



REFORMS INSIDE

*Publication of National Higher
Education Reform Experts*

ISSUE 5



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National Erasmus+ Office

DECEMBER 2024

REFORMS INSIDE – Publication of
National Higher Education Reform Experts

Publisher: National Erasmus + Office

Higher Education Reform Experts in Montenegro

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Graphic Design:
Golbi d.o.o.

Printed by:
Golbi d.o.o.

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Co-funded by the
Erasmus+ Programme
of the European Union

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Instead of introduction



Erasmus+ program has been changing the lives of millions of people throughout the world for years. Montenegro is not an exception. From the beginning of 2000, Montenegro is taking part in EU programmes, and as of beginning of Erasmus + phase, i.e 2014 Montenegro has been actively participating in all the actions available for HEIs in Montenegro. Participation in various projects has been changing the higher education landscape for years and thanks to Erasmus +, HEIs from Montenegro managed to upgrade the quality of Montenegrin higher education through modernization of its programmes, improved teaching methodologies, improved infrastructure, and above all through the human capital development.

Internationalization has been considerably improved, through partnerships developed with partners from EU and WB region. The trend of incoming mobilities is on the rise, and the first bachelor programme in English language is being implemented at the Faculty of Economics in Podgorica.


Regional cooperation has been also improved, and the first joint master programme has been accredited in Montenegro in 2024 in maritime environmental protection and management (MEP&M), thus strengthening WB cooperation, and giving way to first joint programmes developed within Erasmus +.

Interdisciplinary became very common at master study programmes in Montenegro.


One of the elements that is adding to the quality in HE is the work performed by Higher Education Reform Experts Team.

This initiative launched by EC to help beneficiary countries reform their HE policies gathered always


professions from different universities, different disciplines, Ministry and students representatives, giving the different perspectives on HE reform processes and the needs.



The new HERE team was formed in April 17, 2024 and throughout this period, we managed to tackle 4 very topics, of pivotal importance for Montenegrin higher education system:

- 1. Plagiarism in Higher Education - awareness, threats and consequences**
 - 2. Intellectual property rights and copyright at the institutions of Higher Education**
 - 3. Digital teaching and learning**
 - 4. Quality Assurance Mechanisms in Higher Education in Europe: Focus on Quality or Procedures?**
- 

Although quite different when speaking about the topics themselves, still they were all focused on the same objective and that is to make the higher education system the best as possible, trying to compare experiences from different countries in these areas, and have all the good practises implemented in Montenegro. Of course, contextualizing the topics and taking the most appropriate practises, applicable in our context was of utmost importance.



The texts that you can find here are reflections of our newly appointed HERE members on the topics of importance for HE context in Montenegro.

NEO team



LEGAL SOLUTIONS FOR ENHANCING THE QUALITY OF HIGHER EDUCATION IN MONTENEGRO



Dragana Četković, MSc, General Director of General Directorate of Higher Education, Ministry of Education, Science and Innovation of Montenegro

Being a president of the working group for the new Law on Higher Education makes me so proud because this law shall regulate the fundamentals of higher education, conditions for conducting activities, types of study programmes, principles of organisation of institutions performing this activity, the rights and obligations of academic staff and students, quality assurance, financing of higher education as well as other matters relevant to the conduct of higher education activities. Montenegro, like many other countries in the region, has recognized the importance of enhancing the quality of its higher education system, particularly in the context of its aspirations to integrate more deeply into European and global educational frameworks. This article provides an in-depth analysis of the legal solutions implemented in Montenegro to improve the quality of

higher education, examining the current legislative frameworks, their effects on the education system, and the challenges faced during implementation.

In order to implement the goals and measures of the Higher Education Development Strategy in Montenegro (2024-2027), achieve better recognition of our higher education system, and improve the competitiveness of our higher education graduates in both domestic and international labor markets, it was necessary to legally establish the foundations for their realization. All measures related to ensuring quality, alignment with labor market needs, sustainable financing systems, and strengthening internationalization are in line with the Medium-Term Work Program of the Government of Montenegro for 2024-2027 and the Montenegro EU Accession Program for 2024-2027.

The draft Law on Higher Education is proposed with the aim of improving the quality of higher education, aligning education with labor market needs, enhancing practical training, the status of academic staff, enrollment policies, and creating a competitive workforce for the labor market.

The draft Law on Higher Education defines that study programs can be conducted at the undergraduate, postgraduate, and doctoral levels. The draft Law on Higher Education introduces a three-cycle study model, to be implemented in undergraduate, postgraduate, and doctoral study programs. Instead of the previous dominant and unified 3+2+3 model, a flexible study model is being introduced where undergraduate studies will last for three years, postgraduate studies will be offered as one-year or two-year programs, and doctoral studies, as before, will be three-year programs. This approach aims to improve the recognition of graduates

in the labor market.

The law also foresees the introduction of mandatory practical training of at least 30 ECTS credits per study program for undergraduate studies, which will be carried out in a real working environment or in the premises of the institution, in accordance with the study program. Additionally, there will be a different functioning and organizational structure of the Agency for Quality Assurance in Higher Education (formerly the Agency for Quality Control and Assurance in Higher Education). This is, among other things, one of the reasons why it is necessary to adopt the mentioned law in the fourth quarter of this year.

The draft law stipulates that the Agency for Quality Assurance in Higher Education will be responsible for quality assurance tasks defined by this law and other regulations, in line with European standards and guidelines. The Agency will be responsible for conducting the external evaluation process of higher education institutions (accreditation and re-accreditation). The Agency will also set standards for evaluating institutions, in accordance with standards in the European Higher Education Area, rank higher education institutions according to the ranking methodology used in the European Higher Education Area, and more. One of the Agency's responsibilities will also be to carry out periodic quality assessments of licensed higher education institutions at the request of the institution's authorized body or the Ministry. The draft law envisages the establishment of the Agency's governing bodies: a Board of Directors, a Director, and an Accreditation Board.

Students of undergraduate and postgraduate programs at public higher education institutions will still not be required to pay tuition fees, while doctoral students will be required to pay tuition fees. Students with disabilities and students from the Roma and Egyptian (RE) populations in undergraduate and postgraduate studies, admitted under affirmative action, who are enrolled in numbers exceeding

the number of students set in accordance with the institution's license for a specific study program, will be exempt from tuition fees at both public and private institutions of higher education. Funding for these students will be provided in the Montenegro state budget, at the cost of the student at the public institution for the specific study program.

For the first time, a deadline for the completion of studies is prescribed, meaning that a student's status will be terminated if they do not finish their study program within a period twice as long as the expected duration of the program, excluding the time of suspension of student status in accordance with the institution's statute. Transitional and final provisions will regulate the status of students already enrolled, the equivalency of their diplomas with diplomas to be awarded under the draft law, deadlines for aligning programs with the new structure and law, and other relevant matters.

In conclusion, the legal solutions implemented in Montenegro to enhance the quality of higher education have laid a solid foundation for improvement, but significant challenges remain. By addressing the obstacles in implementation, investing in education, and fostering greater collaboration between stakeholders, Montenegro can continue to improve its higher education system. A strong, high-quality education system is essential for the country's long-term economic and social development, and the legal reforms undertaken represent a critical step toward achieving that goal.

Status of Intellectual property rights in Montenegro- case study policy development at University of Montenegro



Prof. Mira Vukčević, President of HERE team

Properly lead Intellectual property issues remove creativity limits and lead to genuine progress toward the solving of big problems and puzzles for those who are dedicated to the invention process. Hence, we have to be continuously aware of priceless contribution of scientists, innovators and researchers who work in dedicated manner and with integrity to make the world face challenges of modern times. However, we are also witnessing that sometimes real scientists get overshadowed by plagiarists who seek to earn academic titles by stealing the work of others. This requires a strong response by the academic and scientific community to defend the dignity of their own profession, but also to showcase the real path someone

needs to tread through in order to become a scientist or a respectable member of the academic community. The responsivity at the national and institutional level is of utmost importance.

The issue of Intellectual property rights (IPR) at the national level in Montenegro is covered by the Montenegrin Intellectual Property Office within the Ministry of economic development, the competent authority within state administration. In the former Serbia and Montenegro, intellectual rights were provided on the federal level by the federal Intellectual Property Office. Any intellectual right gained by the Serbian Intellectual property office before May 28th 2008 is enforceable in Montenegro. Any application for intellectual rights submitted after this date in Serbia has to be re-submitted in Montenegro within the period of six months. If someone wants to acquire intellectual rights for the company's goods and prevent others from exploiting their business ideas, he/she can now fully rely on Montenegrin legislation. Montenegro is drawing an increasing amount of attention for investment and development for several reasons, including its natural beauty and rich culture. Due to its progress toward political freedom, advantageous geographic location, and impending EU membership, Montenegro has to deal also with this issue. The most common type of intellectual property rights in Montenegro include: patents, trademarks and industrial designs. As a foreign investor in Montenegro, someone can obtain intellectual protection for the company's products by submitting a written application to The Intellectual Property Office. According to the type of intellectual

property to be defended, the content of the application may vary.

On the other side, although the awareness of the IPR importance exists, situation at the Montenegrin universities is such that we can say that only the first attempts are made and there is a long way in front of academia to the fully developed system supported by adequate politics.

Speaking about the Intellectual property within academia, Montenegrin academic community is facing a great challenge. The global impression is that Montenegrin universities face only the problem of plagiarism and create their politics and capacities in accordance. By adoption of the Law on Academic Integrity, legal framework to prosecute plagiarists has been strengthened. It is encouraging that the ethics is becoming of a crucial importance at the University of Montenegro the oldest and only public university in Montenegro. The University recognizes the need for and desirability of encouraging the broad utilization of the results of the University research, not only by scholars but also in practical application for the general public benefit. It also acknowledges the importance of IPR protection system in bringing innovative research findings to practical application.

Still a lot of systematic steps are missing toward the fully developed attitude towards the ownership of Intellectual Property and full involvement of all the stakeholders in this process like staff, students, contract researchers, visiting professors, companies to work with and any other relevant party, together with the procedures in place for commercialization of Inventor/University owned .

University of Montenegro adopted IPR Policy in March this year as an overarching document that should be a base for the policy development and system creation. The leading idea for drafting the document was that the user can find all relevant information in one place. Therefore, this document is not a classical

policy, but it consists of procedure description and templates relevant to IPR.

The challenges in front of University of Montenegro (UoM) are to make the process operational by setting up the governance system and by appointing a person in charge of the process, as well as to make the assessment of research work currently undertaken that could be interesting from IPR point of view.

The University's Policy suppose to govern the ownership and disposition of IP which includes, but is not limited to, inventions, copyrights (including computer software), design rights, trademarks. Strategic vision envisages the future steps toward the operational institutional system:

- Motivate the perception that ideas and creative works produced at the University should be used in ways that are meaningful in the public interest, which shall be accomplished and followed by widespread dissemination,
- Promote dissemination throughout the UoM's community whilst at the same time, the public may take advantage of the stronger application of legal protection of IP,
- Recognise that the public benefit should be accompanied by financial gain. It is nonetheless proper and desirable for the University and inventors to benefit financially from the use of a particular invention or creative work,
- Encourage all staff and students to consider the issues associated with the creation, disclosure and protection of IP,
- Consider the benefits and cost for the public and the University as well as for individual inventors.
- Protect traditional rights of scholars with respect to the products of their intellectual efforts and where the Inventors and University share IP

rights over the inventions, the University shall consult with inventors on plans for publication in various forms of IP – Patents, Industrial Designs, Trade Secrets, Trade Marks and Copyrights.

- Promote wide collaboration with external partners.

THE ELEMENTS OF FUTURE IPR POLICY DEVELOPMENT

★ (a) Although the legal position is inevitably complex, the University's position reflects the general legislation, unless there are specific agreements to the contrary. The University will normally be regarded as equally owning all IP generated by University staff during their employment. However, not all IP generated by staff during their employment should necessarily belong to the University. All complex examples should be defined by the future politics

Speaking about the students' accomplishments, it should be regulated in a way that if any student generates IP as part of his/her academic programme, he/she will have sole ownership of this IP unless:

- The IP was generated as equal to an activity whereby a third party equally requires ownership (e.g. where on a student placement, a host requires ownership or where research is sponsored, the sponsor requires ownership).
- The student-generated IP builds upon existing IP generated by University staff.

- The student-generated IP is jointly created with University staff.

- The student has executed practical work which has led to IP but has not contributed to the invention of that IP.

USE OF INTELLECTUAL PROPERTY AND SHARING REVENUE FROM THE COMMERCIAL EXPLOITATION OF INTELLECTUAL PROPERTY

The question of revenue within IPR should be taken with the maximum attention.


IP should be designed to reflect:

- The general position under the law where the University asserts its rights to equitable ownership and use of all IP generated by staff during their employment and use of all IP generated by staff outside their employment where substantial University resources have been used.

- Where the University has ownership, it is committed to sharing with the staff and students concerned with the rewards derived from successful commercial exploitation of IP which they have generated.

- Against this background, the following specific conditions apply to the ownership, use and exploitation of IP:


- (a) Except as may be provided in a contract with a third party (for example, a funding body), except in cases where an individual has been



employed specifically for the purpose of producing a particular academic publication, and except where publication might result in the loss of an opportunity for commercial exploitation, the University allows members of staff and students to publish their research findings in academic publications.]


(b) The University equally owns and therefore has the right to use without limitation all material that is generated by staff during their employment.

(c) Where the University commercially exploits IP generated by members of staff or students, it will share a percentage of the income it derives from such commercial exploitation with the inventors in accordance with the Intellectual Property Assignment Agreement.



(d) The Protection and exploitation of commercially-valuable IP is undertaken on behalf of the University by the Knowledge Transfer Office (KTO).

One of the important future steps of University's administration is to deal with the established KTO and to develop commercialization issues with the companies commercialization issues in a manner that :

- The Company pays for protection of the IP and agrees the ownership with the UoM but not for commercialization; or
 - The Company pays for protection of the IP and agrees both for sharing of the ownership with the UoM and for commercialization.
 - Where a Company funds partly a specific research work conducted by staff at UoM and the research leads to IP, the Company pays for IP protection and the UoM maintains/or not the ownership but not necessarily for commercialization
- 



Ethics of AI for students and teachers – UNESCO's competence frameworks



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INTRODUCTION



Artificial Intelligence (AI) is revolutionizing academia, offering transformative potential in education and research (George & Wooden, 2023). From personalized learning to advanced data analysis, AI enhances efficiency and accessibility. However, these advancements come with risks, such as ethical concerns, biases, and data privacy issues (Aljanabi, 2023; Livberber & Ayvaz, 2023; Cotton et al., 2023).

Artificial intelligence (AI) and generative AI (GenAI) are developing rapidly and are becoming an integral part of all sectors, including education. By all accounts, AI will change not only the education sector, but it will also significantly affect the way of life, therefore defining it only as a technology or a tool is not enough at this moment - AI holds much more. AI can be used for many administrative tasks, teaching preparation, and learning. Its use requires certain knowledge, skills, attitudes, and values. In this discussion, we deal with competencies for the application of AI in education, primarily attitudes that belong to academic integrity, that is, ethics.

By AI in this text, we mean the science that creates machines that function according to the principles of human intelligence. A large number of definitions of AI have been developed over time and the definition itself has an evolutionary character, i.e. the definition evolves and adapts to the development of AI (Pellicelli, 2023). AI, as one definition says, can “imitate intelligent human behavior” (Kok et al., 2009, p. 272). It is clear that the imitation of human behavior can be used in unlimited ways, so naturally there is a need to define how we can use AI. Namely, every great discovery, and invention of AI certainly is, on the one hand, it is there for the benefit of man and humanity, but in the conditions of inappropriate ethical behavior, it can also be misused, that is, used for various purposes that are not beneficial in any way.

Hence, it is not surprising that the Council of Europe Framework Convention on Artificial Intelligence



and Human Rights, Democracy and the Rule of Law was held in September 2024. The Council of Europe, rightly, through the Convention expresses deep concern for human rights, democracy, and the rule of law, and the danger that threatens all of that is observed in AI, that is, primarily in the unethical way of its use. In the exploratory report, used for the drafting of the Convention, it is pointed out that the Council of Europe “has long concerned itself with the problems confronting humankind as a result of advances in information and digital technologies, and in particular algorithmic and artificial intelligence (AI) systems” (Exploratory Report, 2024, p. 1).

The Convention accepts AI as part of modern living space but warns of the need to strictly observe the ethics of its application. In addition to the Council of Europe, other important international organizations are rapidly dealing with AI and publishing many documents for explaining AI use in an ethical manner, so we already have a huge amount of frameworks and conventions concerning AI, such as OECD (2024), UNESCO (2024a, 2024b) etc. OECD (2024) is defining AI system “An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment” (p. 7), and the Council of Europe adopts the OECD definition with the explicit emphasis that, given the urgency of an international harmonized response, it is necessary to use identical terminology.



We can already talk about AI from many angles, e.g. how to use it in writing papers, in data processing, how to use AI to generate a scenario for a lesson, or prepare quizzes, games, images, or other teaching materials. Also, the need to introduce AI into teacher education, to develop their competencies about it, is already obvious. Students are already using AI, it is quite certain, and some teachers are doing the same.



However, it is not entirely certain how this is done in practice, because we still do not have regulations regarding the use of AI, nor do we have pedagogical guidelines. Since AI can more or less skillfully imitate human thinking, do tests, and write essays and scientific papers, from a pedagogical perspective the first question we should address concerning AI is the question of the ethics of its use, so in this text, we deal with the ethical competences of students and teachers in the use of AI.

POTENTIAL BENEFITS AND RISKS OF AI IN ACADEMIA

Potential Benefits

Enhanced Learning Experiences

AI-powered tools such as intelligent tutoring systems and personalized learning platforms enhance education by adapting to individual learning styles and paces (Chen et al., 2020).

Streamlined Research Processes

AI tools like Iris.ai and Semantic Scholar facilitate literature reviews by summarizing vast academic content, saving researchers significant time. Moreover, machine learning algorithms identify patterns in complex datasets, such as in biomedical research where AI has helped discover drug candidates.

Efficient Data Analysis

AI enables the analysis of large-scale data across

disciplines. In climate science, AI models predict extreme weather events with up to 85% accuracy, enhancing disaster preparedness (Rolnick et al., 2022). Similarly, in social sciences, AI uncovers trends in social media and survey data, advancing public opinion analysis.

Enhanced Peer Review Process

AI aids in academic publishing by detecting plagiarism, identifying potential reviewers, and evaluating submission quality. This accelerates the publication process and ensures integrity.

Potential Risks

Ethical Concerns

AI systems may perpetuate biases present in training data. For instance, biased algorithms in criminal justice have highlighted the importance of fairness and transparency in AI applications (Ferrara, 2024).

Over-reliance on AI

Excessive reliance on AI might undermine critical thinking. For instance, automated grading systems and AI-generated reviews should complement, not replace, human evaluation to ensure nuanced analysis (Zhai et al., 2024).

Data Privacy and Security

AI systems handling sensitive data must adhere to

regulations. Academic environments should implement robust measures to protect data from breaches and misuse.

Job Displacement

Automation of administrative and teaching tasks may lead to job losses. Institutions should focus on reskilling staff for roles that complement AI systems.

COMPETENCE FRAMEWORKS FOR THE USE OF AI FOR TEACHERS AND STUDENTS

UNESCO emphasizes that AI must inevitably be added to the communication between teachers and students. This applies to all education systems, even though only a few of them have defined competencies or rules for the use of AI. Both competence frameworks (for students and teachers) developed by UNESCO were developed according to the same methodological principles, and have many common characteristics, but are not identical (UNESCO 2024a, 2024b). Thus, the framework for teachers includes 5 aspects of competencies specified at three levels of progression, which makes a total of 15 groups of competencies, and the framework for students also includes three levels of progression, but for 4 aspects, we are talking about 12 groups. Two aspects are identically named in both frameworks: human-centered mindset and ethics of AI, but their specification into competencies differs depending on whether it is a student or a teacher (UNESCO 2024a, 2024b). As much as AI, thanks to the way it functions, could contribute to teaching and learning, the risks of its use are significant. For example, in education, AI can reduce tasks to the level of automatization, without broader problem-based or research-based learning. Of course, the ability of AI to

perform almost uncontrolled data mining, and even to make decisions based on it, is an objective threat to education and society as a whole. For this reason, the greatest emphasis of the competence framework is placed on the ethics of using AI.

The first level of progression in both models includes knowledge, skills and attitudes related to AI at a basic level, the second already includes practical, skillful, and flexible applications, and the third refers to the creation and assessment of content. Such a hierarchical organization of the levels of progression is consistent with Bloom's taxonomy for the cognitive domain.

Competencies for teachers are defined at three levels of progression: acquisition, deepening, and creation (UNESCO, 2024b).

Table 1. The AI competency framework for teachers: aspects and progression levels

Aspects	Progression		
	Acquire	Deepen	Create
Human-centered mindset	Human agency	Human accountability	Social responsibility
Ethics of AI	Ethical principles	Safe and responsible use	Co-creating ethical use
AI foundations and applications	Basic AI techniques and applications	Application skills	Creating with AI
AI pedagogy	AI-assisted teaching	AI-pedagogy integration	AI-enhanced pedagogical transformation
AI for professional development	AI enabling lifelong professional learning	AI to enhance organizational learning	AI to support professional transformation

Source: UNESCO AI competence framework for teachers (2024b, p. 22)

The five aspects of the competencies are: human-centered mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional development (Table 1). The aspects are, of course, interconnected, although each of them has its internal uniqueness. Each of them is formulated in terms of knowledge, skills, attitudes, and values as elements of learning and teaching. The ethical aspect highlights the basic ethical principles, rules, institutional regulations, and practical ethical codes that teachers must respect. For teachers, this aspect means progress in understanding the ethical use of AI, skills related to creating safe and responsible use of AI, and competencies that are needed to create and maintain ethical norms (UNESCO, 2024b).

The first level (acquire) of AI ethics for teachers, in the domain of competencies, implies that teachers have a basic understanding of ethical issues related to AI, as well as those that encompass the ethics

of communication between humans and AI, which necessarily includes the protection of human rights, human agency, linguistic and cultural diversity, inclusive principles and environmental protection (UNESCO, 2024b).

The second level (deepen) of ethical competencies for teachers refers to the safe and responsible use of AI in the educational process. Teachers are expected to internalize ethical norms about the safety and responsibility of AI use. This includes in particular data privacy, protection of intellectual property rights, etc. These and other such competencies must be incorporated into all stages of the teaching process, including evaluation and grading (UNESCO, 2024b).

The third level for teachers refers to co-creating ethical rules, so teachers' competencies are directed toward critical thinking, leading discussions and activities related to ethical, socio-cultural, and environmental issues. They contribute to the final



creation of ethical rules related to AI, and given the rapid development of AI, the final creation of rules is expected to be an intensive process (UNESCO, 2024b).

Table 2. AI competence framework for students

Aspects	Progression		
	Understand	Apply	Create
Human-centered mindset	Human agency	Human accountability	Citizenship in the era of AI
Ethics of AI	Embodied ethics	Safe and responsible use	Ethics by design
AI techniques and applications	AI foundations	Application skills	Creating AI tools
AI system design	Problem scoping	Architecture design	Iteration and feedback loops

Source: UNESCO AI competence framework for students (2024a, p. 19)

The AI ethics aspect for students concerns the ethical value judgments, reflections, and socio-emotional competencies of students that are necessary for understanding, practical application, and participation in the adoption of the growing normative framework for the use of AI. Students are expected to have embodied ethics toward AI, which includes understanding and respecting human rights, justice, inclusion, equality, and other democratic values. Such ethics are based on the principles of: do not harm, proportionality in assessing the use of AI in a specific context, non-discrimination, sustainability, transparency and explainability, safe and responsible use, and ethics by design (UNESCO, 2024a).

The first level of competence for students concerns embodied ethics and implies that students can critically understand ethical issues related to AI, while keeping in mind the entire set of reference points that must be respected, such as human rights, justice, social equality, inclusion, climate change, etc. At this first level, the principles are: do not harm, proportionality, non-discrimination, human determination, and transparency (UNESCO, 2024a).

The second level, called safe and responsible use, refers to the competencies that enable students to use AI responsibly. Students also need to be aware of the existing risks of using AI, such as those related to privacy protection, and to take all measures to ensure that their data is collected, shared, processed, and stored in an ethically acceptable manner. At this level, the issue of the safety of the student-users themselves and their colleagues is also an issue (UNESCO, 2024a).

The third level (create) refers to the competencies of creating and evaluating materials with the help of AI, as well as adopting and assessing AI regulations.

UNESCO's competency frameworks are complementary to the Council of Europe's fundamental principles of the Convention (2024): human dignity and individual autonomy, equality, and non-discrimination, respect for privacy and personal data protection, transparency and oversight, accountability and responsibility, reliability, and safe innovation.



Conclusion

The various possibilities brought by digital technology, first the internet, and then AI, have continuously shed light on ethical issues. Today, people can use various data sources, ready-made works, and databases almost uncontrollably – all of this is available to them, and thanks to AI, they can also create based on a multitude of digitally stored data. In such an environment, the issue of ethics becomes extremely important, because the use of data, works or inventions of other people must be based on deep ethical principles that imply internalized academic and overall integrity.

Regarding academic integrity, which has been one of the leading topics in the academic community for the past fifteen years, it has been established that moral education, the development of critical awareness, and in general that segment of education that goes beyond the cognitive domain and enters the affective and conative area, must be an integral part of the curriculum and everyday teaching activities. It is not only important to present the latest scientific findings to students – we must enable them to behave ethically.

We may assume that there are considerable differences in knowledge and familiarity with AI among educators, while some may be tech-savvy, others may be resistant and not skill-equipped. Besides this, many educational institutions may hold negative attitudes toward AI, leading to inconsistent implementation. This situation often relies heavily on the goodwill and skills of individual teachers, as well as institutions, which often do not even have enough resources to implement AI technologies or to provide training for teachers.

Furthermore, this threatens to develop significant differences in the level of knowledge of the use of AI tech between students, and can potentially create a divide in their understanding and application of AI in their future careers. Also, lack of regulation leaves the line of ethical use solely on students and teachers.

Given that we already live, work, and learn in the AI era, it is imperative that AI systems are incorporated into curricula, which implies serious training for students and teachers. The elements of this training, of

course, can and must be different, and the competency models discussed in this text can certainly serve to define learning outcomes in the AI domain.

The ethical dimension of education, as emphasized by UNESCO, the Council of Europe, and the OECD, is particularly important, so we think that it is necessary to emphasize two areas in higher education: academic integrity and artificial intelligence, i.e., 2AI literacies.

References:

Aljanabi, M. (2023). ChatGPT: Future directions and open possibilities. *Mesopotamian Journal of CyberSecurity*, 2023(2023), 16–17. <https://doi.org/10.58496/MJCS/2023/003>

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 60(2), 228–239. <https://doi.org/10.1080/14703297.2023.2190148>

Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law (2024). Strasbourg, Council of Europe

Explanatory Report to the Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law (2024). Strasbourg, Council of Europe.

Ferrara, E. (2024). Fairness and bias in artificial intelligence: A brief survey of sources, impacts, and mitigation strategies. *Sci*, 6(1), 3. <https://doi.org/10.3390/sci6010003>

George, B., & Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. *Administrative Sciences*, 13(9),

196.

Kok, J.N., Boers, E.J., Kusters, W.A., Van der Putten, P. and Poel, M. (2009) Artificial Intelligence: Definition, Trends, Techniques, and Cases. *Artificial Intelligence*, 1, 270–299.

Livberber, T., & Ayvaz, S. (2023). The impact of artificial intelligence in academia: Views of Turkish academics on ChatGPT. *Heliyon*, 9(9), e19688. <https://doi.org/10.1016/j.heliyon.2023.e19688>

OECD (2024). Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449

Pellicelli, M. (2023). Managing the supply chain: technologies for digitalization solutions, in: M. Pellicelli (ed.). *The Digital Transformation of Supply Chain Management* (pp. 101–152), Elsevier, <https://doi.org/10.1016/B978-0-323-85532-7.00002-5>.

Rolnick, D., Donti, P. L., Kaack, L. H., Kochanski, K., Lacoste, A., Sankaran, K., ... & Bengio, Y. (2022). Tackling climate change with machine learning. *ACM Computing Surveys (CSUR)*, 55(2), 1–96. <https://doi.org/10.1145/3485128>

UNESCO (2024a). AI competency framework for students. Paris.

UNESCO (2024b). AI competency framework for teachers. Paris.

Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments*, 11, Article 28. <https://doi.org/10.xxxxx>

Creating good HE policies through adequate solutions in Law on HE



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In the moment of adopting new Law on Higher Education in Montenegro (the existing one dates from 2014, with several amendments during the time, the most significant from 2017), we have to be aware that law is the basic document, solutions from this document set up basis for quality in HE. Hence, the law has to reflect good educational policies. Academy community should actively participate in the creation of these policies, which are key preconditions for all reform processes in HE.



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This article provides reflections on some existing and/or proposed legal solutions, which are of particular importance for the quality of HE.

The prime purpose of Montenegrin HE should be creating high quality professionals for labour market in Montenegro. At the same time, Montenegrin HE, within European Higher Education Area (EHEA), should respect Standards and Guidelines for Quality Assurance in the EHEA (ESG), i.e. it should be adjusted, comparable and compatible with European HE. Both students and



graduates of Montenegrin HE should be recognisable in HE (aiming at exchange, mobility or continuation of education) and at the labour market of other European countries. Both purposes – the needs of our country for higher educated staff as well as recognition of our students and professionals out of Montenegro – assume adequate quality of HE.

In line with EU and general international good practice, here are summarised certain issues of key importance for achieving appropriate quality level in HE, that have to be included in the Law on HE.

1/ Study system

Do we really have to insist on a unified study model in all HE institutions in Montenegro?

Currently (since 2017) we apply the system 3+2+3, i.e. 3 years of undergraduate studies (180 ECTS) + 2 years of master studies (120 ECTS) + 3 years of PhD studies (180 ECTS).


The Draft of the law on HE proposes two options for postgraduate studies (between undergraduate and PhD studies):

- 2 years of master studies (120 ECTS), as in the current Law, or
- 1+1, i.e. 1 year of specialist studies (60 ECTS) + 1 year of master studies (60 ECTS).


It is favourable that students will have option of getting a degree/diploma after 3+1 years (180+60 ECTS). However, it is not completely satisfying for all professions and in all cases.

Our reality and practice during the previous period proved:


- Although in final it seems the same, it is much



more complicated to study and graduate in 3+1 than in 4+0 system – for students, for teachers and for institutions, i.e. organisation of work. E.g. 1: Majority of those with 180 ECTS diploma immediately continue their education for one more year (60 ECTS). Why do we complicate it by new enrolment (assuming compulsory entrance exam etc.), after graduation (assuming completion of all 180 ECTS), instead of offering from the beginning of studies 240 ECTS diploma? E.g. 2: Although interdisciplinarity and multidisciplinary are promoted, so that after 180 ECTS diploma in one field, graduates may choose specialisation in another area or sub-area for the next 60 ECTS diploma, when it comes to employment, especially in the public sector, field of undergraduate studies is valid, regardless of the postgraduate area of specialisation. Hence, in case when (sub)areas of 180 ECTS diploma and 60 ECTS diploma are not the same, postgraduate 60 ECTS diploma is not properly recognised. From a certain point of view, it seems like holders of such diplomas are cheated, since learning outcomes of their postgraduate studies are neither accepted, nor respected.



- Labour market in Montenegro still does not recognise bachelor diplomas (3-year undergraduate studies of 180 ECTS), even though we introduced them in HE system nearly 20 years ago. All sectors (public administration, education, economy/business) are looking for graduates with 240 ECTS. Neither 180 ECTS, nor 300 ECTS. Hence, we should not create artificial obstacles in the process of obtaining “the most desirable diploma” – 240 ECTS diploma. It does not mean that we have to suspend issuance of 180 ECTS diplomas. We may issue them as well. This is the appeal to introduce process of more efficient obtaining of 240 ECTS diplomas in professions where it makes sense to do so (Table 1).



- Probably the best (or, better to say, the worst) evidence that something is wrong in our HE is the fact that 2-3 years ago we faced a sudden drop in the number of students in Montenegro, primarily at the biggest HE institution in the country – University of Montenegro. It happened even for professions that are in need at Montenegrin or regional labour market, such as some engineering branches.

All stated implies that HE institutions, i.e. each faculty an organisational unit of the university, should choose study models (among those presented in Table 1) for its study programmes in accordance with all specificities and needs of each profession. Such

suggestion, being completely in line with experiences from region, as well as from Europe (EHEA), is the only way to keep (or even to attract) students in Montenegro and to provide appropriate staff for our employers.


Table 1: Proposed models of studying

	STUDY MODELS			
<i>study year</i>	model 1: 3+1+1	model 2: 3+2	model 3: 4+1	model 4: 5+0 (or 6+0)
I	undergraduate studies (180 ECTS)	undergraduate studies (180 ECTS)	undergraduate studies (240 ECTS),	integrated studies (300 or 360 ECTS)
II	-----	-----	with option of issuing 180 ECTS diploma	-----
III	title: <i>bachelor</i>	title: <i>bachelor</i>	(title: <i>bachelor</i>), on personal demand of those who earn all ECTS from study years I-III	title: <i>master</i>
IV	specialist studies (60 ECTS) ----- title: <i>specialist</i>	master studies (120 ECTS) ----- title: <i>master</i>	----- title: <i>dipl. xyz</i> (e.g. <i>dipl. engineer</i> , <i>dipl. economist</i> etc.)	
V	master studies (60 ECTS) ----- title: <i>master</i>		master studies (60 ECTS) ----- title: <i>master</i>	
VI-VIII	PhD/doctoral studies (180 ECTS); title: <i>doctor of science/art</i>			



2/ Study year vs academic year

Why do we limit students to apply for max 60 ECTS per academic year?



Yes, the scope of one study year within the study program is 60 ECTS. That is how study programmes are created.

However, a huge majority of students do not finalise successfully all courses from the first study year (study year I) in their first attempt, during the first academic year. It happens quite often that students, after their first year of studying, attend courses from different (mostly from two, sometimes even from three) study years of study programme. Lack of certain flexibility to allow them attending courses of a bit over 60 ECTS in total, may prolong their studies unnecessarily. It may even happen that they may not realise their right to attend courses of 60 ECTS in total – there is no combination of available courses so that the total is 60 ECTS. Then they have to choose e.g. only 57, 58, 59 ECTS, since with one more course the total would be over 60 ECTS. Consequently, it may happen that they have to study one year longer because of only one or two courses of e.g. less than 10 ECTS in total.

Hence, we should consider cases when it is justified to enable attending more than 60 ECTS in one academic year. The law should not prevent it. On the contrary, it is the law that should provide the basis for such options.

Good policy should tend to make studying more efficient and to provide better chances to students. Unnecessary administrative barriers do not mean the quality!

3/ Financing of students/studies from the budget of Montenegro

Both the current Law on HE and the Draft of the new law determine that undergraduate and postgraduate students (the first and the second study cycle) do not pay the tuition fee, i.e. they are financed from the budget of Montenegro, while PhD students (the third study cycle) have to pay tuition fees. This may not be considered as a good policy in the country tending to base its development of knowledge, research and innovation. The country that promotes different programmes of support for research and young researchers, including excellence grants for PhD research, the country trying to revert “brain drain” to “brain gain” process should not force by law all PhD students to pay tuition fees. On the contrary, the law should enable option that PhD students do not have to pay tuition fees under certain circumstances.

Another aspect of this issue is a tuition fee for studying at private HE institutions, at all study levels. For the sake of previously mentioned state strategic goals, as well as for the sake of strengthening and development of HE in Montenegro, as an activity of public interest, the state should consider financing students, i.e. their tuition fees at private HE institutions, at study programmes that are not offered at public institutions.

Linked to the previous, further consideration of necessity of commercial bank guarantee for term financial resources, demanded by the current Law on HE as well as by the Draft of the new law, should be done. Such defined financial guarantees do not assure quality of HE process, they even may question the quality and their own purpose. Good policy should be based on proper model encompassing both financial guarantee, which will not be an efficiency barrier or eliminating precondition for private institutions, and quality assurance, throughout regulated procedures.

4/ Comprehensiveness of universities

Why does our Law on HE (the current version as well as the Draft of the new law) prevent existence of specialised universities, such as e.g. technical university, university of social sciences or arts university?

Such attitude – insisting on multidisciplinary universities, having study programmes “from at least three of the seven following areas: natural, technical-technological, medical, social, humanities, agricultural, and interdisciplinary” (n.b. “interdisciplinary” is not the scientific area, it is just characteristic of some study programmes; anyway it should be excluded from this list) – could hardly be justified, having in mind that specialised universities are quite common in EHEA.

5/ Legal entity status of faculties, as organisational units of university

Why does our Law on HE (the current version as well as the Draft of the new law) not allow that faculties as organisational units of public university have the status of legal entity, while it is allowed to the faculties of private universities?

Such injustice towards public faculties could hardly be an example of a good and healthy policy, neither in HE, nor in scientific research and innovation field. All private faculties in Montenegro (independent private faculties as well as faculties within private universities) may have the status of a legal entity and, consequently, significantly larger rights than public faculties (faculties of the University of Montenegro), which are limited by the fact that they are not legal entities. This is particularly important for participation in international programmes and calls, where one legal entity may submit a limited number of applications (e.g. IPA calls assume max three submissions by one applicant, i.e. legal entity). Hence, all private faculties and all public or private scientific/innovative organisations out of University of Montenegro are in a much better, advantageous position the faculties of the University of Montenegro.

6/ Academic vs applied studies

Dilemma of a future student: Should I decide on academic or applied studies? What is the difference? What is easier or more interesting to study? What will I be able to do with my diploma? What is more suitable for me?

Having in mind a plenty of doubts and disputes regarding the status of academic and applied studies, as well as unjustified attitude that applied studies are “less valuable” and “easier to graduate” than academic studies, the law should make a clear distinction and define the difference between them. Neither in the current Law on HE, nor in the Draft of the new law, there is any difference?! Even the quantity of practical teaching/training is the same (Draft: 30 ECTS).

7/ Academic staff – teachers and teaching assistants

Although not mentioned in the Law on HE (or any other legal document), reality (of the University of Montenegro) is that, in addition to conditions regarding scientific-research and teaching achievements, main pre-condition for the first election (to the title of assistant professor) is a number of “available” lecturing hours. This unfair attitude, being very close to mobbing in some cases, is quite disappointing for young people and for sure not a good policy.

The topic of academic titles and election to academic title is a continuous source of questions and doubts.

Should all academic titles be permanent or not? Would it be possible to provide and/or stimulate personal and professional development of academic staff without limiting periods of academic titling? Is it really necessary for all disciplines to have strong

scientific references to be a good teacher, i.e. should certain type of scientific references be determining for elections? Why don't we introduce stimulating policy of possibility of election to higher title earlier than elected period of the current title is finished (e.g. already after three years, instead of waiting till the end of 5-year elected the period – if the person is ready, satisfying all conditions for higher title)?

What happens with academic titles, acquired by unique Montenegrin regulations, in case that person with title ends his/her employment at the university where he/she has been elected – will person keep the title if changes employer (or has to “start all over”, from the lowest title, at new employer/institution) or remains unemployed? Which document regulates that?

The draft of the new law on HE mentions the Council of HE gives opinion on academic titles of persons who have not been elected in accordance with Montenegrin regulations. It may be understood that persons elected to academic title out of Montenegro will have a possibility for their titles to be admitted in Montenegro. If that is the case, elections conducted in Montenegro should be permanent and for sure not under the question if a person changes the employer.

As for teaching assistants, we should carefully consider two specific categories, which are not adequately treated either by the current Law on HE or by the Draft of the new law: master students and PhD holders.

Are we sure that master students, having only 180 ECTS diploma, should be engaged as teaching assistants?

In Montenegrin education system, teaching staff in elementary and high schools should have at least 240 ECTS diploma. From that point of view, it would be at least strange to allow for a person with lower qualification to take part in the teaching process at the

university. Further, teaching assistants are engaged in teaching process at undergraduate and postgraduate studies. It may happen that a master student who is a teaching assistant at the same institution should teach him/herself some course(s) at master studies?! Last, but not least, we could hardly speak about satisfying quality on any side if master student, who is a full-time student, is simultaneously a full-time employee at his/her university. One area – studying or teaching job – will have to suffer.

PhD holders, which are usually high-quality university staff, young enthusiasts who should be main strength and resource of developing research activities, at position of teaching assistants are not well protected by solutions of law. We may not allow to lose them because of shortcomings of the law in combination with earlier mentioned “lack of available lecturing hours”. These people are the future of our HE, HE should rely on them. Hence, we should provide a certain level of security for them, instead of discouraging them by uncertainty of their position.

Although it may seem that these are dominantly personal issues, this is a particularly important aspect of HE policy – there is no high quality in any system, including HE, without people, i.e. high-quality staff at HE.

8/ Diploma equivalence

Both the current Law on HE and the Draft of the new law are “on slippery ground” when it comes to equivalence of diplomas acquired in different legal frames, i.e. study systems/models in Montenegro. This is especially emphasised for diplomas introduced in Montenegrin HE by the same laws, from period 2010-2016, when we were already in the Bologna process, for a while.

The most critical is the equivalence between

specialist and master degree. Diploma of postgraduate specialist studies, assuming a total of 240 ECTS (EQF level 7; MQF VII 1 qualification level) may not be equivalent with diploma of master studies, assuming total of 300 ECTS (EQF level 7; MQF VII 2 qualification level) for any purpose. Such equivalence sends bad messages:

- If we offer both diplomas, after 240 ECTS and after 300 ECTS (as it was the case until 2017 and as it is proposed by the Draft of the new law), we “say” to our students – no need to study for 300 ECTS, since you will have the same rights as those having only 240 ECTS.

- If we offer only 300 ECTS diploma (as it is the case since 2017), we “say” – we force you to study for five years, for 300 ECTS, although you will have the same rights with those having only 240 ECTS.

Quite contradictory and hard to understand, this issue should be reconsidered.

9/ National Council of HE and Agency for quality assurance in HE

Last but not least, an issue that deserves an entire article for the analysis is going to be just tackled herein, implying the need for serious reconsideration of the Law on HE as well as in other documents and acts, for the sake of real quality and good policies in HE.

Both instances are inappropriately treated in the current Law on HE and in the Draft of the new law. Such defined statuses may not really provide realisation of their purposes.

There should be no antagonism between the two of them. We need both of them, each having its own scope and field of acting, complementing each other, but dealing independently.

The Council is consultant body of the Government.

However, in the current form (the same is proposed again), with only seven members, of which only four are academic staff, neither covering six branches of sciences, nor arts, could hardly provide all that should be done.

The Agency should be an independent body, a kind of HE supervisor at state level. However, neither the current nor proposed format may not guarantee that.

Hence, positioning of the Council and Agency in the legislation does not promise realisation of their mission as bodies in charge of quality assurance and development in Montenegrin HE.

Finally, after high quality law enforcement, followed by other adjoining legal and strategic documents, and providing high quality HE staff, we need to have adequate Council and Agency, both to contribute to good policies creation, but even more important to follow and supervise its implementation, providing realisation of what has been mentioned so many times herein – high quality.

Integrating 3D Printing into Multidisciplinary Student Projects: Insights from Case Studies at the University of Montenegro



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Additive manufacturing, commonly known as 3D printing, is revolutionizing the way we design, produce, and interact with products across industries. Unlike traditional manufacturing methods that carve or cut away material, 3D printing builds objects layer by layer using 3D digital models. This approach allows for unparalleled design flexibility, enabling the creation of intricate geometries and customized solutions that were previously impossible or prohibitively expensive to achieve. Beyond its technical capabilities, this relatively new technology offers significant environmental and economic benefits. By using only the material required for a given design, it reduces waste and promotes sustainable production practices. As 3D printing continues to evolve, it reshapes industries, fostering a future where creativity, efficiency, and sustainability drive production processes.

Integrating 3D modeling and 3D printing into university curricula can equip students with practical, hands-on skills that are increasingly valued across industries. By incorporating these technologies into coursework, universities can foster creativity, problem-solving, and interdisciplinary collaboration, as students design and prototype solutions in fields ranging from engineering and architecture to fashion and healthcare. Courses can focus on teaching digital design software, exploring material science, and understanding the principles of additive manufacturing, giving students both theoretical knowledge and real-world application experience. Additionally, 3D printing labs can serve as innovation hubs where students experiment with sustainable materials, create rapid prototypes, and bring abstract ideas to life, preparing them for the demands of modern, technology-driven careers.

Students across the world are harnessing 3D printing to drive creativity, collaboration, and practical problem-solving across various disciplines. Engineering and medical students have used the technology to create affordable, custom prosthetics, combining technical expertise with empathetic, user-centered design. Architecture students have crafted intricate models of sustainable buildings, incorporating innovative green technologies into their plans. In fashion and industrial design, students have pushed creative limits by producing complex garments and functional prototypes. These projects not only enhance technical skills but also cultivate teamwork, innovation, and a forward-thinking approach, preparing students to address complex challenges in their future careers.

● Introduction of 3D printing at University of Montenegro

The first 3D printer at the University of Montenegro was purchased through a national project *Montenegrin Wearable Robots (MWR)* funded by the Ministry of Science in Montenegro in 2019. This project was also supported through involvement of university professors in international COST Action CA16116 - *Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions*. Students at Faculty of Mechanical Engineering had the opportunity to 3D model and print parts of the robotic arm which was an excellent platform for further scientific research in the field of prosthetic devices and assistive robotics.

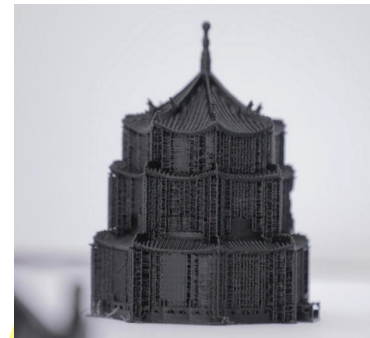
Unfortunately, just a year later, the COVID-19 pandemic and crisis impacted the entire world. In a very short time, it has been proven that innovative, efficient and quick 3D printing solutions can be easily prepared and implemented in order to mitigate the consequences. At University of Montenegro, students at the Faculty of Mechanical Engineering and the Faculty of Electrical Engineering, have shown a positive example of how science and innovation can serve the community and provide the fastest solutions when they are needed. At that time, with three 3D printers out of 45 in Montenegro, students have helped in printing and delivering many protective visors and masks to different parts of the community.

● Student interdisciplinary projects

The arrival of 3D printers at the University of Montenegro also created opportunities for its application in laboratory exercises at the Faculty of

Electrical Engineering. In addition to learning about 3D modeling in SolidWorks and Fusion360 software, students have the opportunity to print their models using recycled materials.

In 2019 and 2020, two student projects, in collaboration with the Confucius Institute at the University of Montenegro and the Embassy of the Republic of China in Podgorica, explored models inspired by Chinese culture. These efforts culminated in exhibitions showcasing the students' works. The first project highlighted the distinctive features of Chinese culture, while the second, in partnership with the Faculty of Architecture, delved into both traditional and modern Chinese architecture.



The three-year project *Innovations in Inclusive Education 2021-2024*, a collaboration between the Institute for Education in Montenegro and the University of Montenegro's Faculty of Electrical Engineering, culminated in an invitation to present at the United Nations headquarters in Vienna. During the presentation, didactic materials created using 3D printing technology by students were showcased. These auxiliary teaching tools, designed to support pupils with developmental disabilities, are also adaptable for use by all children based on their interests. The goal was to promote academic and developmental progress, with a focus on enhancing interaction, socialization, and overall engagement in the educational process. Besides this task, students had the opportunity to work on creating 3D printed kitchen furniture for preschoolers as an aid in mastering self-care skills - independent feeding.



As previously mentioned, 3D printing enables students to participate in projects that have a significant societal impact, often through international collaborations. For instance, students have worked on models inspired by various cultures, such as Chinese architecture, and have developed educational tools for children with developmental disabilities using 3D technology. These projects offer more than just technical skill development; they encourage students to think critically about social issues, fostering empathy and a global perspective.

By integrating 3D printing into their academic experiences, students enhance both their academic and developmental progress. In doing so, they cultivate a forward-thinking, adaptable mindset, which is essential for solving complex problems in their future careers. Through hands-on involvement in these innovative projects, students not only refine their technical abilities but also learn to design with inclusivity and accessibility in mind, preparing them to make meaningful contributions to society in Montenegro and worldwide.

All photographs were taken in Photo studio Eklektik, located in Podgorica.

Fostering incoming mobilities as a platform for the process of internationalisation of higher education in Montenegro



Danilo Bulatović, MSc and Bogdan Malavrazić

- The importance of internationalisation for higher education in Montenegro

Internationalization of studies is one of the key components of University development strategies in an era dominated by the information paradigm. Incorporating international experiences into the curriculum helps students develop intercultural competencies and better understand global trends. Internationalization in higher education is no longer an option but a necessity on all fronts. Universities must be internationally connected and have strong international cooperation to make their studies attractive to prospective students, in order to enhance the quality of education, and to strengthen the multiethnic, multicultural, and multidimensional social environment. Only in such a case can this environment be founded on tolerance, respect, the culture of dialogue, democracy and justice.

In a time when the world is undergoing a new crisis, with many states being directly or indirectly involved in conflicts and where trust in democracy and democratic values is significantly threatened, there is an increasing prevalence of narratives advocating for the strengthening of nation-states and the closure of economies, education, and societies. However, current events show quite the opposite. In the global village the world is today, there is no system that can survive in isolation. The world is a system of interdependence, and any form of closure leads to the erosion of freedom and security. Bastiat once said, "If goods and services do not cross borders, armies will." In a time when many countries are in conflict (trade or military) and citizens around the world are dissatisfied with domestic policies, expressing their discontent through protests, the extent of interdependence in the world becomes even more evident. Globalization and openness, at all levels, are essential prerequisites for reducing tensions in the world.

Why emphasize the social environment? Because today it is widely accepted that politics and the economy form the foundation of society. This is precisely the core problem. The foundation of society is neither politics nor the economy. Culture and education are the foundation of society! The opening up and internationalization of the education system are key prerequisites for improving higher education and preserving young people's trust in it.

However, in today's fast-paced world, where change is a constant, we cannot advocate for isolation. Instead, the focus must be on openness, and even



more so on networking and building such networks. To survive, universities are increasingly forming alliances, recognizing the necessity of collaboration. The problem arises, however, when the home country of such a university fails to recognize this need or does not see the necessity of truly supporting such practices through procedures.

The building of the network of Universities or merging of some, is not only an economic strategy, it is also a political and diplomatic one. The west is still leading by innovation but it only remains to be seen will the enormous amount of money and sheer number of students in the east be able to overtake them. Mobilities and exchanges are a perfect way to bridging cultures, promoting mutual understanding and creating a valuable and loyal alumni network. After the fall of the Soviet Union the United States have started numerous programs in order to promote American values; the European Union has tried the same with Erasmus, proving that there are no borders between EU countries, and on the east China and Japan are creating their own programs. Incoming students pose a serious resource, because they don't only have an academic potential but also a social one, they are representative of their own University and country and later upon return ambassadors of the host.

- Incoming mobilities as an important tool for internationalisation

Internationalisation may often be looked upon as the one way process, especially for the developing country, Montenegro included. It is often perceived by both the government and University management that the only way for internationalisation is to send one's student and staff abroad, often overlooking the possibilities of the two-way exchange. In the ever changing world that we live in, with numerous social, diplomatic and armed conflicts; in the period of economic growth of uncertainty and rapid development of Artificial Intelligence, Universities have realised

that they cannot function as completely independent entities. This day and age emphasises the need for a strong and wide network. Throughout history we have been told the saying "all roads lead to Rome", we are still studying the effects of Dwight D. Eisenhower's National System of Interstate and Defense Highways and are closely looking at the importance that China gives to the "Belt and Road Initiative", all of these and similar sayings and strategies only emphasise the importance of a good and stable network throughout history and in today's day and age.


The European space has always been characterized by remarkable heterogeneity, reflected primarily in its cultural, linguistic, political, and economic diversity. This heterogeneity has not been an obstacle to Europe's development; on the contrary, it has been its main driving force throughout history. Europe has, for the majority of its history, been a meeting point of civilizations—a space of their most fruitful coexistence and creation. Europe was and, to a large extent, still is a crossroads, and this dynamism has become the foundation of today's society and the very ideals advocated by the European Union.

Through mobility, individuals are exposed to the ideals upheld by the EU: tolerance, democracy, and, perhaps most importantly, human rights. All these contribute to the promotion and assurance of peace for the benefit of all citizens. Freedom—or more precisely, the ease of movement—reflects the spirit of a connected society, promoting a European space without divisions. Collaborative work on innovations and start-up ideas through mobility programs, exchange projects, and research initiatives enhances the competitiveness of the European market on the global stage. Mobilities foster the exchange of best practices and resources, reducing disparities among regions and strengthening the interconnectedness of member states while ensuring the fight against social exclusion and discrimination.

Incoming mobilities not only contribute to the development of individuals but also strengthen




European unity through the exchange of ideas, knowledge, and values. Europe has always been, and it is in its best interest to remain, at a crossroads of the world. When considering issues such as negative natural population growth and brain drain—evident in the 2023 census of population, households, and housing, which highlighted significant population aging and youth emigration—incoming mobilities are not only necessary for strengthening the educational system and fostering cultural awareness but also for addressing the long-term needs of the country's economic environment. Montenegro will need to attract foreign students and skilled professionals from other countries to strengthen its human capital, which is essential for driving economic development.



Internationalization, in the true sense of the word, is not only about enabling students to study and improve within other systems but also about creating an environment where foreign students choose to come and study in Montenegro.

- Administrative barriers for incoming mobilities in Montenegro

The current legal and administrative framework doesn't really support the notion of incoming mobilities to Montenegro, the procedure represents a complicated, complex and above everything else a slow and unreliable process that is attributed to the fact that incoming students are treated as immigrants first, tourists second, and students third.



The most practical solution to this problem would be voting for a law that would solve all of the administrative and legal issues. For instance this law could potentially create an interdepartmental office whose sole purpose would be to help both incoming mobilities but also the outgoing ones. This department should have the role of coordinating the procedure


with the Ministry of Internal Affairs, Ministry of Foreign Affairs, Ministry of Education, Science and Innovation in addition to the Ministry of Tourism to serve as a service for international students.

Hence, considering that there is no specific law addressing foreign students, it is necessary to amend the existing legal framework, primarily the Law on Foreigners. The entire procedure currently undergone by students coming to Montenegro needs to be liberalized, which can be achieved through amendments to certain articles within the Law on Foreigners.

The Law on Foreigners, in Article 15, prescribes three types of visas for entry into Montenegro. An amendment to this article would introduce a special type of visa issued specifically for studying in Montenegro, with a simplified application and issuance procedure.

Article 33 of the aforementioned Law, which pertains to types of residence in Montenegro, does not include residence based on studying. This is problematic due to the differences in the length of stay for students in Montenegro depending on the type of mobility or study program they attend. Temporary residence is the most common solution students resort to; however, the process for obtaining a temporary residence permit falls under the jurisdiction of the Ministry of Internal Affairs. This procedure is complex and administratively demanding, as students must prepare extensive documentation that must be fully translated into Montenegrin by a certified court translator. This further highlights that the process is both costly and exhausting. An additional issue is that part of this documentation, particularly proof of a clean criminal record, cannot be issued in every country.

In Article 38, paragraph 1, point 2 of the Law on Foreigners, education is listed as one of the reasons for issuing temporary residence; however, as previously mentioned, the other procedures are not harmonized.



It is particularly important to highlight the inefficient implementation of this procedure by the competent Ministry. Practical examples have repeatedly shown that officers in the foreign services sectors within the Ministry of Internal Affairs do not speak English and claim that the laws do not require them to use any language other than the official one.

As a result, after completing the entire procedure, foreign students who need to submit their documentation to the Ministry face an additional issue—they cannot communicate with the officers. This problem has often been resolved by Montenegrin students or representatives of the university accompanying them to assist with the submission of their documents.

The Law on Foreigners should mandate that Ministry officers handling residence permit issuance must speak English and ensure that foreign nationals have the right to translate their documentation into English and communicate with the foreign services sectors of the Ministry of Internal Affairs of Montenegro in English.


Besides all of these, the thing that complicates the procedure is that for some countries an apostille stamp is required on the documents, but the procedure in that regard is not entirely clear. Furthermore the fact that the administration of Montenegro doesn't know or doesn't want to speak English additionally complicates things and requires additional work from the host institution.

It should be pointed out that Montenegro at the moment does not have a law that specifically deals with international students, therefore they are meant to deal with the same procedure as people who are migrating to Montenegro. So in short the incoming students must complete the following procedure to get a short term visa and residence permit: have a letter of invitation, have all original documents including a birth certificate, a proof of a clean criminal record (which in some countries cannot even be obtained), a proof


of them being a student from the home University; insurance by a Montenegrin provider and everything should be translated by the approved and licenced expert which is always a very expensive cost.

Article 43, paragraph 1, points 1 and 2 state: A foreigner may be issued a temporary residence permit and a temporary residence and work permit if:


1. They have sufficient means of subsistence;
2. They have secured accommodation.



In addition to all other justified points, it is necessary to define how a student proves that they have sufficient means of subsistence and secured accommodation. The Ministry of Internal Affairs of Montenegro requires students to have an open bank account in a Montenegrin bank and to have sufficient funds for subsistence in that account.




Montenegro's banking sector has not previously encountered students from countries such as Azerbaijan, Mexico, and others worldwide, who are now present at Montenegrin universities. As a result, the procedure for opening bank accounts for students from various countries is not clearly defined. One recent practical example caused a significant issue because a bank did not have the mechanism, procedure, or regulations to open a bank account for a student under 18 years of age who was not from Montenegro. It is understandable that the system could not anticipate such situations due to the lack of prior experience. However, it is also necessary to liberalize the procedure in this context.




Students arriving in Montenegro through scholarships should be allowed to use their Grant Agreement as valid proof of sufficient means of subsistence. Additionally, for self-financing students, there should be an option to prove their means of







subsistence through alternative methods. Alternatively, a special, simplified procedure for opening accounts for foreign students in Montenegrin banks should be developed.

The current barriers regarding bank account openings, along with vague procedures for proving sufficient means of subsistence, significantly complicate the process for students to obtain residence permits.



An additional burdensome procedure for international students in Montenegro is the requirement to register their stay with the National Tourism Organization of Montenegro, where they are also required to pay a residence tax. In this process, students are treated as tourists, which is inappropriate, as in most countries, students coming for mobility programs or studies are exempt from paying residence taxes.

In most cases, students from Montenegro going abroad for mobility programs or studies do not need to visit state institutions in the host country to secure everything necessary for their stay. On the other hand, international students coming to Montenegro are required to visit multiple institutions to complete an exhaustive administrative procedure. Moreover, there is no clear guide for them outlining the process they need to follow, where to submit applications, where to collect permits and documents, what documentation they need to provide, and similar details.




In most situations, international students in Montenegro are left to navigate these challenges on their own, with their only help and support coming from the host institution, i.e., the university or faculty they attend.

When addressing the issue of accommodation for domestic students, there are three main options: the use of state-owned dormitories, dormitories operating under public-private partnerships, and private accommodation where the student bears the full cost. However, when it comes to accommodation for international students, the primary option is private accommodation. Montenegro's public calls do not allocate or provide the possibility of securing a portion of dormitory capacities for international students, which is a common practice in many European countries.

If the purpose of student dormitories is to provide good-quality and affordable housing for all students, especially those coming from distant locations, while also fostering a multicultural environment, it would be logical to assume that incoming students should have the right to access such accommodations as well.

The issue of student dormitories and accommodation for international students might not pose such a significant problem if there were at least a service in place, as seen in other countries, where universities and relevant ministries establish agreements and partnerships with landlords to secure housing for international students coming to Montenegro. At the same time, such agreements would enable landlords to reliably rent out their properties to students each semester.

Currently, international students and their host institutions must find accommodation independently, often through agencies. Additionally, rental agreements can usually only be signed once the student arrives in the country, creating complications for those whose visa applications require proof of accommodation at the time of application. Another issue is that most landlords and agencies are unwilling to rent properties for short periods, typically requiring a minimum stay of one year. They also often demand a deposit and several months' rent in advance, further complicating the process for international students.



- Instead of conclusion

The internationalization of studies should not be a one-way street that merely facilitates the departure of young people to foreign universities, but a two-way process—one that creates an environment for young people from all over the world to come to Montenegro to pursue education, conduct research and scientific work, innovate, and create. Promoting incoming mobilities must become a strategic goal of Montenegro's education system.

The complexity of administrative procedures and a lack of understanding from the system and its officials represent significant barriers to any further efforts in the field of internationalization. Liberalizing laws and procedures, alongside the adoption of special acts and changes to processes for international students residing in Montenegro, would be a step in the right direction on this issue.

As a country largely dependent on tourism and its promotion, Montenegro could view international students as a kind of ambassador. To achieve this, it is necessary to recognize international students not only as an academic resource but also as ambassadors/promoters of its universities and the country itself. Upon returning to their home countries, these students could act as ambassadors and promoters of Montenegro.

Through joint efforts by the academic community, government institutions, the private sector, and other stakeholders, the internationalization of studies can be transformed into a platform for the long-term promotion of the country. This approach would enhance the quality of education and scientific research in Montenegro, as well as serve as a platform for investing in future human capital. This capital could contribute to the country's economic development through promotion, attracting new tourists, investments, innovations, initiatives, and by creating jobs within the country.

To achieve this, it is essential to establish a strong administrative foundation that supports the entire process. This includes simplifying procedures, strategically and specifically addressing the needs of international students, and embedding this component of the internationalization of studies into all strategic frameworks of Montenegro's education system.



CIP – Каталогизација у публикацији
Национална библиотека Црне Горе, Цетиње
ISSN 2704-5102 = Reforms Inside
COBISS.CG-ID 40506896



