


Methodological and Practical Approaches to Redesigning a Master's Program


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Abstract. The article discusses the results of the redesign of the module of the master's degree program "Innovation Management in the context of digital transformation of the organization", which includes the discipline "Computer technology in teaching" and pedagogical practice. This program is being implemented at St. Petersburg Polytechnic University. Based on the analysis of the requirements of the main stakeholders, a redesign model of the master's degree program was proposed, the feature of which is a combination of a project approach and the Kolb and Fry learning model. To implement the proposed approach, a standard redesign technique was developed. The project is being implemented with the support of the Potanin Foundation.

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1 INTRODUCTION

In the context of changes in the higher education system, the most important task, along with ensuring that the knowledge and competencies acquired by students meet the requirements of modern economic practice, is to focus on the strategic needs of employers.

This, in turn, defines completely new requirements for training programs and, consequently, for the redesign of existing programs and the design of new programs.

The redesign of programs and, more broadly, pedagogical design is a relatively new field of research. Currently, most of the research focuses on the strict and functional definition of the concept of "pedagogical design" (Abyzova, 2010; Chernobai, 2022; Dick et al, 2015; Merrill, 2001; Osmolovskaya, 2020; Uvarov, 2003; Voronina, 2016;) and the analysis of pedagogical design models (Gustafson et al, 1997; Kolb, 1984; Van Merriënboer et al, 2002). The latest review on this topic was published in 2017 (Göksu et al, 2017).

There is almost no works on organizing the process of redesigning educational programs (Asanov, 2020; Baykov et al, 2024; Baykov et al, 2025; Marabaeva et al., 2024).

Currently, students studying at the St. Petersburg Polytechnic University (hereinafter referred to as SPbPU) under the program "Management of Innovations in the Context of Digital Transformation of the Organization" act at best as tutors during their teaching practice, without being able to fully apply the knowledge gained during the study of the discipline "Computer Technologies in Pedagogical Activities" in terms of developing educational content and using modern innovative educational technologies, especially digital ones.

This situation is typical not only for other modules of the educational program, but also for other areas of study. Therefore, developing approaches to the redesign of educational programs is an urgent task.

The purpose of the study is to redesign the module of the Master's educational program (hereinafter referred to as the MEP) "Innovation Management in the Context of Digital Transformation of the Organization" based on modern methodological approaches.

The following tasks are expected to be accomplished:

1. Analysis of stakeholders related to the MEP.
2. Review of scientific approaches to the design and redesign of the MEP.

3. Selection of a model for redesigning the MEP module in order to develop universal and general professional competencies at a higher level.

4. Development of a standard methodology for redesigning the MEP module.

2 RESEARCH METHODOLOGY

The main tool for pedagogical design is the pedagogical model. In general, such models offer a specific sequence of steps that allow for the creation of a complete learning course. Currently, there are several groups of significantly different models, each of which is specifically designed to meet the needs of a particular audience and tailor the learning process to their requirements (Allen, 2018; Kuri, 2000; McCarthy, 2010; Svinicki, 1987; Van Merriënboer, 2002).

The Kolb Cycle - although this model was developed based on empirical evidence and lacks a strong theoretical foundation, it has remained one of the most popular in pedagogical design for a long time. This model has several key features (Kolb, 1984; Kolb et al, 2000; Kuri, 2000; McCarthy, 2010; Svinicki et al, 1987). First, learning is organized as a cyclical process with sequentially interconnected stages, with each completed cycle serving as the beginning of the next. Secondly, the process begins with experience and is never interrupted. The cycles not only follow each other in a known sequence, but also oppose each other in pairs, with concrete experience opposing abstract conceptualization and active experimentation opposing reflective observation. Thirdly, learning is placed in the context of everyday life and experience, and is not viewed as something that only occurs within formal "educational" settings (sources).

3 RESEARCH RESULTS

At the first stage of the proposed approach, a key stakeholder analysis was conducted. Various methods were used to analyze each target audience, taking into account their specific needs.

For master's students, the "5 Whys" method was employed to identify the root causes of their expectations and preferences, while a standardized questionnaire provided a structured and precise description of the project-related situations. By combining these methods, a multifaceted perspective was gained, enhancing the accuracy of problem diagnosis and facilitating the development of

optimal solutions that address the underlying factors contributing to the difficulties.

A comprehensive analysis of the quality of training and the level of competencies of graduates showed the presence of such problems as low motivation to learn (16% of respondents), inability to work in a team, lack of real projects (working with simplified cases) - 72%, the gap between the knowledge obtained and the possibility of their application - 12%.

The assessment was carried out as part of the implementation of the discipline "Computer Technologies in Pedagogical Activity" in the 2023-2024 academic year.

For employers and the head of the educational program, the interview method was used. In-depth personal conversations allowed us to clarify each participant's perspective on the development of the acquired competencies. The results of the interviews served as the basis for further recommendations and changes in the structure of the educational course.

All of this allowed us to obtain a comprehensive picture of the prospects and limitations in the redesign of the OPM module, taking into account the opinions of each stakeholder. The result of the requirements formalization was an updated matrix of competencies for a graduate in the field of 27.04.05_11 "Innovation Management in the Context of Digital Transformation of an Organization" and the redesign of a specific module of the master's program.

In the first step, the needs of the labor market and interaction with employers are studied. As a result, the real demand for qualified specialists is determined, and a list of necessary competencies is formulated.

In the second step, a competency matrix is created and approved, which is a detailed map of competencies that reflects both general and specialized skills required for a master's degree. Based on the analysis of stakeholders, a matrix of competencies for a master's program graduate was developed, where each competence is divided into indicators and descriptors (knowledge, skills, and abilities).

Table 1: Fragment of the competence matrix of a graduate of the program 27.04.05_11 "Innovation Management in the Context of Digital Transformation of an Organization".

Code	Name	Knowledge	Skills	Possessions
OPK 11: Capable of developing educational materials and participating in the implementation of educational programs in the field of education				

Code	Name	Knowledge	Skills	Possessions
ID -1	He/she supervises practical, laboratory, and research work of students, and conducts training sessions in the relevant field	Fundamentals of educational and methodological pedagogical work at a higher educational institution, modern methods of educational work at a university, and the content and features of teachers' pedagogical activities	conduct methodological work on designing and organizing the educational process; publicly speak in front of an audience and create a creative atmosphere during classes; analyze difficulties that arise in teaching and take action to resolve them	
ID -2	Applies, adapts, improves, and develops innovative educational technologies			They acquire the skills of conducting classes, mastering the methodology of teaching academic disciplines at a higher educational institution, and gaining experience in preparing and conducting classes, as well as in communicating with junior students and teachers.
UK — 2 Capable of managing a project at all stages of its life cycle				
ID -1	Formulates the project's goal, justifies its significance, and assesses its feasibility	Knows the basics and methods of formulating project goals, as well as the set of tasks that ensure their achievement	To be able to formulate the project goal, as well as to formulate the tasks that ensure its achievement within the framework of the project goal	Knows how to formulate the project goal and objectives that ensure the achievement of the project goal
ID -2	Develop an action plan to solve the project's problems, taking into account the available resources and limitations	Knows the legal norms and existing conditions, resources, and limitations	Knows how to choose the best way to solve problems, taking into account current legal regulations, available	Knows how to define project limits depend on its type

Code	Name	Knowledge	Skills	Possessions
			conditions, resources, and limitations	
ID -3	Ensures that the project is completed in accordance with the established goals, deadlines, and costs	Knows the factors influencing the project	Can determine the impact of various factors on a project	Has the skills to solve problems and find practical solutions independently
ID -4	Monitors the progress of the project, corrects deviations, makes additional changes to the project implementation plan, and clarifies the areas of responsibility for the project participants	Knows the basics and methods of formulating project goals, as well as the set of tasks that ensure their achievement	Is able to monitor the progress of the project	Has the skills to evaluate the solution of assigned tasks in accordance with the planned control results, and to adjust the methods of solving tasks
UC-3 Is able to organize and lead a team, developing a team strategy to achieve the set goal				
ID -1	Forms a teamwork strategy based on a joint discussion of goals and areas of activity for their implementation	Knows how to organize a team, set goals, and develop strategies	Knows how to develop a team strategy to achieve a goal	Has the skills to set goals and develop a teamwork strategy
ID -2	Organizes the team's work, taking into account objective conditions (technology, external factors, and limitations), individual behavior patterns, and the capabilities of team members	Knows the methods and principles of planning and organizing teamwork	Knows how to plan team work, distribute responsibilities, delegate authority to other team members, and organize and moderate meetings to discuss ideas and opinions	Has the skills and tools to plan and organize teamwork
ID -3	Ensures that tasks are completed by monitoring teamwork and responding to significant deviations in a timely manner	Knows the theoretical foundations of group dynamics processes	Knows how to monitor teamwork, identify problems, and assess and predict the risks of their occurrence	Has the skills to evaluate the work of the team

The indicators and descriptors formed within the framework of this particular educational module (discipline plus practice) are highlighted in Table 1. The use of the new matrix will allow the formation of the stated competencies at a more advanced level during the redesign of the OMP.

According to the current curriculum, the discipline and distributed practice are conducted simultaneously in the second semester. During the teaching practice, master's students act as tutors, supervising the work of second-year bachelor's students under the guidance of a professor. Master's students do not develop educational content, relying on ready-made materials. This approach limits the students' initiative and creativity, reducing their role to that of a supervisor.

In the third step, the master's curriculum is revised and adapted based on the new competency matrix.

In the new OPM format, conducting pedagogical practice involves working together to create a concept for an author's course for undergraduate students, developing content, selecting the most appropriate educational technologies for implementing the discipline, and testing it in the undergraduate program. The proposed approach focuses on redesigning master's programs and may not be effective for transferring to other levels of higher education.

The fourth step includes the adjustment of the working programs of disciplines and practices - the content of individual disciplines and practice activities is brought in line with the updated goals of the program.

Accordingly, in the fifth step, the funds of assessment tools are adapted and the mechanisms for assessing students' performance are improved.

Finally, the last step of the methodology includes monitoring the effectiveness of changes, i.e., continuous monitoring of students' achievements and responding to any difficulties that arise.

The authors proposed a typical methodology for redesigning an educational program

When implementing the proposed approach to OPM redesign, the following is planned:

- increasing students' motivation and academic performance by providing them with the opportunity to immediately apply their theoretical knowledge in practice and solve real-world problems;
- shifting the focus of learning from the "teacher-student" format to the "student-student" format, which involves horizontal network learning;
- increasing the use of active learning methods, interactivity, and digital technologies in the educational process.

3 RESULTS

As a result, a typical methodology for redesigning the educational program was developed, which

includes a series of sequential steps that lead to the successful creation of an improved educational program.

Stage 1. Researching the needs of the labour market and interacting with employers Objective: Determining the real demand for qualified specialists and formulating a list of required competencies.

Actions:

- Organizing a series of meetings with potential employers.

- Formalizing the results of discussions in the form of a competency matrix.

Stage 2. Developing and approving the competency matrix Objective: Creating a detailed competency map that reflects both general and specialized skills required for a master's graduate.

Actions:

- Collaboration between industry experts, academic community representatives, and educational program leaders.

- Alignment of competency matrices with the regulatory requirements of the Federal State Educational Standard and the Professional Standard.

Stage 3. Review and adaptation of the curriculum Objective: Modification of the existing master's curriculum to align it with the new competency matrix.

Actions: • Reorganize the structure of disciplines and modules to maximize coverage of the specified competencies. • Add specialized subjects and interdisciplinary courses that meet the current requirements of the profession. • Optimize the distribution of hours across disciplines and classes.

Stage 4. Adjusting the curriculum for disciplines and practices Objective: To bring the content of individual disciplines and practice activities in line with the updated program objectives.

Actions:

- Review of the content of each discipline and practice work program, focusing on strengthening the applied elements and deepening the development of practical skills, taking into account their integration into the new module.

Stage 5. Adaptation of assessment funds Objective: Improving the mechanisms for assessing students' performance

Actions:

- Checking and updating the assessment fund
- Expanding the range of assessment criteria.

Final stage. Monitoring the effectiveness of changes Objective: Continuously monitoring students' achievements and responding to any difficulties in a timely manner.

Actions:

- Regularly conducting intermediate knowledge assessments

- Receiving feedback from students and employers on the results of the first graduates.

- Periodic repetition of the research cycle and program updates to maintain the competitiveness and relevance of educational services.

REFERENCES

- Abizova, E., 2010. Instructional design: concept, subject, main categories. In *Herald of VSU*, 3, 12-16.
- Allen, M., 2018. SAM (Successive Approximations Model): Alleninteractions. Experience. The Difference. Retrieved from URL: <https://www.alleninteractions.com/services/custom-learning/sam/elearning-development> (Accessed 15.10.2025).
- Asanov, S., Akimenko, G., 2020. Pedagogical Design and Pedagogical Design as Effective Technologies for Organizing the Educational Process at the University. In *Diary of Science*, 8 (44).
- Baykov, M., Its, T., Redko, S., Surina, A., 2024. Gamification in Corporate Training as a Key Method for Achieving Sustainable Development of the Company. In: *II International Scientific Forum on Sustainable Development and Innovation*. Ekaterinburg, 1429-1433.
- Baikov, M., Its, T., Surina A., 2025. Gamification as a key factor in motivating innovative activities in the company. In *Prospects for science. Information technology*, 3 (186), 39-41
- Chernobai, E., 2022. *Pedagogical design: Russian and foreign research agenda*. In Modern education analytics. 3 (63). Moscow: Higher School of Economics.
- Dick, W., Carey, L., Carey, J., 2015. *The systematic design of instruction*. Boston, MA: Pearson., 8th ed.
- Göksu I. et al, 2017. Content Analysis of Research Trends in Instructional Design Models: 1999–2014. In *Journal of Learning Design*. 10 (2), 85–109.
- Gustafson, K., Branch, R., 1997. Revisioning Models of Instructional Development. In *Educational Technology, Research and Development*. 45 (3), 73-89.
- Kolb, D., 1984. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, Prentice-Hall, N.J.
- Kolb, D., Boyatzis, R., Mainemelis Ch., 2000. *Experiential Learning Theory: Previous Research and New Directions*. Available at: <http://www.d.umn.edu/~kgilbert/educ5165-731/Readings/experientiallearning-theory.pdf>.
- Kuri, N. P., 2000. *Kolb's Learning Cycle: An Alternative Strategy for Engineering Education*.
- McCarthy, M., 2010. Experiential Learning Theory: From Theory to Practice. In *Journal of Business & Economics Research*, 8(5), 131–139.

- Marabaeva, L., Guskova, N., Erastova, A., 2024. Methodological and practical aspects of redesigning the master's course "Project management in professional activities". In *Business. Education. Law*, 4(69), 301—305.
- Merrill, M.D., 2001. Components of instruction toward a theoretical tool for instructional design. In *Instructional Science*. 29(4), 291–310.
- Van Merriënboer, J. J., Clark, R. E., De Croock, M. B., 2002. Blueprints for complex learning: The 4C/ID-model. In *Educational technology research and development*. 50(2), 39-61.
- Osmolovskaya, I., 2020. *Didactics: from classics to modernity*. Nestor-Istoriya, Moscow; St. Petersburg.
- Svinicki, M. D., Dixon, N. M., 1987. The Kolb model modified for classroom activities. In *College Teaching*. 35(4), 141-146.
- Uvarov, A., 2003. Instructional design. In *Information technology: an application to the newspaper "First of September"*, 30, 2-31.
- Voronina, D., 2016. Instructional design in modern Russian education: problems and ways of development. In *Pedagogical Journal*, 3, 61-68.