SIMILARITIES AND DIFFERENCES IN CURRICULA OF A BACHELOR'S DEGREE IN OCEANOLOGY AT THE UNIVERSITIES IN ST PETERSBURG, KLAIPEDA AND KALININGRAD

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Conducting a multi-aspect comparative analysis of curricula of bachelor's degree programmes in oceanology offered at universities in St Petersburg, Klaipeda and Kaliningrad, the authors trace similarities between the existing variants of oceanologist training in the context of competence modules, disciplines, the so-called academic practices, and the number of hours and credits stipulated in the existing curricula.

A formal comparison of generalised quantitative indicators without analysing the content of curriculum components demonstrated certain similarities in all indicators in terms of workload, the number of disciplines (50, 56 and 45) and academic practices.

The clustering of competence modules and disciplines at each university within generalised academic areas — physics and mathematics, philosophy, informatics and computers, geoecology, measurement disciplines, etc. — made a more detailed comparison possible.

The results of research demonstrate considerable similarities in the curricula used at the given universities in terms of all variants of comparison. The strongest similarity is observed in the areas of basic and professional disciplines.

Key words*: bachelors in oceanology, curriculum, competences, credits, compulsory and optional disciplines, expert evaluation, specialist training, sustainable regional development*

It is a well-known fact that training of specialists in the key areas of sustainable development of regions is viewed as an integral part of their socioeconomic development programmes [1; 6; 34]. On the one hand, coastal regions have considerable resources [28]; on the other hand, it is rather difficult to harmonise the natural and socioeconomic interests with the development priorities [18]. Human potential is also an important factor of regional welfare [11; 23; 36]. This work aims to compare curricula of bachelor's degree

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programmes in oceanology in three coastal cities — Klaipeda (Lithuania), St Petersburg and Kaliningrad. Obviously, the integrity of professional competences and skills which are crucial for training in oceanology will enhance a process of administrative decision-making regarding such a complex natural object as the Baltic Sea [18; 19]. This work is based on the materials of curricula for bachelors in Applied Hydrometeorology (specialisation "Applied Oceanology", 280400.62, Russian State Hydrometeorology University, St Petersburg), Physical Oceanography (621F80002, University of Klaipeda, Lithuania) and Hydrometeorology (specialisation "Oceanology", 021600.62, Immanuel Kant Baltic Federal University, Kaliningrad).

Quite recently, Russia adopted the competence-based [19; 30; 32] three-level hierarchy of degrees (bachelor — master — doctor). Responding to current trends in higher education evolution [3; 15; 30; 37] — undergraduate and graduate student mobility, development of international programmes for supporting transboundary research — and having the Baltic Sea region as a common natural and socioeconomic area of research, the authors carried out a comparative analysis of the knowledge component of curricula developed at the coastal universities of the project participants.

1. Comparison of curriculum competences

A multistage comprehensive analysis commenced with comparison of integral characteristics of the universities' curricula, which demonstrated a lot in common in this respect. Thus, the programme load in ECTS credit points appeared to be similar; the number of disciplines also showed close similarity — 50, 56 and 45. The universities' academic performance did not differ significantly either. So, at the level of formal evaluation of quantitative indicators in a spirit of the Bologna declaration ideology [3], without analysing the content of compulsory, elective and optional disciplines, the similarity of the analysed curricula at the three universities proved to be rather high.

As the comparison shows, the competences developed at the Immanuel Kant Baltic Federal University (further referred to as IKBFU) are more focused on theory (they were compiled on the basis of a curriculum designed at the Faculty of Geography, Moscow State University). The competences at Russian State Hydrometeorology University (further referred to as RSHU) are more orientated at engineering and aimed at practical application of hydrometeorology throughout the country. Klaipeda University (further referred to as KlU) adopts a competence structure that reproduces, in effect, the common European perspective on training in such fields of study.

At the second stage of the comparison of the curricula, each university's competence module was regrouped by classing each competence as an element of a general field of study — physics and mathematics, philosophy, informatics and computer science, geoecology, instruments and measurement, processing and interpretation, and others. It enabled the authors to compare content of the modules introduced in each curriculum. This comparison technique corresponds to a common perspective on the pedagogical study methodology [2; 36].

The first competence module — a cultural module — is orientated towards the formation of thinking culture, self-development, communicative skills and cooperation in the graduates. The average result of expert evaluation of cultural competence correspondence (4.875) emphasises similarities in the cultural competences developed at the three universities [2; 29].

The second competence module is associated with knowledge of information and computer technologies demonstrated by future graduates. In this case, a level of similarity in the curriculum competences is also rather high. The average result of expert evaluation of information technologies competences (3.6) reveals a common attitude towards the professional skills of bachelors in oceanology and certain differences in the ways they are developed. As it turned out, the general orientation of all modules is a result of the earlier proclaimed objectives and priorities [24; 25].

The next competence module is formed on the basis of requirements for developing basic professional skills of graduates at each university. This module is responsible for the level of basic knowledge demonstrated by bachelors. The average result of expert evaluation is 3.83. The actual correspondence is somewhat higher, since considerable differences are observed only in one subgroup of competences. One should emphasise that the theoretical component of the programme was formulated quite some time ago and took a classical form in the academic literature [5; 16; 20].

Another competence module is formed by qualities required for solving specific professional tasks in the field of hydrometeorology that relate to organising measurements, and processing and analysing experimental data. The average value of correspondence between the competence modules of the considered universities is 4.1. It is worth noting that, out of 12 local groups, only two demonstrate rather low (assessed at 3) correspondence of professional competences. This evaluation emphasises a high level of correspondence between the project participants' requirements for the development of professional skills of future oceanologists. The correspondence is more than satisfactory. Despite focusing on individual issues of oceanologist training, there is a classical list of academic literature compiled for this field of study [4; 21; 26; 27].

The next identified competence module is determined by the tasks of geoecology, nature conservation and applied oceanology. As a result of differences in the perspective on the essence of geoecology in the participating countries, the obtained correspondence level cannot be called high. The average expert evaluation of 3.6 supports this statement. Despite evident differences in the interpretation of oceanologist training, the list contains monographs meeting the requirements of all curricula [10; 13; 22].

Finally, a number of IKBFU competences have no match in the modules identified by the experts from other universities. They are a result of a stronger theoretical emphasis of the curriculum at IKBFU and reflect knowledge and skills relating to narrower fields of study, such as, for instance, TS analysis, synoptic eddies, wave motion in the ocean, etc. The analysis shows that as component parts they are implicitly included into more generalised structures of general professional competences of the curricula at the univer-

sities in Klaipeda and St Petersburg. As a result, IKBFU's curriculum contains the largest number of competences — 53, that of KlU — 46 and that of RSHU — 38. Thus, the emergence of such competences does not result in the incompatibility of the curricula. At the same time, the content of some elective courses at IKBFU is included in a compulsory course on oceanology offered at St Petersburg Hydrometeorology University (see, for example [16]).

Moreover, the curricula at IKBFU and KlU contain two modules of region-centred competences. In St Petersburg, such a component is absent since no regional association of the curriculum was planned at RHSU initially. IKBFU and KlU demonstrate a great degree of correspondence between their regional competences. A summarising monograph [9], which was published recently in St Petersburg, can serve as a good basis for solving academic problems.

Thus, the analysis conducted makes it possible to identify a more than satisfactory correspondence between the curriculum competence modules formulated for training bachelors in oceanology at the universities in St Petersburg, Klaipeda and Kaliningrad. The table presents average assessments of professional competences in the framework of the selected system. It also offers data on the weight of each subgroup calculated as a ratio of the number of competences in a subgroup to their total number. The total average weighted evaluation of all professional competences equals 3.9 on a five-grade scale.

Mean values of expert assessment of competence correspondence within the selected subgroups of the participating universities according to each competence module ("general culture", information and computers, general professional, special professional, geoecological and regional)

Parameters	Competence					
	"General culture"	Information and computers	General professional	Special professional	Geoecological	Regional
Average expert evaluation of correspondence	4.9	3.6	3.8	4.1	3.6	5
Number of competences in a group	8	5	6	12	6	1
Weight of a competence module	0.2	0.12	0.15	0.29	0.15	0.02
Average weighted evaluation	1.0	0.4	0.6	1.2	0.5	0.1
Total average weighted evaluation	3.9					

The quantitative assessment of competence correspondence characteristic of the curricula at the universities in Kaliningrad, Klaipeda and St Petersburg, which was obtained on the basis of expert evaluation of correspon-

dence of each competence subgroups, demonstrates considerable similarities in the curricula used by the given universities in training bachelors in oceanology. Basic differences in competence orientation of the universities are determined by the history of each educational institution. The RHSU curriculum is more engineering-centred; IKBFU gravitates towards theoretical and classical geographical training; Klaipeda University tends to reach a compromise between these two earlier developed trends in training experts in oceanology.

2. Comparison of disciplines

The next stage is to make a comparative analysis of modules of academic disciplines offered at the universities — participants of the *eMaris* project. First, we will focus on the contents of each component (or cycle) of the universities' curricula — **the humanities, social sciences, economics, mathematics, natural sciences and professional disciplines**, including their internal division in compulsory and elective components as well as optional discipline modules.

When comparing quantitative indicators at a formal level, one can state almost equal significance (in terms of academic hours and credits) of the humanities at all participating universities. In RSHU, great emphasis is put on the natural sciences and the mathematical cycle (engineering orientation of the curriculum survived the transition to the bachelor system). At KlU and IKBFU, the emphasis is shared between these two aspects almost equally. As to the professional cycle, IKBFU, which adopted an analogue of the basic research-centred curriculum of the Faculty of Geography at Moscow State University, occupies the leading position; the performance of RHSU and Klaipeda University is similar.

The next stage of the analysis focuses on the content of each discipline subgroup. The first subgroup brings together disciplines in ***the humanities.*** Here, the difference between the universities is insignificant. KlU's curriculum does not include philosophy, whereas a course in the history of science replaces general historical courses offered at IKBFU.

The second discipline subgroup includes ***mathematics, physics, chemistry***, etc.; it is usually associated with the acquisition of basic knowledge by future bachelors. The content of the subgroup disciplines is traditional. It is orientated towards studying mathematics, physics, chemistry, ecology, informatics and programming. The detected differences in the content of discipline subgroups are determined by the orientation of curricula: the geographical one at IKBFU, the engineering one at RHSU and the general European one at KlU. In particular, RHSU offers hydromechanics and electrical engineering disciplines, KlU offers only hydromechanics, whereas these subjects are absent at IKBFU.

The next discipline subgroup brings together ***general geographical*** disciplines. All universities put equal emphasis on such classical disciplines as meteorology and climatology, geology and geophysics. Major differences relate to the presence/absence and/or detailed study of such courses as geomorphology, hydrology, hydro(geo)chemistry and biogeography. In particu-

lar, the geographical background of an oceanologist who studied at IKBFU is manifested in scrupulous attention to the field of geomorphology. The curriculum offers a group of related disciplines — geomorphology, earth science, soil geography and the basics of soil science, and landscape science.

The ***cartographical*** subgroup shows significant similarities at all three universities; differences lie in the degree of detail, in which the courses are taught. The content of all disciplines is oriented towards developing skills in the fields of topographical survey, cartography and GIS technologies. One should emphasise that in IKBFU's curriculum the study of GIS technologies is highly detailed.

The next discipline subgroup is aimed at developing ***data analysis skills*** of future bachelors in oceanology. The basic courses are identical in each curriculum. The differences relate to the development of additional skills of a hydrometeorology engineer and geographer/oceanologist. In this field, the content of disciplines took a classical form long time ago [7; 8; 12; 33].

The elective part of the hydrometeorology curriculum starts with the so-called ***"general cultural" courses***. The availability of courses in psychology and pedagogy has roots in the training of potential teachers in Russia, which has been a long-standing tradition in the USSR and the Russian Federation.

A common obligatory component of the elective part of any curriculum is ***mathematical statistics***. There is evident prevalence of the RHSU discipline combination, since the university trained initially hydrometeorology engineers, for whom such skills are necessary. At the same time, despite the detected differences, a number of textbooks [7; 8; 12; 14; 33] show a common understanding of such problems and methods to solve them.

Finally, let us analyse the subgroup of ***oceanological*** disciplines. Once again, the earlier adopted professional orientation affects the compilation of a certain discipline list. The geographical orientation at IKBFU and KlU makes their curricula more similar in that respect than that of RSHU, which exhibits greater orientation towards engineering and physics.

One of the basic elective discipline subgroups relates to the field of ***geoecology***. In this case, the difference is great. The structural simplicity of RSHU's curriculum reflects the essence of this field, which is quite excessively presented in that of IKBFU and has minimum presence in KlU's curriculum. These differences cannot be considered significant due to the integral nature of curricula and corresponding targets that affect a number of other academic disciplines.

The next subgroup brings together different ***specialised courses***, which are determined by opportunities for developing a certain line of research at the university. These academic disciplines exhibit common thermodynamic orientation. One can also emphasise the increasing significance of model approaches to studying natural processes [17; 31].

So, the expert evaluation of correspondence between the discipline subgroups offered at the universities participating in the *eMaris* project demonstrated their similarity in all groups — the humanities, physics and mathematics, general geographical disciplines, cartography and GIS, elective

"general cultural" disciplines, statistics, general oceanological subjects, geoecology and specialised oceanological disciplines. Thus, the transition from the formal structural approach to the assessment of curriculum correspondence to the functional one did not change the final positive conclusion.

Conclusion

An integral analysis of correspondence of the curricula developed for training bachelors in oceanology within the hydrometeorology field of study (specialisation "Oceanology" at IKBFU, "Applied Oceanology" at RSHU and "Physical Oceanography" at KlU) at the three coastal universities participating in the *eMaris* project — the Immanuel Kant Baltic Federal University, Russian State Hydrometeorology University and Klaipeda University (Lithuania) — has revealed their close similarity in terms of disciplines, academic practices and the number of academic hours.

The curricula developed in the framework of the *eMaris* project for three-level training of students — bachelors, masters and PhD students — in the field of applied geography will help enhance the level of training of oceanologists for the benefit of the Baltic Sea region [11; 35] and create a common understanding of nature conservation in the region.

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