# Development of Web-environment for Communication Between Master's Degree Students on Research and Innovation Issues

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***Abstract*—The article considers actual problems of the Internet environment development for master's degree students. Results of the analysis of university portals and social networks regarding their relevance for organization of research and innovative activity of master's degree students are cited. The authors conclude that it is necessary to create a special Internet environment for this category of trainees. The structure and implementation of the environment are justified.**

***Keywords—innovative and research activities; web-environment for master's degree students; open education system***

## I. INTRODUCTION

According to the statements of scientists from the United States, Europe and Japan, old forms of socialization lose the importance because of "transition" of youth to Internet space. Emerging new forms of Internet socialization in the process of communication have a significant educational potential, which is not realized yet. Its realization is possible on condition of support of real needs of youth during educational process. If it is possible to reveal potential opportunities of new forms of Internet socialization of youth, then it is possible to create web-technologies which can be useful to the system of open education. Open education will be enriched with new components. And the implementation of such technologies in practice will allow students to engage in professionally-oriented and sociocultural interaction in the global intellectual space.

## II. RESEARCH

For understanding the current state of the problem, an Internet survey was conducted to investigate the problems of using Internet resources for organization of educational, research and innovation activities. It should be noted that half of the respondents (50%) discover information about upcoming contests, conferences and grants for participation independently on the Internet, a quarter (25%) from the teacher, the eighth part (12.5%) on the university's website, the rest (12.5%) learn information from other sources. All respondents would like to receive the necessary information about writing scientific work, upcoming conferences, exhibitions, etc. with the help of a specialized Internet resource, which would contain all the methodical, relevant and useful information. The survey revealed that for 96% of respondents there is an important opportunity to discuss the problems of research among master's degree students. However, the communities of master's degree students are actively trying to interact in the Internet space about innovation activity. This testifies to a new form of Internet socialization of master's degree students, revealing themselves in network communication on the problems of participation in innovation activities, competencies in innovation policy, regulatory and legal competencies, competitive projects of the state, business, non-profit organizations, social partnership and others.

We carried out the analysis of the most popular Internet portals for training of master's degree students of leading universities and subject matters social networks. Internet resources were considered from the point of their availability of: information about competitions and grants for master's degree students; information on research journals for novice researchers; information on the organization of scientific activity of undergraduates; normative and legal base in the field of innovations; base of scientific articles; information on innovative projects of companies in various fields; possibility of organizing team research and project activities; availability of useful links and materials, allowing to form a general understanding about innovation activities.

We have found that, despite the variety of sites specially organized for masters, a significant part contains only educational programs, separate techniques and a bulletin board.


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As a result, there was no special environment revealed for training masters for innovation. Almost all resource groups contain one or more key components, but there is a lack of regulatory framework in the field of innovation, there is no given opportunity of team work on research projects.

Considered social networks for scientists do not provide an opportunity to get acquainted with the regulatory and legal base in the field of innovations, there is a limited or no bank of useful links and materials that allow to form a general understanding of innovative activity for the master students. This analysis determined the need of development of Internet environment for training master's degree students based on the principles of the innovative approach.

Thus, our analysis of the Internet space allowed to come up to the conclusion that master's degree students need a special educational environment for communication, different from graduate students and bachelors. A significant part of universities gives them only academic content, and scientific content is not adapted for master's degree students. The scientific content presented on websites is for experienced scientists and often frightens off because of unpreparedness of master's degree students for learning that content. This means that there is no adequate environment for mastering necessary content by master's degree students, which hampers communication in the process of research and innovation activity [2].

This requirement is reflected also in materials of meetings of the Ministry of Education and Science in January 2018, where the issue of creation of social network for young scientists was discussed.

A significant part of the educational process is the provision of scientific component of master's degree student training. The purpose of scientific research training is mastering the methodology of conducting all stages of research work - from setting a task to preparing articles, patent application for invention, grant proposals, participation in scientific works competition etc., up to writing a master's thesis. Half of the respondents learn about upcoming contests, conferences and grants to participate independently on the Internet. Interviewed master's degree students would like to get the necessary information about writing scientific work, forthcoming conferences and exhibitions using specialized Internet resource that would contain all the methodical, relevant and useful information.

Based on the principles of innovative approach [1] the mandatory components of the Internet environment for teaching master's degree students are identified. Internet environment provides all the necessary information in order to form a general understanding of innovation activities among the user, to familiarize him with the regulatory and legal framework in the field of innovations, competitions and grant-making funds that support scientific and innovative projects of master's degree students, events for masters, leading companies and open vacancies in this field. Master's degree student is given the opportunity to find like-minded people for team research activities, as well as keep records of results of innovation activities using his personal account.

The Internet environment developed by us for training master's degree students is based on an innovative approach and gives an opportunity to communicate on the topic of implementing innovative and research projects. It is also a tool for self-assessment of results in innovations and research.

Internet environment potential for training master's degree students on the basis of innovative approach is illustrated in figure 1.

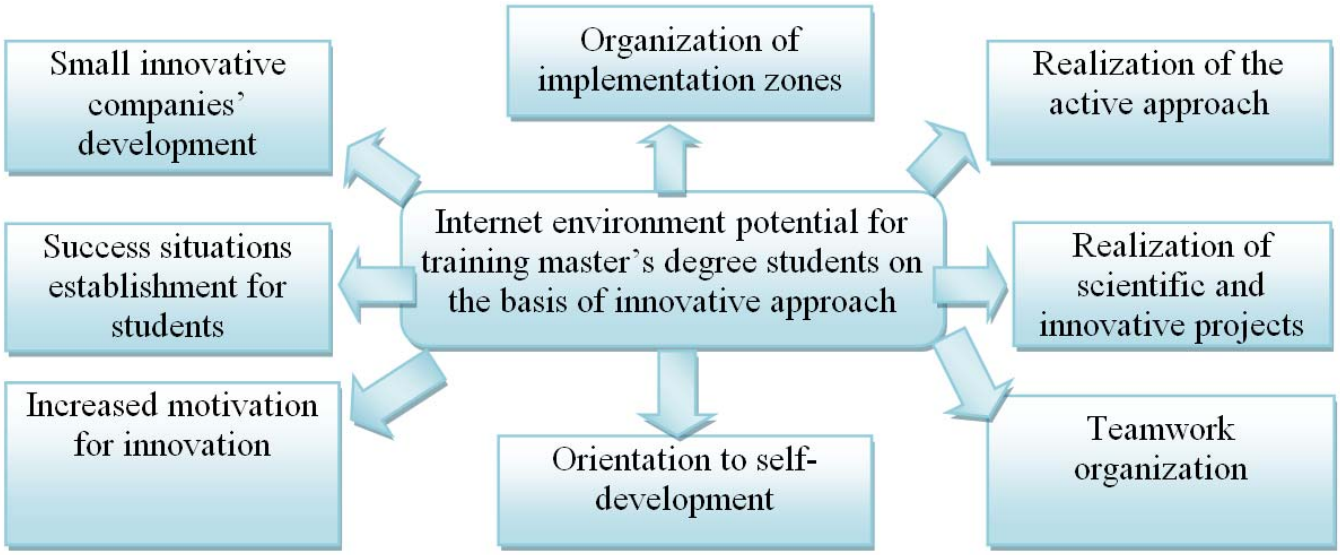


Fig. 1. Internet environment potential for training master's degree students

The Internet environment provides the following basic functions: attachment of documents; sending notifications to users; adding, removal and editing of information about publications, conferences, competitions and grants where the user participated, about objects of intellectual property, about writing a thesis; management of master's work (decomposition of the project, setting deadlines for execution, indicating the statuses of stages completion); formation of master's degree student activity diagram; management of team research (editing, removing, making chats and forums); upcoming innovative events information posting (competitions, conferences, projects, etc.).

Initial data: data on the thesis; publications and objects of intellectual property of master's degree student; conferences, competitions and grants he took part in; information about forthcoming innovative events. The data is entered in a dialog mode. Output data: tables, text messages or graphs displayed on the screen.

The non-functional requirements to the Internet environment for training of master's degree students are the following: user interface must be intuitive; reliability - the system should work 24 hours a day; security – prevention of an unauthorized user from accessing personal accounts of other users; strict users' hierarchy organization - only administrator must have the rights to change the hierarchy; flexibility – capability to easily change or supplement the system if necessary; storage of data; completeness and straight structure of the data - information should be clearly structured and cover all the aspects of research and innovations.

Another important aspect of innovative approach is realization of functions on work with intellectual property in the Internet environment. Team work assumes development of functionality for the organization of communication between users regarding implementation of scientific and innovative projects.

Master's activity is an instrument of self-assessment of the results of innovation activity by students of master's degree. This section assumes the construction of activity graph that shows the result of scientific achievements in various areas of innovation activity on a time interval.

The environment was developed using hypertext markup language HTML, cascading stylesheets CSS and JavaScript. PHP version 5.5 is chosen as the server language for the development of the Internet environment. MySQL is chosen as the database management system. Popular content management system MODX is chosen to meet the challenges.

On the main page (figure 2) the user is able to get acquainted with current scientific journals, as well as with the most important upcoming events in scientific and innovative fields. It is possible to follow to the appropriate resources. From the main page, you can go to the following pages: Home, For master's degree students, Events, Interesting. In the upper right corner there is a link to go to your personal account. On the page "For master's degree students" the following sections are available: "About innovations", "Legislation", "Contests and grants", "Exhibitions and forums", "Innovation support".

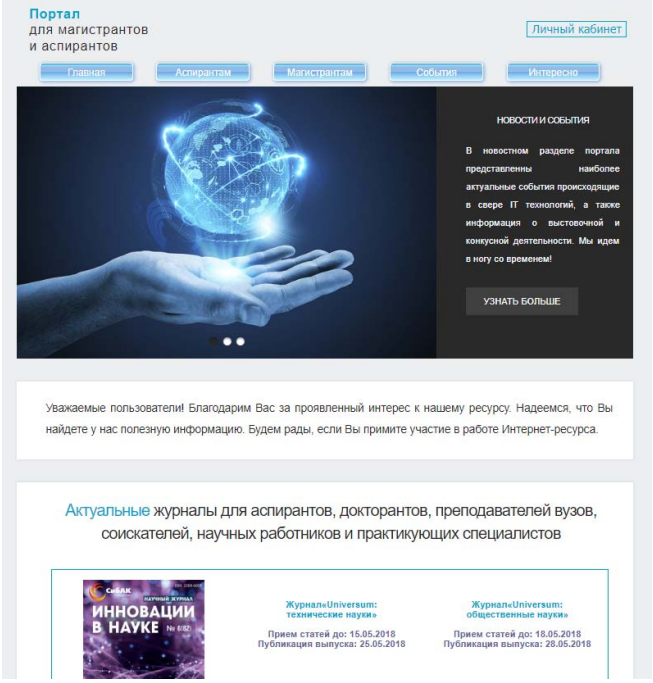


Fig. 2. Main page of Web environment

"About Innovations" section is intended to form a general understanding of the innovation activity of user. It contains such subsections as: innovations and organizational structures of innovative management; innovative strategy choice; research project management; management of creation, development and quality of new products; innovative projects expertise; intellectual property; creation and operation of an innovative enterprise algorithm. Selecting the appropriate subsection, the user is invited to study the information on this topic, organized as presentations, courses, videos and links to external resources.

"Legislation" section is intended for acquainting with standard - legal base in innovations. Includes following subsections: innovative politics of the Russian Federation; financing of innovations; State target programs; specific economical zones; science cities.

Section "Competitions and grants" contains information about competitions supporting scientific and innovative projects, as well as grant-forming funds and organizations with description and reference to the appropriate resources.

Master's degree student can get acquainted with exhibitions and forums in the field of innovations in the section "Exhibitions and Forums". Section "Innovation support" is dedicated to leading companies and open vacancies in the field of innovations, as well as innovative initiatives and programs.

"Events" page provides information about events in science and innovations field. In order to leave an application for posting information about the upcoming event, the user should click on the button "Post information about upcoming events". After clicking the button new window will appear where it's necessary to fill in the appropriate fields and press

“Send" button. This request will be sent to administrator of the system for approval before mailing to registered users, as well as posting on the site.

To enter your personal account or register, you need to click on the "My Account" button on the portal. When clicked, the authorization form will appear. After entering correct login and password the system determines access rights to system modules for the user and loads workspace. User must register to get a personal account.

After authorization in "Master's degree student” personal cabinet, the page shown in the figure 3 opens.


Fig. 3. Personal cabinet «Master's degree student»

The following main sections are available to this category of users: thesis; publications; participation in conferences, competitions, grants; intellectual property; team work; notifications; schedule of activity.

The user can view his private information entered at registration in the "Personal Information" section of user's cabinet. In the "Thesis" section, the user can enter information about his dissertation. By clicking on the "Schedule" button, you can enter the stages and sections of the work. The user can specify due date, status (completed / failed), and attach file for each stage and section.

In "Publications", "Participation in Conferences, Competitions, Grants", "Intellectual property" sections the user can add information about published articles, conferences and competitions attended, including the results of participation as well as data on registered objects of intellectual property.

User is given the opportunity to create and use available chat rooms in the "Team work" section.

"Notifications" section contains a list of notifications about upcoming events. Notifications come after confirmation of applications posted on the portal by administrator. Clicking the "Read" button opens a window with the message text.

In "Schedule of Activity" section the user can create an activity chart for the chosen period.

The following main sections are available for administrator: users, applications. "Users" section allows to edit information about users and confirm users' registration. "Applications" section contains the list of applications posted on the portal. In order to send an alert to users, it is necessary to choose selected application and click "Send".

## III. RESULTS OF THE STUDY

Yandex.Metrics was used for assessment of website effectiveness during the period from 01 May 2018 to 11 May 2018. It was recorded 233 site views during this period. The average time spent by user on the site has increased to 23 minutes. View depth has increased to 22 pages. Failure rate is 0. This means that the duration of visit is more than 15 seconds and during the observation period more than one page view is recorded.

Above mentioned indicators mean that each passing day the interest for information posted on the site increases. We also note that young people aged 18 to 24 years are the main visitors of the Internet environment, which indicates that students are interested in this resource.

Thus, the idea to provide platform for communication for master's degree students, realizing the Internet socialization potential in the educational process, which can be used in open education technologies, was embodied.

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