

PROFESSIONAL TRAINING: NEW COMPETENCES IN EDUCATION INSTITUTIONS BY THE USE OF TECHNOLOGY¹

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Abstract

The article is addressed first to the community of professionals in the area of Vocational Education and Training (VET), companies and their representatives, who seek for mutually beneficial formats of cooperation with educational institutions. It seeks to understand the situation in which the training results are applied and investigates the current needs of the market, considering the technological changes that demand new professional competences for the innovation of educational services. To do so, it analyzes projects applied by the methodology of a Russian educational institution.

Keywords: Professional training. Project moderation. Technology. Educational programs.

1. Introduction

The article was written during the reflection² of the educational program Managing the Changes in the VET System to Strengthen Regional Economy (Khabarovsk Territory), designed and implemented by Skolkovo Moscow School of Management from March to July 2018. The main objective of the program is to train VET management teams in *Srednyee Professional'noye Obrazovanie* (SPO) systems³, capable of implementing new innovative educational programs in line with economic development goals in the region.

The project was implemented in the framework of the International Program to Strengthen VET Systems and Labour Markets in the Commonwealth of Independent States (CIS), Asia and the Middle East under the cooperation of Russian Federation and the International Labour Organization (ILO).

To answer the question "What does the industry really need?" is necessary to understand that the answer is not all time conclusive, and the question needs to be asked and answered from time to

time. Constant monitoring of the processes associated with market transformation becomes a mandatory task for management teams in educational institutions. This is the only way that schools can adequately respond to current situation and establish the requirements for the result and the product of their own activity. Without this analysis, questions about the transformation of the VET system, training content, and new educational technologies make no sense. Institutions capable of conducting such monitoring will become market leaders.

The article is organized as follows: it starts with providing rationale behind the need for transformation of VET system from a servicing to outpacing position. The subject of

Educational institutions need to radically review the concept of the product of training

collective collaboration between colleges and industry representatives is considered in detail with focus on formation of unique technological competences. The inclusion of VET schools in this process will require them to change themselves. The following is a detailed description of Skolkovo educational program for VET management teams designed to clearly establish what VET schools should become and assess the possibilities of such changes. Before moving to conclusions there is a section describing the Skolkovo method in detail. The Skolkovo method allows responding to challenges and at the same time triggering irreversible changes, in this case, in the field of vocational education.

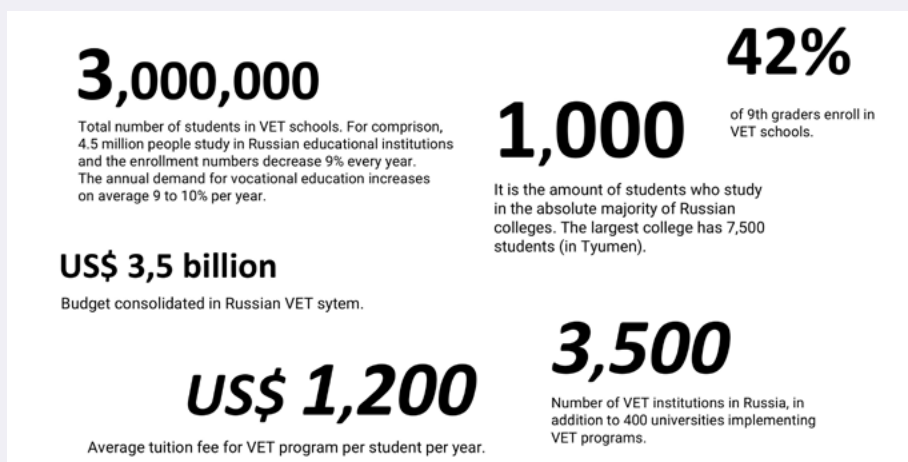
2. Industry schedule

The industry is going through a period of transition - the new industrial revolution is in full swing. New technologies, sometimes disruptive, are constantly changing market conditions, and as a result affect positions of the companies. Leaders are forced to run at ever-increasing speed in order to at least catch up to the changes. Why does it happen? This is what analysts and experts are trying to understand (RIFKIN, 2014; SCHWAB, 2017; SHCHEDROVITSKY, 2018). Traditional industries will either disappear completely or will be significantly transformed. New industries will emerge, and will probably assume leading market roles.

Thus, educational institutions need to radically review the concept of the product of training ("Who will be trained?") for both existing industries undergoing transformation and new emerging industries.

The professional training system established in Russia and in several other countries in its current form cannot keep up with the changes that companies, organizations and corporations are going through. Providers of vocational education – vocational schools, and some universities – in all countries are often criticized and face corporate dissatisfaction. Most of the time, the criticism is due to the fact that the training programs are too long and, almost always, ineffective. Lengthy and ineffective training programs are produced as a result of lack of understanding among VET schools about the situation in the industry, and within companies where newly trained professionals begin to work.

Figure 1 - VET in Russia in numbers



Source: Skolkovo Education Development Center.

This lack of understanding is not rectified even by conducting foresight sessions to see which new professions will emerge as a result of technological changes, and what skills will be required in the future. Skolkovo School itself took the initiative to conduct a series of such sessions. As a result, **Atlas of New Professions**⁴ was published describing which professions will cease to exist, which will emerge, and which skills will need to be trained. It seemed that this publication could be used as a perfect tool by VET schools to start preparing new qualified specialists. But it does not work that way. The training system that works in this way will be, with a high degree of probability, deficient and inadequate related to the nearest industry development horizon.

The inclusion of Russia in the international movement WorldSkills began to change perceived public notion of working professions and made VET schools and their programs more attractive. In addition to champion system used by WorldSkills, colleges also obtain annually updated international standard for work occupations, and if a country can restructure the training system that would massively train people adhering to “medal level”, problems associated with poor training quality would be partially resolved. This line of work remains important and will require educational institutions to have equipped management teams to lead their transformation.

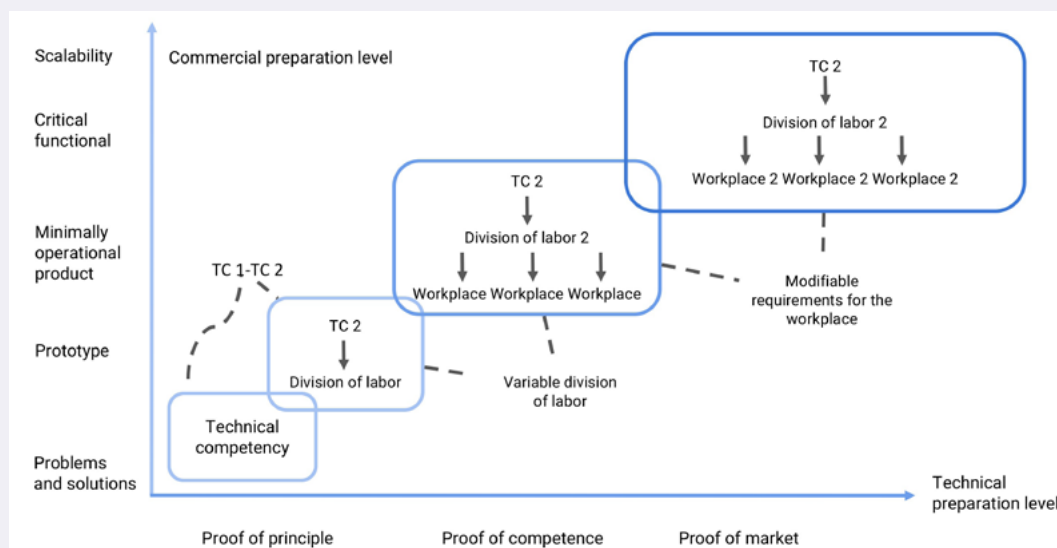
3. A new factor of competitiveness

First, considering the working hypothesis, “What should training institutions pay attention to and focus on to stay relevant and for their educational products to be competitive?”, the hypothesis was formed during the reflection of corporate training programs. How is competitiveness determined in the new conditions?

Skolkovo's experience with corporations and new businesses suggests that every company is looking for its unique skills - technologies or their configurations that allow one company to do what no other company, corporation or start-up can. At the same time, the set of "must have" technological competences that market leaders have is constantly being renewed. In addition, companies need not only have such skills, but also be ready to change with the speed that allows them to keep the leading market positions. With these competences, the company and/or corporation participates in the international division of labor. A set of "must have" and unique competences determines their place in the international division of labor: how high or low the margin is how promising it is.

For example, when visiting Airbus Defence and Space in 2016, the company possessed a unique competence - printing a satellite box on a 3D printer. None of the other satellite manufacturers did that at the time, it was their exclusive technological competence. It allowed them to redesign the product, which was impossible to produce using old equipment. Due to the special design, the satellite was made lighter and more durable – a series of expensive rework associated with traditional methods of metal processing was either excluded or reduced, manufacturing expenses and production time were also considerably cut. In many ways, the possession of this unique competence together with the availability of a "must have" set of skills and good reputation allowed the company to receive a request for the creation of the world's first large serial satellite for the One Web project.

Figure 2 - Levels of preparation of new technical and technological skills



Source: Own depiction.

Note: The scheme for the gradual development of exclusive competences was formed by Foresight participants in future competences (July 2018), conducted by Skolkovo Moscow School of Management, commissioned by the Ministry of Labor and Social Protection of the Russian Federation. The steps are determined by the technological readiness (TRL) and commercial (CRL) scales.

It is necessary to understand that each technological competence is in development. Companies try to follow every stage of development by launching a product based on that development, even if the technology is not fully finished. If it is possible to implement at least some function that already creates value for the user and client, they do so and launch an already usable product. The user is also involved in the development. The company reviews the user experience and makes changes to the product. Thus, each subsequent launch of a serial product may be different from the previous one.

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This means that the development of technological competence goes through certain stages. At each stage, it is necessary to create a new system of division of labor, a new set of jobs, define new goals and determine the timeframe for achieving them. Once the necessary parameters have been met, it will be necessary to divide the work and provide new jobs and requirements for the personal skills of those who will execute it.

The requirements for the staff and the composition of the team are determined from the tasks of the specific stage of competence development: new stage, new tasks; new division of labor - new jobs. As a rule, part of the people move on from the previous stage, while some are replaced. Sometimes you need to change the whole team. In fact, each employee is interested in moving on to the next step, they are involved in the process of creating new jobs.

In the previous case of Airbus Defence and Space, it was also necessary to redefine the jobs and the composition of the team. The company was able to reduce the rejection rate with 3D printing by up to 20%. For the transition to the next stage of technology development, it was necessary to refine the engineering design of the 3D printer, continuing the development of the powder from which the product was printed, which would reduce the rejection rate to 3%, and in that trend to 0%.

To ensure this task, the company dedicated five years and assumed that the team would consist of several professionals capable of working in the same technological competence.

For example, they needed a chemist with relevant experience and knowledge; an engineer in charge of reducing the rejection to a minimum; a process technician who simultaneously solves the problems of scalability and integration of this technological redistribution in the old chain, as well as the exclusion of some old redistributions. In addition, due to the transition to 3D production, revenue and expenditure centers have changed, so a position with an old name but with new functions was introduced: the "marketing professional", who redesigns the business model.

In the process of digital transformation of modern production, the Chief Digital Officer (CDO) usually takes part in the team, who, in this example, needed to manage the 3D printer and ensure that it was equipped with the necessary sensors, allowing information to be received.

Thus, as stated earlier, at every stage of technological competence formation, the system of division of labor, the workstation, and the requirements for personal competences change. To provide technological competence with needed labor, it is necessary to be able to assemble a team composed of professionals from different training areas but gathered for tasks related to the same technological competence. It is also very important to anticipate the life expectancy of workplaces and plan career development paths for each professional or team as a whole.

4. Challenges and opportunities for VET system

4.1 Need challenge

In general, it is believed that the professional education system trains a person to assume a specific job. However, nowadays, this is not enough: you have to be able to train professionals who will ensure the technological competence of the company. And this means that, in addition to performing their direct professional duties, they will have to communicate with other professionals who ensure the

You have to be able to train professionals who will ensure the technological competence of the company

development and updating of this competence. At the same time, it is also important to take into account that any specialist, throughout life, sometimes needs to change jobs. Even if the work task remains the same (if one was a chemical, he can still be a chemical), he/she will have to change the job at some point in time. Nevertheless, even if he does not change the job, he will certainly change the position itself, i.e., in any case, he will have to be able to do something else. This means that VET must work not only with the professional skills and qualifications, but also with the possible career trajectories, both within the same professional area and beyond its borders.

4.2 Efficacy challenge

How much does a specialist with this set of skills cost? How much time and money is spent to train such skills so that it is possible to provide corresponding jobs for a given stage of the technology life? In Russia, the State is responsible for training the majority of specialists. Data produced by the Skolkovo Education Development Center show that the government spends an average of US\$ 1,200.00 per person per year in training and, for some specialties, up to US\$ 5,000.00. For most technical colleges, the cost of training ranges from 2 to 3 thousand dollars per year, with a standard training period of four years. However, technological development suggests that the increasingly important factor is not even the cost of training, but its accuracy and speed.

Reducing time and changing educational formats inevitably leads to the increased cost of training per hour. And this, ironically, is beneficial to all process participants,

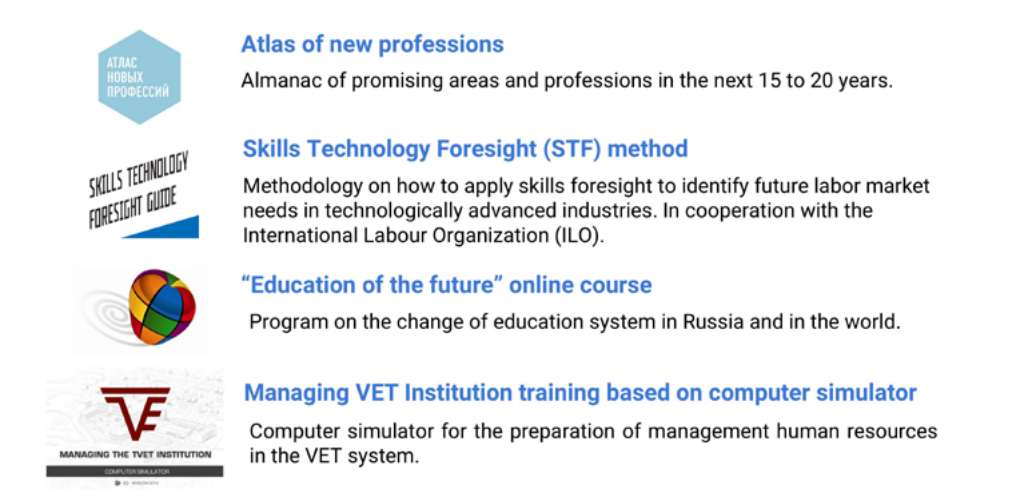
because it increases its effectiveness: the labor market regularly receives required specialists, competition is increased; companies receive high-performance employees and the possibility of more aggressive and flexible modernization of production processes; As a result, companies can pay more to educational institutions at a comparable or even lower total costs. The benefits to students are also obvious: faster access to the labor market, increased demand due to inclusion in the processes of technological development and modernization, gain of unique experience and, consequently, a more attractive career path.





5. New opportunities for VET system

In the past, the goal of the VET system was to provide a student with professional specialty that would be sufficient through life, a specialty that would stay the same until retirement (possibly with an increase in the hierarchy and level of responsibility, but usually in the same area). Nevertheless, the system should be centered around the student and his Life-Long Learning (LLL) philosophy. The VET system becomes more than just a provider of professional education, to be something the student can come back to at any time. Thus, there is a change of paradigm: the focus now is not competence and qualification, but the person itself. The person and his/her career trajectory.

Educational organizations that choose this path demonstrate greater competitiveness in professional training. The numbers confirm this: the university enrollment rates drop by an average of 9% a year, while the number of students enrolled in vocational education institutions grows annually by 9-10%. How can one use the emerging new opportunities and respond to new challenges?

Figure 3 - Skolkovo expertise within VET



| | |
|---|--|
|  | <p>Atlas of new professions Almanac of promising areas and professions in the next 15 to 20 years.</p> |
|  | <p>Skills Technology Foresight (STF) method Methodology on how to apply skills foresight to identify future labor market needs in technologically advanced industries. In cooperation with the International Labour Organization (ILO).</p> |
|  | <p>"Education of the future" online course Program on the change of education system in Russia and in the world.</p> |
|  | <p>Managing VET Institution training based on computer simulator Computer simulator for the preparation of management human resources in the VET system.</p> |

Source: Skolkovo online page – www.skolkovo.ru

6. The international training program Managing the changes in the VET System to Strengthen Regional Economy, a pilot-project for the Khabarovsk Territory, at Russian Federation

The key goal of the program was to train management teams in leading regional VET schools capable of developing and implementing innovative educational programs to form the necessary technological skills in the region, and thus guarantee the competitiveness of the region's leading businesses. However, how to accomplish this? It is necessary to have sufficient expertise about the priority markets and to assess the potential for growth in these markets. Also, it is necessary to have a great deal of expertise on new and emerging technological packages that can provide a qualitative breakthrough, predict the timing and main tasks of each development stage of the technological package and at each stage have a version of the (future) jobs that will be necessary with their respective requirements for future skilled workers. Only when possessing all of this information, it becomes possible to answer the question about how to train people.

The emergence of new technology immediately changes the situation in markets, which directly influences training requirements

The linear world has collapsed because it is impossible to work in the system where a process participant - a business or industrial partner - will determine the priority market; and then the technology partner⁵ will formulate the technical task for the necessary technology and develop such technology, make a prototype, and develop the technological line. The manager will determine which jobs will need to be created and formalize a request for the personnel training, and then the college will develop an educational and methodological complex, complete enrollment and conduct training for several years.

Nowadays, this system has no more consistency, everything happens in parallel and everyone influences one another. It is further complicated by the fact that the market situation is changing, and market rates are being specified all the time, changing the requirements for technologies and training specialists. Plans for launching new technologies are also uneven, often unpredictable, and the emergence of new technology immediately changes the situation in markets, which directly influences training requirements.

A demand for professional training arises: to keep up with the changes, you need to be a full participant in this process together with business and technology developers. At the bare minimum, this means having your own strategy, understanding the value that the education institution creates/can create for other participants and be ready for the change. If today development drivers are a business strategy or technological innovations, then the question arises: "Can the professional training systems itself act as driving forces of change? In addition. How should the training systems be reconceptualized?"

Having formulated these problematic issues, Skolkovo's proposal was to conduct an educational program for the management teams of professional education institutions that are interested in designing an active response.

6.1 Main steps of the work

Each step of the work was moderated, monitored and provided with complementary expertise from practice teachers, specially invited international and Russian experts and Skolkovo expert team.

At the beginning of the program, a foresight session was held, aiming to predict technological changes and skills required for the regional priority sectors, with the broad involvement of representatives from industries, developers and suppliers of technological solutions, as well as representatives of training and education development institutions. The foresight was carried out in the light of global trends of transformation of industries, markets and technologies.

Next, a competitive selection of VET schools wishing to participate in the program was conducted. In total, seven teams were selected. The VET development teams analyzed each of their activities for the development of markets and scenarios for the development of technology. As a result, the strategic betting hypothesis was formulated in each of the activity area. The hypothesis was discussed, criticized and clarified in dialogue with representatives of regional companies, governmental authorities, employers' associations and development institutions.

The teams had to critically analyze their institutions, as well as their own conditions, capacities and ambitions. As a result, they formulated the strategic assumptions of the business. The hypothesis was also criticized and clarified in a dialogue with an industry partner, a technology partner, as well as representatives from regional companies, government authorities, employers' associations and development institutions.

At the same time, the preparatory work was started and the design of the new innovative educational programs continued, a hypothesis of which became the main theme of cooperation between schools and industrial and technological partners. The program dealt with Russian and international benchmarks, examples of best educational programs and their implementation plans were discussed. The negotiation platform was also established, where management teams discussed new programs with their partners, and where new partnerships were formed under the scope of new programs. VET schools have begun testing individual elements of new programs that were being developed and working on functioning pilot versions. In addition, program participants analyzed the results of several studies on future skills and new educational technologies.

For designed training programs, which are based on innovative principles, the recruitment of new staff and attraction of new resources is required, so there are always threats from representatives of the "institution's old corporate culture". To

eliminate these threats, a new organizational design is required that would support the implementation of new innovative training programs. Only after making sure that all conditions were met, the teams, supported by partners, presented their programs to experts for consideration and approval, and proceeded to make steps towards implementation.

Table 1 - Themes of new innovative programs (Khabarovsk Territory)

| Name | Partners |
|--|--|
| Digital agronomy | Russia's largest agricultural producer. |
| Industrial design | Major corporations in aircraft manufacturing and shipbuilding. |
| Cross-border logistics | Professional education institutions in China and Russian and Chinese logistics companies. |
| Remote administration of mining automation | Russian mining companies and universities. |
| Operator in unmanned mining complex field | Mining, processing and mineral enrichment companies. Companies that offer digital technology and technological solutions for automation and robotization of mining companies. Specialized technical colleges from Siberia and from the Far East of Russia. |
| Modern mechanical engineering technologies | Machinery construction plants of the region under the process of modernization of production. Major global manufacturers of steel and welding equipment, as well as equipment control systems. |
| Energy efficiency solutions in housing and utilities (water, electricity, gas) | Management companies. Suppliers of equipment and materials for the housing market and utilities services. Regional University. |

Source: Own depiction.

Seven coordinated pilot programs with partners have been scheduled for launch in Fall, 2018. At the same time, the regional administration will organize discussions on the possibilities of forming a regional ecosystem that supports the formation of unique technological competences in the territory. Works were announced about the development of maps of exclusive competences required in the territory, involving representatives of regional technology companies.

6.2 Intermediate conclusions

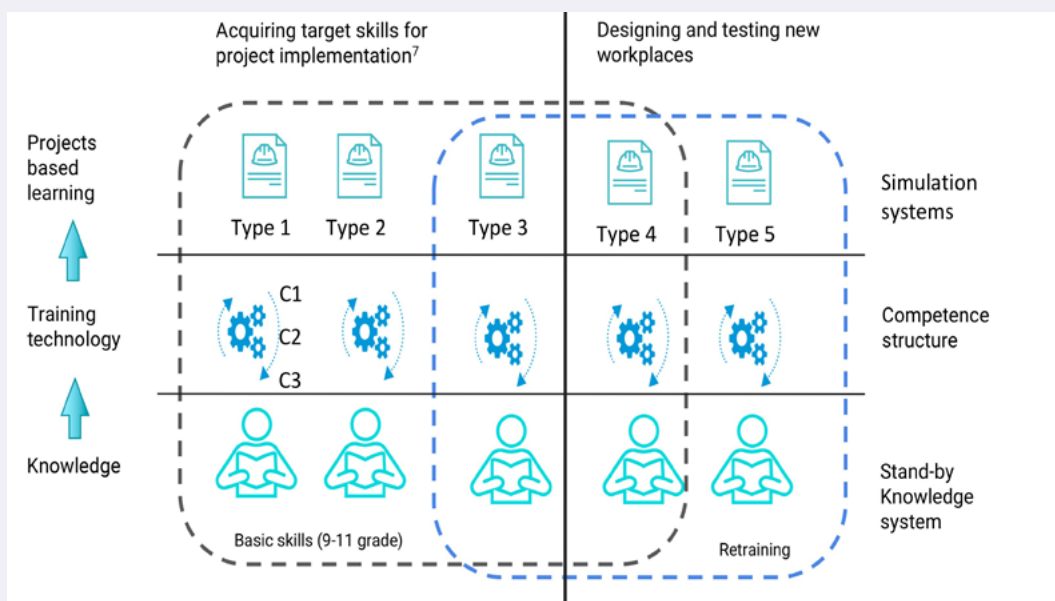
It is important to mention key general solutions established by management teams while developing new educational programs:

- The competence structure in new developed training programs differs from the competence structure adopted by VET schools. As a rule, in addition to the core professional skills required for the future job, the new competence structure must contain general professional skills. It should also include soft skills, such as teamwork, communication, self-education, decision-making, etc. In addition, the new competence structure gives special attention to the so-called “corporate competences”, directly related to the corporate culture of the company or organization, in which the student will continue advancing his/her career.
- Modular training format: each module has a limited term, focused on a certain skill, ability or concept. The presence of a large number of effective modules allows to implement individual educational programs. In addition, each module or a combination of modules can be introduced by the VET school in the additional education market as an independent product, providing additional financial sustainability and supporting the educational and professional trajectory of specialists, implementing the LLL principle.
- The team project method is the basis for choosing content of all new programs. The typology and sequence of the projects that are being implemented establish the requirements for the necessary academic and practical content.
- The new programs should establish strong ties and be closely connected with industrial partners and suppliers of technological equipment.
- The students enrolled in training have an opportunity to advance their career during their studies. Success in project activities and academic affairs directly affects student position during their company-internship and define career advancement opportunities while still in training.
- The system of division of labor among teachers becomes more advanced. New requirements for teaching and management staff require the introduction of new positions, such as tutor, mentor, project manager, technology specialist, etc.
- With no exception, each VET school established partnerships with universities and research centers. The access to applied research is known as one of the critical factors for the formation of unique technological competences. In fact, VET schools have entered into the zone of activity traditionally occupied by the applied bachelor’s degree in higher education.
- The teachers center their attention around students and their learning and career trajectories. The institution’s position shifts from merely supplying industries with skilled workers towards servicing student’s life-long interests. Thus, it acts as an assistant in advancing their careers through life. Students come back to VET schools for new competences at each new stage of their professional lives.

6.3 Working model of the new innovative program's individual study plan⁶

Developers of new programs can use this model as a special scheme of organization and activity that allows planning educational programs jointly with students who attend them. From the previous discussion, it is already clear that one must proceed from the affirmation: the learner is the subject of his own learning. The model (see Figure 4) contains the following logic.

Figure 4 - New innovative program: model of the individual learning plan



Source: Own depiction.

The basic level is the level of projects. During the main program, the student does several assignments and target projects. Each type of assignment has its own purpose. Some are designed to equip students with certain skills, some are conducted to help students understand and become engaged in the corporate culture, while others are designed to enable students to make a product demanded in the market, and to feel satisfaction from making a needed product.

Thus, the new developed program for industrial design assumes that the student must be constantly involved in five target activities - conducting research in the city where the school's target audience is located, finding a problem, developing a technical solution, implementing and transferring their products to the end-user. As an example, the **project of the students from Olin College of Engineering** (Needham, Massachusetts, United States). The objective of the project was to assist people with disabilities in solving weight control problems. The presence of a wheelchair makes this procedure extremely difficult. A team of students designed scales easily accessible by wheelchair and created a mobile application that can weigh different

types of wheelchairs. The product was delivered to the target group and then actively used. Thus, students learnt to feel pleasure from their work.

The second level is the level of simulators. All of the necessary skills acquired by the students are strictly aligned with project work. In other words, students master skills and competences necessary for successful implementation of the developed project. Different types of simulators allow students to master the logic and mechanics of the work already done. The reproduction of certain actions form new skills.

Knowledge is transmitted and academic subjects are taught in order to support main activities: program design, and where necessary, to master skills. First, it is important to formulate a query. It is called inquiry-based learning.

Forming representation is one of the key activities of professional training

This research has found a similar attitude towards educational disciplines in Chinese schools, where a stage of design work is supplemented with simulations of typical and non-typical production situations students are likely to encounter in their work environments. In addition, production situations are divided into lessons and elaborated on via computer simulators. Only the necessary information and knowledge is communicated.

However, unlike the Chinese model, research has considered the key stage of design work - work with representations. The representations are formed with the help of teachers, representatives from industries, industry-mentors, tutors, and moderators rather than being merely presented to students. Forming representation is one of the key activities of professional training and is conducted through special procedure, repeated at each stage of the training and the reflection.

The domain of the objective work, during the design mode, must be done in a safe format (by simulation/imitation), in the first step, allowing the student to see all his/her mistakes. For mistakes to be translated into knowledge of activity, they must be reflected, i.e., reinterpreted. This is the second most important function of reflection.

Finally, the key point of this model. Part of the projects has a specific focus: training, approval, it might be said, the experimental exploration of new jobs. This is the new product of new programs - the ability to create structures for new jobs to solve problems - in other words, the ability to create the right jobs. This means creating tasks to solve tasks corresponding to the stage of development of an exclusive or must have competence.

This model does not address the issues of interaction and involvement of industrial partners. These issues are important, but they are well-developed in the **dual learning**⁸ model. The industrial partner⁹ is actively involved in the implementation of projects, some of the competences are trained using company simulators, and then applied in the production, and some requests for required knowledge are addressed directly to the industrial partner. In addition, the experience of engaging companies in the development of new programs has shown that VET management teams are capable of close cooperation with industrial partners and easily accept

their corporate culture. This cooperation and common corporate culture enables VET schools to deliver meaningful solutions to the next stage development goals of the company's unique competences, which makes such partnerships ever more attractive to companies.

7. Developing the design method

The Skolkovo Method is a collective, problem-oriented, highly engaging, a large group approach to addressing the issues of structural development, or, as Skolkovo experts like to say – to 'constructing the future'. It is gamified in the sense that the result is never known beforehand. The Skolkovo Method is also sometimes called Future Programming Machine (SKOLKOVO MOSCOW SCHOOL OF MANAGEMENT, 2018).

The educational program for VET management teams in Khabarovsk Territory was built on the same basic principles that Skolkovo uses when developing all educational programs¹⁰ - whether they are for corporations, municipal or regional authorities or for universities - hence the importance to outline these principles.

The Skolkovo Moscow School of Management implements business education programs. Generally, participants in such programs are managers involved in making strategic decisions for the development of a company or organization. Most of the Skolkovo programs are created in a design method, making them more effective. In addition, despite the young age of Skolkovo School, some of its programs have already been recognized by international professional communities and awarded with prestigious awards.

Figure 5 - International awards of Skolkovo programs based on PBL methods



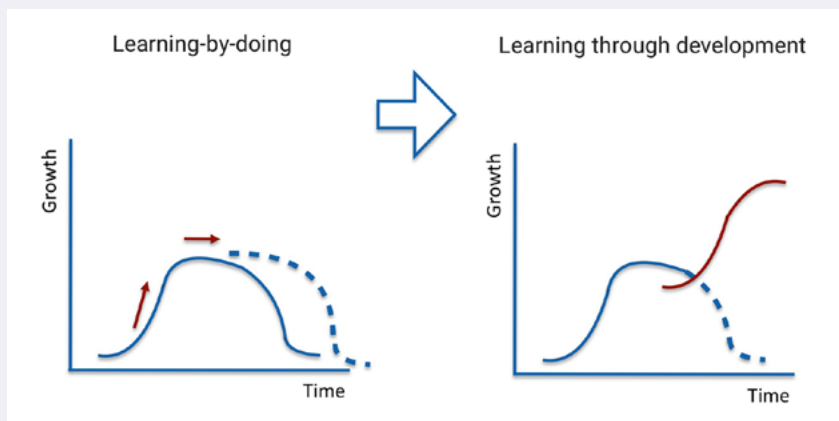
Source: www.skolkovo.ru

The project method is different from Project Based Learning (PBL). While preserving the problem objective principle, the first difference is in design. The most successful educators usually use the design method in teaching, implementing its main principle-learning-by-doing. This is particularly useful in developing non-management activities.

Management activity is associated with identifying the main problem and changing the approach to the real state of affairs. To transform the activity itself, the order is to change the opinion and the ideas about the subject of the project.

The main principle of the design method practiced at the Skolkovo School of Management is Learning-by-Strategic Development. In this view, participation in development processes results in the best educational outcomes.

Figura 6 - Main challenge upon business education



Source: Own depiction.

The greater the ambition, potentially more the educational effect. It is necessary to take into account such problems by solving which the professional or student develops.

The complexity of Skolkovo programs is a consequence of this premise – each method-based program deals directly and simultaneously with two design objects: the activity development project and the team capable and in charge of implementation of the development project.

Two design objects require significant efforts. In this process, it is not clear whom the student and who the teacher is, which results in subsidiary responsibility. The quality of the idea adheres to the highest standard – any information not considered at the elaboration/inception phase might result in project implementation failure. Indeed, in different stages, everyone participates in the same team but assume different roles and positions. The moderators of the project work¹¹ become co-designers. Thus, the school assumes its share of responsibility for the projects implemented by its graduates.

**Strategic
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7.1 Development project

Strategic development project is the main subject of the project method, because it incorporates the image of the future, the next development step for the company and its activities. In the case of educational program for Khabarovsk region, management teams designed development projects for their institutions.

The key, must-have characteristics of the strategic development projects are:

- Strategy: the project must solve a non-trivial (large-scale) task of the company and must be aligned with the corporate strategy.
- Subjectivity: the project should require participants to be entrusted with its implementation.
- Problem: every project should be intended for eliminating a fundamental gap in the management system, which is a significant barrier strategy implementation.

7.2 Prerequisites for applying the project method

Managers need to develop throughout their lifelong learning.

From a certain point, for managers it is not enough (or is redundant) to improve their qualification, it is necessary to develop competences, especially in the field of management thinking.

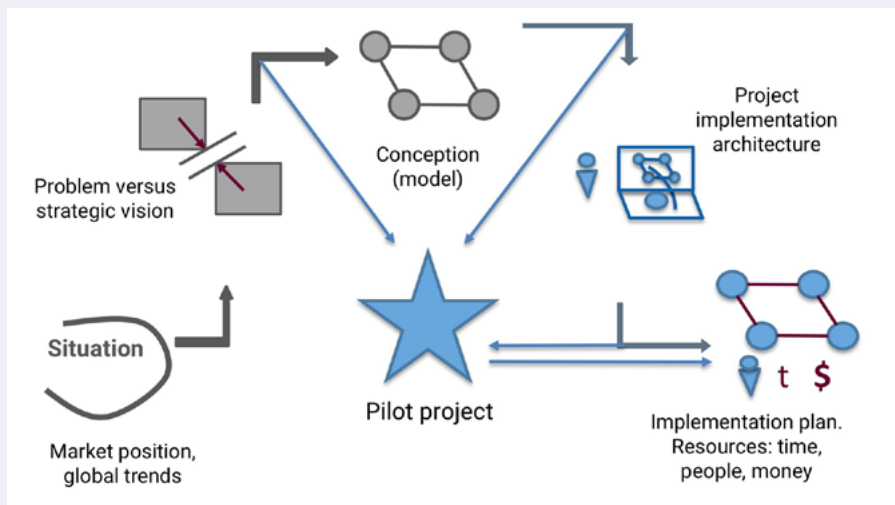
The ultimate horizon of managerial thinking is to think actively about the future.

The only way to develop managerial thinking is to master the thinking processes required and enter a management position. This is only possible in practical activities, for example, in the creation and implementation of a development project.

7.3 Steps of the project work¹²

The work in the project is carried out in a certain order. Figure 7 shows the main phases:

Figura 7 - Steps of the designed work



Source: Own depiction.

Note: The steps of the project work were proposed by A. E. Volkov, the first rector of the Skolkovo Moscow School of Management. Since then, they are the technological core of the design method. They were then refined and developed by N.S. Verkhovsky and B.M. Ostrovsky.

The work is carried out in two modes: modular and intermodular. During the modular mode the participants are fully involved in the project work, they are separated from the usual day-to-day operations at their institutions. During intermodular mode participants go back to their institutions but continue to be in close contact with moderators and experts via different electronic platforms. At the end of each module, participants present their projects to an expert committee composed of managers and specialists, receive feedback about the quality of the project and recommendations for its development, which they take into account in the intermodular period.

Project development requires constant communication with various stakeholders – technology holders, experts, potential customers and partners. Thus, the project work is transformed from an academic exercise into a practical work, preserving theoretical elaboration and mental depth.

7.4 Roles in the design process

7.4.1 Moderator

Each group leads its own project and its work is accompanied by a moderator, whose functions are:

- Organization of effective communication in the group.
- Supplying of the thinking tools required, design and communication to the group.
- Arrangement of the work plan of the group and transmission of the most interesting findings of the group work in the communication space of the entire educational program.

The moderator has the key position in the design. The essence of the work of this position differs from the discussion moderators at conferences. The moderator simultaneously assumes different roles – a project engineer, social engineer (interpersonal skills), coach, planner, methodologist, and sometimes an expert in the topic of a group project.

7.4.2 Curator (sponsor)

The design work aims to develop projects that need to be implemented. To ensure successful implementation, it is assumed that there is a curator (sponsor) of the project that is a member of the company. The curator, as a rule, is appointed by the upper management of the company, and it is usually a representative of a senior management – an industrial partner.

Curator's role:

- Synchronization of the project objectives with the strategic objectives of the company.

- Examination and approval of the project with the team.
- Supplying the group with specialized knowledge.
- Provision of necessary resources (administrative, communicative, including participation in financial decision-making) for project implementation.

7.4.3 Project team members

The project team consists of five to nine participants, and is formed based on three cornerstones:

- Skills required for the development and implementation of the project for the selected topic.
- Ability to assume the roles needed for successful teamwork at each step (the role structure can vary from step to step).
- Personal interest in successful implementation of the project.

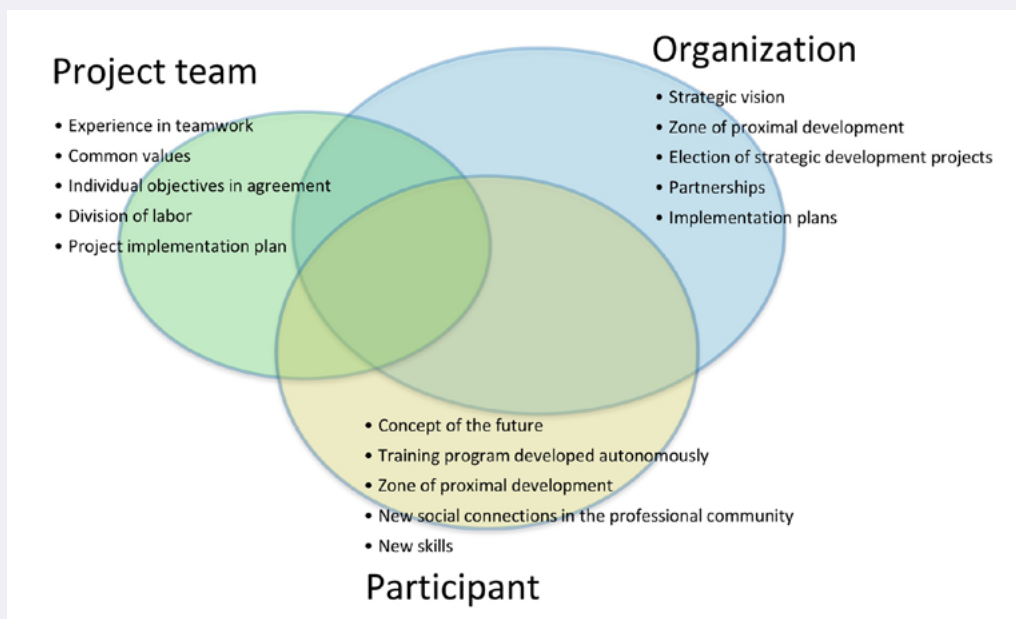
7.5 Results of the program

As a result, each group that follows the results of the program should have:

- Subject and group composition are defined. Situation analysis is conducted.
- Description of the strategic objectives within the subject of the group, both in conceptual (visionary) and outlined (digitized) approach.
- Description of the problem situation, impeding the achievement of strategic objectives.
- Description of the project idea, possible means to overcome the problem situation.
- Project implementation plan and its schedule, with the map of the necessary resources.

Different projects in the same program may imply a different time horizon for implementation. Part of the projects can be implemented at the time of the program, and then they are used in the defense of the immediate results of the project described as a case. However, most of the time, the project requires a long period for preparation and launching and the results can be obtained in years. In this case, the project team tests the feasibility on a small scale and prepares a pilot.

Figure 8 - Results of the program

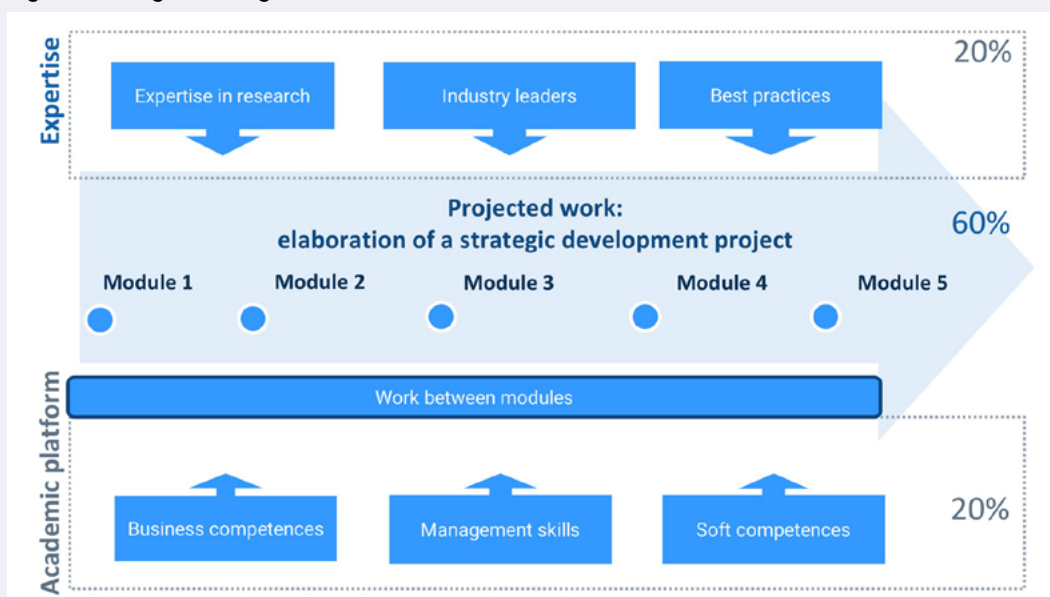


Source: Own depiction.

8. Educational plan construction¹³

The program consists of five stages, each representing a full-time module (five full-time days) and an intermodular period.

Figura 9 - Program design



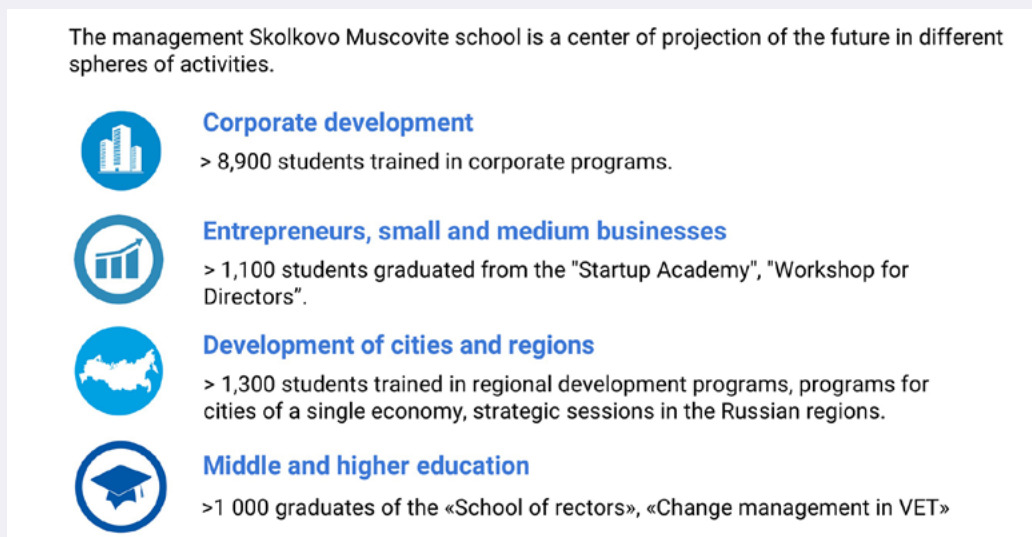
Source: Elaborated by the authors.

Each module ends with a reflection of the obtained results, and intermodular group work objectives are defined. During the intermodular period management teams collect the missing information and conduct negotiations with their industrial partners that are affected by the project, attend meetings with external specialists and stakeholders. An important part of the intermodular period is the examination of the project's intention, whether the proposed solution solves the problem and, at the same time, ensures the achievement of the strategic objectives. In the intermodular period, the group curator usually works closely with the project team.

9. Further development of the design method

At present, in the practice of the design work of the Skolkovo Moscow School of Management, several directions have been outlined for the realization of peculiar laboratories in which experiments are conducted and the design method is being developed. It is possible to highlight the five most promising guidelines implemented:

- Problematization is perhaps the most valuable part of the design method. The accuracy and depth of the problem is half the solution. The ability to problematize is not so common. The work on the technological gain character of the collective formulation of the problem was discussed by G.P. Shchedrovitsky. In this direction, there are works of research, quite current.
- Positional communication. Perhaps, the most effective and promising “engine” of the design method. Experiments on positional communication tuning are conducted in corporate digital transformation programs, university management, entrepreneurship training programs, and the VET management program.
- The emphasis is on the feasibility (effective reproducibility and scalability) of the programs being developed. It is the technological development of individual steps of work design in the programs about the method and formats that provide efficiency. Experiments are conducted with formats and ways of working. Various didactics are developed.
- Proximal development zone. The idea is that the project concept that fits the zone of development closest to the company and the participants provides the most powerful qualitative increase to all. This can be empirically observed. There is an issue of tools and methods of working with the development zones closest to different participants and organizations. The very idea of proximal development zone was formulated by L.S. Vygotsky with reference to children's development. Nowadays, this idea works also in the andragogy and in the strategic development of the companies.
- Preparation of moderators and project managers. This direction appeared on the basis of increasing practice scale and the need to describe and introduce dynamic professional practice standards. This is the formation of a professional department. In addition, there is an important discussion about which path to follow in the moderator's profession.

Figura 10 - Community of graduates from the Skolkovo Moscow School of Management

Source: Own depiction.

Note: The educational curriculum project was originally developed by A. P. Zinchenko, and finalized by A. E. Volkov and O. L. Nazaykinskaya.

10. Final considerations

Nowadays, the boundaries between secondary and higher professional education are indistinct. Under the current conditions of rapid technological changes, the professional education system can and should be built as a full participant in the region's social and economic development strategy. Now, there is an opportunity for technical education institutions to move away from the usual service paradigm, in accordance with the residual principle, and position themselves actively in the market and compete with universities.

For this transition to happen, VET schools must have a strategy. This means that vocational education institutions should stop merely servicing the existing employment system and enter into communication zone with other parties interested in their training. Otherwise, they will lose track of changes and will become utterly irrelevant.

In Russia, as a rule, VET schools are considered the "younger brother" of universities, or as schools designed for less promising students. However, current conditions push vocational education institutions to compete in the market of educational services and they need to absorb research and humanitarian competence. Interestingly, VET schools have a number of competitive advantages - proximity to industries, applied training nature, speed and cost of training.

New educational programs are the main driver for the development and re-positioning of vocational education institutions. The competence to create new programs was largely lost in the post-Soviet period. Under the new conditions, if the educational institution does not have new programs, it will lose its place in the market, resources and the target audience. Going back to competent institutions to

create new training programs is a key factor for success. In the same way, as for other teaching institutions, it is important to face the challenge associated with the dynamism of jobs and related specialties.

The concept of LLL is directly related to professional education. In this respect, the demand for soft skills is significantly increasing and the short programs, that can be assembled like Lego can become the key market for VET schools.

Notes

¹ The authors are grateful, for the discussion of the theses of this article to Andrey Sadakov, moderator of the project work of the SKOLKOVO Moscow School of Management, and to its team: Andrey Volkov, Nikolay Verkhovsky, Olga Nazaikinskaya, Dara Melnik, Andrey Sergeev, Stepan Galushkin, Konstantin Shevchenko, Svetlana Bantos, Anastasia Pyshkina, Mark Mamrykin, Natalya Nikitina, Stepan Galushkin and Zinaida Vorobyeva.

² Reflection means after action review. It is the analysis of the action performed, its effectiveness, which is associated to the allocation of methods of action, its problematization or consolidation. It is a fundamental tool for building skills.

³ It is important to note that in Russia, the SPO system, which refers to Vocational Education of High School or Secondary Education, is carried out on the basis of the elementary school (9 years) and above. The SPO conducts both two to four-year training programs as short programs in supplemental education mode. The SPO also conducts recycling programs for specialists.

⁴ The *Atlas of New Professions* is an almanac of promising areas and professions in the next 15 to 20 years. It consists of a joint project of the Moscow School of Management SKOLKOVO and the Agency for Strategic Initiatives <atlas100.ru/en/>

⁵ Technology partner is a company, a manufacturer or supplier of solutions and technological equipment. The partnership provides education institutions with demonstration equipment, simulators, and training programs for the job. The technology partner is interested in working with schools to promote their technologies in the market.

⁶ The new innovative program provides market positioning and implementation of the education institution's strategy. As a rule, it is based on new technological solutions, ensures the formation of exclusive competences and is based on a new package of educational technologies.

⁷ Objective works are, in the context of the development of an individual curriculum, a special type of project training organization. It is applicable in the step of mastering basic skills. Unlike the projects, perhaps, they do not yet have all the necessary resources.

⁸ The Russian language version of the dual learning method is available for consultation on the website of the Agency for Strategic Initiatives: https://asi.ru/upload/0b6/Method_dualeducation_full.pdf

⁹ Industrial partner is a company or organization in the industry for which the education institution prepares human resources. In most cases, the industrial partner is a potential employer for graduates and provides vacancies for practice and internships for students. Likewise, when the company's employees act as teachers, mentors and tutors, the company's production problems are the subject of projects developed with the students. Generally, the interest in partnership is confirmed by the existence of financial relationships.

¹⁰ The Moscow School of Management Skolkovo Program is based on the design method and in the development ontology. A distinctive feature is that the educational effect is achieved in the course of the collective development of strategic projects, which assumes positional coorganization. At the core of the program is the problematization process (an analysis of the situation that leads to a qualitative identification of the problem that the project aims to solve).

¹¹ Design work manager is the organizer of the design process in the group. He/she is responsible for the quality of the situation analysis and problematization, acts as a source of problematization of the current ways of working in group and is a source of new resources, initiates and follows the process of changing concepts and representations in the group and outlines the group work.

¹² The steps of the project work were proposed by A. E. Volkov, the first rector of the Skolkovo Moscow School of Management. Since then, they are the technological core of the design method. They were then refined and developed by N. S. Verkhovsky and B. M. Ostrovsky.

¹³ The educational curriculum project was originally developed by A. P. Zinchenko, and finalized by A. E. Volkov and O. L. Nazaykinskaya.

References

Шваб, К. [SCHAWAB, k.]. **Четвертая промышленная революция**. Москва: Э, 2017.

МОСКОВСКАЯ ШКОЛА УПРАВЛЕНИЯ СКОЛКОВО. Шаг развития школы
Московская, 2018. https://sedec.skolkovo.ru/en/sedec/method/?fbclid=IwAR3yfmnw3REmyzRNW5-0FUsUphaFyIbZzAgDwdX9aUIku_jFu2eAuJluZAU

Рифкин, Д. [RIFKIN, J.]. **Третья промышленная революция: как горизонтальные взаимодействия меняют энергетику, экономику и мир в целом**. Москва: АНФ, 2014.

Щедровицкий, Петр [SHCHEDROVITSKY, P.]. **Три догоняющие индустриализации России**. ХВИЛЯ, 9 jan. 2018. <http://hvylya.net/analytics/economics/petr-shhedrovitskiy-tri-dogonyayushhie-industrializatsii-rossii.html>