Tourism 4.0: Education, Pedagogy and Digital Learning Solutions for the Russian Arctic

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Abstract. The study aims to identify the main problems associated with the provision of professional tourism training and the creation of a tourism talent pool for the Russian Arctic in the context of Industry 4.0. The article analyses the current socio-economic factors that determine the development of the Russian Arctic. The pedagogical environment's crucial aspects are systematised to ensure an effective educational process in modern tourism pedagogy. The necessary conditions required for creating the high competitiveness of tourism specialist are determined. The factors and features of tourism personnel training for the Russian Arctic are systematised. An analysis of the organic tourism design concept is carried out. Based on the results obtained, methodological recommendations for the Tourism 4.0 educational process and the formation of a Russian Arctic tourism talent pool are proposed. The necessity of developing the latest competencies for competitive specialists and vocational guidance in the needs of Tourism 4.0 has been substantiated. A model of arctic tourism vocational guidance activities within integration “education throughout life” into the full educational and life cycle is proposed. The need to increase the level of digital literacy and in-demand informational, tech skills, communication competencies and over-professional skills of the tourism talent pool for the Russian Arctic has been substantiated. The latest technologies that must be studied and applied in tourism pedagogy are listed.

1. Introduction
Global digitalisation, the dynamic development of socio-economic and globalisation processes, the possible threat of replacing a person as a specialist with artificial intelligence (A.I.) requires high professionalism and competitiveness of university graduates with interdisciplinary competencies, as well as a willingness to function effectively in the conditions of the fourth industrial revolution. The modern world and the change in business processes decree the inevitable transformation of pedagogical approaches and technologies in the higher education system. Simultaneously it requires an urgent adaptation to the future pedagogy and creating pedagogical conditions and an environment focused on the integrated development of intellectual, logical and analytical abilities. A new emerging pedagogy must focus on students' flexible skills (soft-skills), wherein they develop students' emotional intelligence (E.I.). This process's connecting link must be a successful communicative competence and crucial adaptation skills to Industry 4.0. All those stipulate the need to increase digital literacy and in-demand informational, tech skills, communication competencies and over-professional skills of the tourism talent pool due to Tourism 4.0.

In the context of increasing in-demand skilled personnel competition, the list of interdisciplinary competencies in the labour market is expanding, affecting the tourism and hospitality industry.
Analysing various forecasts and the "professions of the future", we conclude that the comprehensive digitalisation of production and consumer spheres brings competence in applying and effective use of information and communication technologies to the fore. The report The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution (World Economic Forum), published in 2016, already noted the tangible impact of the trend of growing geopolitical instability (21% influence on a scale of demographic and socio-economic drivers), which has far-reaching implications for global trade, staff mobility, high adaptation rates for industries such as oil and gas, aviation and tourism. [1] The global pandemic of 2020 caused by 2019-nCoV has made its adjustments to the tourism economy worldwide, as well as international and domestic tourist flows and flocks. It has affected more than 50 tourism and hospitality related industries. As noted in our June 2020 forecast, a 60-75% decline in international tourist arrivals worldwide was expected in 2020 in total [2]. On January 28, 2021, the World Tourism Organization presented the reporting period results and reported a 74% reduction in the total number of tourist arrivals for 2020 [3], which confirmed our fairly accurate prediction [2]. Nevertheless, in the current situation of the global tourism market collapse, closed state borders and general tourism decline, many countries were forced to pay more attention to their domestic tourism resources to maintain at least the minimum internal tourist flows and flocks. Simultaneously, tourism governments made attempts to inspiring tourism destinations towards possible further tourist flows increase. Numerous tourist destinations and objects have taken the path of "digitising" tourism products and museum items, virtual tours creation. However, the very essence of the tourism business structure is the economics of individual and personal experience. Currently, the technical capabilities of Industry 4.0 and Tourism 4.0 cannot replace the personal tourism experience of a particular individual, which one can acquire at the specific tourism destination.

Concurrently with the dynamic expansion of new technologies in the context of global informatisation, digitalisation and standardisation of world and interregional business processes, the development of ultrafast international communication of modern times, and personnel formation reserve with both highly specialised and interdisciplinary competencies. In the Russian Arctic tourism rise, there is a need for international-level specialists with developed cross-border competencies in information and communication technologies trained and adapted to work in the Arctic, providing Tourism 4.0 requirements.

2. Features of tourism personnel training for the Russian Arctic in the context of Industry 4.0

The training and creating of a new talent pool of specialists capable of successfully conducting socio-economic transformations in the interests of the individual, society, and the state is one of the priority directions of the present's Russian pedagogy. Simultaneously, the progressive and intensive development of modern pedagogy, which ensures the creation and renewal of a personnel reserve for the Russian Arctic, is impossible without identifying and clarifying the crucial factors affecting the pedagogical requirements and environment. The design of learning outcomes, generic and subject-area related competencies of a competitive Arctic specialist during the university's professional development, should be based on in-depth scientific research and philosophy of not damaging the northern economic sectors in Russia and the Arctic Region as a whole.

Successful interaction of students and teaching staff in the university's educational information space (subjective reality) needs to be formed by applying a mix of classical and innovative conditions. The development of a new pedagogical environment depends on many external and internal factors (objective reality). The last-mentioned ones are the location of the higher educational institution, promising social and economic development of the region, availability of an educational program and education policy correlated to the needs of the particular territory, the relevance of the federal state academic standard of the subject-area, the situation on the labour market in the context of long-term forecasting and many other factors that determine the vector of pedagogical development.

The applied Arctic tourism pedagogy requires many conditions to be met. The educational process should be implemented under the current Federal-State Standard of Higher Professional Education, in
pedagogical conditions (substantive, organisational, motivational, technological), the vector of which is the values of the academic discipline, correlating with the daily tasks of future professional activity and the area of practical application in production by graduates of the acquired competencies. At the same time, the educational process should be structured in such a way as not to contradict the fundamental principles of the current national project "Education" while meeting the modern requirements of Industry 4.0 and Tourism 4.0, as well as long-term and short-term national tasks defined in the Fundamentals of State Policy of the Russian Federation in the Arctic Zone until 2035, the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035, and other regulatory legal acts.

The Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 (hereinafter referred to as the Strategy) includes a set of accelerating the socio-economic development of the northern Russian regions measures. At the same time, the Strategy aims to improve the population's quality of life, including indigenous small-numbered people of the North. Among other priority tasks, the document includes a list of issues and measures aimed at the Arctic zone's social and economic development [4]. The Strategy also outlines state support standards to the economically active population ready to relocate to the Russian Arctic to hold labour activities. The Strategy reflects the prospects for the tourism territories design, the prominence of clustering activities, the integrated development, the development of small aviation, and medical support. The Strategy emphasises the importance of the construction of Arctic ice-class cruise ships, the lack of which today is a severe deterrent to the development of the tourism industry in the Arctic and the modernisation of other areas of the economy, from which the tourism industry is in direct or indirect dependence.

3. Pedagogical conditions for the creation of a Russian Arctic tourism talent pool

Pedagogical conditions and environment should provide students with a set of attributes, skills, general and professional knowledge that all tourism labour market participants should possess to ensure that they have the capability of being effective in the workplace and competitive presently and adaptive to the new market requirements in times to come. Considering the phenomenon of interdisciplinarity and practice-orientedness in tourism pedagogy in the talent pool training to ensure tourism in the Russian Arctic, special attention should be paid to the following priority issues:

• psychological and physical preparation of students for work and life in unfavourable climatic conditions of the Far North of the Russian Arctic;
• the formation of professional and supra-professional skills and the development of the competencies of a tourism and hospitality specialist following the updated Federal State Educational Standard;
• studying the up-to-date Russian geopolitics vector in correlation with national interests and Russian presence in the Arctic region;
  • skills of survival, search and rescue operations and first aid in the Far North;
  • developing crisis communication skills and anti-crisis management skills;
  • mastering and developing foreign language communicative competence;
  • mastering at a high level of I.T. competencies, high technologies, digital and technical literacy;
  • studying the functioning of particular legal regimes [5] in the field of tourism due to the digital economy and innovations both in the Russian Federation and the world, mastering e-commerce in tourism and hospitality and the functioning regulatory sandboxes in use for new financial technologies [10], one way or another affecting the interests of the development of tourism and hospitality;
  • development of skills in working with Global Distribution Systems (GDS) and digital financial tools;
  • knowledge of the principles of operation and, to one degree or another, the management of vehicles, including both traditional wheeled and tracked vehicles, all-terrain vehicles, hovercraft, snow and swamp vehicles (such as the arctic snow and swamp vehicle "Burlak" [6]), as well as traditional vehicles Indigenous minorities – skis, sledges, reindeer and dog sledges;
• skills of using geographic information systems in tourism and willingness to participate in the development of tourism-oriented GIS of a new generation;
• skills in working with navigation tools, satellite navigation in the Far North, including offline;
• the skill of well-coordinated teamwork, which must be uncompromisingly brought to a high level, especially in organising tourist routes on rough terrain;
• the formation of sociocultural competencies in working with consumers of a tourist product and participants in the production process of tourism, including in communication with representatives of the indigenous small-numbered peoples of the North;
• development of management skills and promotion of the tourist region, tourist product using SMM, AR, V.R., IoT and other high-tech solutions;
• emotional intelligence development, self-study skills and continuous self-education.

A multi-level guidance system of organisational, methodological, and practical measures that determine the successful creation and development of professional and communicative competencies required for tourism development in the Arctic Region is shown below (Figure 1).
Figure 1. A multi-level guidance system (at preschool, school, university, employer/professional activity levels) required for tourism development in the Arctic Region.

* Hereinafter, the subparagraphs indicate events, actions and conditions with an Arctic focus.

The current guideline is intended to improve pedagogical efficiency in tourism and hospitality qualitatively and raise competitiveness among graduates aiming for further employment in the Russian Arctic.

The success of entering and applying Tourism 4.0 in the Russian Arctic depends on the implementation of the following pedagogical conditions in the higher education institution:
- taking into account the modern and advanced needs of the labour market, depending on the socio-economic development of a particular Arctic region, trends in international, interregional and state development, as well as government programs to support small and medium-sized businesses in tourism and hospitality in the Russian Arctic;
- taking into account intercultural communicative features, prospects and locations for further employment of tourism and hospitality graduates;
- the innovative pedagogical technologies application in combination with an individual and personality-oriented approach;
- professional use of available laboratory equipment, ICT;
- digital literacy and motivation for self-study and practice-oriented professional development among the teaching staff;
- supporting the motivation of students for self-development and learning throughout their lives; finding a solution to the problem of the destructiveness of educational and professional development and infantilism through the advanced career guidance activities;
- identifying the shortage of personnel in tourism and hospitality in the Russian Arctic and developing a strategy for their attraction and staff retention;
- developing refresher courses and additional education for tourism and hospitality specialists from non-Arctic regions to attract and adapt to work in Arctic conditions and many other conditions.

4. The concept of organic design in Arctic Tourism and Hospitality 4.0

Nowadays, in applied tourism, hospitality and recreational design, one of the topical solutions for tourism destinations and tourism and hospitality objects assumed to be organic architecture and design. The laid down concepts of "organic architecture" by the American architect and creator Frank Lloyd Wright (1867-1959) [7] now take on new meanings in the concepts of "smart houses", "smart hotels", "eco-hotels" equipped with smart technologies. The methodology of organic design is based on the idea of a building as an integral organism, all parts of which are interconnected and interdependent; no element can be arbitrarily removed, added or replaced. Thus, the organic design creates an alternative to the compositional-combinatorial techniques that underlie modernism and various traditionalism forms. This direction of tourism design is widespread in the Arctic countries, does not contradict, but, on the contrary, is in full agreement with the basic principles of sustainable tourism development. For example, the following Arctic accommodation projects, designed in the organic architecture concept, can be mentioned as an illustrative example: Snowhotel Kirkenes, Norway (in operation since 2006); Sorrisniva Igloo Hotel, Alta, Norway (in operation since 1989); Kakslauttanen Arctic Resort, Saariselkä, Finland (in operation since 1974), Radisson Blu Polar Hotel, Spitsbergen (completed in March 1995, reopened after major renovations in February 2019), Basecamp Explorer Hotels, Svalbard (in operation since 1998). Architectural structures of the concept of organic design blend harmoniously with the environment in all forms. Materials used in construction in compliance with organic design principles are made of environmentally friendly materials that do not emit substances harmful to humans and the environment during operation. The same applies to communication systems.

These projects, ahead of tourist fashion and time, successfully operate in the Arctic tourism market and promote the philosophy of responsible tourism consumption. Simultaneously, all the latest
achievements are being in use, including the latest information technologies and solutions in advertising and promotion by shooting tourist sites, spaces and activities in dynamics via quadcopters, online video broadcasts, tourist sites, virtual tours. Similar tourism and hospitality projects can also be implemented in the Russian Arctic, become "honeypots" for tourists, and be dispersed over the Arctic region and clusters.

It should be noted that the concept and philosophy of organic design, along with the concepts of "smart cities" in the Arctic [8], should also be studied in the educational process of training tourism and hospitality specialists, as it is inextricably linked with the crucial principles of tourism sustainability and Tourism 4.0.

5. The latest technologies and pedagogy solutions required for the Russian Arctic tourism development

Virtual reality technologies are useful, among other things, for modelling tourist routes passing and escorting in Arctic conditions. V.R. technologies can be used with great success in tourism and recreational design in northern latitudes, shown by foreign and domestic experience. Training in the use of IoT (Internet of Things) both in organising trips, accommodating guests, accompanying tourists on the route and promoting tourism offers through a personalised approach to analysing tourist preferences. Developing skills in working with drones, robots and applying 5.0 technologies is highly promising and relevant in tourism pedagogy. The aforementioned is especially important when training guides and highly specialised marketing, promotion and branding specialists for Arctic tourism. [2] [9]

Practice seminars and practice sessions in the Arctic regions, internships involving students in information and communication processes to promote the tourism of the Russian Arctic, attracting students as volunteers to the Arctic events, conferences, exhibitions, forums, cultural events stimulate students to further skills improvement, professional competencies development, learning and self-education "through life". Thus, adaptation to the current tourism market conditions and further employment is provided.

Students must develop comprehensive, general professional and highly professional competencies aimed at managing tourism business, operating processes, and relevant promotion and distribution technologies during training at university. In this regard, in order to increase the competitiveness of graduates, the tourism destination stakeholders and education authorities ought to be considered the possibility of introducing advanced tourism technologies into the learning process, including interaction with the research, professional tourism community and objects of tourist interest in the form of a consortium. However, it is worth noting the super-fast pace of technological progress and, consequently, the modification of hardware and software and equipment of V.R., AR. All this causes difficulties in equipping tourism laboratories and requires ongoing financial costs for their renovation, new models and versions.

6. Conclusion

The tourism sector, as an area of economic activity, is a complex structure, the level of progress of which is determined by the scale of economic development, the level of security provided, technological advancement, international relations, international and interregional strategic development, infrastructural, energy, innovative development, financial development, sociocultural, demographic, environmental factors, as well as by many interconnected economic components at macro, and micro levels. In the context of the advanced development of the economy, global digitalisation, robotisation, ultra-fast development of the information space and the integration of information technologies into international business processes in all spheres, and especially tourism, the higher school of our days should be focused on the future needs of the labour market. Russia scientists note the need to follow a systemic and person-centred approach to implementing international level education programs.
Analysis of the situation with staffing in the tourism sector shows the need to improve pedagogical approaches in order to increase the competitiveness of graduates of the tourism direction and the formation of interdisciplinary competencies, which is especially important in the Arctic conditions. The creation of stable stipulations for attracting professionals and highly specialised personnel of tourism and related fields (hospitality, catering, sports events, and others), which could realise their professional potential in the Arctic, will lead to an increase in the region attractiveness, will form flows of labour migration among the Russian population, will increase the interest of compatriots in Arctic tourism in Russia. At the same time, the educational process in tourism, in addition to the development of universal and professional competencies outlined in the Federal State Educational Standard, should include the development of skills for working and surviving in harsh Arctic conditions, working with the latest technologies used in tourism (wireless sensor networks, blockchain, Internet of Things, AR, V.R., robotics, cloud computing, fog computing, big data analysis, self-driving vehicle technologies). Students actively and with great enthusiasm should be encouraged to develop supra-professional skills and lifelong learning ability. Those mentioned earlier will allow the graduate to maintain a high level of competitiveness in the labour market for a long time and responsibly and productively participate in developing tourism and related areas of the Russian Arctic. Remote, Internet and mobile technologies have been successfully used in modern pedagogy for the last decade, which is especially important in the context of an increase in the level of cross-border competencies of graduates of higher educational institutions and can be used with excellent efficiency in organising the educational process in the direction of tourist pedagogy, including for the Russian Arctic.

The presented multi-level guidance system can be used to outline a long-term strategy for arctic tourism pedagogy development.

It is also highly recommended to revise the concepts of Soviet scientists and architects of the middle and second half of the 20th century, including those from the North sector of the Leningrad branch of the USSR Academy of Civil Engineering and Architecture. They aimed to find optimal, ergonomic and innovative solutions for developing cities in the northern territories. Many of their ideas can be finalised and improved today considering modern requirements and the concept of "organic architecture". Implementing such projects can also become an integral part of the Russian Arctic tourism cluster and provide new jobs for domestic professionals.

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