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GenESG
COMPREHENSIVE GAP AND NEEDS REPORT

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EXECUTIVE SUMMARY

The GenESG - Sustainable Finance Microlearning with Educational Generative AI project's Comprehensive Gap and Needs Report offers a thorough examination of the present situation and educational requirements in sustainable finance, ESG, and the use of artificial intelligence (AI) in higher education across five nations: Austria, Bulgaria, Poland, Slovenia, and the Netherlands.

Focus groups with academic professors , online surveys of students, and desk research analysing literature and curricula were all part of the study. Determining the potential for using AI, including chatbots, in the teaching of ESG and sustainable finance, as well as identifying knowledge, competency, and instructional material gaps, were the objectives.

Although interest in ESG and sustainability issues has grown globally, degree programs' incorporation of these subjects is dispersed and frequently restricted to graduate or postgraduate studies. ESG Lab (Bulgaria), Sustainable Finance Lab (Netherlands), specialized learning paths (Poland), and innovative courses and simulations (Austria, Slovenia) are a few examples of best practices.

AI's application in ESG education is still in its infancy. Even though students are quite familiar with AI tools (like ChatGPT), there is little use of them in didactics, particularly when it comes to ESG. The only country using more sophisticated AI4FinTech and educational chatbots is the Netherlands, though still at a very early stage.

Specific competency gaps and training needs pertaining to ESG topics and the use of AI in teaching were identified through focus groups with academics. International regulations, sustainable finance, and ESG are topics that professors s frequently do not know enough about. They also lack access to current materials and resources and the practical ability to use AI tools in the classroom. Clear rules for the moral application of AI are required, as are more hands-on, multidisciplinary teaching strategies. Another obstacle is the lack of cooperation with other departments and the business community, which restricts the development of contemporary, interesting courses.

According to surveys, students indicated a limited access to educational resources and content, despite their interest in ESG and AI topics. Many consider their knowledge to be incomplete or basic, and they believe that the course offerings are too theoretical and insufficiently practical. They lack opportunities to work with AI tools and real-world examples

of ESG applications. In addition to using contemporary e-learning platforms, students would prefer to learn through case studies, team projects, and simulations. They observe that there are not enough courses on AI and ESG, particularly at the undergraduate level.

The information gathered indicates certain structural gaps and opportunities in the way AI, sustainable finance, and ESG are taught in higher education. Courses are frequently overly theoretical and a certain extent disregard the realities of the market. An interdisciplinary, integrated strategy that combines finance, new technologies, and ESG is lacking. The educational options are few, inconsistent, and not well suited to the demands of the labour market and students. Furthermore, access to AI tools, ESG databases, and contemporary teaching resources is restricted for both faculty and students.

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1. OVERVIEW

As part of the Erasmus+ GenESG project, three primary research methods were employed to examine the current state of sustainable finance, ESG, and AI chatbot integration in higher education in Austria, Bulgaria, Poland, Slovenia, and the Netherlands: desk research, focus group interviews, and online surveys.

The desk research in all countries aimed to analyse existing higher education curricula, scientific articles, reports, strategies, and policies related to sustainable finance, ESG, and artificial intelligence. In Austria, the desk research provided an overview of how these topics are integrated into university programs. In Bulgaria, the focus was on analysing academic programs and sustainability initiatives. In Poland, the study examined curricula for the integration of sustainable development, sustainable finance, ESG, and AI concepts, identifying examples of best practices. Slovenia based its desk research on secondary sources and analyzed curricula for their alignment with labour market demands. In the Netherlands, various sources, including government documentation on AI implementation in education, were analyzed to identify gaps between current teaching methods and the needs of sustainable finance and AI education.

Focus group interviews were conducted with academic staff in each country. In Austria, they aimed to gather teachers' perspectives on challenges in teaching sustainable finance and ESG, as well as the need for interdisciplinary collaboration. In Bulgaria, focus group interviews were also held, similar to Poland, where an online session brought together professors teaching finance and AI-related courses. Slovenia and the Netherlands organized a focus groups to explore practices, challenges, and opportunities in teaching sustainable finance and ESG, as well as the role of AI.

Online surveys targeted students to assess their knowledge, skills, and competency gaps in sustainable finance and AI.

Together, these three research methods provided a comprehensive picture of the current situation in each participating country, forming the basis for further analysis and recommendations within the GenESG project.

2. IDENTIFICATION OF THE STATUS-QUO OF SUSTAINABLE FINANCE, ESG, AND AI CHATBOTS

The integration of sustainable finance and ESG in higher education is a dynamic process, with varying levels of advancement in Austria, Bulgaria, Poland, Slovenia, and the Netherlands. Generally, most partner countries recognize the growing importance of these areas, leading to a gradual incorporation of relevant content into curricula, though often in a fragmented manner or limited to master's and postgraduate levels.

In Austria, integration is ongoing, with significant progress at some universities offering courses on sustainability and climate finance. In Bulgaria, ESG education remains scattered, lacking comprehensive programs across all study levels, and is primarily theoretical with limited practical application. Poland demonstrates a growing trend of including sustainability topics, but mainly at the postgraduate level, with varied approaches among universities. Examples of good practices include specialized programs and dedicated study tracks. In Slovenia, integration is progressing, but lacks uniformity across institutions. The Netherlands, in contrast, actively incorporates sustainable finance and ESG principles into curricula and research activities, with Wageningen University & Research serving as a leader in the field.

Similarly, the use of AI chatbots and other digital teaching tools in ESG education is still in the early stages across most countries. In Austria, implementation is just beginning, with some research into AI-driven simulations, but no widespread use of chatbots for personalized learning. In Bulgaria, adoption is initial, though both educators and students recognize their high potential, and students exhibit strong familiarity with AI tools. Poland is gradually incorporating AI into business and finance programs, yet integration into ESG education remains underdeveloped, with no clear policies in place. In Slovenia, the use of AI chatbots is underdeveloped, despite their potential in ESG education. However, specialized modules and access to AI tools are still lacking. The Netherlands demonstrates active AI integration, with emerging initiatives and chatbot applications to support students in sustainable finance education.

Examples of best practices include the ESG Lab at Sofia University in Bulgaria, which functions as a research and training centre. In Poland, various initiatives in ESG and AI education have been identified. Slovenia is exploring innovative approaches in combining AI and ESG through case studies and simulations. The Netherlands has well-established initiatives such as the Sustainable Finance Lab at Utrecht University and AI4FinTech at the University of Amsterdam, alongside research on the effectiveness of chatbots in education.

In summary, despite growing interest and some progress across all countries, the integration of sustainable finance, ESG, and AI in higher education still faces challenges. In most cases, AI use in ESG education remains limited, and teaching often requires greater emphasis on practical skills and modern educational tools. The exchange and adaptation of best practices, along with clear strategies and policies for AI implementation in ESG education, are essential for further progress in these areas.

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3. IDENTIFICATION OF KNOWLEDGE, SKILLS, AND COMPETENCE NEEDS OF EDUCATIONAL PROVIDERS (PROFESSORS)

Based on focus group sessions conducted in the partner countries (Austria, Bulgaria, Poland, Slovenia, and the Netherlands) with academic staff, key needs were identified in the areas of knowledge, skills, and competencies of professors regarding sustainable finance, ESG (Environmental, Social, and Governance), and the use of AI tools in teaching. Below is a compilation of the main findings, which could serve as a foundation for developing the GenESG training program:

- Insufficient specialized knowledge of ESG and sustainable finance: In many countries, it was emphasized that finance professors often lack in-depth knowledge of ESG principles, sustainable finance regulations, and reporting frameworks. There is a need for a better understanding of international ESG standards and reporting frameworks. Sustainable finance and ESG are often treated as supplementary rather than integral parts of the core finance curriculum.
- Limited skills and knowledge in using AI tools in education: Professors exhibit a lack of specialized training in AI applications for finance and ESG education. They lack knowledge of AI tools for finance, such as machine learning models for sustainability assessment. There is a need for training in AI tools in teaching, including critical analysis and verification of AI-generated information. Additionally, concerns were raised about unclear institutional policies and regulations regarding AI use in education.
- The need for practical and interdisciplinary teaching approaches: Current ESG and finance courses are often too theoretical, with limited opportunities for practical application. Professors require support in developing case studies, simulations, and interactive educational experiences. There is a need to integrate finance, management, and environmental sciences through the creation of interdisciplinary curricula.
- Lack of access to up-to-date information and tools: Professors point to the need for access to current information, research, and regulations related to ESG. AI tools, such as chatbots, could support teaching by providing quick access to information and interactive learning methods. Additionally, access to ESG-related databases and analytical tools is necessary.
- The need to develop pedagogical competencies in AI use: Effective use of AI in ESG education requires professors to have both technical knowledge and pedagogical skills. There are concerns about assessing AI-generated student work and issues related to plagiarism, necessitating the development of clear guidelines.

- Limited opportunities for interdepartmental and business collaboration: A lack of sufficient collaboration between different faculties within universities was highlighted. There is also a need for closer cooperation with the business sector to provide access to real-world ESG data and create interactive learning experiences.

In summary, the GenESG training program should focus on providing professors with specialized knowledge in ESG and sustainable finance, practical skills for integrating these topics into traditional finance courses, competencies in effectively and ethically using AI tools in teaching, and promoting interdisciplinary approaches and business sector collaboration. Access to practical teaching materials and up-to-date information should also be a key component of the training program.

4. IDENTIFICATION OF KNOWLEDGE, SKILLS, AND COMPETENCES NEEDS OF STUDENTS

Based on online surveys conducted among students in partner countries (Austria, Bulgaria, Poland, Slovenia, Netherlands), key needs in the areas of sustainable finance, ESG, and the use of AI tools were identified. Below is a compilation of the main conclusions:

I. Knowledge and Awareness in Sustainable Finance and ESG:

- General Awareness: In most countries (Austria, Bulgaria, Poland, Slovenia), the majority of students declare some familiarity with sustainable finance concepts, but only a small percentage consider themselves very well versed in this topic. A significant number of students in Bulgaria and Poland admit to lack of prior exposure to this topic. In the Netherlands, more than half of the surveyed students have not participated in any courses related to sustainable finance.
- Recognized ESG Concepts: Students are most familiar with ESG criteria. Concepts such as financing renewable energy projects and green bonds are also popular. However, less knowledge is demonstrated in areas such as impact investing, decarbonization strategies, sustainability reporting, and circular economy finance.
- Educational Gaps: In Slovenia, 70% of students have never participated in a sustainable finance course or training. Students in Bulgaria and Poland highlight the lack of appropriate courses at universities as the main barrier to gaining knowledge on this topic. In the Netherlands, half of the students indicated the lack of courses covering essential content.

II. Awareness and Use of AI Tools in Education:

- General Awareness: Students in Bulgaria and Poland show high awareness of AI tools. In Slovenia and the Netherlands, awareness of AI is widespread, but detailed knowledge is limited. In Austria, a significant percentage of students have never used AI tools for learning.
- Most Commonly Used Tools: The most popular AI tools among students are content generators (e.g., ChatGPT) and chatbots supporting learning. AI-powered educational platforms and tools for financial modelling or ESG risk assessment are used less frequently.
- Self-Assessment of Skills: Students rate their skills in using AI as good or average. Only a small percentage considers themselves highly proficient in this area. In Austria, over 40% of students rate their AI knowledge as low or lacking experience.

- Challenges with AI: Students point to limited access to AI tools (licenses, platforms) as a significant barrier. They also mention poor quality or functional limitations of some tools. In Slovenia, students emphasize the lack of clear guidelines from instructors regarding the use of AI.

III. Challenges and Educational Needs of Students:

- Lack of Practical Examples: Students in Bulgaria, Poland, and Slovenia consistently highlight the lack of practical examples of sustainable finance application in real-world scenarios as one of the biggest weaknesses of current education.
- Excessively Theoretical Approach: Students in Poland and Slovenia indicate that educational materials on sustainable finance are too theoretical.
- Need for Access to Updated Materials: Students in Bulgaria and Poland express the need for greater access to up-to-date educational materials (books, scientific articles, reports, case studies).
- Preferred Teaching Methods: Students prefer case studies, practical simulations (e.g., ESG investment projects, green bond exercises), and more courses and workshops at universities. They also indicate a need for multimedia materials and e-learning platforms.
- Role of AI in Education: Students recognize the potential of AI in simulations and financial models, data analysis support, increasing accessibility, personalizing learning, and generating educational materials. They express the need for practical exercises using AI and training and workshops on its use.

In summary, students in partner countries show limited, though growing awareness of sustainable finance and ESG. While they are generally open to using AI tools in education and often use them, they lack in-depth theoretical knowledge and practical skills in both areas. There is a strong need for more practical, interactive, and market-oriented teaching methods, as well as better access to up-to-date information and modern AI tools in the context of sustainable finance and ESG.

5. GAP ANALYSIS: CONTENT AND METHODS OF TRAINING

Based on the analysis of existing teaching methods and identified needs of students and professors in the partner countries (Austria, Bulgaria, Poland, Slovenia, Netherlands), the following gap analysis and proposals for training content and methods within the GenESG project are presented:

GAP ANALYSIS: CONTENT AND METHODS OF TRAINING

The conducted research (desk research, focus group interviews, online surveys) revealed significant gaps in current teaching in the areas of sustainable finance, ESG, and the use of AI tools in higher education. Below are the key identified gaps:

- Insufficient integration of practice: In many countries (Austria, Bulgaria, Poland, Slovenia), education on ESG and sustainable finance remains largely theoretical. Students report a lack of practical examples, case studies, and simulations that would allow them to apply the acquired knowledge in real business scenarios. In the Netherlands, the analysis of teaching methods also indicates minimal deviation from traditional methods.
- Limited application of AI in sustainable finance: Although AI tools are present in education, their specific application in the context of sustainable finance and ESG analysis is limited. There is a need to train both students and professors in using AI for ESG data analysis, sustainable financial modelling, and ESG risk assessment.
- Lack of interdisciplinarity: Curricula often treat sustainable development, finance, and AI as separate domains instead of highlighting their interconnections. There is a need for integration of knowledge from different disciplines to achieve a holistic understanding of the challenges and opportunities in sustainable finance.
- Insufficient preparation of professors: Many professors lack specialized knowledge in ESG and sustainable finance regulations and lack skills in effectively and ethically using AI tools in teaching. There is a need for dedicated training programs for academic staff in these areas.
- Insufficient standardization and availability of courses: In some countries (Poland, Bulgaria), there is a lack of standardization of ESG education content and the offer of undergraduate courses is limited. In Slovenia and the Netherlands, a significant portion of students has never participated in courses in this area. There is a need to increase the availability and diversity of courses on sustainable finance and ESG at various study levels.

- Limited access to tools and resources: Students report limited access to specialized ESG databases and AI platforms and lack clear guidance on how to use them in the learning process.

SUGGESTIONS FOR TRAINING CONTENT AND POSSIBLE MODULES

Based on the above gap analysis, the following thematic areas and training modules are proposed for inclusion in the GenESG program:

- Module 1:**Foundations of ESG and Sustainable Finance** :
  - Content: Definition and evolution of ESG and sustainable finance, global initiatives and standards, key sustainable finance policy tools, key stakeholders in the ESG ecosystem.

- Module 2: **Ethical Implications and Trust in Sustainable Finance** :
  - Content: Ethical aspects of investment and lending decisions, greenwashing versus genuine responsibility, mechanisms for building and maintaining trust among investors and clients, the role of ethics in ESG reporting and communication.

- Module 3: **Corporate ESG Reporting and Stakeholder Engagement** :
  - Content: ESG reporting standards and frameworks, key ESG indicators and how to define them, strategies for effective ESG communication to different stakeholder groups, analysis of best practices in ESG reporting

- Module 4: **Sectoral Sustainable Finance** :
  - Content: ESG in the energy, technology, and financial sectors, taxonomy of environmentally sustainable activities in different industries, sector-specific ESG risks and opportunities, examples of sectoral projects and investments, simulation exercise: evaluating investment projects using ESG criteria.

Module 5: **ESG Investment Strategies and Impact Portfolio Design :**
  - Content: Different ESG investment strategies, analysis of risk and return in ESG investments, building impact-oriented investment portfolios, methods for measuring the impact of investments, case study: designing an ESG investment portfolio for an institutional client.

SUGGESTED LEARNING METHODS

It is suggested to apply diverse teaching methods that address the identified needs of students and professors, including:

- Microlearning: Short, focused educational modules that facilitate knowledge acquisition.
- Case studies: Analysis of real business situations related to ESG and sustainable finance.
- Practical workshops and simulations: Allow gaining practical skills in ESG analysis, sustainable investments, and using AI tools.
- Interactive lectures and webinars: Enable effective transmission of theoretical knowledge and engage participants.
- E-learning platforms and multimedia resources: Provide flexibility and access to educational materials.
- Group projects: Foster collaboration and interdisciplinarity.
- Gamification: Use game elements in the learning process to increase engagement.

Training format should be flexible, combining online elements (for theory and demonstrations) with face-to-face sessions (for practical workshops and teamwork) or virtual laboratories (for AI exercises).

MODULE STRUCTURE

- **Theory**
  - Scripts (teacher guides)
  - Core literature for each module
  - Presentation slides based on the assigned literature
  - Knowledge checks (sets of questions and answers for use at the beginning and end of each module)
- **Applied Study**
  - Case study (or alternative activity, such as an escape room)
  - Supplementary materials (e.g., legislation, company reports, industry studies)
- **Instructions for AI Integration**
  - Specifications for chatbot behaviour

TARGET GROUPS, TIMEFRAMES AND CREDITS

Students studying business, economics, and entrepreneurship will be the course's primary beneficiaries. The course will target both undergraduate and graduate students. To ensure that students do not feel excluded due to their level of English proficiency, individual course modules and activities will be translated into their respective national languages. Both students with no prior knowledge of ESG, sustainable finance, and AI tools as well as those with more advanced knowledge will be able to use the course.

Each module will correspond to **2 to 3 ECTS credits**, representing approximately **50 to 80 hours** of student workload.

(Note: In Poland, Austria, Bulgaria, and Slovenia, 1 ECTS = 25 hours; in the Netherlands, 1 ECTS = 28 hours.)

The course can be introduced as a separate subject in the curricula (mandatory or elective). Furthermore, specific modules from the prepared course can be incorporated into already-existing courses.