The model of an online digital competencies development system for the management personnel of the Arctic region

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Abstract. The article presents a model of online system devised for the development of digital competencies of management personnel in the Arctic region. The model includes a description of the means and technologies allowing implementation of distance learning processes, justification of choice of digital platforms used, structure of electronic educational resources, and methodology of analysis of students' performance based on the "digital footprint" technology. The structure of electronic educational resources is expected to provide an opportunity of use in various modes and forms of management training, basic and additional professional education, as well as online exchange of positive professional experience between the leaders of the Arctic regions. This approach use e-learning tools in the education shall increase the interest and involvement participants in various types of cognitive activities. The use of Microsoft Office 365 solution for education allows to integrate LMS Moodle with Teams communication application, which supports interactive format of communication. And the OneDrive cloud service shall allow to ensure secure storage of electronic documents and to organize online project work in teams. The statistical data of students' performance is collected with the use of “digital footprint” technology and analyzed in order to obtain qualitative characteristics of online education process. The expected outcomes of learning will be related to the consumers’ requests. The proposed model of the training system for managers is expected to allow the practical implementation of the Life Long Learning concept, by drawing multi-component individual educational and professional development trajectories in the Arctic region subjects.

1. Introduction
The digital transformation taking place in the world community becomes more and more actual and required in the context of the global economic and political changes and the expanding pandemic. It defines new strategies for the behavior of people in society, the implementation of business processes,
the management of economic markets and opportunities of real sectors of the Russian economy. The Decree No 164 "Concerning On the Foundations of the State Policy of the Russian Federation in the Arctic for the Period until 2035" was adopted in the Russian Federation on March, 5 2020. This document defines the tasks of development in the fields of economy, social infrastructure, science, education, technology in the Russian Arctic segment under conditions of joint use of the Arctic by interested countries, globalization of markets and digitalization of economies. It is necessary to develop both new infrastructure and technological solutions in the training of managerial personnel to ensure international cooperation in the Arctic.

The digitalization can help to reduce the social and economical lag in development of regions, including the Arctic. Speaking on the issues it is necessary to mention the population decline in the Russian Arctic zone and the low level of social, transport, information and communication infrastructure there, especially for places of indigenous peoples inhabitants. The modern need for education contradicts the nomadic lifestyle. An attempt to resolve this problem by teachers visiting children in the nomadic families has no perspective due to extremely high budget costs [1]. The formation of competencies of the Arctic managerial personnel is an important area of activity in the current need to find new ways in developing the Russian Northern regions.

2. Analysis
The analytical report of Digital McKinsey experts [2] indicates the sources of GDP growth due to digitalization, to be used only when providing the economy with prepared managerial personnel. Education and retraining systems of such professionals should be modernized. It is also important to increase the attractiveness of professions requiring high qualifications [3].

In accordance with the global connectivity index (GCI 2018), Russia ranks 36 of 79 and shows promising figures for five technological capabilities. It confirms the potential readiness for digitalization [4]. But the realization of the necessary transformations is possible only by the managers with a high level of digital competencies [5, 6].

The journal "Competencies" [7] presents the Analytical report of Sberbank Corporate University Autonomous Non-Commercial Organization "Training in digital skills: global challenges and best practices," previously discussed at the III International Conference "More than training."

This report presents the outline of the European Model of Digital Competencies for Education, which includes the following categories:

1) information literacy - the competence to view, search and filter data, information, digital content, their evaluation and management;
2) communication and cooperation - the competencies of interaction, exchange, cooperation, ability for creating digital content, programming, copyright requirements;
3) providing security - the competencies related to information security, data protection, including personal;
4) decision making - the competencies of solving technical issues, educational tasks.

Meanwhile, the content of the listed competencies is not described in the report. Moreover, the scheme is called "digital competencies," but the competencies themselves and their structure are not considered by the authors and are not even included in the content of the model itself. It is not clear what the authors of the model mean by the concept of "transboundary competencies"? Why are other competencies lower than "digital" and "transboundary"? What does the promotion of digital skills process mean? What is the process and whom it concerns? Thus, neither the structure, nor the content, nor the relationships of the suggested in the report model are not clear. In this regard, the list of competencies can be only partly accepted, but in no way the logic, content and meanings of pedagogical concepts, processes presented in the proposed scheme.

The UNESCO International Bureau of Education report [8] identifies the concepts of knowledge and skills for the XXI century. It is emphasized that the requirements of the XXI century imply the orientation of education on knowledge and technology. The XXI Century Skills Partnership identifies key fields and topics that include learning and innovation skills (creativity and innovation, critical
thinking and ability of decision making, communication and collaboration); information, media and technology skills (e.g. ICT literacy, media literacy).

This approach seems to be acceptable because it allows to represent the model of digital competencies in the form of a cube of various levels of descriptions, competencies, roles, activities:

1) basic digital competencies related to using network, mobile technologies, capabilities in the conditions of the information society and the development of the digital economy. At the same time, that digital literacy (digital fluency) can be understood as a set of knowledge and skills that are necessary for the safe and effective use of digital technologies and Internet resources [9],

2) social competencies of interpersonal communication related to work in social groups, participation in electronic government, electronic state,

3) general professional competencies related to knowledge, skills in solving problems in the educational area,

4) professional competencies corresponding to professional standards.

3. Main part

The digital competencies, offered for the public administration servants of the Arctic region are directly related to the system of qualification requirements for public administration personnel of the Russian Federation, which currently consists of three components of education, knowledge and skills: basic, professional, functional.

Today, the Executive power of the Russian Arctic region subjects has 5 groups of civil service (higher, main, leading, senior, junior), which correspond to different levels of higher (bachelor's, specialty, master's) and secondary professional education. The system of digital competencies should also include the qualification requirements for managerial personnel of the Russian Federation.

Since 2018, RANEPA has been developing and implementing programs for professional retraining and additional education on Arctic themes, including e-learning [10]. This experience can be used for the development of digital competencies for managerial personnel in the Arctic region.

Global trends in recent years clearly show how online technologies are changing the situation in education [11], and how the situation with the coronavirus pandemic in 2020 has accelerated the transition to online learning [12].

The active research on the advantages and disadvantages of online and traditional training [13] has been conducted in recent years. The authors share the opinion that there are more opportunities to interest and involve learners in active activities through the use of iterative elements, in e-learning [14] and in this case the digital learning environment needs special design to increase the efficiency of training [15].

The tradition model of education uses the indicators for measuring the results of academic performance. Moreover, linear models of analysis are mainly used. However, life as a whole, and each individual person is much more complicated, the patterns are more diverse, especially if managers of different categories and with different professional experience are trained.

One of the promising areas of research in the field of analysis of educational results is the collection of a "digital trace." The digital footprint is the information expressed in the data about the experience, activity and state of a person. The digital footprint provides a set of data and facts based on comprehensive information about visits and user input while using digital space. These include: personal data, personal profiles on social networks, information about sites visited, photos, personal messages and comments, as well as other virtual activity.

The proposed online system model for developing digital competencies of management personnel in the Arctic region includes the following components (see Figure 1).

The software and hardware infrastructure is based on the joint use of LMS Moodle Electronic Education Environment (EEE) as the main platform for hosting electronic educational resources – and the MS Office educations solution.
Figure 1. Components of the digital competency development remote system model.

"Digital competencies of a manager" includes an electronic portfolio - log with records about learners' activities based on digital footprint technologies, which allows to implement multi-component individual educational and professional development routes in LMS Moodle. MS Office 365 supports online classes in the form of lectures or consultations using the MS Teams communication application. Access to MS Office 365 applications provides cooperative processing of documents. Such applications as MS Outlook for e-mail exchange and cloud disk space service MS One Drive, provides secure storage of electronic documents are necessary for effective management of joint online work of learners and teachers.

The model suggests to confirm educational results by digital footprint of activities, left in the system using its interface and logic. Learners also leave traces of their activities in the form of artifacts made during learning and reflections, which are the most valuable for evaluation.

The structure of the electronic educational resource "Digital competencies of a Manager" includes the following sections for the formation and development of knowledge and skills for mastering:

1) software products and communication tools in the digital economy and the globalization of management systems,
2) hardware, global communication systems and networks in the digital economy and management,
3) work in the electronic environment and electronic culture of digital communications of managers,
4) artificial intelligence systems, big data technologies and machine learning in management activities,
5) solutions of applied management tasks using Industry 4.0 tools and technologies,
6) digitalneurotechnologies, hybrid biotechnologies and digital interfaces in management activities,
7) management decision making, based on the requirements of cybersecurity and state secrets protection,
8) principles of management robotization,
9) principles and technologies of using virtualization (VR) tools in management activities,
10) principles and technologies for using the social and industrial Internet of things (IoT) in management activities,
11) principles of using augmented reality (AR) technologies in management activities,
12) principles of using hybrid reality technologies (Mixed R) in management activities,
13) quality management of electronic services in the Arctic region, taking into account regional and national characteristics

Practical implementation of the online model of the system for digital competencies development of managerial staff is focused on the existing model of the Russian Arctic region Executive power. It requires the description and specification of system components that represent the input model of the educational process:

1) data on subjects and objects of the management system, including a personalized profile of the subject/object,
2) training events schedule and time sequence of the digital competence development processes
3) technical and software tools, forms of implementation and support of the system's activities, taking into account the personal educational background of each student - Manager,
4) methodological materials, cognitive technologies, and methods for implementing and supporting the activities of the distance learning system differentiated by the levels of development of digital competencies,
5) development and maintenance of the a register of external didactic relations, relations between objects and subject in the system (teachers, tutors, experts, trainees – managers), as well as between internal links and interdependencies between educational and cognitive processes and the content of training,
6) conditions for implementing and supporting the system's activities, working and training conditions, including the legal, educational, methodological, and software and technical base for the system's operation,
7) material, software, hardware, communication, organizational, and human resources for implementing and supporting the system's activities,
8) target functions, tasks, and planned learning and development results,
9) requirements for the individual portfolio and profile of the individual digital footprint of managers and teachers.

4. Discussion
As in the digital economy, management and decision-making are mainly based on Big Data technologies, so in digital education, efficiency improvement is associated with the use of big data collection and analysis, including those that are outside the education system itself. The ability to work with big data and to understand the possibilities of managing the educational process based on them – from aggregating data about students to creating individual educational routes allows to speak not only from the point of view of “competence-based, activity-based education”, but also from the point of view of moving to the concept of “data-driven education”.

A group of Specialists from the University 20.35 developed their own methodology for collecting a digital footprint and processing it based on semantic and ontological analysis, building test rubricators for participants in the educational process [16]. For this purpose, a set of different software is used, from collecting "raw" data (files from applications for messaging, notes from chats, blogs, comments from social networks, audio files, subtitles from video files) to structuring this data, either manually or automatically. The use of this technique in our model is generally possible, but it is very time-consuming for ordinary teachers. Therefore, you either need to introduce a separate specialist for collecting and analyzing the digital footprint, which is called a data engineer in education; or develop additional software modules for integrating and analyzing data from the Moodle and Microsoft Office 365 platforms. Both options are currently being worked on.

The use of artificial intelligence will provide more opportunities for analyzing learning skills [17, 18]. Intelligent assistants and chatbots can be used to personalize educational content [19], including machine learning [20]. The authors agree that the using of artificial intelligence and cognitive analysis of the students digital footprint, including behavioral and emotional characteristics, is appropriate [21,
22]. There are also great expectations, especially for distant areas, for the use of mobile devices and applications in training [23]. Based on the analysis of the digital footprint, we will be able to build individual educational routes, form a digital profile of the Manager, and provide all participants with information about the educational results obtained. Thus, the heads of organizations that send their managers for training will be able to immediately receive feedback and build an individual professional trajectory for the development of personnel. This approach will improve the quality of educational results and their further relevance for the managerial personnel development in the Arctic region.

5. Conclusions
The article considers the existing models of remote and traditional systems for the development of digital competencies of managerial personnel, including the Arctic region. The advantages and disadvantages of existing models of digital competencies are analyzed. It is shown that the model of digital competencies can be represented as a cube of various level descriptions of competencies, roles, and activities. The relationship between the formed digital competencies of management personnel of the Arctic region and the system of qualification requirements for managers in the Russian Federation is established. It is proposed to use the software and technical infrastructure for the placement of electronic educational resources for the development of digital competencies of managerial personnel in the Arctic region based on the LMS Moodle. The structure of the electronic educational resource "Digital competencies of manager" and sections of the formation and development of digital competencies of managers are substantiated. To implement the model of a remote system for the development of digital competencies of Executive managerial personnel of the Arctic regions in practice, its optimization and further development, it is necessary to clarify the system components that represent the input regional (Federal, district, municipal) features and personal data of subjects of the educational process model. Existing and re-emerging educational models of remote work in the context of the pandemic are valuable experiences that need to be studied, analyzed, disseminated and used.

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