Innovative Pedagogy: Problem-Oriented Project Learning in Higher Education

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Abstract. Modern innovative pedagogical activity in higher education requires from professors not only scientific development, applied methods but also their implementation in practice. The authors of the article consider applying psychological and pedagogical technology, which consists of the application of problem-oriented project-based learning method, on the example of the experience of the Danish Roskilde University.

Keywords: Innovative pedagogy · Innovative universities · Problem-oriented project learning · Experiential learning · Learning environment · Student-centered learning

1 Introduction

By innovation in pedagogy, we mean a purposeful change in the functioning of the learning system, introducing a new goal, content, methods, forms, and organization of training. Several academics consider the concept of innovative pedagogical activity as an activity that implements pedagogical innovation - from scientific development to its implementation in practice [1].

If we look at the history of pedagogical thought, we can see that over the past 100 years, the search for alternatives to the traditions of reproductive learning has intensified. Both practitioners and theorists have become increasingly aware of the expediency of the learner's active involvement in the process and the change of his/her position from a passive, receiving, memorizing object to the position of a subject, an actor, a co-author of learning, a creator of his/her learning. Importance is attached to a different type of

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learning process, in which the teacher could more fully realize the potential of learning by mastering new roles, such as project leader, facilitator, and even coach. Through new roles, the teacher masters interactive learning methods, acquiring a whole repertoire of diverse competencies needed in today's educational institutions.

Urgent issues of higher education pedagogy are widely discussed at international conferences, studied, and developed in international projects. Some like-minded universities unite in profile associations to develop their ideas, theories, and practices of student and teacher education. Known, for example, are such communities as the Association for Experiential Education (1977), International Experiential Learning Network (IELN) (2009), European Consortium of Innovative Universities[1] (1997); Critical Edge Alliance[2] (2016), European Reform University Alliance[3] (2020). The latter explicitly aims to share innovative teaching and learning methods and create a transnational university network to develop the European education of the future.

2 Theoretical Grounds and Definitions of the New Learning Paradigm

Academic and pedagogical search in the university environment shows that psychological and pedagogical sciences do not stand still - researchers of many countries along with practitioners master new paradigms of learning, pedagogical technologies, methods, forms, and means of learning. Innovations are determined by various factors, including the need to meet the age specifics of the student, as well as modern changes taking place in society, employers' requests, and the new needs of the modern and future labor market. Let us name some of the concepts operated by developing educational systems, their distinctive features:

- Experiential Learning is a learning paradigm centered on co-created and professional experiences and its inherent reflective learning methods.
- Learning environment.
- Learning community.
- Problem-based learning.
- Research as part of learning activities.
- Project-Based Learning.
- Student-centered learning.
- Dialogue-based learning.
- Interdisciplinary approach.
- Competence as a result of learning (not only qualifications, knowledge, abilities, skills) [2].

[1] 13 partner universities from Denmark, Sweden, Norway, Finland, France, the Netherlands, Germany, Ireland, Lithuania, Spain, Italy, Portugal, and Mexico.

[2] Eight partner universities from Denmark, France, Colombia, India, Morocco, Brazil, and the USA.

[3] Five partner universities from Denmark, Germany, France, Bulgaria, and Greece. The Alliance is supported and funded by the European Commission.

Some educational institutions *acquire* individual approaches or teaching methods for themselves, while others completely restructure the system of education, creating a fundamentally new educational model. The latter does not often happen in pedagogy. This article will look at just such an example - an educational model that has been created and works successfully at two Danish universities - Roskilde University (1972) and Aalborg University (1974). This model is attractive because it combines several innovations at once, and those are the ones we named above.

This article's scope allows us to focus only on one part of this model - problem-oriented, project-based learning, which occupies 50% of the curriculum at Roskilde University and 80% at Aalborg University. This type of learning, which at first was the "face" of Roskilde University alone, is now gradually penetrating all other educational systems in Denmark. Thanks to this type of education, students are as involved in the learning process as possible. It is no coincidence that applicants are guided by this criterion when choosing a university. As the survey "Why RUC?[4] Because RUC!" (2011), devoted to the survey of students in connection with their choice of Roskilde University, problem-oriented project-based learning is a priority, it was indicated by 55% of respondents [3].

The methodological rationale for problem-oriented project-based learning is based on a solid theoretical framework that integrates many scientists' ideas from pedagogy and psychology, political science, and sociology. These include Danish scholar in andragogy field Knud Illiris (problem-oriented learning, student-centered learning, interdisciplinary approach); Brazilian adult learning scholar Paulo Freire (dialogue-based learning, teacher as co-researcher and co-learner, learning as collaboration); the German sociologist Oskar Negt, representative of the Frankfurt School (the theory of learning through model examples); the American educator and educational philosopher John Dewey (learning through experience, facilitation in learning, learning by doing, project, game methods in learning).

Problem-oriented project-based learning is also based on cultural-historical psychology and activity theory developed by the Russian psychological school (L.S. Vygotsky, A.N. Leontiev, A.R. Luria, etc.); the theory of expansive learning by Finnish psychologist Yrjo Engestrem; the theory of situational learning and the theory of learning in communities of practice developed by the American social anthropologist Jean Lave and the Swiss-American education theorist Etienne Wenger.

The suggested model of education considers learning as an active process and the value of relying on the personally significant interest and experience of the learner. The main word in this system of learning is not to learn but to become. In this approach, it is essential that in the process of working on the project, the student, on the one hand, "mines" knowledge about those areas in which the topic and problem of the project is considered, and on the other hand, he/she learns the very ways of acquiring this knowledge. Practical relevance is an indispensable part of project work: each project

[4] RUC is the Danish acronym for Roskilde University, an abbreviation of the original name given to the university when it was founded as Roskilde University Center. At present, the RUC abbreviation is retained only as a brand name and is used in the logo and web page. In other cases, the academic name Roskilde University is used.

must provide an answer to a certain problem of society - either the society in which a student lives or society in a broader, international context.

In the Danish language, the authentic and extended name of problem-oriented project-based learning does not sound very short: "det problemorienterede, eksemplariske, tvaerfaglige og deltagerstyrede projektarbejde". The Russian version of this definition, taking into account the specifics of languages, will look even longer if we mean interpreting the concepts used. In English, we get the following definition: "problem-oriented educational and research activity of a student, organized as a project, based on learning from samples, interdisciplinary approach and self-management of learning by the participants of the project group during the project work." The teacher does not give the project topic. It should be born in the process of group discussion, and reflect in one way or another, in one aspect or another, *each* student's interest [5, 6].

We express the most unusual characteristic, reflected in the expanded name of problem-based project-based learning, by the concept of "eksemplariske." The use of this concept here means that in problem-oriented project-based learning, we work with the content, which is an "example," a particular typical "pattern," set by a specific "class of tasks," which, at the same time, reflects the general aim.[5]

3 Practice of Problem-Oriented Project-Based Learning

Proposed learning approach, which is a part of the educational process and the basis of the educational model of Roskilde University and Aalborg University, is a whole pedagogical technology developed and elaborated in detail by Danish scientists and which they have been developing in theory and practice for 50 years. A problem-oriented project as an educational process has an internal dynamic, sequence of actions, and structure, including ten stages. Each semester project is distinguished by the presence of its learning objective, which the project solves. For each semester project, the authors have developed their own set of questions to guide the process in the right direction. In each semester project, there are also a certain number of requirements, both concerning students and teachers as project leaders [5].

The central component in a problem-oriented project is working with a research task. This approach is based on the pedagogical idea that a student will learn better, get a better education if he or she starts learning by searching for and posing a problem, and, necessarily, on a topic that interests him or her personally. The problem, from formulation to a solution, is a semantic component. Students find the solution to a problem in considering it and discussing it from different perspectives. Discussion as a collaborative research effort is the essence of project-based learning. The problem statement is the path that the project team must take by answering the following questions:

- *What* is accepted as the main problem question of the project - what exactly do you want to investigate? (Setting the problem).

[5] The Danish "eksemplarisk" is an adjective from "eksemplaritet" (exemplar), "det eksemplariske princip" is translated as a teaching principle. This relatively new, modern concept in didactics appeared in the 1860s and is associated with the name of the German sociologist Oskar Negt who expressed the concept originally in German. The English-language literature uses "exemplary learning."

- *Why* do you want to research it? (Defining the purpose of the research and your motivation).
- *What factual material* will you use to solve the problem? (Defining the empirical basis of research).
- Within the framework of *what theory* will you investigate the chosen problem and with the help of *what methods*? (Defining the theoretical basis of research).
- *How* will you carry out the intended search? (Choosing the research methodology).

Consider that the project's problem must be *real*. It must be perceived by the participants of the group as authentic and represent, in fact, a value for life - social or productive. It is also crucial that the solution to the problem is found within the lecture cycle. During the work on the project, the formulation of the problem can be refined and changed throughout the semester. Analysis of the project's progress, the work process, i.e., reflection on the project work, is a compulsory component of this type of learning.

There are several critical *organizational* moments in project work since self-governance in a study group requires organization. Here is an example, such as a contract between students. The contract secures the obligations of each student to the group, as each member of the project group must participate in the course of the joint work by performing specific functions and roles. If a student fails to fulfill the contract, he or she may be subject to sanctions, up to and including expulsion from the project group. Another example is related to the regulation of weekly project teamwork meetings, during which students discuss the progress of the project and keep detailed minutes of the discussions. During the semester, the project team meets with their instructor/head of the team several times: no fewer than three and no more than seven. The rest of the time, the group works independently.

Each project is for one semester. Each semester students create a new project-product: ten projects in five years.[6] Students are immersed in project activities since the first day of the first year. It happens in the following way: all cohort students, that is, about 80–100 people, gather in one auditorium, where 8–12 teachers, who will work with this stream as project leaders, speak in turn. Each project leader briefly talks about themselves and their area of professional interest, presenting their areas of expertise. During this presentation, students should orient themselves to which faculty member to approach based on personal interest. Thus, a project group of students gathers around the instructor. There should be at least two and no more than eight people in the project group. In the middle of the semester, there is a preliminary defense of the course of the project, called "Midway," during which the two project groups oppose each other. At the end of the semester, there is a defense of the project. The defense consists of two parts: written and oral. For the written defense, the group prepares a text. This is a collective work of about a hundred pages. The oral defense is individual: each member of the project group defends one aspect of a jointly written project. The project is evaluated by two examiners: an external reviewer - an invited expert, and a project manager.

[6] In Danish universities, as in all their European counterparts, a complete university education is five years, of which three years are assigned to a Bachelor's degree and two years – to a Master's degree.

The learning environment in the educational model of Roskilde University has a special meaning [7]. It is a rare case where a particular architectural space was designed and built to implement a pedagogical idea - the academic buildings called *House*. The *House* premises have a characteristic purpose and arrangement: small rooms for project groups, general big lecture room, kitchen, toilets, restrooms, administrative room, and a room equipped with printers and provided with the paper. In addition to project work meetings, the *House* hosts students' social life - general meetings, parties, and joint lunches. One *House* accommodates 80–100 students. The project managers oversee the life of the House. Each *House* also has an administrator and a secretary.

Problem-oriented project's management implies the presence of certain personal qualities and competencies, including communicative ones, and mastery of interactive teaching methods and competence of a facilitator [8]. At the same time, the teacher must be an expert in the areas in which he/she leads the project and be an active researcher. To master the relevant competencies, teachers take professional development courses conducted by the *Centers for University Pedagogy* that exist at universities. Professional development during the year is an integral part of a university teacher's professional activity, and the hours spent on professional development are part of the workload.

4 Conclusion

Theory and practice of innovative universities deepen the understanding of many aspects and new possibilities of modern education and learning, demonstrating that successful models of education can be different and learning strategies flexible, precisely, and subtly responsive to modern society and the individual learner. The experience of innovative universities is a valuable source of knowledge for professionals. It inspires colleagues worldwide to search for learning resources, improve the quality of education, and expand the boundaries of professional growth, professional thinking, and self-awareness of university teachers. Mutual interest in the professional community and the development of exchange and cooperation programs in teaching science and practice bring us closer to the main task - creating a common educational space for modern and future generations of specialists of various specialties.

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