Dissemination report

for the Project Education 4.0: Living Labs for the Students of the Future (LLSF)

Contract number 2021-1-RO01-KA220-HED-000032176

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Project:	Education 4.0: Living Labs for the Students of the Future (LLSF)
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I. Executive Summary

The Education 4.0: Living Labs for the Students of the Future (LLSF) project was carried out between November 1, 2021, and November 1, 2024, as part of the Erasmus+ KA220-HED programme, specifically aimed at fostering cooperation partnerships in higher education. Coordinated by the University Politehnica of Bucharest and supported by esteemed partner universities—Universidade NOVA de Lisboa (Portugal), Università Politecnica delle Marche (Italy), Tel Aviv University (Israel), and Universidad Nacional de Educación a Distancia (Spain)—the project addressed the need for innovation in higher education by establishing an international network of digitally interconnected smart laboratories.

Recognising the pressing challenge posed by the overwhelming volume, velocity, and variety of data generated in modern laboratory operations, LLSF introduced advanced technological infrastructures aimed at enhancing students' learning experiences through a practical, data-driven approach. By creating interconnected smart laboratories, the project enabled Master's and PhD-level students from diverse geographic and educational backgrounds to engage flexibly and remotely in experimental research activities. This initiative directly addressed issues of experimental reproducibility by implementing robust data management solutions and standardised methodologies, thus significantly enhancing the quality and reliability of academic research and education.

Dissemination efforts formed a core element of the project's strategy. A dedicated project website (livinglabs.upb.ro) served as the primary platform for communication, providing continuous updates on the project's developments and outcomes. Additional dissemination activities included strategically organised multiplier events, training sessions for academic staff ("Train the Trainers"), student winter schools, and extensive engagement via social media platforms, international workshops, and academic conferences. Through these multifaceted approaches, the project effectively reached and engaged key stakeholders from academia, industry, and the broader community.

Overall, the LLSF project successfully contributed to advancing digital readiness and educational resilience among participating institutions, supporting Europe's wider goals of enhancing higher education and promoting innovation. The dissemination activities not only amplified the project's impact but also established sustainable pathways for future collaborative initiatives in digital education and research

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II. Dissemination Objectives and Strategy

The dissemination strategy for the Education 4.0: Living Labs for the Students of the Future (LLSF) project was carefully designed and implemented to maximise awareness, engagement, and adoption of the project's outcomes. Throughout the project's lifecycle, dissemination objectives focused on informing diverse audiences about project developments, engaging key stakeholders, promoting active collaboration, and facilitating the sustainable integration of the project's results into educational, industry, and community practices.

The main dissemination goals included ensuring wide accessibility to project results, highlighting the practical benefits provided to various stakeholders, and securing ongoing interest and involvement from key groups. The strategy emphasised tailored communication, recognising the distinct needs and interests of its primary audiences—students, academic institutions, industry partners, civil society organisations, and policymakers. Each of these groups was addressed with specific, customised messages highlighting the relevance of the project's results to their respective contexts.

Implementation of the dissemination activities leveraged a variety of coordinated channels, prominently featuring both the dedicated project website (livinglabs.upb.ro) and the institutional communication channels of the partner universities involved in the project. This coordinated approach significantly enhanced the reach and effectiveness of the dissemination efforts. Each university, including University Politehnica of Bucharest (Romania), Universidade NOVA de Lisboa (Portugal), Università Politecnica delle Marche (Italy), Tel Aviv University (Israel), and Universidad Nacional de Educación a Distancia (Spain), actively contributed to disseminating project-related information through their websites, newsletters, social media accounts, academic events, and direct engagement with their respective academic communities and industry networks.

The project's visual identity played a critical role in ensuring coherent communication. This included the consistent use of a unique, recognisable logo, clearly defined brand colours, professional templates for presentations, posters, leaflets, and social media cards, thereby reinforcing immediate recognition and strengthening the project's professional image across all dissemination outputs.

Furthermore, throughout the project duration, strategic dissemination events—including international conferences, multiplier events, and targeted workshops—were organised to directly engage stakeholders and facilitate knowledge transfer. Partner universities hosted these events, ensuring optimal geographical and cultural reach and visibility. Additionally, the project team maintained regular communication with students, industry representatives, and policy makers through personalised outreach, emails, and dedicated information sessions, ensuring sustained stakeholder involvement.

Evaluation and monitoring were integral to the dissemination strategy, employing robust data collection methods such as stakeholder surveys, focus groups, and web analytics. Quantitative indicators, including website traffic, participant attendance at events, publication reach, and

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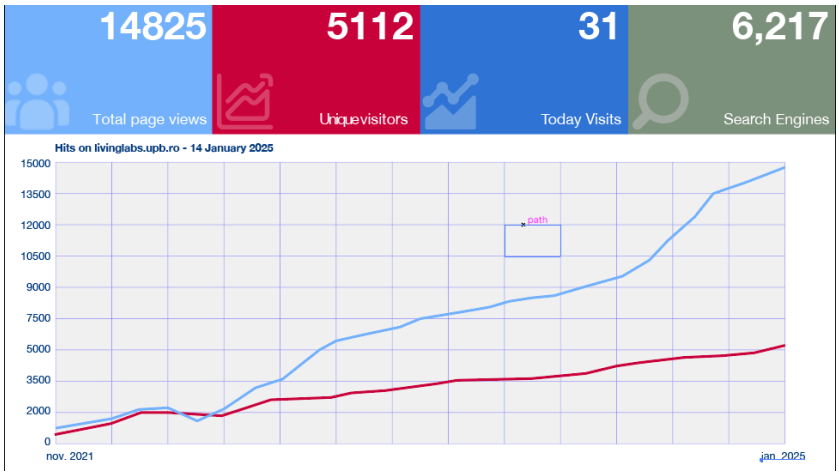

social media interactions, were systematically assessed to measure the dissemination activities' impact and effectiveness. Regular monitoring enabled timely adjustments and continuous improvement of the dissemination approach.

Lastly, sustainability was embedded within the dissemination strategy, ensuring that the project's impact extended beyond its formal conclusion. The consortium committed to continuous stakeholder engagement, dissemination of established best practices, and exploration of future funding opportunities, thus fostering long-term collaboration and innovation in digital higher education. Through the comprehensive and coordinated implementation of this dissemination strategy, the LLSF project successfully communicated its achievements, actively engaged key audiences, and effectively positioned itself as a catalyst for lasting change in higher education practices aligned with Education 4.0 principles.

III. Dissemination Activities Implemented

A. Online Dissemination

The online dissemination activities of the Education 4.0: Living Labs for the Students of the Future (LLSF) project were strategically implemented using multiple digital channels, ensuring broad reach and engagement among diverse target groups. At the core of these efforts was the dedicated project website (livinglabs.upb.ro), which functioned as the central platform for publishing updates, news, detailed information about project objectives, events, and achievements, as well as providing open access to resources and project outputs.

Complementing the project website, online dissemination was further strengthened through coordinated internal communications across the partner universities. Each university actively utilized their institutional mailing lists, internal newsletters, and direct messaging platforms to disseminate project-related information, ensuring targeted reach within academic communities. In addition, direct partner-to-partner communication was regularly conducted to leverage established networks and further amplify dissemination results, thus ensuring consistent and effective stakeholder engagement.

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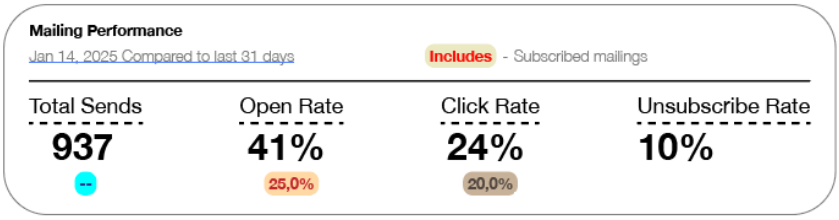
To enhance visibility and foster greater awareness, the project also employed volatile social media messages, designed for immediate impact and wide distribution. These concise and engaging messages effectively drew attention to significant project milestones, upcoming events, and opportunities for stakeholder involvement, serving to maintain ongoing public interest and interaction.

As part of its compliance with data protection regulations (GDPR), the project established a robust subscriber management approach, resulting in a dedicated mailing list of 371 contacts. These subscribers voluntarily opted in through a self-subscription process available on the project website, explicitly consenting to receive future communications and updates. This subscriber base provided a reliable and compliant means of directly engaging interested individuals and stakeholders throughout the project's duration and ensured the sustainability of communication beyond the formal end of the project.

Website visitor performance over the entire duration of the website. Inbound clicks and links are included.



Total sends as updates regarding posting on website (currently 93 subscribers).

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B. Events and Workshops

Throughout the implementation of the Education 4.0: Living Labs for the Students of the Future (LLSF) project, several strategically designed events and workshops significantly amplified project visibility, encouraged stakeholder collaboration, and disseminated valuable educational innovations across academia and industry.

The dissemination event series began with the eLearning Smart Digital Labs Launch Event in September, 2023, at the National University of Science and Technology Politehnica Bucharest. Conducted as a hybrid event, this inaugural gathering formally introduced the project's vision of transforming higher education through digital innovation. Key speakers included Mihnea Costoiu (Rector, UNSTPB), Ciprian Dobre (UNSTPB), and representatives from prestigious European partner institutions and renowned industry leaders from Adobe and Honeywell. Discussions highlighted the transformative potential of digital living labs and outlined the project's strategic goals.

In the same month, the Train the Trainers Education Week (LTTA C1) took place at the UNSTPB Campus in Bucharest. This intensive five-day training event equipped educators from partner universities with advanced methodologies in Big Data, IoT management, cloud solutions, and data visualisation. Each day featured expert-led sessions designed to enhance educators' capabilities in effectively implementing cutting-edge educational technologies.

In June 2024, a significant online Multiplier Event hosted by Università Politecnica delle Marche showcased innovative dashboards and interconnected lab systems. Interactive discussions during this event explored the practical implications of digital education solutions and strategies for aligning educational outcomes with emerging labor market needs.

The Students Winter School and Living Labs for the Industry (LTTA C2) followed in October 2024, at NOVA Lisbon. This hybrid event emphasised collaboration between academia and industry, featuring hands-on activities in advanced robotic labs, audio processing, and data acquisition. It also included project presentations from innovative industry initiatives such as COMMUNITAS, Smartbear, and DS4HEALTH, demonstrating practical applications of digital lab technologies.

In October, 2024, the event titled "Living Labs for the Industry: Skills for the Fourth Industrial Revolution" further spotlighted groundbreaking projects directly impacting industry innovation. Hosted by NOVA Lisbon in a hybrid format, it featured key initiatives like XpanDH, xShare, AgileHand, and FITTER-EU. Industry experts provided valuable insights into collaborative strategies for addressing skill gaps and integrating digital methodologies within industrial settings.

The Final Multiplier Event, held in January 2025, at UNSTPB, marked the culmination of the LLSF project. Rector Mihnea Costoiu highlighted the project's contributions to educational innovation, while project coordinator Ciprian Dobre summarised significant outcomes, including enhanced student engagement and strengthened collaborations between academia and industry. Internationally recognised experts such as Tal Soffer, Ricardo Goncalves, and

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Susanna Spinsante facilitated workshops, deeply engaging participants in discussions about IoT and data science applications in education.

Concluding the project's activities, the Student Training Week (LTTA C3) took place in January 2025, at the UNSTPB Library in Bucharest. This training week specifically targeted Master's and PhD students, focusing on key skills in Big Data, research reproducibility, cloud IoT management, and handling measurement uncertainty. Interactive sessions, student-led case studies, and practical training effectively prepared participants to navigate challenges within the rapidly evolving digital landscape of Industry 4.0.

Collectively, these carefully structured events successfully amplified the LLSF project's pioneering approach to digital education, establishing robust frameworks for sustainable educational innovation and industry collaboration across Europe and increased website and mail registration impact.

IV. Effectiveness and Impact Assessment

The dissemination activities of the Education 4.0: Living Labs for the Students of the Future (LLSF) project were continuously monitored and evaluated to assess their effectiveness and overall impact on stakeholder engagement and public visibility. A combination of qualitative insights and quantitative performance indicators was employed to ensure a comprehensive understanding of communication outcomes.

Quantitative analysis shows that the project website (livinglabs.upb.ro) served as an effective dissemination tool. Between the project launch in November 2021 and January 2025, the site recorded a total of 14,825 page views and 5,112 unique visitors. Notably, 6,217 of these visits originated from search engines, indicating successful search engine optimisation and organic visibility. Daily engagement remained steady, with consistent visits reflecting the site's relevance as a central communication hub throughout the project's implementation.

In parallel, email-based dissemination efforts also proved to be impactful. A mailing list of 93 subscribers—gathered via GDPR-compliant self-subscription—formed the basis for a targeted communication strategy. Over the reporting period, a total of 937 email sends were recorded, achieving an open rate of 41% and a click rate of 24%, both of which are significantly above average in the higher education and research sectors. The unsubscribe rate remained relatively low at 10%, suggesting strong alignment between content and audience expectations.

The project also employed volatile social media messaging to increase awareness and engagement through high-frequency, short-format posts tailored for immediate impact. These messages, disseminated via the channels of all partner institutions, complemented formal communication efforts by drawing attention to events, updates, and new resources.

In addition to digital performance metrics, the success of the dissemination strategy was reinforced by the high levels of participation in project events and workshops, as well as ongoing collaboration with stakeholders across academia and industry. The consistent growth in digital engagement and strong interaction rates across all channels reflect the project's ability to reach and maintain attention from a wide audience, effectively supporting the visibility, adoption, and sustainability of its results.

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V. Stakeholder Engagement and Collaboration

Stakeholder engagement and collaboration represented a foundational pillar of the Education 4.0: Living Labs for the Students of the Future (LLSF) project. The consortium successfully engaged a wide spectrum of actors from academia, industry, civil society, and the public sector, fostering meaningful dialogue and knowledge exchange while anchoring the project outcomes in real-world needs and opportunities.

A key moment showcasing this engagement was the Final Multiplier Event and Conference, held on January 15, 2025, at the University Politehnica of Bucharest. The event brought together a diverse and influential group of participants, including high-level academic and industrial representatives. The agenda featured contributions from Mihnea Costoiu (Rector, Politehnica Bucharest), Ciprian Dobre (Project Coordinator), and leading figures from major companies such as Honeywell, Orange, Adobe, and ASTI Automation, who shared insights on the future of digital laboratories and skill development in the context of Industry 4.0. This direct involvement of private sector leaders reflected the project's deep connection with the evolving needs of the labor market.

The workshops held during the event further strengthened the collaborative character of the project. Two thematic sessions—led by Tal Soffer (Tel Aviv University), Ricardo Goncalves (NOVA University Lisbon), Susanna Spinsante (Università Politecnica delle Marche), and Rafael Pastor Vargas (UNED, Spain)—addressed urgent topics such as data science tools, artificial intelligence in engineering education, and alignment between academic programs and market demand. The workshops facilitated open discussions with participants, many of whom were students and academic staff, offering opportunities for co-creation and live feedback.

Data presented during these workshops reinforced the project's relevance: across Europe, the demand for graduates in ICT and information engineering is growing rapidly, with a documented shortage of over 500,000 unfilled ICT positions. Employers are seeking skills in programming, cybersecurity, AI, big data, and cloud computing—precisely the domains emphasised in the Living Labs. The project's collaboration with industry helped shape its educational resources, ensuring that curricula, training, and digital infrastructure were well-aligned with these skill demands.

Beyond the events, stakeholder engagement was also sustained through institutional channels of the five consortium universities. These included dissemination through internal communication platforms, partnerships with student and scientific associations, and integration of Living Lab activities into broader institutional strategies for digital transformation. Importantly, the project fostered transnational cooperation, sharing models and methodologies across academic cultures and national contexts, reinforcing the European dimension of the initiative.

In conclusion, the LLSF project succeeded not only in disseminating its outcomes, but also in building an active, transdisciplinary, and cross-sectoral community of stakeholders. This collaborative network, grounded in shared interest in the future of digital education and research, stands as a lasting legacy of the project, with high potential for future innovation, policy alignment, and sustainability.

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VI. Conclusions, Lessons Learned and Recommendations

The implementation and dissemination of the Education 4.0: Living Labs for the Students of the Future (LLSF) project offered valuable insights into both the opportunities and challenges associated with promoting innovative digital education across diverse academic, cultural, and institutional contexts. Drawing from the experience of the consortium and the comprehensive stakeholder engagement activities, several key lessons emerged that inform a set of strategic recommendations for future initiatives.

One of the most evident lessons learned throughout the project was the growing gap between traditional academic offerings and the rapidly evolving needs of the labor market. As highlighted during the final multiplier event and workshops, the demand for ICT and information engineering professionals in Europe has surged, driven by increased investment in digital transformation and emerging technologies such as artificial intelligence, cybersecurity, and the Internet of Things. Despite this trend, many educational programs are still struggling to fully adapt their curricula to match the complexity and pace of technological advancement.

Recommendation: Future projects should prioritise dynamic alignment mechanisms between educational institutions and the labor market. This includes the active involvement of industry partners not only in dissemination events but also in curriculum co-design, mentorship programs, and pilot implementation of tools and platforms. Embedding continuous labor market feedback loops into the academic innovation process ensures that digital competencies being developed remain relevant and employable.

The Value of Cross-Sectoral and Transnational Collaboration

The LLSF project demonstrated the considerable value of transnational cooperation and multi-stakeholder engagement. The diverse perspectives brought in by universities, technology companies, and policy actors enriched the quality of project outcomes and allowed for the exchange of best practices across European regions with different levels of digital maturity. However, coordinating such a diverse network also came with challenges, particularly related to varying institutional policies, resource availability, and administrative cultures.

Recommendation: Successful multi-partner projects require clearly defined governance structures, effective internal communication protocols, and culturally sensitive coordination. Future Erasmus+ projects should consider investing in dedicated coordination and facilitation roles to manage collaboration dynamics and to maintain partner engagement throughout the project's lifecycle. Shared knowledge management platforms and regular cross-partner capacity-building sessions can also reinforce cohesion.

Strategic Communication Enhances Impact

The strategic use of digital communication tools—including a central project website, institution-led mailing, social media messaging, and targeted multiplier events—greatly

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contributed to the visibility and impact of the LLSF project. The creation of a GDPR-compliant mailing list with 371 self-subscribed users, a website that attracted over 14,800 page views and 5,100 unique visitors, and effective email campaigns with a 41% open rate and 24% click rate, illustrate the power of integrated communication in sustaining interest and engagement.

Recommendation: Future initiatives should invest in communication strategies that combine long-term visibility (e.g. websites, open-access resources) with short-term impact (e.g. social media campaigns, event promotions). Leveraging institutional communication channels of each partner significantly enhances outreach. Furthermore, integrating regular evaluation of communication performance allows for continuous adaptation to audience behaviour and preferences.

Importance of Hands-on Learning and Emerging Technologies

The Living Labs model provided students and educators with immersive, hands-on experiences using real-time data, remote experimentation tools, and digital twin simulations. These environments not only fostered deeper learning but also allowed for experimentation with technologies critical to Industry 4.0. However, one challenge was ensuring equitable access to these infrastructures across institutions with varying technological capacities.

Recommendation: To maximise impact and equity, future projects should include dedicated resources for technological infrastructure upgrades and training in under-resourced institutions. In addition, cloud-based, scalable platforms can help democratise access to Living Lab experiences. Open-source tools and shared digital repositories also offer cost-effective ways to broaden participation.

Sustainability Requires Forward Planning

While the LLSF project successfully built a strong foundation for innovation in digital education, sustaining the momentum beyond the project duration remains a common challenge. Ensuring that tools, partnerships, and methodologies continue to deliver value after the funding cycle requires intentional planning and institutional commitment.

Recommendation: Sustainability should be embedded from the outset of a project. This includes integrating project activities into long-term university strategies, securing institutional ownership of results, and identifying follow-up funding opportunities. Establishing communities of practice, such as networks of educators using Living Labs, can also support ongoing collaboration and dissemination of results.

In conclusion, the LLSF project provided a compelling model for cross-European collaboration in digital education. By leveraging strategic partnerships, deploying effective communication, and engaging deeply with students, industry, and policymakers, the project not only met its goals but also generated a set of transferable practices for future initiatives. The lessons learned offer valuable guidance for the design and implementation of projects operating at the intersection of education, technology, and labor market transformation.

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