Criteria and evaluation tasks aimed at the development of divergent thinking for university students

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Following the Bologna Process, a major concern in the reform of higher education in Kazakhstan is the development of students’ divergent thinking. The market always needs professionals who can make dozens of new – sometimes extraordinary – decisions, who can be fully adaptable, but who also have the ability and skills, and sometimes the intuition, that enable them to select the most effective from amongst those extraordinary ideas.

Such professionals could be described not only as being able to think in a linear way, but also as versatile, critical and objective thinkers. Although it may at first seem strange, these are requirements not just for managers, but for other professionals, too, as they will determine the efficiency – and productivity – of specialists in the labour market.

We believe it is of particular relevance to apply the principles of divergent thinking to professional development in higher education, and in the broadest sense, this is our area of professional interest.

In the Republic of Kazakhstan the Ministry of Education has launched a programme of teacher training in various disciplines in higher education. Its main purpose is to improve the qualifications of teachers with modern techniques of teaching and learning so as to enhance the competitiveness of higher education in Kazakhstan.

The objectives of the programme are as follows:

- Organization of a flexible, dynamic system of developing teacher training qualifications for teachers in higher education
- Creation of conditions for the development of innovative modular training programmes, developing sustainable professional competence for teachers
- Development of innovative modular educational programmes in accordance with international trends in research, education and technology
- Improving the skills of designing and developing careers in teaching and research, as well as the ability to handle the flow of information

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The development of divergent thinking is relevant not only for students, but also for academics, especially in the development of creative tasks.
In order better to understand the issue, we need to define divergent thinking. The concepts of convergent and divergent thinking were first identified by Guildford (1967), who defines them as follows:

**Convergent thinking** (from Lat. convergere – to converge) a form of thinking based on the strategy of using pre-learned algorithms for solving a particular problem. This kind of thinking is prevalent in traditional education systems.

**Divergent thinking** (from Lat. divergere – to diverge) a form of thinking based on the strategy of generating a plurality of solutions to a single task.

We propose organizing research work on practical tasks and students’ independent work as a way of developing divergent thinking skills. Current research in various practical disciplines helps us to combine the principles of contextual learning, the formation of skills and the abilities of the student in relation to real-world needs, in ways that will shape competitive professionals. Working on practical projects, students will also have the opportunity to select a particular specialisation, and can therefore clearly define the knowledge and skills they will need for quality writing projects. This can provide additional motivation either for self-education, or with the teacher posing relevant questions, acting as a consultant and giving directions for finding the right information and developing relevant areas of knowledge.

Consequently there is a need to adopt a student-centred approach, as each student will choose a topic to research and develop it according to their abilities. It is very important in promoting this kind of learning not to impose pre-selected topics on students; on the contrary, students need to choose their own research topics relevant to their courses. Successful implementation of this approach also involves the use of an effective and appropriate system of assessment. Traditional tasks are easier to assess, as they are more linear and require students to apply specific techniques, with solutions that can be reduced to a single objective answer, in the form of numbers or a specific piece of information. With these tasks, however, the teacher has the challenge of devising assessment criteria for students conducting diverse forms of research.

In evaluating research projects aimed at the development of divergent thinking, it is possible to apply the principles of Bloom’s Taxonomy (Fig. 1), to assess the level of students’ assimilation of new knowledge. Bloom’s Taxonomy allows us to establish a very clear system of evaluation of a research project by awarding marks according to the level of complexity of its execution. Different principles of assessment can be combined in a synthesised approach, which allows different kinds of innovative learning techniques to be evaluated.

![Fig.1. Bloom’s taxonomy of learning objectives.](image-url)
It is particularly important not only that the trainees can answer questions, but that the questions themselves should be graded, using the so-called "Bloom’s Camomile" (Fig. 2). This method involves the development of particular types of questions that follow the concepts in each block of the Bloom’s Taxonomy pyramid. The method allows the instructor to generate questions at various levels of demand and assess the quality of the knowledge acquired during the practice session.

![Evaluation Table]

- **Assessment questions.** These questions are intended to clarify the evaluation criteria of certain events, phenomena and facts. "Why do something good and something bad?" "How is one lesson different from another?" etc.

- **Creative issues.** If a question includes "would", or other elements of conditionality, if the question requires assumptions or a forecast, we call it creative. "How would the world be different if humans had three fingers on each hand, and not five?"

- **Interpretative questions.** Usually begin with the word "Why". They are aimed at establishing causal relationships. "Why do the leaves on the trees turn yellow in the fall?"

- **Practical issues.** If the question is aimed at establishing the relationship between theory and practice, we call it practical. "Where in everyday life can you see diffusion?"

- **Clarifying questions.** These questions usually begin with the words: "So you’re saying that ...?", "If I understand correctly, then ...?" The purpose of these questions is to provide opportunities for individual feedback on what has just been said.

- **Simple questions.** These are questions responding to the need to name some facts, to remember and reproduce certain information.

**Fig. 2. Questions for blocks of Bloom’s taxonomy.**
(Developed by the authors on the basis of Zagashev I. “The ability to ask questions.”)

It seems to us that this framework favours the development of divergent thinking in students, as it prompts them to consider multiple aspects of a single topic. As well as responding to questions, students will formulate their own questions and seek answers to them, providing the opportunity to assess the phrasing of their questions. This is unlike traditional practice in education, where teachers, not students, ask the questions. Limited time and excessively theoretical training do not allow for the construction of high-quality knowledge, as knowledge without practice produces a one-sided and very narrow understanding of the subject being studied. Students gain additional motivation in finding the answers to more complex questions, and their performance can be differentiated in the assessment scheme. So, for example, at the basic level answers can be given 2 points, and for each subsequent level 2.5, 3.0, 3.5 etc. Once they are accustomed to such a system, students can prepare further questions, and focus not only on the theoretical aspects of the issue, but on other, more complex, aspects.

It might also be noted that the traditional system of higher education has some limitations associated with the nature of lectures, workshops and the organisation of students’ independent work. Due to limited time, strict standards of education and large groups of students, unfortunately, in most cases, teachers manage to cover only the lower two levels (knowledge and understanding) of the Bloom’s Taxonomy pyramid, and only very rarely go higher. This, it seems to the authors, defines the gap between higher education and real-world needs.
Most employers emphasize the fact that graduates in many professions, unfortunately, do not have the basic skills they need. As is well known, it takes an average of 3 years for a graduate to adapt fully to the requirements of a professional post and acquire the requisite skills. It also involves a greater investment of personal time and effort, not to mention the psychological demands, without which the working graduate can feel ‘unfit’.

We believe, therefore, that it is necessary to develop assignments that can not only give students theoretical knowledge and develop divergent thinking, but also enable them to cover all the levels of Bloom's taxonomy. We can of course foresee a sceptical response, based on an assumption that it would take too much time and additional work for teachers and most likely will not be accepted by the academic community; so we would like to propose a combination of practical lessons and students’ independent work that would be maximally useful to both students and teachers.

The most common tasks for students’ independent work in most cases are essays and papers, and sometimes glossaries on subjects of study. It should be noted that in most cases, such implementation is straightforward for students, not least because there are now entire websites containing sample essays on virtually all disciplines and topics. It is possible, however, to avoid the limitations outlined above if you use the following scheme for the organization of students’ independent work:

![Diagram showing evaluation criteria and principles of the organization of CDS development of divergent thinking and Bloom’s taxonomy.](Image)

**Figure 3 evaluation criteria and principles of the organization of CDS development of divergent thinking and Bloom’s taxonomy. (developed by the authors)**

As can be seen from the diagram, this involves the differentiation of tasks at various levels of complexity, carrying different scores. Under this scheme, students cannot get 100% if they fail to complete one level of the assignment. But to gain 100%, a student must not only perform all the tasks, but also do it effectively. Undoubtedly, very clear requirements should also be developed for task performance at each level, which will include completeness, quality, respecting deadlines, etc.
Moreover, this will allow the teacher to give objective scores and discourage students from trying to negotiate higher marks.

A points-based system will motivate students to perform different tasks, seek additional literature, and hence improve the quality of their education. For optimal organisation of such training it is necessary in the beginning to give a choice without repeating any topics (usually on average between 10 and 20), which will allow each student to specialise in a particular subject, and in turn avoid the banality of ‘cheating’. As a result, students will be busy every week throughout the semester – the diagram shows a time span of about 10 weeks, but we should point out that each individual teacher will determine their own schedule, course content and assignments, according to their own vision, as well as the specifics of courses they teach. Also for the teacher’s convenience, assignments can be submitted via email. And during the students’ independent work with the teacher students must be supervised by the teacher so that they are required to complete various tasks, as well as respond to emerging issues.

It should be noted that to sustain students’ interest, assignments should not only focus on theoretical aspects, but also on practical application. Ideally, of course, if the topic of the course allows for developing relationships with real companies and organizations, assignments can be devised according to their real needs. Examples could include writing a business plan, verification of a balance sheet, work with data, situation analysis, SWOT analysis, competitor analysis etc. This will give them a clearer understanding of the real needs of the market, and students will already be involved in the process of getting effective training in basic business practices. For companies such cooperation can also be useful, because at no cost they can get research and analysis which they sometimes lack the time and money to undertake themselves.

We can conclude that to prepare competitive professionals, we need to make a little more effort not only in the formation of students’ knowledge, as in the traditional system, but also in the development of the skills necessary to research and generate practical outcomes according to real-world needs. This will enable us to train specialists, prepared for the needs of the market, and capable of finding the right set of solutions from a choice of the most effective. Specialists trained on the proposed scheme will already have begun their process of learning, with clear ideas about their specialisation, but within a broader spectrum, and with effective ways of solving other problems.

References


Notes
3 Sitnikov M. & S.I. Tarasova "Structural and functional model of education quality management in terms of innovative development of the university“ Teacher Education in Russia, № 2, 2012 p.23
5 Zagashev I. "The ability to ask questions." [Link](http://evolkov.net/questions/Zagashev.I.Question.skill.html)