular education; credit-module system; metacompetence; prospective teachers; pedagogical conditions; metacognition; self-regulation; reflection; teacher education.

1. Introduction

The rapid renewal of knowledge, the digital transformation of schooling and the growing diversity of learners have substantially changed what society expects from a teacher. A graduate of a pedagogical university can no longer rely solely on the body of subject knowledge and teaching techniques acquired during the years of study, because such a body becomes outdated considerably faster than a professional career unfolds. What proves decisive is the ability to keep learning, to analyse one's own professional actions critically and to transfer accumulated experience to unfamiliar situations. These abilities operate, as it were, above particular subject-specific skills, and in contemporary literature they are increasingly referred to as metacompetencies.

In Uzbekistan the problem has acquired special significance in the context of the ongoing reform of higher education. The national Concept for the Development of the Higher Education System until 2030 envisages a transition of universities to the credit-module system and a stronger practical orientation of professional training[1]. Under the credit-module model a considerable share of responsibility for learning shifts to the student, who has to plan independent work, choose elective modules and demonstrate learning outcomes at fixed checkpoints. It follows that the modular organization of instruction both demands and is capable of cultivating the self-management capacities that form the core of metacompetence.

At the same time, the mere introduction of modules does not guarantee such development. Practice shows that a module is often reduced to a formal regrouping of lecture topics, whereas assessment continues to reward the reproduction of content rather than the conscious management of learning. The

[1] Decree of the President of the Republic of Uzbekistan No. PF-5847 of 8 October 2019 "On Approval of the Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030" // National Database of Legislation of the Republic of Uzbekistan. – URL: https://lex.uz

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contradiction between the developmental potential of modular education and the absence of scientifically grounded conditions for realizing this potential in teacher training defines the research problem of the present article.

The aim of the study is to identify and theoretically substantiate the pedagogical conditions that ensure effective development of prospective teachers' metacompetencies within modular education. To achieve this aim, the following objectives were set: to clarify the essence and structure of the metacompetence of a prospective teacher; to reveal the developmental potential of modular learning; to determine the system of pedagogical conditions; and to propose criteria and indicators for diagnosing the results.

2. Theoretical Background

2.1. The concept of metacompetence

The notion of competence has been interpreted in educational science in many different ways, from narrow behavioural definitions to holistic models that unite knowledge, skills, motivation and values. Analysing this diversity of approaches, F. E. Weinert pointed out that competence implies not merely the possession of knowledge and skills but also the readiness and ability to mobilize them for solving problems in variable situations[2]. It is exactly this mobilizing and orchestrating function that lies at the centre of the concept of metacompetence.

The prefix "meta" signals a second-order level: metacompetence is a competence directed at other competences, namely the capacity to acquire, apply, evaluate and renew them. Its psychological basis is provided by research on metacognition. J. H. Flavell described metacognition as a person's knowledge about his or her own cognitive processes together with the active monitoring and regulation of these processes[3]. G. Schraw and R. S. Dennison subsequently distinguished two major dimensions of metacognitive awareness, knowledge of cognition and regulation of cognition, the latter covering planning, information management, comprehension monitoring, debugging and evaluation4. B. J. Zimmerman's cyclical model of self-regulated learning, which includes the phases of forethought, performance and self-reflection, demonstrated in addition that these processes are teachable and can be deliberately practised5.

For the teaching profession metacompetence has a twofold meaning. On the one hand, a teacher must regulate his or her own learning and professional growth; on the other hand, the teacher is expected to cultivate the same capacities in pupils. D. A. Schön's idea of the reflective practitioner, a professional who reflects both in action and on action, remains a fundamental reference point in this respect[6]. F. A. J. Korthagen's onion model likewise shows that good teaching depends on the alignment of observable behaviour and competencies with deeper layers of beliefs, professional identity and mission, which become accessible mainly through reflection7.

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[2] Weinert F. E. Concept of competence: A conceptual clarification // Defining and Selecting Key Competencies / ed. by D. S. Rychen, L. H. Salganik. – Seattle; Toronto; Bern; Göttingen: Hogrefe & Huber, 2001. – P. 45–65.

[3] Flavell J. H. Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry // American Psychologist. – 1979. – Vol. 34, No. 10. – P. 906–911.

[4] Schraw G., Dennison R. S. Assessing metacognitive awareness // Contemporary Educational Psychology. – 1994. – Vol. 19, No. 4. – P. 460–475.

[5] Zimmerman B. J. Becoming a self-regulated learner: An overview // Theory Into Practice. – 2002. – Vol. 41, No. 2. – P. 64–70.

[6] Schön D. A. The Reflective Practitioner: How Professionals Think in Action. – New York: Basic Books, 1983.

[7] Korthagen F. A. J. In search of the essence of a good teacher: Towards a more holistic approach in teacher education // Teaching and Teacher Education. – 2004. – Vol. 20, No. 1. – P. 77–97.

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Generalizing these positions, in the present study the metacompetence of a prospective teacher is interpreted as an integrative personal and professional quality that ensures conscious management of one's own learning and pedagogical activity, the transfer of acquired competences to new contexts and their continuous renewal. Its structure is formed by five interrelated components: (1) the metacognitive component, i.e. awareness of one's knowledge, strategies and their limits; (2) the self-regulatory component, i.e. goal setting, planning, monitoring and correction of activity; (3) the reflective component, i.e. critical analysis of experience and its conversion into professional growth; (4) the communicative-collaborative component, i.e. the ability to coordinate one's reasoning with others and to give and receive feedback; and (5) the adaptive-creative component, i.e. flexibility, tolerance of uncertainty and readiness to generate non-standard solutions.

2.2. Modular education as a developmental environment

Modular instruction arose as an alternative to the rigid, lecture-centred course. J. D. Russell defined a module as a self-contained instructional unit organized around a set of clearly specified objectives and containing the materials and activities required to attain them[8]. Reviewing the experience of universities, B. Goldschmid and M. L. Goldschmid emphasized that the principal advantages of modular courses are the individualization of learning pace, the active involvement of students and regular feedback on their progress9.

In the post-Soviet pedagogical tradition the theory of modular learning was elaborated in detail by P. A. Yutsyavichene, who formulated such principles as modularity, the structuring of content into separate elements, dynamism, flexibility, conscious perspective and methodological consultative support of the learner[10]. The principle of conscious perspective is of particular importance for our purposes: the student has to understand the goals of each module and see its place in his or her own professional development. In effect, this principle places metacognitive awareness at the very foundation of modular design.

Another significant feature is the congruence of modular learning with outcome-based education. J. Biggs's concept of constructive alignment requires intended learning outcomes, teaching and learning activities and assessment tasks to be consistent with one another[11]. If the intended outcomes of a module explicitly include indicators of metacompetence, alignment obliges the teacher educator to design activities and assessments that make students' self-regulation and reflection visible and assessable. Modular education therefore possesses an inherent potential for metacompetence development; however, this potential is realized only when specific pedagogical conditions are created.

3. Materials and Methods

The research is theoretical and design-oriented in nature. It relied on the analysis and synthesis of psychological and pedagogical literature on competence, metacognition, self-regulated learning, reflective practice and modular instruction; comparative analysis of normative documents regulating the credit-module system in the higher education of Uzbekistan; structural modelling of teacher metacompetence; and pedagogical design of the conditions for its development. In this article

[8] Russell J. D. Modular Instruction: A Guide to the Design, Selection, Utilization and Evaluation of Modular Materials. – Minneapolis: Burgess Publishing Company, 1974.
[9] Goldschmid B., Goldschmid M. L. Modular instruction in higher education: A review // Higher Education. – 1973. – Vol. 2, No. 1. – P. 15–32.
[10] Yutsyavichene P. A. Teoriya i praktika modul'nogo obucheniya [Theory and practice of modular learning]. – Kaunas: Shviesa, 1989.
[11] Biggs J. Enhancing teaching through constructive alignment // Higher Education. – 1996. – Vol. 32, No. 3. – P. 347–364.

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pedagogical conditions are understood as a purposefully created combination of features of the educational environment, namely its content, methods, organizational forms, means and the relations between participants, that ensures attainment of the intended result.

The conditions were selected according to three criteria: (a) correspondence to the identified components of metacompetence; (b) compatibility with the principles of modular learning; and (c) feasibility within the existing credit-module curricula of pedagogical universities without additional contact hours.

4. Results

4.1. Pedagogical conditions for developing metacompetencies

The theoretical analysis allowed us to single out five pedagogical conditions. Their content is described below, while their correspondence to the components of metacompetence and the tools of implementation are summarized in Table 1.

Condition 1. Designing modules with explicitly formulated metacompetence-oriented learning outcomes. Alongside subject-related outcomes, every module should state outcomes that describe metacognitive and self-regulatory actions, for instance: "the student formulates personal learning goals for the module and justifies the choice of strategies for achieving them". Such outcomes are built into the module map, a navigational document that reveals to the student the logic of the module, the entry diagnostic, the sequence of learning elements, the intermediate checkpoints and the final assessment. Besides testing prior knowledge, the entry diagnostic includes self-report instruments of metacognitive awareness, which help the student to recognize his or her starting position and to plan an individual trajectory through the module.

Condition 2. Systematic organization of reflective activity at every stage of the module. Reflection should be a structural element of each learning element rather than an occasional event at the end of a course. In practice this means forethought prompts before a task, self-monitoring checklists while performing it and reflective questions after its completion, which reproduces the cyclical logic of self-regulated learning. Effective tools include learning journals, electronic portfolios, the analysis of video-recorded micro-lessons and the use of the experiential learning cycle as a framework for interpreting teaching practice12.

Condition 3. Application of interactive, problem- and project-based methods that place students in situations of uncertainty. Metacompetence grows when ready-made algorithms prove insufficient. Case studies taken from real school practice, pedagogical projects, simulations and lesson study require students to choose strategies, coordinate with peers and defend their decisions. Group work additionally develops the communicative-collaborative component, since students externalize their reasoning and compare it with that of others. As L. Darling-Hammond observes, the most powerful teacher preparation programmes closely connect university coursework with clinical practice and engage candidates in investigating authentic problems of teaching[13].

Condition 4. Formative, criteria-based assessment with active participation of students. The rating-based control traditionally used in modular courses should be complemented by self-assessment and peer assessment against transparent rubrics, by feed-forward comments and by opportunities to revise submitted work. When students regularly compare their products with explicit criteria, they gradually

[12] Kolb D. A. Experiential Learning: Experience as the Source of Learning and Development. – Englewood Cliffs, NJ: Prentice Hall, 1984.

[13] Darling-Hammond L. Constructing 21st-century teacher education // Journal of Teacher Education. – 2006. – Vol. 57, No. 3. – P. 300–314.

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calibrate their judgement, and such calibration is central to metacognitive regulation. In this way assessment becomes not only an instrument of measurement but also a means of learning.

Condition 5. Tutorial support of students and development of the metacompetence of teacher educators. In line with the principle of methodological consultative support, the university lecturer acts as a tutor and facilitator who helps students set goals, analyse difficulties and build individual educational trajectories, progressively reducing the amount of external guidance (scaffolding). This condition presupposes that teacher educators themselves possess well-developed metacompetence and are able to model reflective professional behaviour; consequently, it includes targeted professional development programmes for faculty members.

Table 1. Correspondence between pedagogical conditions, components of metacompetence and implementation tools

Pedagogical condition	Leading components of metacompetence	Implementation tools
1. Metacompetence-oriented module design	Metacognitive; self-regulatory	Module map, explicit learning outcomes, entry self-diagnostics, individual learning plan
2. Systematic reflective activity	Reflective; metacognitive	Learning journals, e-portfolio, video analysis of micro-lessons, reflective prompts
3. Problem- and project-based methods	Adaptive-creative; communicative-collaborative	Case studies, pedagogical projects, simulations, lesson study
4. Formative criteria-based assessment	Self-regulatory; reflective	Rubrics, self- and peer assessment, feed-forward, revision cycles
5. Tutorial support and faculty development	All components	Tutorials, scaffolding, individual trajectories, faculty workshops

4.2. Criteria and indicators of metacompetence development

To diagnose the level of metacompetence development, four criteria are proposed. The cognitive criterion reflects knowledge of metacognitive strategies and awareness of one's own learning characteristics. The regulatory criterion characterizes the quality of goal setting, planning and self-monitoring. The reflective criterion indicates the depth of analysis of one's own experience, from descriptive accounts to critical and transformative reflection. Finally, the activity-practical criterion shows the extent to which students transfer self-regulation strategies to pedagogical practice, for example when planning and analysing lessons during teaching practicum.

On the basis of these criteria three levels of metacompetence are distinguished. At the reproductive level the student follows external instructions and reflects on activity only when asked to do so. At the productive level the student plans and monitors learning independently and analyses the causes of success and failure. At the creative level the student designs his or her own strategies, transfers them to new contexts and supports the self-regulation of others. The diagnostic toolkit may include the

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Metacognitive Awareness Inventory, rubric-based analysis of reflective journals, expert evaluation of micro-teaching and structured self-assessment questionnaires.

Experimental verification of the proposed conditions is planned as a pedagogical experiment involving experimental and control groups of second- and third-year students of a pedagogical university. The experimental groups study selected modules of the pedagogy and teaching methods cycle designed in accordance with the five conditions, whereas the control groups study the same modules in their conventional form. Pre-test and post-test measurements according to the criteria described above, followed by statistical processing of the data with non-parametric tests, will make it possible to assess the effectiveness of the conditions.

5. Discussion

The conditions identified in this study agree with the international view of teacher education as a process of forming a reflective, self-directed professional rather than transmitting a fixed set of techniques. L. S. Shulman's model of pedagogical reasoning and action, which culminates in reflection and new comprehension, indicates that the capacity to analyse one's own teaching is an intrinsic part of professional knowledge rather than an optional supplement[14]. Our contribution lies in showing how this capacity can be systematically embedded in the architecture of a module, which in the Uzbek higher education system has become the basic unit of curriculum planning.

It should be emphasized that the five conditions operate as a system. Introducing reflective journals without formative assessment, or project-based tasks without tutorial support, is likely to produce only a limited effect, because students receive no feedback that would help them convert experience into improved strategies. This conclusion is consistent with the position of L. K. J. Baartman and E. de Bruijn, who argue that competence develops through the integration of knowledge, skills and attitudes in learning processes rather than through their separate acquisition[15].

Several risks must also be taken into account. Reflection may degenerate into a formal ritual if prompts are repetitive and are not followed by discussion; an excessive number of self-assessment forms may overload students; and lecturers who are not themselves prepared for the tutor's role may revert to transmissive teaching. These risks underline the importance of the fifth condition and point to the need for further empirical research on the dynamics of metacompetence across the entire period of university study.

6. Conclusion

The study has shown that metacompetence represents a key resource for the professional development of a future teacher, as it ensures the conscious management of learning and activity and the continuous renewal of professional competences. Modular education, owing to its principles of conscious perspective, flexibility and consultative support and its orientation towards learning outcomes, possesses considerable potential for developing this quality. That potential is realized when the following pedagogical conditions are created: modules are designed with explicit metacompetence-oriented outcomes; reflective activity is organized systematically at every stage; interactive, problem- and project-based methods confront students with uncertainty; assessment is formative, criteria-based and involves students; and tutorial support is combined with the professional development of teacher educators. The proposed criteria and levels make it possible to monitor the results. Prospects for further research include

[14] Shulman L. S. Knowledge and teaching: Foundations of the new reform // Harvard Educational Review. – 1987. – Vol. 57, No. 1. – P. 1–22.

[15] Baartman L. K. J., de Bruijn E. Integrating knowledge, skills and attitudes: Conceptualising learning processes towards vocational competence // Educational Research Review. – 2011. – Vol. 6, No. 2. – P. 125–134.

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the experimental verification of the conditions and the development of digital tools that support self-regulation within credit-module courses.

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