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Implementation and validation of innovative tools for enhancing the competencies of employees in the copper ore mining and processing sector

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Abstract: This article presents the results of implementing and validating an innovative programme designed to enhance the skills of employees in one of the strategic sectors of the European economy – the copper mining and processing industry. This comprehensive programme comprises innovative educational materials and tools designed for the current and future professionals in this sector across the EU, developed by an international team as part of the SkiComCu project. Both the training content and the tools directly address the identified needs regarding the competences required of future employees in the sector, as well as the diagnosed gaps in soft and technical skills. The pilot implementation and validation of training materials enhanced with XR (extended reality) tools is presented. The aim of the study is to verify the usability, relevance and educational effectiveness of the proposed substantive content and XR technologies supporting the learning process.

The evaluation study was conducted among all participants of the training modules (664 participants in total). 212 fully correctly completed questionnaires (32% response rate) were obtained, including 83 questionnaires from participants of in-person trainings and 129 questionnaires from participants of on-line trainings. The article presents detailed results of the evaluation of one of the Copper Supply Chain training module (n=34) implemented in the online formula.

The results show that the integration of XR tools, which provide immersive and interactive learning experiences supports the understanding of complex metallurgical processes and safety procedures. Potential areas for their further development are indicated.

Introduction

One of the most important challenges facing the copper ore mining and processing industry today is the shortage of sufficiently qualified personnel, alongside the need to increase efficiency, reduce environmental impact and improve social acceptance. An international team has undertaken R&D work within the SkiComCu project[1] co-funded by the European Institute of Innovation and Technology - EIT Raw Materials[2] to support European copper companies in this area. Very serious staff shortages of companies in this extremely important sector of the economy result from demographic phenomena: on the one hand, competencies, inadequate for the current technological achievements and expectations of sustainable development, and on the other hand, the lack of an influx of young people who perceive the copper industry as dirty and unattractive (Ernst & Young, 2023; WEF, 2023).

The future of the copper sector requires employees who are collaborative, innovative system-thinkers, who can manage complexity and see the interconnectedness and the necessity for improvements across the copper value chain. Future employees of the copper sector should be familiar with and be able to benefit from technological developments and digitalisation in the field, as well as understand and apply sustainability practices (Figure 1). The skill gaps and training needs of the selected occupational groups employed in the copper sector in European countries were identified by the international team of the SkiComCu Project. Research results highlighted the importance of improving understanding of complex industrial processes, material properties and health and safety procedures (Religa et al., 2025).

Theoretical background

In this context, XR-based learning offers promising opportunities to support competency development in industrial and vocational training settings. Its use in education is grounded in constructivist and experiential learning theories, which emphasise active engagement and learning through experience. By combining immersive visualisation, interaction and contextualised practice, XR environments can facilitate an understanding of complex concepts that are difficult to convey through traditional teaching methods.

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1 Project SkiComCu-Lifelong Learning Course for skills & competences in the Copper sector, financed by EIT RawMaterials (Project Agreement No. 23043): https://skicomcu.eu/ [accessed: 17.03.2026]

2 European Institute of Innovation and Technology: https://www.eit.europa.eu/our-communities/eit-rawmaterials [accessed: 16.03.2026]

Recent studies have shown that this approach can enhance learner engagement, support conceptual understanding and promote the development of practical skills in technical and vocational education (Radianti et al., 2020; Burke et al., 2025). Furthermore, XR tools provide opportunities for safe and repeatable practice in realistic scenarios, making them particularly valuable for industrial training contexts. In this way, XR can help bridge the gap between theoretical knowledge and practical application.

Training curriculum and XR tools supporting learning processes as the subjects of the research

The programme for enhancing the skills of professionals in the copper sector has been developed on the basis of research findings of the SkiComCu project. This research focused on: 1) an analysis of the current trends and directions in technological development, as well as the associated changes in expectations regarding the skills of various groups of employees (desk research, Delphi survey) (Religa et al., 2024); 2) the identification of skills gaps among selected groups of employees in the copper sector (online survey and Focus Groups Interviews in 3 EU countries) (Religa et al., 2025).

Finally, the competency gaps recognised within the research part of the SkiComCu project were „translated" into a modular training curriculum covering copper mining, processing, physical metallurgy, waste management, health and safety as well as soft skills (see Figure 1).

Thematic areas were selected by an international team of experts. They developed training modules that meet the real needs of various groups of employees and thus are attractive and relevant for copper mining companies from the EIT RIS (Regional Innovation Scheme) countries (Poland, Greece and Bulgaria).



Fig. 1. Thematic scope of the desired training for employees of the copper sector

Source: Deliverable 2.1. Report on the assessment & validation of needs for Cu-oriented education chain selected groups

A comprehensive SkiComCu five-module curriculum (balanced across technical and soft skills) was designed:

Module 1: Copper Supply Chain

This module provides a comprehensive understanding of the copper supply chain, encompassing both primary and secondary resources, beneficiation methods, metallurgical processing, by-products handling, market dynamics, and environmental aspects. It targets a wide audience, from engineers and geoscientists to managers and policymakers, enhancing effective cross-disciplinary communication and supporting informed decision-making for sustainable copper production and use.

Module 2: Extractive Waste Management

This module concentrates on the responsible handling and disposal of waste generated during mining and mineral processing activities. As the demand for natural resources increases, effective management of extractive waste becomes essential to minimise environmental impact, protect public health, and ensure compliance with EU regulatory standards. This introductory module covers the core principles of waste characterisation, classification, and rehabilitation, with an emphasis on the copper industry. By understanding the complexities of extractive waste, participants gain insight into innovative solutions that balance economic growth with environmental stewardship.

Module 3: Copper Physical Metallurgy

This module is aimed at professionals across the copper value chain. This module deepens the understanding of the principles of physical metallurgy and their application to process optimisation and sustainable manufacturing. It connects fundamental science with practical performance analysis, supporting the transition toward Industry 4.0 practices.

Module 4: Health & Safety

This module introduces participants to the fundamental principles and practices of health and safety management in industrial environments, with an emphasis on mining and metallurgical operations.

Module 5: Soft Skills

This cross-cutting introductory module builds interpersonal and managerial skills essential for effective communication, leadership, teamwork, and inclusion in technical workplaces. It complements technical competence with professional behaviour aligned with lifelong-learning and diversity objectives.

Each training module was designed to align with the European Qualifications Framework (EQF), ensuring participants achieve the necessary competencies for their respective roles. By meeting these standardised learning outcomes, it is ensured that employees are adequately prepared to perform their duties safely, efficiently, and in compliance with industry regulations. The materials were created based on the latest academic expert knowledge, complemented with real-life examples. Several modules identified the need for resources capable of illustrating structures, workflows and operational contexts that are difficult to convey through traditional teaching materials. The extended Reality (XR) tools respond directly to these pedagogical needs. Overall, SkiComCu training modules provide a hybrid modular lifelong learning offer that combines asynchronous and in-person training supported with XR tools: "CuExplorer", "Peirce-Smith Converter Inspector" and "Health & Safety Procedures in Mining".

The curriculum follows a hybrid learning model that combines asynchronous online modules with interactive synchronous sessions, ensuring both flexibility and strong practical relevance. The SkiComCu pedagogical approach is built on the principles of competency based education, ensuring that learners can transfer newly acquired knowledge, technologies, and sustainable practices directly into real industrial settings. The learning objectives follow Bloom's Revised Taxonomy, enabling a structured progression from basic comprehension to higher-level analytical and creative problem-solving across the stages of Remember, Understand, Apply, Analyse, Evaluate, and Create (Anderson, Krathwohl, 2001).

XR tools development

The XR-based solutions were designed to complement the modular curriculum by providing interactive and immersive environments that support the understanding of complex metallurgical concepts, process operations and health and safety procedures in the mining and copper sectors. These solutions integrate augmented reality, virtual reality and interactive 3D technologies as complementary pedagogical elements, enabling learners to explore material structures, industrial processes and safety procedures in a more intuitive and experiential way.

Together, these tools form a coherent learning ecosystem that strengthens the overall effectiveness of the SkiComCu training programme and supports the development of a skilled and digitally literate workforce. The proposed set of XR tools includes three main components: CuExplorer, which focuses on crystal structures and material defects;

the Peirce-Smith Converter Inspector, which illustrates the key stages of the copper production process; and the Health and Safety VR application, which provides immersive scenarios for practising safety-related decision-making.

CuExplorer (AR)

The CuExplorer was developed as a Unity-based application structured around a single core scene adapted for deployment in two formats: an Augmented Reality (AR) mobile application and a SCORM-compatible WebGL module. Both versions share common rendering and interaction logic, implemented using the Unity's Universal Render Pipeline (URP) to achieve a consistent visual quality, optimised lighting and reliable performance across platforms.

This tool is designed to support the Physical Metallurgy module by providing interactive visualisations of crystal structures, material defects and copper-based alloys. The AR version allows learners to project and explore three-dimensional crystal models in physical space using a mobile device, while the WebGL version delivers similar interactive experiences directly within the learning platform. By enabling learners to visualise structural features that are difficult to grasp through static diagrams or text-based materials, the CuExplorer enhances the understanding of fundamental metallurgical concepts.

The CuExplorer supports the pedagogical objectives by allowing learners to observe and manipulate a range of crystallographic representations, including pure copper, alloy systems such as brasses, bronzes and aluminium bronzes, and other representative structures derived from the Materials Project database[3]. This facilitates a direct comparison between different crystal systems and compositions, aligning with the curriculum's emphasis on structural diversity and its effect on material properties.

Figure 2 illustrates the CuExplorer AR version, showing the simultaneous visualisation of two crystal structures for comparative analysis.

[3] Materials Project Database, Lawrence Berkeley National Laboratory: https://materialsproject.org/ [accessed: 17 March 2026].

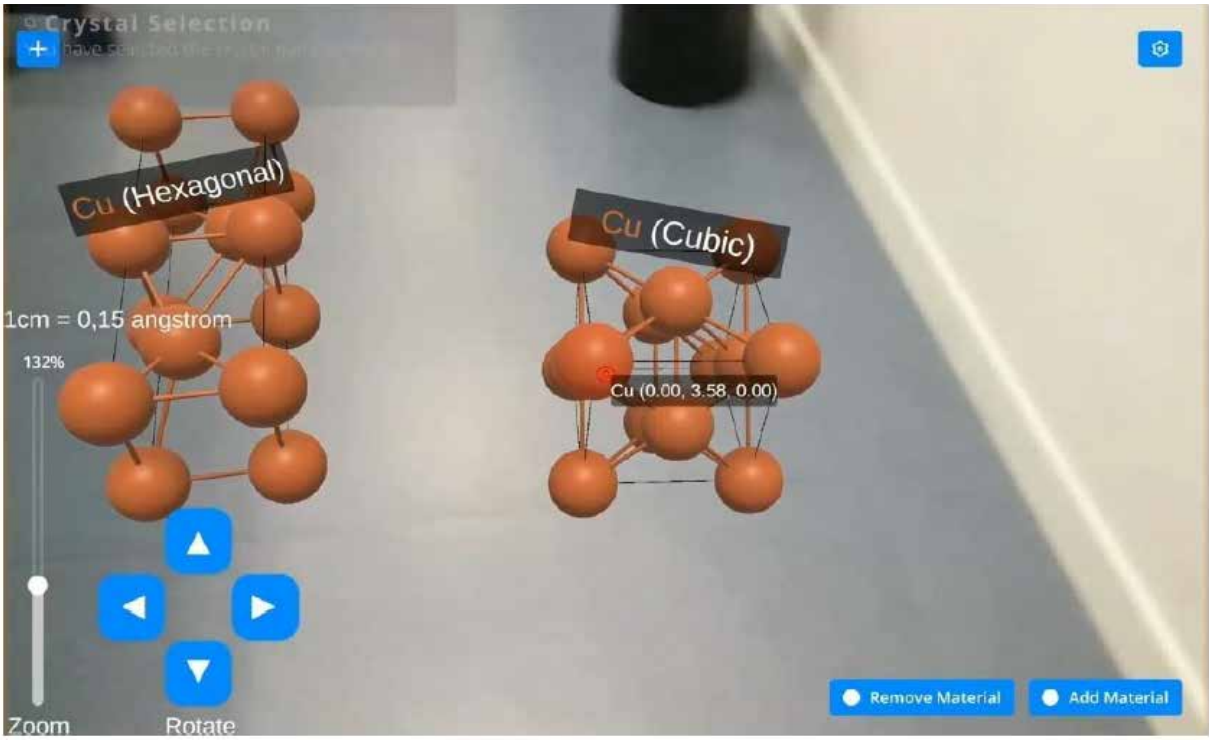


Fig. 2. Multiple materials placed for comparison in CuExplorer AR: two crystal structures (hexagonal and cubic forms of copper) are shown simultaneously in the AR scene.

Source: Deliverable 4.2. SkiComCu XR Tools

A key feature of the CuExplorer is the visualisation of crystallographic defects. Learners can inspect point defects, such as vacancies, self-interstitials and foreign interstitial atoms, which play a central role in diffusion, strengthening mechanisms and degradation processes. In addition, the tool supports the visualisation of linear defects, including edge dislocations and screw dislocations, which significantly affect plastic deformation and mechanical behaviour in metallic materials. By representing these features, the tool supports the interpretation of atomic-scale structures and helps develop the spatial and analytical skills essential in metallurgical education.

Peirce-Smith Converter Inspector (3D)

The Peirce-Smith Converter Inspector is a SCORM-based 3D interactive tool that complements the module on the copper supply chain by allowing trainees to explore the structure and operation of a Peirce-Smith converter and to observe the main steps of the conversion from matte to blister copper. The tool provides interactive 3D representations of the converter, enabling users to examine its physical components (Part Inspector) and the associated metallurgical processes (Operation Inspector).

In the Part Inspector mode, learners can analyse individual structural elements of the converter and understand their function within the system. The Operation Inspector mode complements this by illustrating the dynamic progression of the converting cycle, from matte charging to the final removal of blister copper. Animations, internal cross-sections and information panels provide a clear representation of slag–matte separation, oxygen injection, oxidation reactions and furnace behaviour.

The tool has been implemented as a Unity WebGL module using a modular architecture that supports both inspection modes within a single project. As in CuExplorer, the application is built using URP to ensure consistent lighting, performance and visual clarity across browser environments. Both modes rely on a shared 3D scene, while mode-specific functionalities are accessed through dedicated interface panels.

Figure 3 illustrates the interface and the main functions of the tool, including the visualisation of the converter structure, access to explanatory information and the representation of dynamic processes within the furnace.

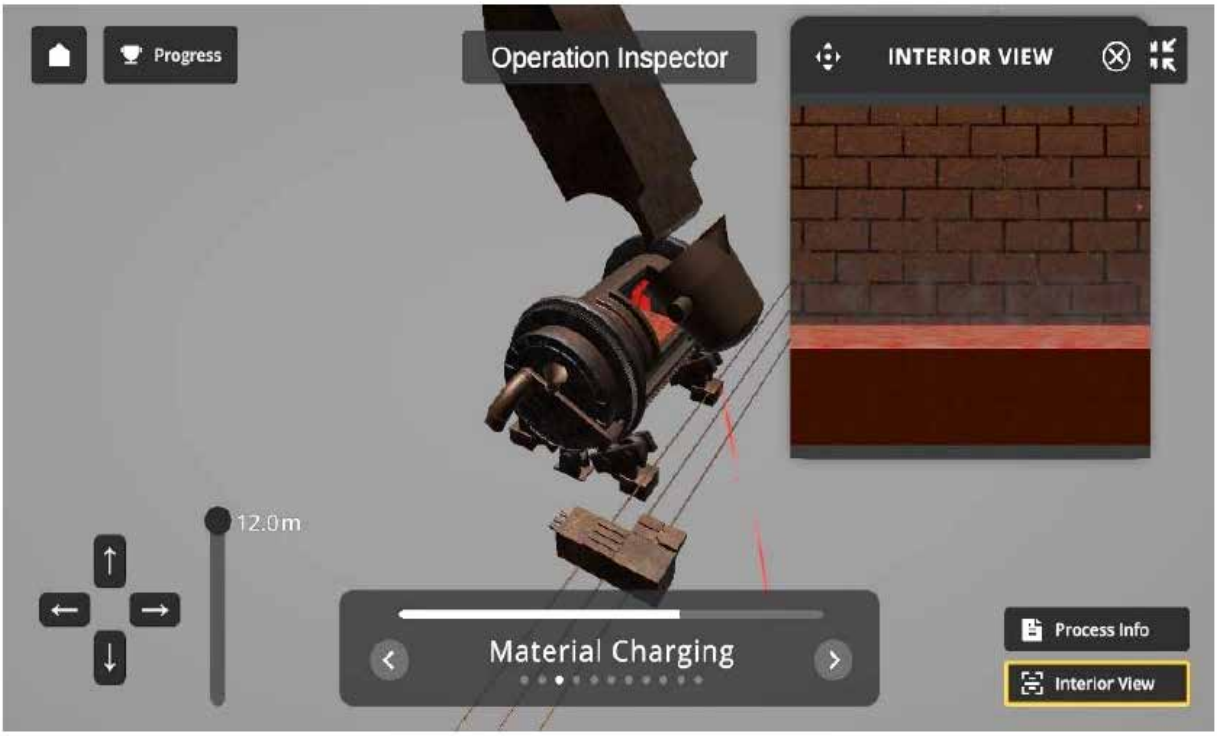


Fig. 3. Animation and interior view of the Peirce-Smith Converter Inspector: learners can visualise the external animation of the converter and simultaneously access the interior cross-section view, which shows the behaviour of matte, slag and injected air inside the furnace.

Source: Deliverable 4.2. SkiComCu XR Tools

By enabling learners to transition between structural exploration and process-based visualisation, the tool supports the pedagogical objective of linking equipment design to operational outcomes. This dual approach facilitates a deeper conceptual understanding and promotes active learning, allowing trainees to observe how each operational stage contributes to the refining sequence.

Both modes support flexible exploration, while a task checklist ensures that required actions are completed before the evaluation quiz is enabled.

Health and Safety Procedures in Mining (VR)

This application allows trainees to practise risk identification and safe behaviour in simulated mining environments without being exposed to real hazards. It is designed for use with head mounted displays (HMD) devices and enables learners to navigate a virtual workspace, identify risks and apply appropriate operational protocols.

The application runs in virtual reality and is compatible with a wide range of HMDs through its implementation using the OpenXR standard[4]. It presents representative mining scenarios in which users can move through the environment, interact with key elements such as personal protective equipment, access control systems and safety devices, and receive immediate feedback when unsafe actions are performed. The pedagogical objective is to transform regulatory and procedural knowledge into measurable skills, including the correct preparation of equipment, maintaining safe distances, responding to environmental hazards, and executing appropriate actions in response to incidents.

Unlike the WebGL-based XR tools, the VR application is not delivered as a SCORM object but as a standalone immersive experience designed for HMD devices, complementing the SkiComCu platform through instructor-led or supervised training sessions.

Learners are presented with specific safety-related objectives, such as identifying hazards, selecting appropriate protective equipment or performing correct operational procedures near mining machinery. Each task requires explicit user actions and is validated by the system before progression is allowed. Users are free to move and interact within the environment, while the system verifies essential steps and reinforces safe decision-making, in alignment with the training objectives of the Health & Safety module.

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[4] OpenXR is an open, royalty-free standard developed by the Khronos Group for cross-platform virtual and augmented reality applications, enabling compatibility across multiple hardware vendors. https://www.khronos.org/openxr/ [accessed: 17 March 2026].

Figure 4 illustrates a representative VR scenario of the *Health and Safety Procedures in Mining* tool.



Fig. 4. Personal protective equipment selection in a mining environment: trainees must choose the appropriate equipment before starting work underground.

Source: Deliverable 4.2. SkiComCu XR Tools

Methodology

Based on the available literature and the research tea's experience, the team formulated the following hypothesis: innovative IT tools using augmented reality, applied in the process of developing the competencies of workers in the copper sector, will ensure a high standard and efficiency of the learning process, as well as raise its attractiveness (thereby increasing the participation of employees of the sector in lifelong learning).

The focus was placed on several key aspects, including content accuracy, usability and quality, educational effectiveness (materials support the learning process), technical and functional performance (IT systems run smoothly without errors).

Methods and tools

During the pilot testing phase, taking place in the 4th quarter of 2025, the educational materials and tools were released to a broader group of end users, including participants from the pilot group, trainers, and selected external experts / end users. This controlled release allowed the project team to observe real-world usage and assess how effectively the materials support learning and engagement. The project team decided to deliver the training through multiple formats. Some sessions were conducted face-to-face, during on-site, in-person meetings, and some as asynchronous learning (online sessions).

For the purposes of online testing and validation, the training tools and educational materials were made accessible through the LearningPoint, the Learning Management System (LMS) provided by EIT RawMaterials and based on the Rise Up platform.

Both the initial testing, which involved a small group of specialists from the SkiComCu project team, and the pilot testing conducted with a broader group of end users, aimed to refine and optimise the training tools and materials. The goal of these phases is to prepare the outputs for the next stage of wider testing, involving a selected group of participants outside the consortium. This approach ensures that the tools and materials are thoroughly validated and ready for a potential commercial application.

The SkiComCu Training Modules Evaluation Survey was designed to collect structured feedback from participants on the module's content, delivery, and impact. The survey included both participants of stationary and online trainings. But, due to the limited length of this article, we focus below the method, tool and results of the evaluation of training modules delivered only online.

The structure of the evaluation questionnaire used in the survey of online trainings participants covered 4 main sections: 1) module structure and content; 2) educational design and delivery; 3) learning outcomes and impact; 4) overall satisfaction. For each of them, several statements were assigned:

Section A Module Structure and Content

- The module objectives were clearly defined.
- The module content was well organised and logically structured.
- The materials provided (slides, readings, activities) supported my learning.
- The examples and case studies were relevant to real-world applications.
- The module duration was adequate to cover the described learning outcomes
- The content of the interactive 3D application aligns properly with the content.
- Ease of use of the interactive 3D application.

Section B Educational Design and Delivery

- The module used appropriate teaching and learning methods.
- The balance between theory and practical examples was effective.
- The platform used for the training module was easy to navigate and user-friendly.
- The module includes interactive elements (e.g., quizzes, discussions) for enhancing my engagement.
- The pace of the module supported understanding of key topics.
- The use of the interactive 3D application is intuitive and the concepts are easy to understand.

Section C Learning Outcomes and Impact

- I have gained new knowledge or skills relevant to my professional or academic field.
- I feel confident applying the knowledge gained in my work/studies.
- The module helped me strengthen my competencies.
- The module improved my digital competencies, including the understanding and use of digital tools for smart operations.
- Using the interactive 3D application helped me better understand the content of the training module they are associated with.

Section D Overall Satisfaction

- Overall, I am satisfied with the quality of the training module.
- I would recommend this module to others.
- I would recommend to others the use of the interactive 3D application to complement the module content.

The respondents were asked to assess the extent to which they agreed with this statement. A 10-point scale was adopted, where 1 meant "strongly disagree" and 10 meant "strongly agreed".

Participants

Participants / end users engaged in the validation process included industrial sector employees at various levels and areas (such as senior and middle managers, line workers and HR personnel), as well as students – the future sector's employees. At the conclusion of each training session, participants were asked to complete a satisfaction survey, complemented participation in the face-to-face interview in case of in-person training.

A total number of 664 participants took part in the process of testing educational materials both online and in-person. There were 316 women and 348 men. All of them registered for five available modules (Tab. 1).

Table 1. Characteristics of training modules participants (n=664)

SkiCom Cu training module	total	male	female
Soft skills	198	27	171
Physical Metallurgy	138	107	31
Copper Supply Chain	248	155	93
Health & Safety	59	17	42
Extractive Waste Management	21	10	11
	664	316	348

Source: The authors'compilation.

On-line training survey results

The survey was optional and did not determine successful training completion. As a result, a total of 212 fully completed questionnaires were collected, i.e. with answers in all required fields (response rate 32%). Nevertheless, it made it possible to collect key information regarding the quality of the training module, its usefulness, and the participants' overall satisfaction. During the online training survey testing all five training modules were released and available for a wider group of users. Based on the collected data, it was found that 129 participants completed the online training and submitted their feedback survey (Fig. 5).

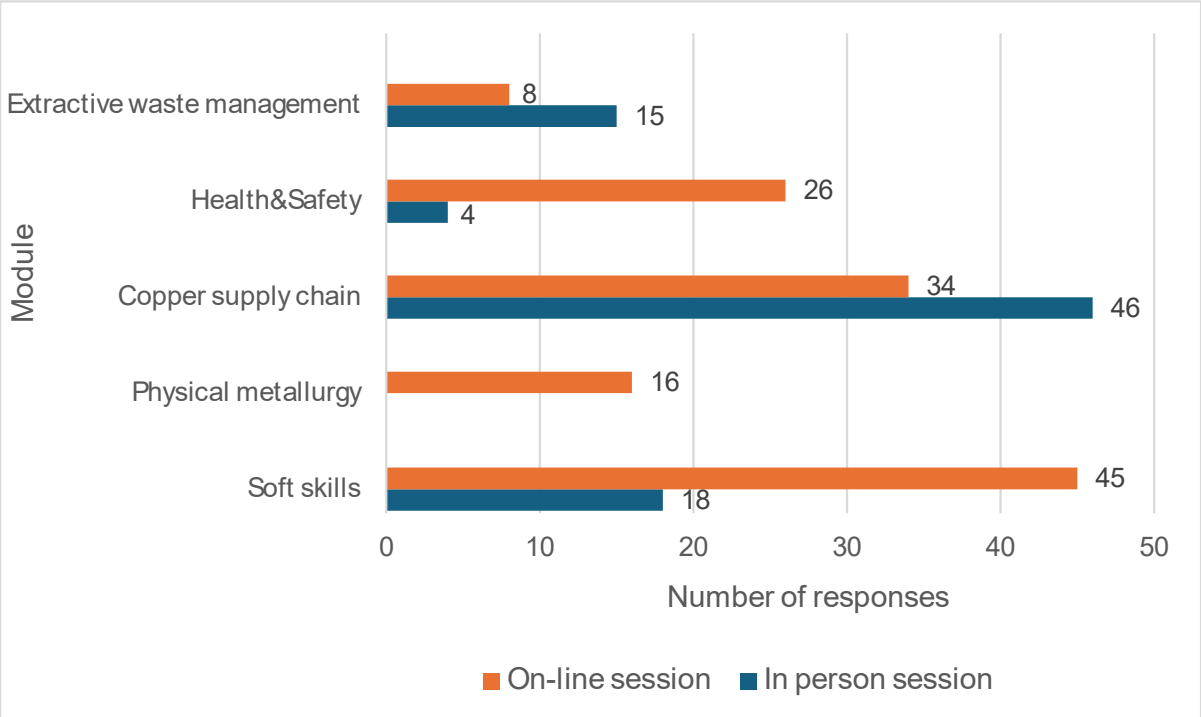


Fig. 5. Survey distribution in terms of training modules and number of responses (n=212).

Source: The autors'compilation.

In order to maintain the transparency of the article, the results of evaluation survey for one selected module (technical) are presented below. The criterion for selecting a module was the number of correctly completed evaluation questionnaires (excluding the very specific soft skills module).

Figures 6-8 show the evaluation results obtained within the different sections (A-D) for Module: Supply Chain of Cu.

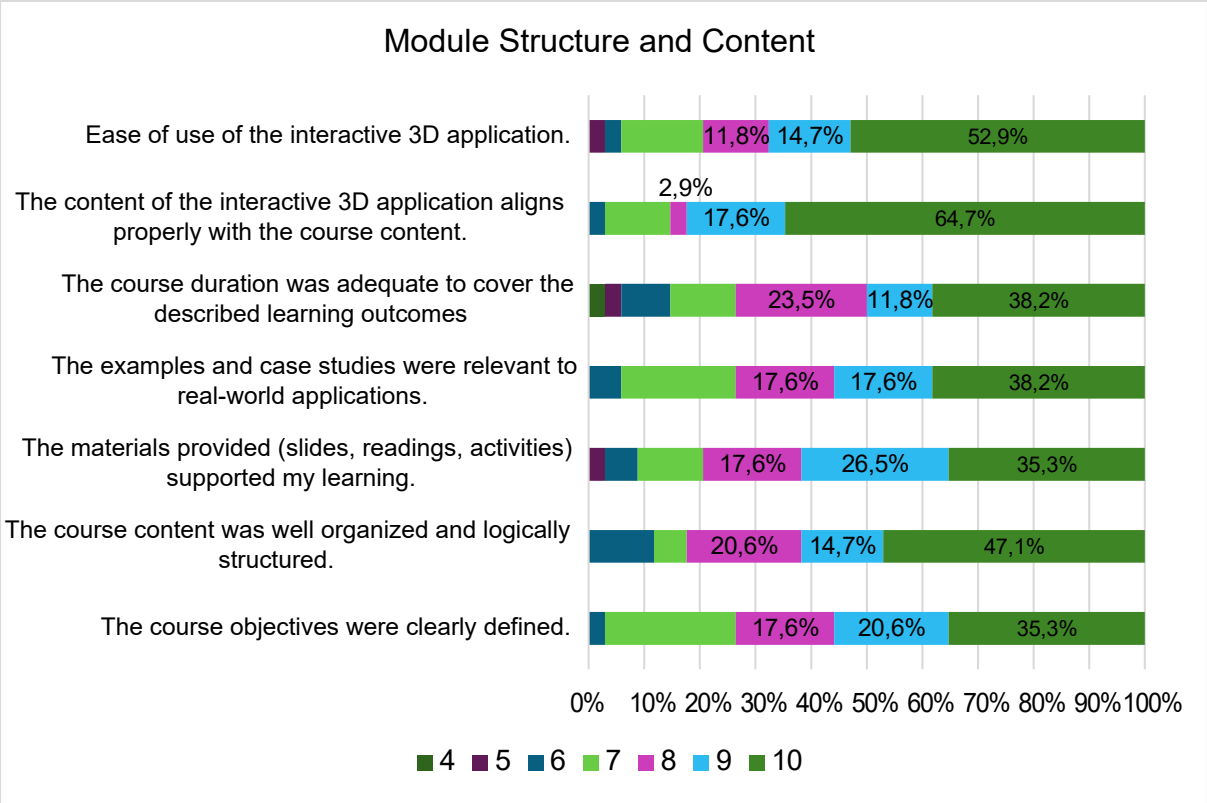


Fig. 6. Evaluation results of section A of Module Copper Supply Chain (online training) (n=34).

Source: The authors' compilation.

Participants generally rated the module's structure and content very positively. A total of 56% of respondents agreed or strongly agreed that the training module objectives were clear. The content was well organised and logically structured, with 67.7% top responses. Learning materials such as slides, readings, and activities supported learning for 62% of the participants. Examples and case studies were relevant to real-world applications, with 55.8% positive responses. Most users (61.7%) felt the module duration was adequate. The interactive 3D application was highly aligned with the module content (82.3% agreement) and easy to use (67.6% agreement). Overall, the module was well-structured, effectively supported learning, and included interactive elements that the participants found highly valuable.

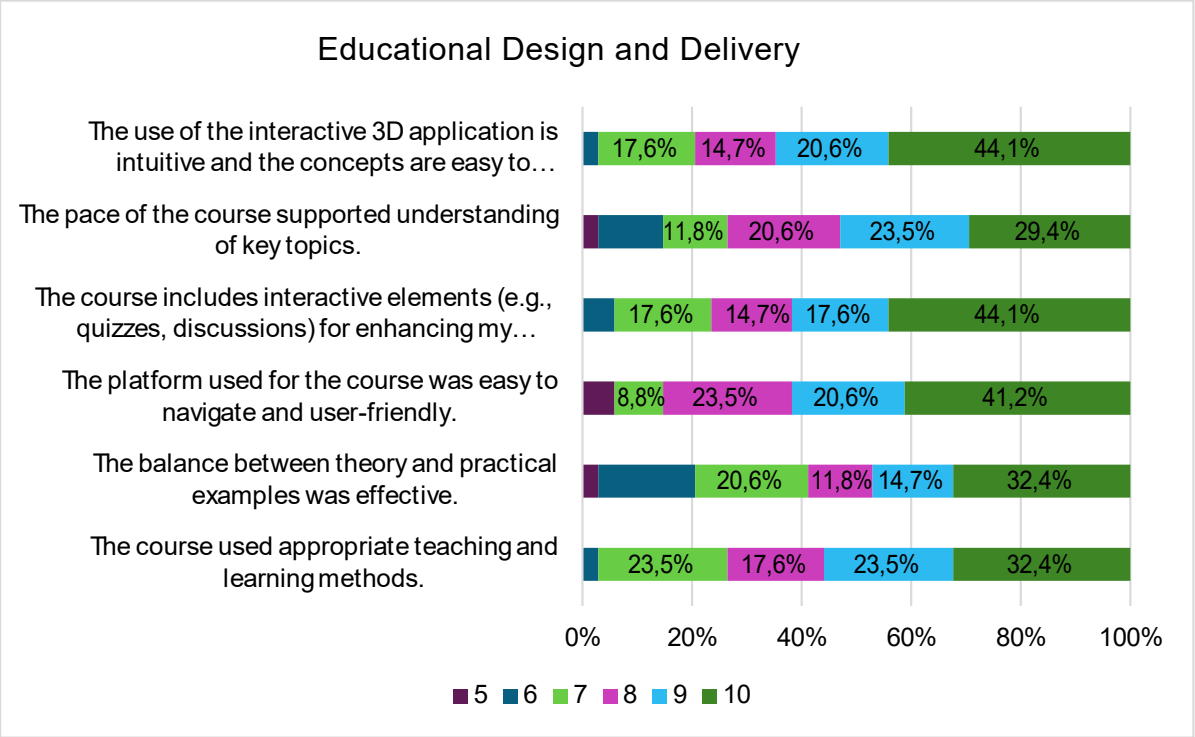


Fig. 7. Evaluation results of section B of Module Copper Supply Chain (online training) (n=34).

Source: The authors' compilation.

The participants rated the educational design and delivery of the training module very positively. A total of 96.2% agreed or strongly agreed that the module used appropriate teaching and learning methods. An effective balance between theory and practical examples was reported by 79.1% of participants. The training platform was user-friendly and easy to navigate for 88.1% of respondents. Interactive elements such as quizzes and discussions enhanced engagement for 76.5% of participants. The pace of the module supported the understanding of key topics for 85.9%, while the interactive 3D application was considered intuitive and easy to understand by 87.0% of participants. Overall, the training module design successfully combined effective teaching methods, practical examples, user-friendly technology, and engaging interactive elements.

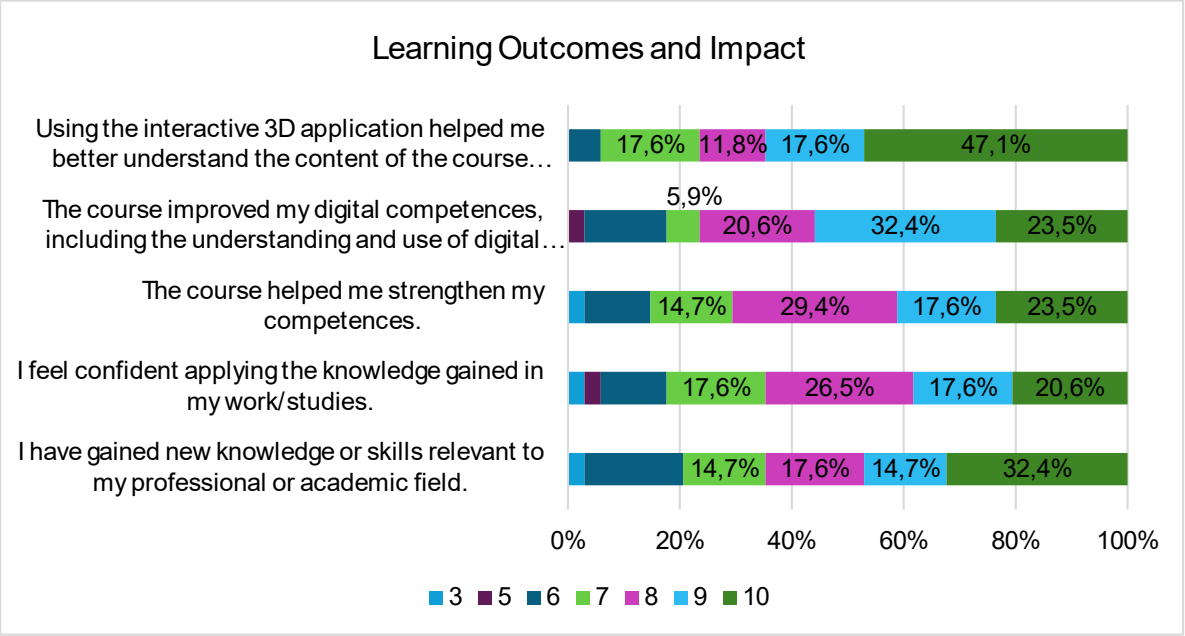


Fig. 8. Evaluation results of section C of Module Copper Supply Chain (online training) (n=34).

Source: The authors' compilation.

The next section of the survey regardings "Learning Outcomes and Impact" supported strong and positive feedback from participants. A total of 82.4% agreed or strongly agreed that they gained new knowledge or skills relevant to their professional or academic field. Confidence in applying this knowledge was reported by 82.3% of participants. The module helped strengthen competencies for 85.9% of respondents. Digital competencies, including understanding and use of digital tools, improved for 82.4%, while the interactive 3D application enhanced the understanding of the module content for 94.1% of participants. Overall, the module was effective in developing knowledge, practical skills, competences, and digital literacy, with interactive tools playing a key role in supporting learning. The participants were highly satisfied with the training module. Overall, 80.0% agreed or strongly agreed that they were satisfied with the quality of the module. A similar proportion (79.4%) would recommend the training module to others. The interactive 3D application received particularly strong endorsement, with 77.9% agreeing or strongly agreeing that they would recommend its use to complement the module content.

Most participants (~75%) indicated no improvements were needed or did not comment, showing a general satisfaction with the module. A smaller group suggested adding practical examples, interactive content, or improving usability and structure, highlighting potential areas for targeted enhancements.

Validation summary

The entire process of testing and validating the SkiComCu programme was carried out in a structured and systematic manner to ensure the achievement of the intended objectives. During the initial testing, all IT tools and the e-learning platform were carefully assessed against predefined technical specifications and content requirements. Technical verification included checking system performance, compatibility across devices, user interface functionality, and error-free operation. The verification of the tools in both areas allowed for a comprehensive testing and provided appropriate feedback on any potential errors, thereby enabling their correction and elimination. The next step was to collect feedback from the participants through satisfaction surveys. Feedback focused on usability, clarity, quality, educational effectiveness as well as technical and functional performance. In the case of online training validation, the survey results indicate that the SkiComCu programme was very positively received by participants. High ratings were recorded across all evaluated areas, including module structure and content, educational design and delivery, learning outcomes and impact, and overall satisfaction. Participants particularly appreciated the clear objectives, well-organised content, user-friendly platform, effective teaching methods, and relevant practical examples. The training modules were found to support the development of professional, technical, and digital competencies, while also increasing confidence in applying the acquired knowledge in practice. Several areas for potential improvement were identified, such as adding more practical examples or increasing the level of detail (specific results are presented in the section above). These areas will be re-evaluated, and after analysing the feasibility and relevance of implementing any changes, the training will be adjusted accordingly.

Limitations

The findings should be interpreted with caution due to several limitations. First, the evaluation relied on self-reported perceptions rather than objective measurements of competency gains. Second, the response rate was relatively low (32%), creating a potential non-response bias. Third, the detailed analysis was based on a small subgroup of participants (n=34), limiting the generalizability of the results. Fourth, no control group or pre-post assessment design was used, making it impossible to attribute observed outcomes solely to the use of XR technologies. Finally, the study measured short-term participant reactions and perceptions rather than long-term learning retention or workplace performance outcomes.

Conclusions

The SkiComCu consortium partners were deeply involved in the implementation as well as testing and validating the training materials and XR tools. Their primary goal was to evaluate effectiveness and pinpoint potential areas for enhancement. Beyond technical performance, the consortium focused on the content's appeal, relevance, and market competitiveness compared to other online offerings. These resources were specifically tailored to bridge the existing skill gaps and equip the copper industry's workforce with the competencies required to meet future sector demands.

The feedback emphasised the clarity and logical structure of the SkiComCu modules, though it also identified technical bugs and a desire for a more diverse practical content. The proposed enhancements include more multimedia and scenario-based exercises to drive interactivity. Partners will continue a cycle of testing and refinement through August 2026 to ensure the platform is robust before its public release. This rigorous verification process is essential to guarantee quality; once all standards are met, the results will transition to the commercialisation phase.

Overall, the survey results confirm the high quality of all evaluated modules and their strong educational value. The participants expressed high levels of satisfaction with both the training content and the technology used in our hybrid sessions. The majority gained practical skills they intend to apply in their fields. A key contribution of this work is the integration of XR technologies (AR, VR and interactive 3D tools), which provide immersive and interactive learning experiences that support the understanding of complex metallurgical processes and safety procedures. Although the general reception was excellent, identified areas for improvement will guide our next steps. Interestingly, suggestions for additional multimedia and case studies propose a clear path for evolving these programs beyond their original design.

In conclusion, the validation and verification process confirms that the SkiComCu training materials are effective, relevant, and well-received, while also highlighting opportunities to further enhance interactivity, practical application, and overall user experience. These insights will help ensure that the project delivers high-quality, industry-relevant training solutions that remain competitive and impactful in a rapidly evolving sector. The main value of the SkiComCu programme is also that by addressing identified skill gaps and incorporating both technical expertise and essential soft skills, the program is well-positioned to enhance productivity, innovation, and sustainability in the industry.

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