

AMURCON 2021
AmurCon 2021: International Scientific Conference

**ENVIRONMENTAL COMPETENCE BUILDING OF FUTURE
EDUCATORS IN LEARNING FOR SOUND PROGRESS**

Ekaterina A. Igumnova (a)*, Natalia N. Popova (b), Yulia Yu. Levanskaya (c)
*Corresponding author

(a) Transbaikal State University, 30 Aleksandro-Zavodskaya St., Chita, Russia, igumnova1@mail.ru
(b) Transbaikal State University, 30 Aleksandro-Zavodskaya St., Chita, Russia, nnp18@mail.ru
(c) Transbaikal State University, 30 Aleksandro-Zavodskaya St., Chita, Russia, art-koltsova@yandex.ru

Abstract

The purpose of the article is to find out and present an argument for pedagogical conditions for building an environmental competence of future educators in learning for sound progress (LSP). The methods used are a questionnaire, method of expert evaluation and content analysis. During the correlation analysis, it was possible to find out several significant relations between the types of activities influencing the development of student environmental competence during their studies at university (learning-research ($r=0.968$) and teacher training ($r= -0.979$), as well as scientific research student activities ($r= - 0.840$)). These activities contribute to the development of environmental competence of future teachers in the field of learning for sound progress in terms of practising skills and abilities to organize the interaction with all participants of education, to keep nature safe, solve environmental problems, aimed at improving the environment and the quality of life. The research proved the effectiveness of the integration of sound progress ideas and solving professional problems in the field of LSP by motivating students to take creative initiatives in the course of socially significant projects with schoolchildren, organization of educational integrated events, competition and game programmes, learning quests and other modern forms and formats of learning with the use of digital resources.

2357-1330 © 2022 Published by European Publisher.

Keywords: Environmental imperative, environmental competence, environmental culture, ecocentric consciousness, learning for sound progress

1. Introduction

The ideas of the concept of sound progress (SP), the world community has known since 1972, were developed in the final document of the UN summit in 2015. The document postulated that the concept of SP was adopted to implement a long-term (until 2030) strategy for the prosperous development of humanity, in which meet the needs of the present generation would not threaten the needs of future generations, provided that the integrity of the biosphere and its ability to self-repair is maintained. This agenda contains 17 Sound Progress Goals (SPGs), which are based on the idea of maintaining a balance between the progress of humanity (satisfaction of social needs in the areas of learning, health, social defence) and environmental protection.

However, as Panov (2020) notes, when summing up the 20-year outcomes (since 1992) of the SP Strategy at the UN Conference “Rio+20”, it was recognized that the progress achieved in succeeding in the PSGs was insignificant. Moreover, these goals are threatened by the worsening economic, food, energy and other modern crises. The danger of the current human development paradigm and the need for its fundamental change was pointed out.

It is widely admitted in the scientific community that education in general and higher education, in particular, take a key part in achieving the SP goals and changing the technocratic paradigm of human development (Argunova & Plyusnina, 2020; Panov, 2020). Foreign research on Learning for sound progress (LSP) emphasizes the integration of SP ideas into higher education institutions of various levels and fields of training (Sokolova et al., 2021).

Many foreign researchers consider the development of ecological values as one of the goals of environmental education for SP in the context of environmentalism - the creation of an ecological environment of a person and his life through the actualizing projects and programmes of environmental education in the open air: “Green schools”, an eco-school system, eco-gardens (Cincera et al., 2019; Cincera, et al., 2020a; Cincera, et al., 2020b; Cincera, et al., 2020c).

Argunova and Plyusnina (2020) in solving future problems give a high status to environmental learning for sound progress (LSP), which is understood by the authors in the context of meta-disciplinary content of education, where the targets are meta-disciplinary educational results based on students’ understanding of ecology laws, sound progress ideas (integrity of nature, society, economy), the role of professional activity in solving environmental problems, and creating conditions for students’ conscious motivation in project.

The authors emphasize that the obligatory components of any professionogram should be knowledge of examples of implementation of sound progress tasks in different jobs; the contribution of all professions to environmentally sound progress of the country; professional activity and its ecological footprint; ecological culture of the professional and readiness for professional environmentally-oriented actions (Argunova & Plyusnina, 2020). Let us specify that the concept ‘environmental learning for sound progress’ (LSP) in national studies correlates with the concept of ‘learning for sound progress’ (LSP) in foreign studies.

Igumnova (2019) believes that mastering of supra-subject content of learning for sound progress in the process of mastering meta-subject ways of work with the content by learners should be carried out in

the logic of the meta-subject approach. In addition, meta-disciplinarity means a way of developing theoretical thinking, basic thinking and thinking abilities, universal ways of action, as well as a means of developing a holistic picture of the world.

2. Problem Statement

New geopolitical challenges and aggravating contradictions between global and national interests are mainly determined by intensifying environmental and socio-economic problems of anthropogenic civilization (climate change, food problem, man-caused disasters, etc.), which requires research on preparing the young generation in education to meet the future challenges (Galtung & Inayatullah, 1997).

improving the professional training of future educators in the context of the idea of LSP, as it is the educator who is the key figure in solving the problems of increasing the effectiveness of education and its impact on the social, political, economic and cultural development of society, where the future is understood as holistic images of expected events in the definitions of ‘futures awareness’ (Jahn & Koller, 2019; Lombardo, 2016); ‘future orientation’ (Bootz, 2010; Trommsdorff, 1983), ‘prospective attitude’, ‘projectivity’, ‘futures literacy’, ‘anticipation’ (Durance, 2010; Godet & Roubelat, 1996).

As Panov (2009, 2020) notes, the deep reasons for problems of implementing SP ideas are not only and not so much on the political and economic basis, but have serious psychological and pedagogical bases, which correlate with laws of human thinking and consciousness building. It is necessary to change the current consciousness of a consumer, corresponding to the anthropocentric type of consciousness, and accordingly, a consumer’s attitude to nature using the recognition of ecological imperative - such interaction with the substance of the nature which does not break ecological equilibrium, where the person is a component of a subsystem ‘a person – nature’ is its multisubject. The author considers the solution to the problem in the development of ecocentric and nature-centric environmental consciousness in education for SP.

In our opinion, such position is justified, because education as a social institution, according to E. Durkheim, is included in the reproduction (assimilation of already existing forms of consciousness) and production (development of new forms of consciousness) of social and individual consciousness, which are the key components of the historical evolution of society. According to representatives of elitology, the main mission of higher education consists of elitization of personality, whose anthropological criteria are, first of all, elitist consciousness, theoretical thinking, creativity, moral imperative, ecological responsibility for the results of his/her activity (Karabushchenko et al., 2019).

The result of education for SP, according to Panov (2020), consists of the development of competence as the ability of a person to cooperate with nature and other people in various types of subject-subject interactions (environmental, social, etc.) based on the development of environmentally-oriented cognitive and spiritual-moral areas, subjectively acting for the student as an ecological imperative of his perception, thinking and behaviour.

Dziatkovskaya and Zakhlebny (2018) prove that ecological competence is a general cultural index, a result of integrated learning and educational activity of educational institution as a student’s ability to apply knowledge of the subject and universal ways of activity design independently and

comprehensively, organize environmentally safe activities and behave in socially problematic ecological situations for SP, human health and life safety.

Foreign research in the context of LSP competence building is carried out in the concept of environmental citizenship - environmental nationhood/citizenship (EC), implemented by the European Network of Environmental Citizenship (ENEC) project, which includes scientists from different fields of knowledge from 37 countries of the world. The project aims to support the education and practice of EC socio-educational practices around the world focused on the emotional involvement of learners in the practical experience of the activity.

Father of the concept A. Dobson believes that environmental citizenship competence corresponds to pro-environmental behaviour of responsible citizens, conditioned by a vision of equitable distribution of environmental benefits and their collective participation in the development of sound progress principles (Dobson, 2005).

The analysis and synthesis of objectives, concepts (environmental citizenship; education for environmental citizenship; environmental sensitivity) and principles in the field of EC, allowed to define the structure and content of education for sound progress (ESP) competence in EC concept (Cheah & Huang, 2019; Cincera et al., 2020a; Dobson, 2005):

motivational-emotional component (development of 'environmental sensitivity as an appeal to emotional experience;

establishment of emotional relations with nature; cognitive (environmental knowledge in civil society, sound progress, environmental rights and responsibilities);

value-based (understanding of philosophical and cultural foundations of relationships in the human-nature system, including ethical principles of respect and recognition of rights for all biological species, conditions for human intervention in natural processes;

principles of intergenerational equity, pro-environmental behaviour);

the activity-based (skills and abilities, including civic participation, contributing to environmental conservation, enabling decision-making, including collective decision-making, concerning the arrangement of personal and public space based on awareness of the ecological footprint;

solving existing environmental problems and preventing new ones; willingness to be a mentor in pro-environmental behaviour; participation in environmental protection projects).

It is important to note that competence building in the EC concept is based on the ideas of lifelong learning and the interdisciplinary nature of environmental citizenship.

Ecocentric consciousness does not develop spontaneously. It is the result and product of special purposeful education and upbringing, enriching the ecological culture of a person, expanding the range of perceived, understood and practically solved questions of optimal interaction of a person and nature. Thus, the scientific problem of this research consists of defining conditions for building environmental competence of future teachers in the field of learning for sound progress.

3. Research Questions

It is important for our study that the post-non-classical type of scientific rationality focuses on the study of the poly subject of coevolutionary development of humanity and the planet as a system factor of

the world picture from the point of view of holism and ecological imperative. It implies the identification of regularities, principles of interaction between rapidly changing environment (natural, social, cultural) and man. Moreover, we actualize discourse concerning value aspects of human activity in the context of ontological and meta-central approaches of eco-psychology concerning building and development of the joint subject of the 'Man – Nature' system and development of human ecological competence in the given system.

The theoretical foundation of the research is the general institutional approach, which assumes the primacy of SP principles in management, various types of internal and external activities of educational institutions in a part of integration as a cross-cutting theme of SP in curricula, social partnership, arrangement of life activities of teachers and students. For Teacher Training students, the implementation of the general-institutional approach contributes to the development of environmental competence in the area of LSP and the development of teacher training culture in the context of LSP ideas (Sokolova et al., 2021; Sokolova & Ermakov, 2020).

The subject of the research is instructional conditions of the development of environmental competence of future educators in the field of learning for sound progress. The setting of research questions: 1. What are the characteristics of environmental competence in learning for the sound progress of future teachers? 3. What is the impact of university learning on students' environmental education? 4. Have students developed competencies in the field of organizing environmental education with school students? 5. What are the pedagogical conditions for the development of environmental competence of future teachers in the field of learning for sound progress?

4. Purpose of the Study

The aim is to find out and prove teaching conditions for the development of environmental competence of future educators in the field of learning for sound progress.

Theoretical review of foreign and national studies on the problem of LSP integration in higher education in general and the problem of LSP competence development of future teachers allowed us to make several generalizations. We have implemented activities that prove the effectiveness of the integration of LSP ideas into learning. Thus, the experience of implementation of meta-disciplinary approach was scaled in TransBaikal State University to develop experience of solving professional problems for LSP and mastering ways of solving social-environmental problems in the course 'Learning for Sound Progress' for Master students of Teacher Training major, Master programme 'Social and Teacher Training Activity in Educational Institutions.

The meta-disciplinary object in the course is the concept of 'socio-ecological problems', and the priority learning technologies are 'immersion' in the technology of critical thinking development, the technology of inventive problem solving, as well as the organization of socio-cultural practice of Master students on LSP in extracurricular activities in the regional educational environment, promoting interaction with social partners in development and implementation of socially significant projects for sound progress (Igumnova, 2019).

Based on qualitative research method (focus groups) and comparison of the content of focus groups Sarayeva et al. (2021) with two categories of students of Teacher Training major carried out the

research and found out that ecological consciousness of youth, level of understanding of environmental problems directly depended on the inclusion of special eco-oriented courses into learning content, motivating them to creative activity and conscious consumption in their personal life.

Although specific LSP courses contribute to the competence of future educators in this field, these courses are part of the educational programme chosen by the students. There is often not enough time and awareness on the part of the curriculum planners to include them in learning. In this context, we share the opinion of L.I. Sokolova, D.S. Ermakov, and A.S. Ermakov on the need for universities to implement LSP projects and practice based on a whole-institution approach that implies internal activities and external relations of an educational institution taking into account SP principles (Ermakov & Ermakov, 2020; Sokolova & Ermakov, 2020; Ermakov, 2021).

When organizing learning at the university, we focus on students' mastering the competencies related to LSP (Ermakov & Ermakov, 2020; Sokolova et al., 2021): systemic and future-oriented thinking; ability to cooperate, negotiate, participate in discussions on SP and joint decision-making; ability to reflect on personal values and values of others in the context of SP, their role in local communities and the global context; empathy. The ideas of these authors correlate with the structure and content of LSP competence in the EC concept (Cheah & Huang, 2019; Dobson, 2005).

Guided by the above-mentioned, we propose the following theoretical hypothesis of the study: we assume that integration of LSP ideas into university learning in general, and into all types of practices (as a condition for including future teachers in active practice-oriented activities) has a significant impact on the development of environmental competence of future teachers in the field of LSP.

In this study, we address the following research objectives: 1. to find out the connection between types of practices and the level of development of environmental competence of future teachers in the field of LSP. 2. to determine the significance of future teachers' participation in educational events of environmental orientation, including students' creative initiatives and implementation of socially significant projects, as the main condition for the development of environmental competence in the LSP area in the system of 'man-nature' poly-subject.

5. Research Methods

The subject of the study was studied using the following set of methods: theoretical (analysis, synthesis, comparison); empirical (questionnaire survey, method of expert evaluation and content analysis). In the present study, the statistical analysis of the results was carried out using the statistical data processing software IBM SPSS Statistics, version 19.0. Pearson correlation coefficient data were obtained. A non-parametric Kolmogorov-Smirnov one-sample criterion (to assess the normality of distributions) was carried out, which showed sample homogeneity (Kolmogorov, 1986).

6. Findings

These are the results of the empirical study aimed to identify the teaching conditions for the development of environmental competence of future teachers through a questionnaire survey.

Basis of the research: from April to May 2020 students of four faculties of TransBaikal State University consisting of 106 people participated in a questionnaire survey, created through the service Google. Form. The following respondents took part in the survey: 62 of 1st-2nd year students of the Faculty of Natural Sciences, Mathematics and Technology and the Faculty of Psychology and Education (FNMS&T and PEF respectively); 44 of 1st-4th year students of the Faculty of History and Philology and the Faculty of Culture and Arts (HPF and C&AF respectively), at an average age of 20 years old ($M = 19.56$). The study did not take into account data on gender differences, as girls made up 78% of the sample ($N = 83$) and boys composed only 22% of the sample ($N = 23$). During the questionnaire, students were asked to answer a series of questions, choosing the suggested answers or requiring an opinion. One of the sections of questions was aimed at examining the students' competence in the field of organizing environmental education at school. The answers of all the respondents without distribution among faculties are presented in Figure 1.

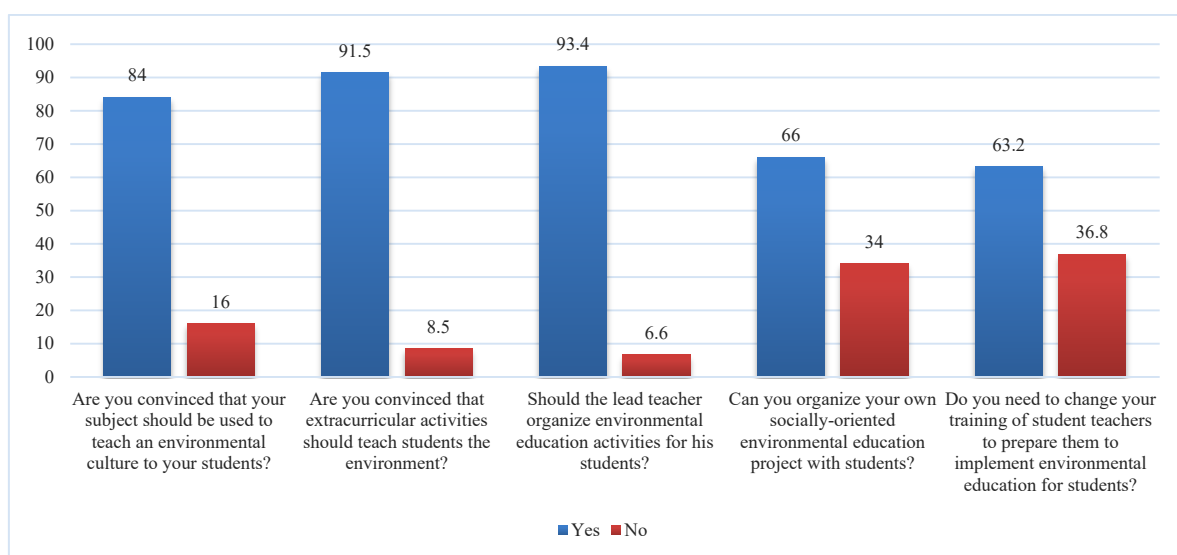


Figure 1. Answers of respondents to questions identifying readiness to implement environmental education at school

The descriptive statistics presented in Figure 1 prove that the features of ecological competence are not developed spontaneously. The respondents' beliefs about the role of their knowledge in environmental education and learning directly depend on the range of perceived, understood and practically solved professional issues of optimal human-nature interaction related directly to their teaching activity as a subject teacher and as a lead teacher.

This correlates with the findings of a study (Kashapov & Poshekhonova, 2017), who on a sample of 59 respondents, find that a teacher who sets an independent research task that requires a separate empirical study is in the mediated nature of the relationship between metacognitive knowledge and professional instructional thinking. Consequently, developing the readiness of future teachers to implement environmental education at school, which is an essential rate of environmental competence, it is advisable to implement through the development and active use of skills of managing their cognitive

processes (Kashapov & Poshekhonova, 2017). Next, let us find out whether the active involvement of future educators in learning can contribute to this.

Studying the respondents' opinions on the types of activities that can influence the development of their environmental competence through their active involvement in it, we learn about dominant ones among them and presented in Figure 2.

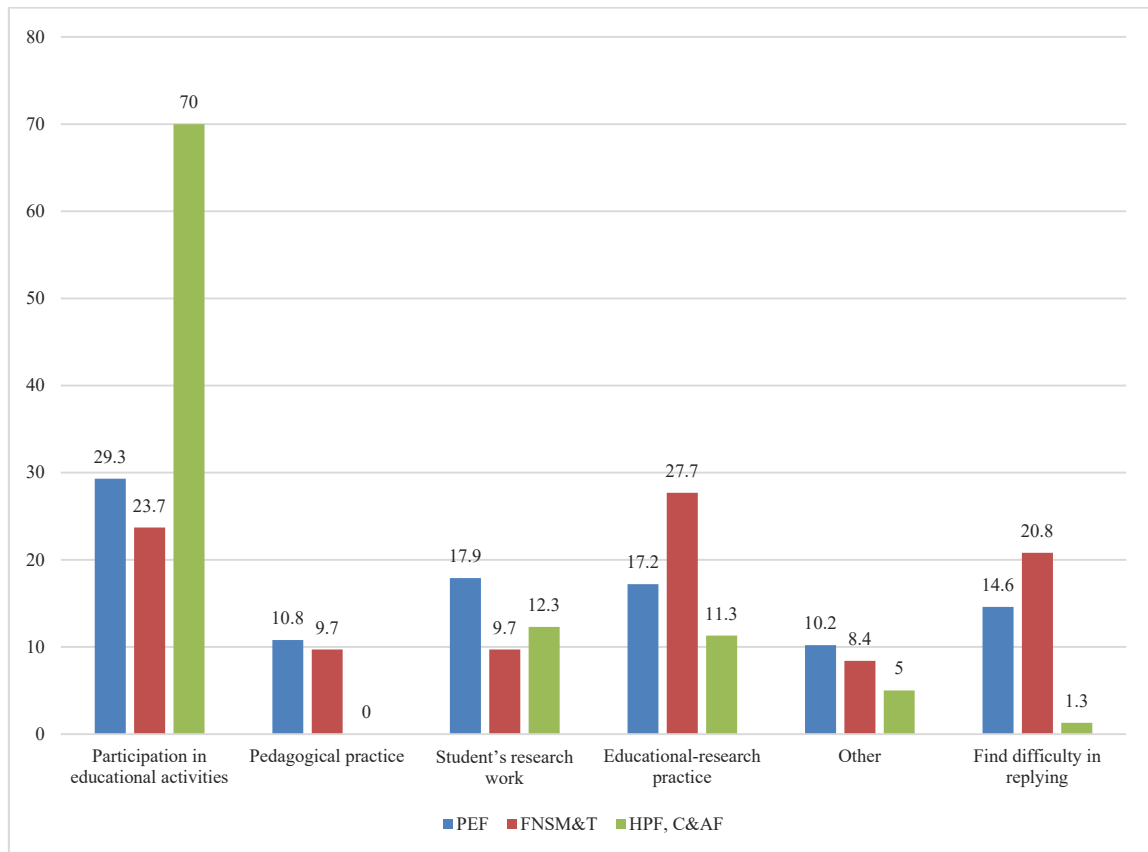


Figure 2. Students' opinions on activities affecting the development of competencies in the field of fostering students' environmental culture (PEF - Faculty of Psychology and Education; FNSM&T - Faculty of Natural Sciences, Mathematics and Technology; HPF - Faculty of History and Philology; C&AF - Faculty of Culture and Arts)

The analysis of the data showed that the majority of the respondents consider participation in educational events and personal immersion in research practice as the most significant predictors of the indicators of environmental competence development. This is proved by the data of some experimental studies carried out in the Laboratory of Developmental Psychology of the Institute of Psychology of the Russian Academy of Sciences for 2012-2016 (Sergienko, 2017, pp. 8-9), in which the following conditions of subjectivity development are defined: activity meanings; personality orientation on communicative interaction; possibility of sense-making, change and control of behaviour during the experience. As it is known, everything is present in the process of the types of activity indicated by students.

During the correlation analysis, it was possible to reveal several significant connections between the types of activity, influencing the development of ecological competence of students during higher

education. The reliability of the study is quite high as the correlation loadings of the studied activities have high and average values (Table 1).

Table 1. Correlation matrix of activities influencing the development of environmental competence of future teachers in the field of LSP

	Teaching and research practice	Pedagogical practice	Participation in research and educational activities	Educational and research practice
Educational and research practice	-	0,968	-	-
Pedagogical practice	-	-	-	0,713
Participation in educational activities	-0,897	-0,979	-	-0,840
RESEARCH AND DEVELOPMENT	0,513	-	-	-

The analysis of the correlation matrix of activities influencing the development of competencies related to the development of environmental competence of students showed both negative and positive relationships.

Thus, the total values of activity load have the following interrelations: pedagogical practice and participation in educational activities ($r = -0.979$); educational research and pedagogical practice ($r = 0.968$); participation in educational activities and educational research practice ($r = -0.897$); participation in educational activities and S&R ($r = -0.840$); educational practice and S&R ($r = 0.713$); educational research practice and S&R ($r = 0.513$).

As the most productive, according to respondents, can be considered teaching and research practices ($r = 0.968$) and pedagogical ($r = -0.979$), as well as S&R ($r = -0.840$), which contribute to the development of skills and abilities to deal with all participants of learning, partners and people who are not indifferent towards nature preservation.

There is a significant, negative relationship between participation in educational activities and all types of practices of students. In other words, future teachers are convinced that they should be engaged in one thing, either educational activities or pedagogical practice ($r = -0.979$), S&R ($r = -0.840$), or teaching and research practice ($r = -0.897$). The obtained values indicate the lack of a direct relationship between the variables, but reflect their significant part in the development of environmental competencies, the experience of environmental activities of the respondents. This does not contradict the data obtained in several studies (Dziatkovskaya & Zakhlebny, 2018), as the mentioned activities form the predictability of future educators in matters of competent attitude to the remote perspective of sound progress, as the main metacognitive condition of environmental competence.

The study confirmed the effectiveness of integrating LSP ideas through the use of information and interactive materials on the issue presented on the UN website and other specialized websites and international programmes into various types of practices by motivating students to take creative initiatives in the course of socially significant projects with schoolchildren, organizing educational integrated events, competition and game programmes, educational quests and other modern forms and formats of education. In practice, students are involved in professional activities that reveal personal meaning, their

knowledge and skills are implemented in the process of real professional tasks and interaction with students and other subjects of education.

7. Conclusion

As a result of the conducted research aimed at identifying teaching conditions for the development of environmental competence of future teachers in the area of learning for sound progress, the following conclusions can be made.

1. Increasing environmental-socio-economic problems of technogenic civilization as a strategic challenge for human development point out the mission of teaching community in the problem of LSP problems solving, which actualizes scientific search of future educators' competence development in the field of LSP;

2. LSP projects and practices have to take a special place in the general institutional approach which implies review and revision of all aspects of internal activity and external relations of an educational institution taking into account the principles of SP.

3. The hypothesis that integration of ideas of learning for sound progress and professional tasks in this context in all types of practices as a condition of inclusion of future teachers in active practice-oriented activities has a significant impact on the development of their environmental competence in learning for sound progress during higher education has been fully confirmed. We can reliably state that both pedagogical and educational-research practices significantly develop key indicators of ecological competence, which include metacognitive, communicative, activity, value, reflexive, motivational-emotional and personal (environmental consciousness and environmental responsibility, environmental citizenship) criteria.

4. Correlation loadings of investigated pedagogical conditions confirm stable relations between kinds of practices of future teachers and the level of development of ecological competence and correlate with the aims of sound progress (meta-disciplinary educational results (integrity of nature, society, economy), role of professional activity in solution of ecological problems aimed at improvement of environment and life quality).

5. Statistical significance of future teachers' participation in educational activities of ecological major as the main condition for the development of ecological competence in learning for sound progress in the system of the poly subject 'man – nature was determined.

6. Pedagogical conditions of development of environmental competence of future teachers in the field of learning for sound progress are:

- integration of SP ideas and professional tasks in the field of learning for sound progress in all types of practices promotes the inclusion of future teachers in active practice-oriented activities;
- promoting the ability of future teachers to cooperate with nature and other people in various types of subject-subject interactions through collective participation in the implementation of sound progress principles by motivating students' creative initiatives and implementation of socially significant projects.

The conducted research emphasizes the importance of implementing a general institutional approach in higher education institutions as a whole and the special role of various practices contributing to the development of environmental competence of future teachers in the field of LSP, without rejecting the significance of several social, economic, political, psychological and regional conditions, acting as an essential core of building of poly subject 'man-nature' relations. The significance of future teachers' participation in educational events of ecological direction, including their creative initiatives and implementation of socially significant projects as the main condition for the development of ecological competence in the field of LSP in the system of 'man-nature' polysubjects, is empirically proved. Targeted work on teachers' training within the higher education system could increase not only the level of their ecological competence in the field of sound progress goals but also assist in the development of ecocentric and nature-centric environmental consciousness in learning for sound progress.

References

- Argunova, M. V., & Plyusnina, T. A. (2020). Obrazovaniye dlya ustoychivogo razvitiya v deystvii: dorozhnaya karta resheniya sotsial'no-ekologicheskikh problem. Problemy i noosfernyy podkhody k formirovaniyu kul'tury myshleniya tsennostno-oriyentirovannoy lichnosti v sovremennom obrazovanii dlya ustoychivogo razvitiya tsivilizatsii [Learning for sound progress in action: a roadmap for solving socio-ecological problems. Problem and Noosphere Approaches to Developing a Thinking Culture of a Value-Oriented Person in Modern Learning for Sound Progress of Civilization]. *Proceedings of the XIX Moscow International Conference*, 46-51.
- Bootz, J.-P. (2010). Strategic foresight and organizational learning: A survey and critical analysis. *Technological Forecasting and Social Change*, 77(9), 1588-1594. <https://doi.org/10.1016/j.techfore.2010.06.015>
- Cheah, S. L., & Huang, L. (2019). Environmental citizenship in a Nordic civic and citizenship education context. *Nordic Journal of comparative and internat. Education*, 3(1), 88-104. <https://doi.org/10.7577/njcie.3268>
- Cincera, J., Johnson, B., Kroufek, R., & Simonova, P. (2020b). Values Education in outdoor Environmental Education programs from the perspective of practitioners. *Sustainability*, 12(11), 4700. <https://doi.org/10.3390/su12114700>
- Cincera, J., Pauw, J., Goldman, D., & Simonova, P. (2019). Emancipatory or instrumental? Students' and teachers' perceptions of the implementation of the EcoSchool program. *Environmental Education Research*, 25(7), 1083-1104. <https://doi.org/10.1080/13504622.2018.1506911>
- Cincera, J., Romero-Ariza, M., Zabic, M., & Kalaitzidaki, M. (2020a). Environmental Citizenship in Primary Formal Education. In A. Hadjichambis (Ed.), *Conceptualizing Environmental Citizenship for 21st Century Education. Environmental Discourses in Science Education*, (pp. 163-177). Springer. https://doi.org/10.1007/978-3-030-20249-1_11
- Cincera, J., Simonova, P., Kroufek, R., & Johnson, B. (2020c). Empowerment in outdoor environmental education: who shapes the programs? *Environmental Education Research*, 26(12), 1690-1706. <https://doi.org/10.1080/13504622.2020.1814205>
- Dobson, A. (2005). *Environmental citizenship and pro-environmental behavior: rapid research and evidence review*. Sustainable Development Research Network.
- Durance, P. (2010). Reciprocal influence in future thinking between Europe and the USA. *Technological Forecasting & Social Change*, 77(9), 1469-1475. <https://doi.org/10.1016/j.techfore.2010.06.006>
- Dziatkovskaya, E. N., & Zakhlebny, A. N. (2018). Razvitiye teorii soderzhaniya ekologicheskogo obrazovaniya v Rossiyskoy akademii obrazovaniya [Development of the content theory of ecological education in the Russian Academy of Education]. *Education and society*, 3-4(110-111), 36-41.

- Ermakov, D. S. (2021). Sustainability as a driver for vocational education and competitiveness. *Lecture Notes in Networks and Systems*, 280, 760-767. https://doi.org/10.1007/978-3-030-80485-5_87
- Ermakov, D. S., & Ermakov, A. S. (2020). Interdisciplinary integration on sustainable development issues. *E3S Web of Conferences. Actual Problems of Ecology and Environmental Management: Cooperation for Sustainable Development and Environmental Safety, APEEM «2020»*. 02001. <https://doi.org/10.1051/e3sconf/202016902001>
- Galtung, J., & Inayatullah, S. (1997). *Macrohistory and macrohistorians: Perspectives on individual, social, and civilizational change*. Praeger.
- Godet, M., & Roubelat, F. (1996). Creating the future: The use and misuse of scenarios. *Long Range Planning*, 29(2), 164-171. [https://doi.org/10.1016/0024-6301\(96\)00004-0](https://doi.org/10.1016/0024-6301(96)00004-0)
- Igumnova, E. A. (2019). Metapredmetnyy podkhod kak usloviye professional'nogo rosta magistrantov pedagogicheskogo obrazovaniya (na primere uchebnogo kursa «Obrazovaniye v tselyakh ustoychivogo razvitiya»). Pedagogicheskoye obrazovaniye: istoriya, traditsii i perspektivy [The meta-disciplinary approach as a condition for the professional growth of Master students of pedagogical education (on the example of the course *Education for Sustainable Development*)]. *Pedagogical Education: History, Traditions and Prospects (Materials of All-Russian Scientific and Practical Conference dedicated to the 80th Anniversary of Higher Pedagogical Education in Zabaikalsky Krai)*, 69-77.
- Jahn, R., & Koller, H. (2019). Grasping human perception of the future: A structured approach to mental models of time and prospect. In M. Schröder, & K. Wegner (Eds.). *Logistik im Wandel der Zeit – Von der Produktions steuerung zu vernetzten Supply Chains* (pp. 767-789). Springer Gabler. https://doi.org/10.1007/978-3-658-25412-4_37
- Karabushchenko, P. L., Podvoisky, L. Y., & Rezakov, R. G. (2019). *Elitologiya obrazovaniya: elita i universitet: monografiya [Elitology of education: the elite and the university]*. Econ-Inform.
- Kashapov, M. M., & Poshekhonova, Y. V. (2017). Rol' metapoznaniya v professional'nom pedagogicheskoye myshlenii [The role of metacognition in professional pedagogical thinking]. *Journal of Psychology*, 38(3), 57-65.
- Kolmogorov, A. N. (1986). *Teoriya veroyatnostey i matematicheskaya statistika [Probability theory and mathematical statistics]*. Nauka.
- Lombardo, T. (2016). Future Consciousness: The Path to Purposeful Evolution-An Introduction. *World Futures Review*, 8(3), 116-140. <https://doi.org/10.1177/1946756716673636>
- Panov, V. I. (2009). 5-ya Rossiyskaya konferentsiya po ekologicheskoy psikhologii [5th Russian conference on ecological psychology]. *Journal of Psychology*, 3(4), 113-115.
- Panov, V. I. (2020). Psikhologicheskoye vzglyad na obrazovaniye v interesakh ustoychivogo razvitiya. Ot ekologicheskogo obrazovaniya k ekologii budushchego [Psychological perspective on learning for sound progress. From Ecological Education to Ecology of the Future]. *Materials of VI All-Russian Scientific-Practical Conference on Ecological Education*, 1088-1103.
- Sarayeva, N. M., Igumnova, E. A., & Sukhanov, A. A. (2021). Osoznaniye ekologicheskikh problem regiona studentami, izuchavshimi i ne izuchavshimi uchebnyy kurs *Obrazovaniye v tselyakh ustoychivogo razvitiya* [Awareness of ecological problems of the region by students who have and have not studied the course 'Learning for Sound Progress'. Education 2030]. *Roadmap (Materials of International Scientific-Practical Conference)*, 32-44.
- Sergienko, E. A. (2017). Realizatsiya printsipa razvitiya v issledovaniyakh psikhologii sub'yekta [Actualization of the principle of development in studies of subject's psychology]. *Journal of Psychology*, 38(2), 5-18.
- Sokolova, L. I., & Ermakov, D. S. (2020). Comparative analysis of the application of educational technologies for sustainable development. *E3S Web of Conferences. Actual Problems of Ecology and Environmental Management: Cooperation for Sustainable Development and Environmental Safety, APEEM «2020»*, 05001. <https://doi.org/10.1051/e3sconf/202016905001>
- Sokolova, L. I., Ermakov, D. S., & Ermakov, A. S. (2021). Teoretiko-metodologicheskoye problemy i prakticheskiy opyt obrazovaniya dlya ustoychivogo razvitiya v zarubezhnykh vuzakh. Shamovskoye pedagogicheskoye chteniya nauchnoy shkoly Upravleniya obrazovatel'nymi sistemami [Theoretical and methodological problems and practical experience of learning for

sound progress in foreign universities]. *Shamov pedagogical readings of scientific school of Management of educational systems (Proceedings of XIII International. Science-Practice Conference)*, 93-96.

Trommsdorff, G. (1983). Future Orientation and Socialization. *International Journal of Psychology*, 18(1-4), 381-406. <https://doi.org/10.1080/00207598308247489>