

Model of organization of network project-research students activities in collaboration with city-forming enterprises

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Abstract

The article proposes a model of organization of network project-research activities of students. This model describes the involvement of students in the scientific and practical-oriented directions of the city-forming enterprises for their early profiling and career guidance. City-forming enterprises can offer educational organizations human and logistical resources, relevant topics, directions for practical and research activities of students, act as managers and experts in the implementation of these projects. As a result, conditions for the training of future personnel, corresponding to state priorities for the development of science and technology will be created. The organization of the network project-research activities of students in the collaboration with the city-forming enterprises will be successful if: to distinguish the types and mechanisms of the network interaction of the parties for the implementation of socially significant and practice-oriented projects; to determine the principles of organization of network project-research activities of students; to develop a diagnostic card of the directions of network interaction and the themes of the project-research work, proceeding from the needs of the region; to offer effective methods, technologies, organizational forms, means for implementing network projects.

1 Introduction

A city-forming enterprise is a production enterprise, on which a significant or even a major part of the working citizens of a city is employed, and in this connection it determines the employment of the population, affects

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infrastructure and social problems. Such enterprises are in urgent need of an influx of young mobile personnel, that is explained by the country's new course for the implementation of the National Technology Initiative as one of the priorities of state policy [Nat]. For this, already at the stage of general education, early profiling and vocational guidance of students is needed. City-forming enterprises can take patronage over educational organizations, offering actual topics and directions for practical and research activities of students, and the employees of enterprises themselves can act as managers and experts in the implementation of these projects. Thus, we see the main task in creating conditions for the training of future personnel, corresponding to state priorities for the development of science and technology, able to develop in their homecity, thereby increasing its economic potential.

The relevance of the chosen direction is determined by the following trends:

- emergence of various forms of open education;
- focus on the student-oriented concept;
- increasing academic mobility of students;
- enhancement variability, flexibility and differentiation of educational programs;
- implementation of individual educational routes;
- use of non-standard forms of educational process organization, going beyond a certain educational organization;
- review of technologies and methods of teaching, strengthening of cooperation ties and development of social partnership of educational organizations.

In the field of integration processes of science and education, the project-research methodology in educational organizations allows to implement strategic research directions and practice-oriented approaches of city-forming enterprises at the propaedeutic level.

Educational network projects (ENP) are joint educational and cognitive, research, creative or gaming activities with a common goal, agreed methods, ways of operation aimed at achieving the overall result of this activity, organized on the basis of computer telecommunications [Zar15].

2 Main part

2.1 Status of the Issue

Project-research activity initiates early career guidance of schoolchildren, and students consolidate the understanding of the right choice of future profession, promotes creative self-determination and development. Network, socially significant projects with a practical component, aimed at implementing of authentic education (taking into account the experience that real life gives), expand the horizons of students outside the classroom, increasing their motivation for learning activities [Abd14]. Network interaction in the implementation of network projects leads students to master new activities, acquire new competencies and personal qualities:

- ability to operate information (criticality in its choice for solving future professional tasks),
- possession of various types of communication,
- ability to constantly learn and improve,
- increase the level of their own initiative to make qualitative and responsible decisions,
- ability to manage their own cognitive activities and design a personal educational result,
- ability to choose the best educational routes and means.

2.2 Model of network project-research activities

Organization of network project-research activities of students in the collaboration with the city-forming enterprises will be successful if:

- to highlight the types and mechanisms of network interaction between the parties for the implementation of socially significant and practice-oriented projects;
- to define the principles of organization of network project-research activities of students;
- to develop a diagnostic map of the areas of network interaction and the topics of design research work, a plan for joint activities of startups of school teams and expert councils of city-forming enterprises, based on the needs of the region;
- to offer effective methods, technologies, organizational forms, tools for implementing network projects.

On this basis, we propose the following model of network project-research activities of students in collaboration with city-forming enterprises (see Fig. 1)

Introduction of the model begins with a description of the mechanisms and types of network interaction.

The mechanisms of network interaction in the project-research activities of students in the collaboration with the city-forming enterprises include:

- a mechanism of formation of network interaction (distribution of rights, duties, roles, directions and topics for research, definition of responsibility levels, definition of social pedagogical norms, material and technical resources, etc.);
- a mechanism for managing network interaction in the implementation of project-research activities;
- a mechanism for communication of participants in project-research activities.

Among the types of network interaction in the implementation of project-research activities of students can be identified:

- network interaction within single organization;
- network interaction between educational organizations of the same level (at the level of schools, at the level of universities, colleges, etc.);
- network interaction between educational organizations of different levels (for example, school-college, school-university, university-enterprise, etc.);
- network interaction between educational organizations and city-forming enterprises.

Lets call the principles of formation of network project-research activities of students:

- the principle of equal partnership and joint productive activities of net-work participants;
- the principle of the navigation and meaningful orderliness;
- the principle of openness and voluntary communication;
- the principle of information correctness and copyright ethics;
- the principle of responsibility and educational efficiency [Zen16].

Within the implementation of the chosen direction, it is planned to conduct diagnostic studies of the dataware conditions and support of network project-research activities in the region, which will become the foundation for development a model of organization of network project-research activities of school-children. Diagnostic card of relevant trends on networking and topics of project-research work and plan of joint activity of startups of school teams and expert councils of city-forming enterprises will be developed. Such work should be carried out on the basis of academic experimental platforms, which are educational organizations that conclude an agreement on cooperation with the city-forming enterprises.

We see the next stage in the forming a model of project-research activities of students in the offer of effective methods, technologies, organizational forms, training tools for the implementation of network projects.

Project-research technology, as a system of integrated procedures for the implementation of network projects, may include many well-known methods and means of active learning, such as: project method, immersion method, data collection and processing methods, research and problem methods, search experiment, experimental work, generalization of results, business and role games, etc. [ZenSav16]. But for network projects, the new methods and forms of the organization that have emerged through the development of network technologies, such as virtual tours, teleconferences, forums, discussions, discussion blogs, web quests, hackathons, etc., are becoming actual. Here it is possible to use various pedagogical and information technologies for organizing joint research in small cooperation groups at different stages of project implementation, contacts with the teacher and project participants, with the heads of the city-forming enterprises, discussion of issues in the teleconferences, forums, organization of joint research [Jim17].

Today, each teacher can use a huge number of services to organize network re-search projects. We will briefly focus on Google services, which seem to us have the necessary potential for the implementation and presentation of these projects. For example, the ability to combine several well-known Google-services, such as Hangouts, YouTube and Google+ will create a video conference with access to up to 150 participants. Online video conferences (webinars) can be arranged with the above-mentioned services, Hangouts and YouTube, and adding a service of Google Presentations, you can set up a question and answer session with a voting item.

Network services are widely used in the educational process of the school. Using cloud services allows the teacher to manage the learning process. Google services help to organize students joint activities on the project, communication between the subjects of the educational process, the interaction of teachers with the group and group members with each other.

The described type of joint activity with students can and should be organized exclusively in the classroom, taking place in computer classes, and each student must create an account.

In the students joint work on the learning of Google services, conducted by the teacher, we can conditionally distinguish several steps.

Step 1. Register students on Google. Each student creates his account, his email account on the gmail mail server and configures this mailbox.

At this step, the level of students basic skills with computer technical and mobile devices is revealed. Step 2. Forming contacts and groups. Through the created mail service gmail the teacher from the received messages forms a list of contacts and combines these contacts into a group of the same name learning group.

Step 3. Organization of joint work with documents. On the Google Drive, the teacher creates the Google Sheets and gives editing access to all the members of the group. In this table, which is shared, the students enter information about themselves, for example, phone number, date of birth, hobbies, additional e-mail and other. As a result, not only the skills of working together with documents are formed, but also the students get to know each other better, getting additional information about classmates.

Step 4. Organization of sharing, control and self-control of knowledge. At this step, each student creates a folder on their Google Drive, the name of which corresponds to his name (for the convenience of the teacher). Hereinafter, there will be files with reports on the work performed. The student sets up access to this folder for the teacher, who can view all the reports, evaluate and comment on them [Kon17].

The above technology of complex application of Google services can be reflected in one of the well-known Google Classroom applications, which is a free service for schools, non-profit organizations and anyone who has a personal Google account. It simplifies the dialogue between students and teachers both at school and outside. Google Classroom helps teachers create, collect, and grade homework electronically, saving teacher time. For example, automatically copy Google documents to all students. Students can follow the deadlines for assignments on a special page. The teacher sees who has already completed the task and who has not yet, and can leave comments and evaluate the work. It is important that the network application "Google Classroom" is designed for mobile devices.

One more, not so long ago appeared event, but original and interesting is hackathon. Hackathon is an event that has become very common not only in foreign countries, but also in Russia. This is a forum for developers, during which experts from different areas of software development (programmers, designers, managers) work together to solve any problem. Hackathons, in our opinion, are the best invention for the implementation of research projects, as within the framework of this event: communities of active young people who are interested in a specific problem are created; there is an opportunity to work in a free format, to gain new knowledge, to face the problems that were not before, to demonstrate their professionalism, to implement new ideas and

projects. At the hackathon in brainstorming format and working in small groups, the team task is to develop some IT-solution on the proposed topic and present its prototype [Sco18]. A hackathon can be conducted in a network format, which means that this technology is quite suitable for network research projects.

One of the newest, interesting, adaptive ways to conduct network research projects is a web quest. Now in educational institutions, most students are free to use modern information technology. Therefore, the work of students in this version of the project research activities, like a web quest, diversifies the educational process, making it lively and interesting. Web quest developer is Bernie Dodge - Professor of educational technology at the University of San Diego (USA) [Dod99]. Web quest is a form of organization of students' project activity by the Internet site, where they are looking for a solution of a research project on a particular or interdisciplinary problem, the subject of research. A feature of educational web quests is that some or all of the information for self-study or group work of students is found on various websites. In addition, the result of the work with the web quest is the publication of student works in the form of web pages and web sites (both online and offline).

For functioning of educational network projects the support program system of network project and research activity of students (with a network project competition module) is necessary. As an example, we propose to use Google Cloud Plat-form to develop new network projects in the key areas:

- science of man;
- social Sciences (history, social science);
- natural sciences (biology, botany, zoology, geography, ecology);
- science of art (literature, art history);
- mathematical, physical, chemical and technical Sciences, astronomy, space;
- computer science (robotics).

The module will provide access to the interactive guide of network projects, it will organize a network interaction of the participants in the project activity and focus the report and analytical information on the competition.

3 Expected results and prospects

Organization and carrying out of network project-research activities of students in collaboration with the city-forming enterprises leads to the following results:

- early training of future specialists in demand at the city-forming enterprises of the region;
- extension of experience to all educational organizations of the region, expansion of training areas: to learn not only engineering and technical specialists, but, to a greater extent, to form and develop scientific and research competence of students and teachers);
- providing continuous communication based on the joint project-research work of city-forming enterprises and general education organizations for early specialization and vocational guidance of schoolchildren.

4 Conclusion

Thus, the presented descriptive model of the organization of the network form of students project-research activities in the collaboration with the city-forming enterprises, in our opinion, will become the starting point in providing effective information exchange between all participants of such work, will give basis for consulting support of experts of city-forming enterprises in order to enhance their participation in the integration processes in the sphere of education, will promote cooperation among all interested subjects in the network project-research activities of youth for the development of the region.

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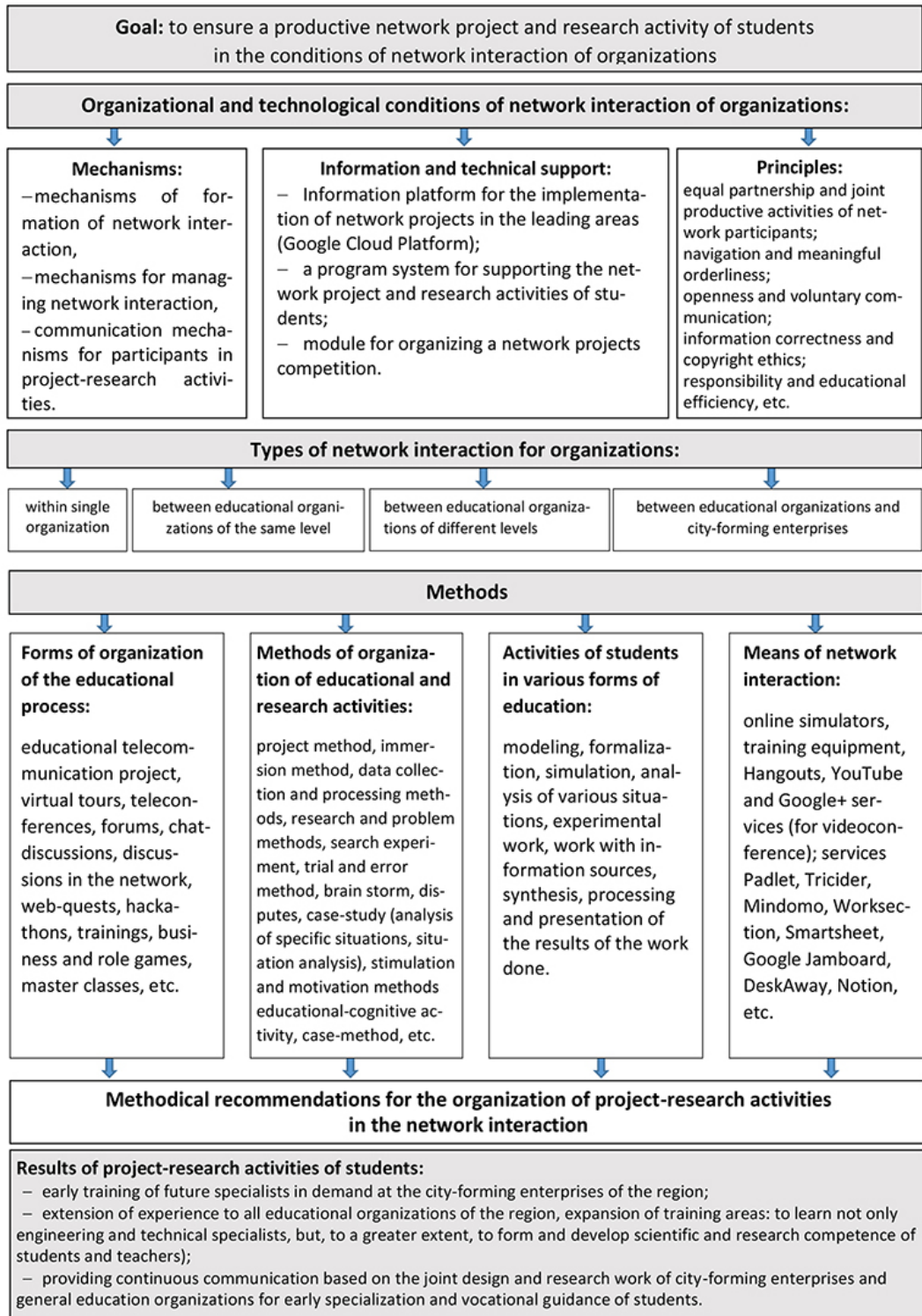


Figure 1: Model of organization of network project-research students activities in collaboration with city-forming enterprises