

COMPETENCES OF THE TEACHING STAFF IN THE COMPUTERIZATION OF THE LEARNING PROCESS

Igor Yu. Anikin, Svetlana V. Lapteva,
Anatoliy V. Kozlov, Olga S. Tamer
„Industrial University of Tyumen” Branch of the Tyumen
Industrial University in Noyabrsk, Noyabrsk, Russian Federation

Abstract: *The article shows that competences of the teaching staff should be tested involving the necessity of establishing certain points about a bigger role of the individual work of the students in the process of acquiring knowledge. The authors show that a teacher should act not only as a motivator but also as a moderator guiding the students towards right directions of acquiring knowledge. The authors offer a model which evaluates the efficiency of teaching activities in the structural concept of learning process computerization.*

Keywords: competences, teaching staff, computerization, learning process, development.

Competence-based paradigm of higher education has currently gained popularity and consists in formulating the contents of education from the end result, i.e. from the characteristics of professional activity, to the goal of the result of professional education and, further on, to the choice of teaching organization forms and methods.¹

Broad application of competence-based approach requires the search of methods, approaches and technologies of competence measurement.² The task gets more complicated by the fact that competences are integral internal formations which can be assessed only partially since by no means all of their components manifest themselves to be seen, but often remain latent psychological feelings or affirmations.³

¹ G. B. Smith, J.R. Welch, “Rapid Response Systems: Education for Ward Staff Caring for At-Risk and Deteriorating Patients”, in M.A. DeVita, K. Hillman, R. Bellomo (eds.), *Textbook of Rapid Response Systems: Concept and Implementation*, Cham, Springer International Publishing, 2017, pp. 351-365. doi:10.1007/978-3-319-39391-9_34.

² M. Grünhagen Johannes, “Kepler University Linz: Inspiring Teaching and a Support Network for Academic Entrepreneurs”, in C.K. Volkmann, D. B. Audretsch (eds.), *Entrepreneurship Education at Universities: Learning from Twenty European Cases*, Cham, Springer International Publishing, 2017, pp. 537-569. doi:10.1007/978-3-319-55547-8_19.

³ M. Bücker, E. Borowski, R. Vossen, S. Jeschke, “How to Prepare Academic Staff for Their New Role as University Teachers? Welcome to the Seminar “Academic Teaching”, in S. Jeschke, I. Isenhardt, F. Hees, K. Henning (eds.), *Automation, Communication and Cybernetics in Science and Engineering 2013/2014*, Cham, Springer International Publishing, 2014, pp. 231-254. doi:10.1007/978-3-319-08816-7_19.

The search for ways to measure professional teaching competences of college teachers predetermines looking into the issue of defining framework of the definition of professional competence with singling out its structural components since measuring complex psycho-physiological functions is only possible by the totality of its separate components.

Literature review

Currently there is not a single definition of the notion of professional teaching competence. However, a definition suggested in the dictionary under the editorship of Beckmann⁴ is worth noting: professional competence is a total of knowledge and skills necessary for efficient professional activity, a skill to analyze, foresee the consequences of professional activity, use the information.

The education encyclopedia under the editorship of del Moral Pérez, 2012 gives a definition of professional competence as an integrative characteristics of business and personal qualities of a specialist reflecting the level of knowledge, skill, and experience sufficient for achieving a goal of a certain type of professional activity, as well as a moral stance of the specialist. While McGee⁵ defines professional competence as knowledge and skills a person needs in a certain area of activity. Zhu⁶ in terms considers the notion under examination a system of special knowledge and skills associated with the work that's being accomplished.

A broader definition can be found in the work of Bion: Professional competence is an ability to efficiently use acquired knowledge and skills; an ability to solve a certain problem, carry out an active search of new experience and identify its individual value, abilities and skills for independent planning, organization, control of one's own

⁴ E. A. Beckmann, A. Cathcart. "Institutional Strategies for Developing Postgraduate Research Students' Teaching and Communication Capabilities", in R. Erwee, M. Harmes, M. Harmes, P.A. Danaher (eds.), *Postgraduate Education in Higher Education*, Singapore, Springer Singapore, 2017, pp. 1-19. doi:10.1007/978-981-10-0468-1_1-1.

⁵ P. McGee, D. Windes, M. Torres, "Experienced online instructors: beliefs and preferred supports regarding online teaching", in *J Comput High Educ*, 29(2) (2017), pp. 331-352. doi:10.1007/s12528-017-9140-6.

⁶ C. Zhu, D. Wang, "Key competencies and characteristics for innovative teaching among secondary school teachers: a mixed-methods research", in *Asia Pacific Educ Rev.*, 15(2) (2014), pp. 299-311. doi:10.1007/s12564-014-9329-6.

activity; creativity, ability for self-development, self-analysis, self-regulation, self-organization, self-control.⁷

As we can see, it's the personal component of professional activity the definition stresses.

The encyclopedia of professional education provides support to this idea: Professional competence includes not only an idea about qualification (professional skills as an experience of activity, ability and knowledge) but also the acquired socio-communicative and personal abilities ensuring independence of our professional activity.⁸

There is no doubt that by professional competence of a teacher we mean teacher's profound understanding of the learning process, modern issues in teaching, psychology and the subject of teaching, as well as to be able to apply this knowledge in your everyday work.

Materials and methods

In terms the contents of the teacher's professional competence, pedagogy distinguishes procedural and result indexes.⁹ Professional competence of a teacher is defined as an ability and readiness to carry out personal professional.¹⁰

Thus, professional teaching competence is a total of activity-and-role-based and personal characteristics of a teacher which ensures efficient completion of the tasks and duties of the teacher's activity in a higher education institution, is a measure and the main criterion of his/her match to the professional activity.¹¹

⁷ J. Bion, G.D. Perkins, "The Acute Care Undergraduate TEaching (ACUTE) initiative: consensus development of core competencies in acute care for undergraduates in the United Kingdom", in *Intensive Care Med*, 32(5) (2006), pp. 786-786.

⁸ R. S. Causby, M.N. McDonnell, L. Reed, C.E. Fryer, S.L. Hillier, "A qualitative evaluation of scalpel skill teaching of podiatry students", in *J Foot Ankle Res*, 10(1) (2017), p. 21. doi:10.1186/s13047-017-0202-9.

⁹ B. Preston, K.J. Kennedy, "The national competency framework for beginning teaching: A radical approach to initial teacher education?", in *Aust Educ Res*, 22(2) (1995), pp. 27-62. doi:10.1007/BF03219592.

¹⁰ R. D. Simpson, K.S. Smith, "Validating teaching competencies for graduate teaching assistants: A national study using the Delphi method", in *Innov High Educ*, 18(2) (1993), pp. 133-146. doi:10.1007/BF01191891.

¹¹ A. E. du Plessis, "Turning the Teaching Workforce and Workplace around with Open Discussions", in *Out-of-Field Teaching Practices: What Educational Leaders Need to Know*, Rotterdam, Sense Publishers, 2017, pp. 63-105.

The aim of the article consists in the theoretical analysis of the term and the structure of teacher's professional competence and development of approaches to its measurement.

Results and Discussion

In our opinion, teacher's professional competence is ensured by the maturity and integrity of its structural components.

The analysis of scientific sources on the issue of the structure of professional competence of college teacher's shows, once again, that there are various approaches to understanding the term under investigation.¹² Thus, Causby¹³ defines professional competence of a school's manager as a complex multi-aspect personal formation consisting of these elements:

- motivational-a total of motives appropriate to management goals and tasks;
- cognitive-a total of knowledge necessary for management;
- operational-a total of personal qualities important for management;
- reflexive-a total of abilities to predict, assess one's own activity, and choose management strategy.

In the research of the issue of the future teacher's professional competence formation Rhode¹⁴ singles out these structural components: motivational (defined by the system of motivational powers of the subject of the activity, ambitions, encouragements), determined (which includes the dominant of their mentality an worldview, a system of personal meanings, the contents of which is oriented at the change in the value of professional activity) and content-surpassing (which characterizes the subject of the activity as a creator, researcher and constructor).

¹² S. Kobayashi, J. Dolin, A. Søborg, J. Turner, "Building Academic Staff Teaching Competencies: How Pedagogic Continuous Professional Development for Academic Staff Can Be Organised and Developed in Research-Intensive Universities", in B. Stensaker, G.T. Bilbow, L. Breslow, R. van der Vaart (eds.), *Strengthening Teaching and Learning in Research Universities: Strategies and Initiatives for Institutional Change*, Cham, Springer International Publishing, 2017, pp. 103-128.

¹³ R. S. Causby, M.N. McDonnell, L. Reed, C.E. Fryer, S.L. Hillier, "A qualitative evaluation of scalpel skill teaching of podiatry students", in *J Foot Ankle Res*, 10(1) (2017), p. 21. doi:10.1186/s13047-017-0202-9.

¹⁴ J. Rhode, S. Richter, T. Miller, "Designing Personalized Online Teaching Professional Development through Self-Assessment", in *TechTrends*, 61(5) (2017), pp. 444-451. doi:10.1007/s11528-017-0211-3.

Thus, we can draw a conclusion that the content components of the teaching analysis of the teacher's professional competence correspond to its structure and are assessed according to these components: teaching technique; teaching mastery; teacher's teaching culture; teacher's research and development activity.

Teaching technique. A greatly important role in the process of formation and further development of the college teacher's professional competence is the teacher's mastery of the teaching technique, because thanks to it the teacher is capable of achieve success in professional activity.

Teaching technique is defined as an integrative property of an individual who is characterized as wholesome which appears in video-differentiation from other properties and internal unity of its components (emotion-willful, contextual, behavioral) and is implemented through the ability to make pedagogically appropriate impact on the participants of the education process by emotional expressive means.

To sum up numerous scientific papers, the components of teaching technique are:

-speech technique: grammatical correctness, expressiveness, imaginativeness, humor, speech skills (voice tone and timbre, emotion, persuasiveness, richness of inflections and shades, articulation, pace);

-appearance technique: an ability to correctly sit, stand, project confidence, calmness, friendliness (posture, clothes, mimics, emotional expressivity);

-pedagogical communication technique: an ability to listen; ask questions; analyze the answer; be attentive, observant; understand others; establish contact; see and understand the reaction of the audience; share your attitude towards what is being said; get others interested and excited with the explanation, narration, message; familiarize with the situation;

-psycho-technique: an ability to create appropriate mood, lessen excessive tension, anxiety, overcome one's own indecisiveness and mobilize oneself; an ability to transform, play, manage one's mood.

Teaching mastery. By the definition of one of the classics of teaching mastery Kraineva,¹⁵ the components of professional mastery of a teacher are pedagogical focus (value orientations to oneself, to means of pedagogical impact, to the team, to the goals of pedagogical activity),

¹⁵ S. V. Kraineva, O.R. Shefer, "On the formation of very high competencies in bachelor's degree students using information and communication technologies", in *Sci Tech Inf Process*, 44(2) (2017), pp. 94-98. doi:10.3103/S0147688217020046.

professional knowledge (knowledge of the discipline taught, its methodology, pedagogy and psychology); teaching activity skills: communicative (respect towards people, amiability, sociability); perceptive (professional predictability, empathy, pedagogical intuition); dynamic (ability for forceful impact and logical persuasion, for reflection); emotional (an ability for self-control and building pedagogical impact on positive feelings, optimistic prediction); teaching technique (a form of organization of the teacher's behavior). Teaching mastery is a set of properties of the teacher's personality necessary for a high level of professional activity. The criteria for mastery of a teacher are reasonability (by focus), productivity (by results), dialogueness (by the nature of relations with students), optimality (in the choice of tools), creativity (by the content of activity).

We also agree with the definition of Reefman,¹⁶ who defines this term as a sophisticated art of educating and teaching which constantly improves itself and is available to any teacher working by vocation and loving children. According to the researcher's opinion, the elements of teaching mastery are:

1) Humanitarian focus as a systemic creative component; expressed in value-based orientation of the teacher in the form of humanitarian strategy when accomplishing goals of pedagogical activity.

2) Professional knowledge which serves as fundament for teaching mastery which gives it depth, solidness, sense of purpose.

3) Teaching skills which ensure good speed and successfulness in improving the teacher's mastery.

4) Teaching technique relying on knowledge and skills and incorporating all tools of pedagogical impact and interaction for efficient execution of teaching activity.

Professional culture. Professional culture is identified, above all, by a professional group authenticity of which it ensures. Traditionally, professional culture represents a multitude of standards, rules, and models of people's behavior, social theoretical knowledge and practical skills associated with a certain type of labor.

Profession in the modern context is regarded as not so much of a separate narrow type of activity but more of a broad group of specialized types of activity united by common tasks executed in the social system. Therefore, professional culture ensures a unique way of constructing

¹⁶ K. Reefman, H.E.M. Daelmans, U.M.H. Klumpers, G. Croiset, "Symposia in undergraduate medical education: tailoring training in competencies to students' needs", in *Perspect Med Educ.*, 6(6) (2017), pp. 429-432.

reality of professional activity by representatives of a certain profession. Meanwhile, professional culture is an organic part of the common social culture.

Thus, teacher's professional culture is reflected in these characteristics: motivation of teachers in terms of knowledge and development of innovational teaching approaches; commitment to results; team work; eagerness to achieve high level of professionalism; opportunities to talk to colleagues at research-and-practice seminars, exhibitions, conferences (outside work); freedom of speech; freedom of professional teaching creativity.

Thus, teacher's professional culture is a component of the larger culture which represents a system of values, knowledge, standards, abilities, and skills in executing educational research activity which are formed or developed over the course of teacher-training education and practice, and provide, under certain conditions, fulfillment of educational research potential in the professional activity.

Scientific research work. When training future professionals at a higher education institution, along with bringing professional knowledge, a great importance belongs to scientific research skills as a mechanism of further self-improvement of a specialist and support of their competitiveness. The key figure in providing these skills is the teacher since it is him/her whose function is to encourage the student to get involved into research activity, provide them with techniques of scientific search, innovational activity, theoretical analysis and practical solution of problems in non-standard ways. And it is absolutely clear that implementation of this task would not be possible if teacher's activity did not involve a scientific research component.

The problem of assessing the teacher's work in the sphere of scientific research is not new: it is the same age as the science itself. There has always been a need to identify the level of quality, efficiency, and productivity of a scientist's work. To do this, different systems and scientific metrics methods were used which gave an opportunity to assess the work based on quantitative indexes. These are, above all, publications, patents, and authorship certificates. Furthermore, when modern colleges gain the scientific status, it brings out the need to ensure efficiency of carrying out scientific research work which is mostly represented by public recognition of the research results, as well as by increasing applicable significance of scientific achievement of teachers and students.

The development of methodological approaches to assessment of the quality of scientific research and the productivity of pedagogical

scientific workers remains one of the main problems of science studies since despite the numerous works in the sphere of scientometrics, there is no universal methodology which would solve the problem of combining quantitative and qualitative analysis methods.

Rüütman,¹⁷ when looking at the term “scientific methodology work”, points out that international practice separates terms “scientific work” and “research work”. Scientific work implies processes with the help of which knowledge on certain subjects is renewed or scientific publications are prepared, different area of scientific and practical activity are developed and improved. Research activity means original research in the sphere of natural or social sciences, culture or education implying thorough, organized search based on critical approach using different techniques and methods which depend on the personality and conditions of problems posed. If scientific work is a direct work with announcing a scientific result which is followed by reporting, reviewing and supervision of students’ scientific work, while scientific research work is gaining a scientific result.

When analyzing indexes of scientific research activity, Maheu¹⁸ focuses on such indexes as the index of demand for theoretical scientific achievements; level of commercialization of their methodology developments; frequency of real implementation of numerous theoretical methodological recommendations on improvement of companies’ functioning and development management efficiency into the practical activity of companies; engaging college specialists as experts in the discussion and making important economic decisions in the country.

Due to structural components of professional teaching competence is how qualimetric expertise for measurement of existing condition and quality changes of teachers’ professional teaching competence is carried out.

Expertise (expertus-experiences) is the expert’s (specialist’s) investigation of certain questions looking into which requires special knowledge in the sphere under investigation. It is issued as an act, decision, in some case-as a certificate of quality or compliance. It is

¹⁷ T. Rüütman, M. Löhmus, R. Sell, I. Stõun, M. Pihel, “Self-evaluation of Pedagogical Competencies of Academic Staff in the Context of Career Management”, in M.E. Auer, D. Guralnick, I. Simonics (eds.) *Teaching and Learning in a Digital World*, Cham, Springer International Publishing, 2018, pp. 436-446.

¹⁸ M. M. Maheu, K.P. Drude, K.M. Hertlein, R. Lipschutz, K. Wall, D.M. Hilty, “Correction to: An Interprofessional Framework for Telebehavioral Health Competencies”, in *J Technol Behav Sci*, 3(2) (2018), pp. 108-140.

worthwhile to mention the opinion of Zakharova,¹⁹ that expertise of human activity products in socio-political, medical, legal, educational and other spheres is a consistent, necessary component of any system.

The goal of the expertise is to assess the compliance of the data with the existing standards, technology criteria and requirements. The term “pedagogical expertise” as a combination of procedures which are necessary to get a collective expert opinion about a pedagogical objects was first introduced by Stensaker,²⁰ 2017 who views pedagogical expertise as opinions that are based on profound and quality study of all characteristic properties of the object via the usage of different methods if designed criteria of pedagogical expertise and competent experts are available.

Further broad theoretical research allowed distinguishing these components of pedagogical expertise: expert evaluation of the phenomenon or object from viewpoint of novelty, currency, alternativeness; identifying compliance with the existing standards of the condition of the object under investigation; activity organization expertise in terms of management over investigated objects (educational institution as a whole, as well as its separate components); expert evaluation of the technological process; activity results expertise; activity conditions expertise; expertise of the internal and external parts of the investigated object (compliance with the economic, psychological, valeological and other requirements).

Comprehensive study of scientific literature showed that there is a current lack of research which would provide a systemic representation on the issues of development of professional competence of the teacher’s in higher education institutions with economy focus, present methods, forms and principles of educating, upbringing and self-development for the formation and further development of the teachers professional competence for the appropriate specialists.

¹⁹ E. Zakharova, A. Bogdanova, M. Netesova, “The Issues of Teaching English and German for Specific Purposes to the Academic Staff of a Technical University”, in M.E. Auer, D. Guralnick, I. Simonics (eds.), *Teaching and Learning in a Digital World*, Cham, Springer International Publishing, 2018, pp. 776-782.

²⁰ B. Stensaker, G. T. Bilbow, L. Breslow, R. van der Vaart, “Strategic Challenges in the Development of Teaching and Learning in Research-Intensive Universities”, in B. Stensaker, G. T. Bilbow, L. Breslow, R. van der Vaart (eds.), *Strengthening Teaching and Learning in Research Universities: Strategies and Initiatives for Institutional Change*, Cham, Springer International Publishing, 2017, pp. 1-18. doi:10.1007/978-3-319-56499-9_1.