

Disaster Risk Management and Civil Resilience

DRM-FRAME

Teaching methodologies, tools and methods to be used within the pedagogical approach and training activities

Work Package: WP1 Proposal for Disaster Risk Management framework

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The DRM-FRAME project

The project "Disaster risk management and civil resilience DRM-FRAME" is an ERASMUS+ co-funded EU project of action type KA220-VET-"Cooperation partnerships in vocational education and training" and has a duration of 2 years. The scope of the project is to enhance the capacity, skills building and preparedness in the area of Disaster Risk Management (DRM), including prevention, effective response and recovery and to promote local development opportunities. This will be achieved through the development of an interactive learning and training tool which will integrate a training curriculum in the area of DRM. The training audience is primarily composed by civil protection professionals at local, regional and national level, vocational trainers, volunteer associations, etc.

The consortium, composed by Higher Education Institutions, Research Institutes and Vocational Educational Providers, will jointly create an integrated curriculum which inter alia will train professionals in the basic concepts for Disaster Risk Reduction (DRR) and relevant policy issues, basic steps for Vulnerability and Capacity Assessment, enrichment of strategic plans for DRR and management at local level, etc.

In this framework an interactive multilingual platform will be developed with the following features: (i) an e-learning space, including the topics of the training curriculum, supported by a web-GIS platform which will allow the illustration of the evolution of scenarios at the areas of interest; (ii) a double assessment tool, which will enable the customization of the training path and the evaluation of the acquired skills; (iii) communication and networking capabilities among users. The outcome of the project will be validated by a number of external experts and during the multiplier events in all partner countries.

Table of Contents

Abbreviations.....	5
Executive Summary.....	6
- Introduction	7
o VET definitions and EU policy	7
o VET and DRM-FRAME.....	7
- Teaching methods and techniques for VET	9
o Teaching methods.....	9
o Innovative educational means.....	12
- Pedagogical Strategy of DRM-FRAME.....	16
o Principles and Methodologies.....	16
o Innovative learning methods and practical training experiences in DRM.....	19
o Overview of Training modules in DRM-FRAME, Target audiences and recommended Teaching methods	21
o Synchronous and asynchronous modes of learning/training	29
▪ Modes of training in DRM-FRAME platform	30
o Adjusting Strategies for Expert and Non-Expert Learners	31
▪ Application in DRM-FRAME platform	33
- Digital and ICT tools for teaching and training within DRM-FRAME – the Interactive platform..	35
o E-learning platforms and Learning Management Systems (LMS).....	36
o Participatory web GIS simulation platform.....	37
- Conclusions	38
References	40

List of Figures

Figure 1. Kolb's experiential learning cycle describes a four-stage process for learning. Learning through experience is emphasized, where individuals actively engage, reflect, analyze, and then apply their learning (<https://www.simplypsychology.org/learning-kolb.html>). 18

List of Tables

Table 1. Summary comparison of innovative educational tools and methods for VET.....	15
Table 2. Target audience and teaching methodology per module and sub-module.....	22

Abbreviations

Table 1: List of Abbreviations

Abbreviation	Explanation
AR	Artificial Reality
CBT	Competency-Based Training
DRM	Disaster Risk Management
ICT	Information and Communication Technology
LMS	Learning Management Systems
PBL	Problem-Based & Project-Based Learning
VET	Vocational Education and Training
VR	Virtual Reality

Executive Summary

The deliverable “Teaching methodologies, tools and methods to be used within the pedagogical approach and training activities” corresponds to the relevant Activity of WP3 “Proposal for a Disaster Risk management Framework” which is expected to include the pedagogical approach, learning/teaching methodologies appropriate for Vocational Educational Training (VET) and the proposed ICT tools. A collection of the most known and applied teaching methodologies and techniques for VET have been discussed with reference to their main advantages as well as shortcomings. Subsequently different digital and non-digital, yet innovative tools for the implementation of the above-described methodologies, have been enlisted with a critical review of their main strengths and limitations as far their efficiency as well as applicability are concerned. The core chapter of the deliverable focuses on the key principles of DRM-FRAME pedagogical approach. The specific learning methods proposed to be adopted by the different modules of the DRM-FRAME curriculum are analyzed and associated with each sub-module of the training curriculum. Equally the expertise of the main target audience of each sub-module has been presented, followed by a description of the most appropriate training strategy when the training is addressed to expert or non-expert learners. Lastly, the interactive e-learning platform that is being developed, its functions and digital tools to accommodate the training requirements and needs of the different modules and trainees, are briefly presented, preparing the ground for the next activities of WP4 Interactive platform.

- Introduction

○ VET definitions and EU policy

Vocational Education and Training (VET) refers to education and training courses developed to equip young people and adults with the practical skills, information, and competencies required to enter a particular career or respond to general labor market needs. Differing from academic education, VET is Career-oriented and competency-based and is offered across all qualification levels using a combination of formative and non-formal channels.

For UNESCO, VET—is colloquially known as Technical and Vocational Education and Training (TVET)—covers “education, training and skills development” across a range of vocational occupation domains, thus enabling entry into decent work, opening up access to lifelong learning, reinforcing social equity, and supporting sustainable development. Within the European Union (EU), VET is recognized as a fundamental element of lifelong learning systems as a driver of employability, innovation, and social inclusion. The EU’s Council Recommendation on VET (2020) evocatively describes VET as essential for the achievement of “sustainable competitiveness, social fairness and resilience,” signaling member countries’ obligation to modernize VET in light of employment market shifts, adopt inclusivity, and aim for “equipping young people and adults with the knowledge, skills and competences to thrive... and drive the recovery and the transitions to the green and digital economy.” VET programs are set to integrate vocational (technical) skills with necessary competencies like digital skills and “life skills,” creating a sound basis for resilience, lifelong learning, and active citizenship.

○ VET and DRM-FRAME

Disaster Risk Management (DRM) involves critical components of disaster prevention, preparedness, response, and recovery, a field where the need for specialized competencies and skills has become increasingly pressing. International agreements, such as the Sendai Framework for Disaster Risk Reduction (2015–2030), stress the necessity of incorporating disaster risk knowledge and training into education at all levels.

For example, Sendai Priority 1 (Understanding Disaster Risk) calls for states to “promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and non-formal education.” This appeal stems from an understanding that building societal resilience is contingent not just on educated citizens but also on skilled practitioners, volunteers, and officials able to apply DRM principles to real-world situations. These priorities have been echoed by the European Union in its policies; in particular, the Union Civil Protection Mechanism includes training programs alongside the newly initiated Civil Protection Knowledge Network, whose aim is to strengthen professional training and knowledge exchange among emergency management professionals. By situating DRM within a Vocational Education and Training (VET) framework, projects like DRM-FRAME address crucial skills gaps while addressing the EU’s goals of strengthening preparedness and resilience. Carefully designed DRM training within a VET context has the potential to equip local authorities, civil protection professionals, NGOs, and community leaders with skills to prevent and respond to disasters more effectively, protecting communities and advancing the EU’s aspirations under the Sendai Framework and the Sustainable Development Goals, in particular SDG 11, which aims to make cities and communities sustainable.

DRM-FRAME is located at the intersection of EU VET policy and the pressing needs of disaster risk reduction. It mobilizes the inherent strengths of vocational education and training—marked by its practical nature, flexibility, and focus on competencies—and translates them into a leading-edge pedagogical model of disaster risk management training. It is fully in line with priorities of Erasmus+, aimed at innovation promotion, the enhancement of digital skills, and capacity development within the VET area, as presented in the proposal of the project. The prime rationale of the project is the delivery of an "innovative package of learning, training, and navigation tools in the area of civil protection and resilience" by combining the best practices of VET with the scholarly expertise of the partners from the world of higher education. In the following, we will unveil the pedagogical idea of DRM-FRAME, describing the teaching approach, tools, and techniques involved as well as how it links with current VET theory and is responsive to the specific challenges of disaster risk management education.

- Teaching methods and techniques for VET

○ Teaching methods

There are different types of teaching methods that include e.g. differentiated instruction, lecture-based instruction, technology-based learning, group learning, individual learning, etc. In particular, as far as Vocational Education and Training (VET) is concerned, effective teaching techniques in VET focus on practical, hands-on learning, real-world application, and fostering critical thinking skills. Training and education ideally involve active learning, feedback, and collaborative learning strategies. This can be achieved through a variety of methods, including experiential learning, project-based learning, and the use of technology like virtual and augmented reality, some of which will be discussed in the following chapter.

Below a comprehensive list of key teaching methodologies used in Vocational Education and Training (VET) is presented together with their main advantages.

1. Competency-Based Training (CBT)

It focuses on learners achieving specific workplace-relevant competencies. Requires demonstration of skills to meet industry standards.

Main advantages

- Practical and goal-oriented: Structured around real job tasks, supporting immediate workplace application.
- Skill mastery emphasis: Learners must demonstrate competence before advancing.

2. Experiential Learning

Learning through direct experience—hands-on tasks, simulations, workshops, fieldwork. It is rooted in the idea of “learning by doing.”

Experiential learning is a teaching methodology where learning is achieved through direct experience and reflection. It emphasizes hands-on activities and the application of knowledge to real-world situations, simulations, workshops, fostering a deeper understanding and retention of information.

Main advantages

- Enhances retention and engagement.
- Boosts critical thinking and confidence.

Nevertheless, it needs structured reflection and facilitator support, while it often requires suitable physical or virtual spaces and resources.

3. Collaborative & Cooperative Learning

It consists of group-based tasks where learners solve problems together, enhancing teamwork and peer learning. Includes workplace placements, internships under guidance.

Main advantages

- Strengthens communication and teamwork skills.

- Mirrors actual workplace collaboration.

Nevertheless, the following challenges may need to be addressed:

- Group dynamics management and clear role definition needed.
- Requires effective facilitation of group processes.

4. Self-Directed Learning

- Self-directed learning (SDL) is an approach where individuals take the initiative to identify their learning needs, set goals, and choose methods and resources to learn, with or without the guidance of others. It emphasizes learner autonomy and self-management in the educational process, however since it demands high self-motivation and discipline, supportive scaffolding by the educator is essential.

Main advantages

- Fosters lifelong learning habits and autonomy.
- Allows personalized progression.

5. Problem-Based & Project-Based Learning (PBL)

They are both student-centered instructional approaches that emphasize active learning and collaboration, but they differ in their focus and structure. Problem-based Learning emphasizes solving complex, real-world problems through inquiry and investigation, often with a focus on the process and development of skills. Project-based learning, while also collaborative, centers on creating a tangible product or outcome to demonstrate knowledge and skills acquired throughout the learning process. It is important that learners tackle real-world problems or take on projects end-to-end—from planning to execution. Nevertheless, it is definitely time-consuming and resource-intensive, while it heavily relies on the facilitation and a quality problem design, both requiring a skilled and highly competent educator/trainer.

Main advantages

- Develop critical-thinking, problem-solving, collaboration.
- Highly context-relevant and engaging.

6. Flipped Classroom

A flipped classroom is an instructional strategy that reverses the traditional learning environment by delivering content outside of the classroom (e.g., through videos, readings) for which learners need to get prepared, and using class time for interactive, hands-on activities and collaboration. This approach aims to increase student engagement and deeper learning by allowing students to engage with material at their own pace and then apply that knowledge in class with the guidance of the educator. Inevitably it heavily relies on learner's discipline for preparation outside the classroom, as well as access to learning material. The educator can prepare the learner appropriately and encourage them towards this direction.

Main advantages

- Maximizes hands-on practice time in instructor presence.

- Promotes active learning and peer interaction.

7. Blended Learning

It consists of a hybrid model of mixing online training (e-learning) with in-person instruction. Includes several formats (rotation, flex, online driver). As expected, it is digitally dependent and requires technologically literate learners, while it requires complex planning on behalf of the educator.

Main advantages

- Flexible, scalable, data-informed (analytics guide teaching).
- Cost-effective when properly designed.

8. Simulation & Immersive Learning (VR/AR/360° environments)

Simulation and immersive learning leverage technologies like virtual reality (VR), augmented reality (AR), and mixed reality (MR) to create interactive, realistic learning 360° environments. These environments allow learners to practice skills and gain experience in simulated scenarios, enhancing engagement and knowledge retention. This technique requires costly technical equipment, maintenance and competences from both educators and learners and is mainly applied when the trainees need to practice specific skills.

Main advantages

- Safe, risk-free practice in realistic settings.
- High engagement and experiential learning.

9. Recognition of Prior Learning (RPL)

This is a process that assesses and acknowledges a person's existing knowledge, skills, and experience, regardless of how they were acquired (e.g., through work, life experience, or previous education). This allows individuals to gain formal recognition for their learning, obtained outside formal education, potentially leading to credit towards a qualification, exemptions from certain course components, or entry into further education or training. Although this is a more of an accreditation method, it encourages adult learners to acknowledge and enhance their knowledge, while the need for robust protocols to evaluate and validate informal learning should not be disregarded.

Main advantages

- Accelerates learning by acknowledging existing competence.
- Motivates adult learners and opens flexible entry pathways.

10. Dual Education / Apprenticeship System

This system combines vocational training in a school some days of the week with practical experience (apprenticeships) in a workplace. It's a system where students spend time both in the classroom and on the job, gaining both theoretical knowledge and practical skills relevant to their chosen field. This system aims to bridge the gap between education and the workforce, preparing individuals for successful careers. Close coordination between schools and companies is necessary as well as an effort for standardizing the traineeship offered by the different firms. Moreover, it is important the academic/school knowledge offered not to be disregarded both by the students and the educators.

It is more of an educational system rather than an educational methodology, commonly used in countries like Austria, Germany, Switzerland, yet it is listed herein as it may be used as inspiration for a teaching methodology that combines theory with practical application in the real working environment.

Main Advantages:

- Strong industry relevance, early workplace exposure – sometimes the same is considered as a drawback if not properly addressed
- Well-defined standards and career orientation.

Most VET programs succeed when employing a **multimodal strategy**, combining various methodologies:

- **CBT + Experiential + PBL:** Ensures skill building through real challenges.
- **Blended & Flipped:** Supports the theoretical base with flexible delivery.
- **Simulations/VR/AR:** Provides safe, immersive skill practice with simulated hands-on practice, where real tools are too costly or unsafe.

This multimodal, integrated approach maximizes engagement, accessibility, and real-world readiness—while ensuring resources and context are well matched to the learner and industry needs. By thoughtfully combining these approaches, VET institutions can create powerful, relevant, and learner-centered training pathways.

○ Innovative educational means

The implementation of the above-analysed methodologies for successful Vocational Education and Training requires different means (digital and non-digital). Below, an analysis of innovative tools employed for **Vocational Education and Training (VET)**, is conducted, including some **pros and cons**, as identified for the special needs of VET.

1. Digital Tools & Platforms

These include Learning Management Systems (LMS), mobile learning apps, interactive simulations, online assessment tools, and collaborative platforms (e.g., Moodle, Google Classroom, Kahoot, Labster).

Advantages

- **Accessibility & convenience:** Learners can access materials from anywhere, anytime.
- **Interactive learning:** Gamification, quizzes, and simulations boost engagement.
- **Progress tracking:** Teachers can monitor learner data and adapt content.
- **Scalable:** Easy to update and share content across regions.

Disadvantages

- **Digital literacy gaps:** Some learners and trainers may lack tech skills.
- **Infrastructure dependency:** Requires reliable internet and devices.
- **Less tactile experience:** May not replicate hands-on skills training well.

2. E-learning

a) Synchronous (Live online classes via Zoom, Teams, etc.)

Live sessions replicate the classroom in real time.

Advantages

- **Real-time interaction:** Promotes direct Q&A, discussion, feedback.
- **Social connection:** Builds a sense of community.

Disadvantages

- **Scheduling challenges:** Difficult across time zones or for working students.
- **Bandwidth-dependent:** Disruptions possible with poor connectivity.

b) Asynchronous (Recorded lessons, self-paced modules)

Learners access pre-prepared content on their own schedule.

Advantages

- **Highly flexible:** Ideal for self-motivated learners and part-time students.
- **Revisitable content:** Learners can rewatch and review material.

Disadvantages

- **Limited interaction:** Isolation risk; no real-time support.
- **Discipline required:** Learners must self-manage progress.

3. Blended Learning

Combines online (both synchronous and asynchronous) with face-to-face training. Popular in VET for mixing theory and practical instruction.

Advantages

- **Best of both worlds:** Online theory + in-person skills training.
- **More adaptable:** Accommodates various learning preferences.
- **Continuity:** Enables learning during disruptions (e.g. lockdowns).

Disadvantages

- **Requires planning:** Teachers must design cohesive, balanced programs.
- **Digital divide:** Disparities in access can hinder inclusion.

4. Simulations, AR/VR & Immersive Technologies

With the use of advanced and costly equipment. It is often employed in technical training (e.g., automotive repair, healthcare, driving, firefighting) to simulate equipment or procedures for which practical training is not easily feasible and with the available resources.

Advantages

- **Safe practice:** Risk-free environment to repeat complex tasks.
- **Engaging:** Encourages active, exploratory learning.
- **Industry-relevant:** Simulates real work environments.

Disadvantages

- **Cost-intensive:** Hardware and content creation are expensive.
- **Limited scalability:** Not accessible in all regions or institutions.

5. Microlearning & Mobile Learning

Short, focused content modules delivered via mobile devices (videos, quizzes, podcasts).

Advantages

- **Ideal for busy learners:** Fits into short time windows.
- **Better retention:** Bite-sized learning helps memory and comprehension.

Disadvantages

- **Fragmented:** Lacks depth for complex skills.
- **Easy distraction:** Competes with other mobile notifications.

6. Social media in learning

The creation of virtual learning communities in which students use social networks and media to research content, engage in online study groups, to conduct surveys, to support each other by exchanging questions and answers, as well as to seek information of personal interest.

Advantages

- **Enhanced communication and direct collaboration**
- **Increased engagement and motivation**, as learning becomes more interactive, engaging, fun and integrated into everyday life
- Development of essential **digital skills**

Disadvantages

- **Destruction and reduced productivity:** simultaneous employment of social media for other purposes is major source of destruction

- **Dependence on technology and reduced face-to-face interaction**
- **Exposure to fake news and misinformation**, which can be from misleading to harmful if not critically evaluated

Table 1. Summary comparison of innovative educational tools and methods for VET.

Method and means	Strengths	Limitations
Digital Tools Synchronous E-learning Asynchronous E-learning	Scalable, trackable, engaging	Infrastructure and skills gaps
	Real-time connection, interaction	Time-bound, tech-dependent
	Flexible, repeatable	Isolating, requires discipline
Blended Learning	Flexible, robust, learner-centered	Complex planning, tech disparities
AR/VR Simulations	Immersive, risk-free, hands-on	High cost, access limitations
Micro/Mobile Learning	Fast, convenient, effective in short bursts	May lack depth, attention split
Social media	Communication, engagement, digital skills	Destruction, technology dependence, risk for misinformation

- Pedagogical Strategy of DRM-FRAME

DRM-FRAME's pedagogical approach is learner-centered, competency-based, and tailored for adult learners in a VET context. Rather than relying on one-dimensional lectures, the curriculum emphasizes active engagement and practical application of knowledge.

○ Principles and Methodologies

Key principles of this approach include:

Modularity and Flexibility: The training is organized in modules and sub-modules that are self-contained or can be taken in sequence, serving the needs of a heterogeneous audience—from those without any background in DRM to professionals with experience. The structure allows learners to engage with appropriate content at an appropriate level and time. Additionally, the modularity supports individualized learning pathways and just-in-time learning for those already employed. It reflects the vision of agile VET systems in the Council Recommendation, which is to be responsive to learners' needs and a range of contexts.

Blended and Multimedia Teaching: The course utilizes a blended learning paradigm that integrates self-study online learning with interactive and experiential components. Through an e-learning platform, learners interact with succinct textual materials and rich video lectures supplemented with face-to-face or virtual workshops, lively debates, and hands-on field exercises. This synergy of online and offline approaches enables learners to control the pace and mode of learning while requiring active engagement with hands-on activity. Blended learning has shown in adult learning research that it is more powerful when compared with the exclusive application of face-to-face and all-online modalities since it implies increased flexibility without decreasing engagement.

By incorporating multimedia components such as readings, video clips, simulations, and maps into the course offerings, the course utilizes various learning approaches and translates abstract ideas into concrete comprehension. For example, a course might include an e-learning tutorial on risk theory that flows into an interactive group activity that revisits theoretical understanding in the context of real-life practice. These blended designs have proved to improve adult learners' satisfactions as well as enhance learning outcomes by leveraging the best aspects of both modalities.

Technology-Enhanced Training: One of the project's defining characteristics is the use of cutting-edge Information and Communication Technologies (ICT) to enhance the learning process. Training occurs on an interactive digital platform, developed in project Work Package 4, which is both a Learning Management System and a collaborative workspace. The platform is a repository for multimedia e-learning content, quizzes, and assignments, as well as a host for specialized software such as a web-based Geographic Information System (GIS) for hazard scenario visualization. Because disasters have an inherent spatial component, the GIS tool allows learners to browse hazard maps, query risk data, and run disaster scenarios using an intuitive map interface. This interactive and immersive feature brings Disaster Risk Management (DRM) concepts like vulnerability mapping and evacuation planning vividly to life, while also promoting learners' spatial literacy in the context of disasters.

In the DRM-FRAME method, technology is not used for its own sake but as a means of delivering immersive learning experiences and introducing trainees to the digital tools increasingly central to DRM practice today, from GIS and simulation software to decision-support tools. Trainees thus gain digital skills together with DRM knowledge, a double dividend in this vocational skills training. This

focus on digital readiness is in line with EU policy to enhance digital competencies in Vocational Education and Training (VET), indicating the project’s investment in innovative, state-of-the-art learning materials. With tools such as web-GIS and crisis simulation platforms, learners develop conceptual as well as technical competences essential to 21st-century emergency management.

Collaborative and Social Learning: Disaster management is a cooperative endeavor – effective response and resilience depend on coordination across agencies, communities, and teams. Accordingly, the pedagogical approach emphasizes social learning through group activities, discussions, and peer exchange. The online platform includes networking and communication features (forums, chats, group spaces) so that learners from different regions or professional backgrounds can interact, share experiences, and solve problems together. Many training activities are designed as team exercises: e.g. a group simulation where learners must collaborate on an incident response, or a discussion where experts and non-experts compare perspectives.

Such design acknowledges that adults learn not only from instructors or content but also from each other. Peer learning leverages the diverse experience that adult learners bring – an emergency services veteran and a community volunteer can both contribute insights in a scenario discussion, enriching the learning for all. This approach resonates with broader adult education strategies recognizing learning as a social, participatory process. It also mirrors the real-life teamwork required in DRM (emergency operations centers, community preparedness efforts, etc.). Facilitated reflection is another social learning element: the curriculum encourages participants to reflect on their own prior experiences with disasters or drills and discuss them. Structured debriefings after simulations, for example, allow learners to articulate lessons learned and hear others’ viewpoints, reinforcing knowledge through dialogue and self-assessment. By building a learning community, DRM-FRAME aims to break the isolation of online learning and promote a culture of continuous improvement and shared practice in disaster management.

DRM-FRAME strongly recommends the use of experiential and Problem-Based Approaches, supported by adult learning theories, including Kolb’s experiential learning cycle (Figure 1), placing a strong focus on learning-by-doing. Throughout the course, students actively participate in simulations, case studies, scenario-based problem solving, and role-play exercises, applying concepts to realistic challenges. Instead of passively memorizing information, participants engage in problem-solving activities—such as developing an emergency plan for a given scenario or playing the roles of decision-makers in a disaster simulation. These experiential and problem-based approaches to learning are strongly supported by literature, with research showing their significant contribution to improving learners’ knowledge retention and their ability to transfer skills to real-life situations. In the context of disaster management, simulation exercises are particularly significant. Simulated emergencies, whether they involve tabletop drills, functional exercises, or full-scale field drills, provide a safe space for rehearsing decision-making in a high-stress environment. Indeed, simulation exercises (SimEx) have been found to be “an excellent tool for improving disaster planning and response,” as established in the conclusion of a systematic review of disaster preparedness drills in 2023.

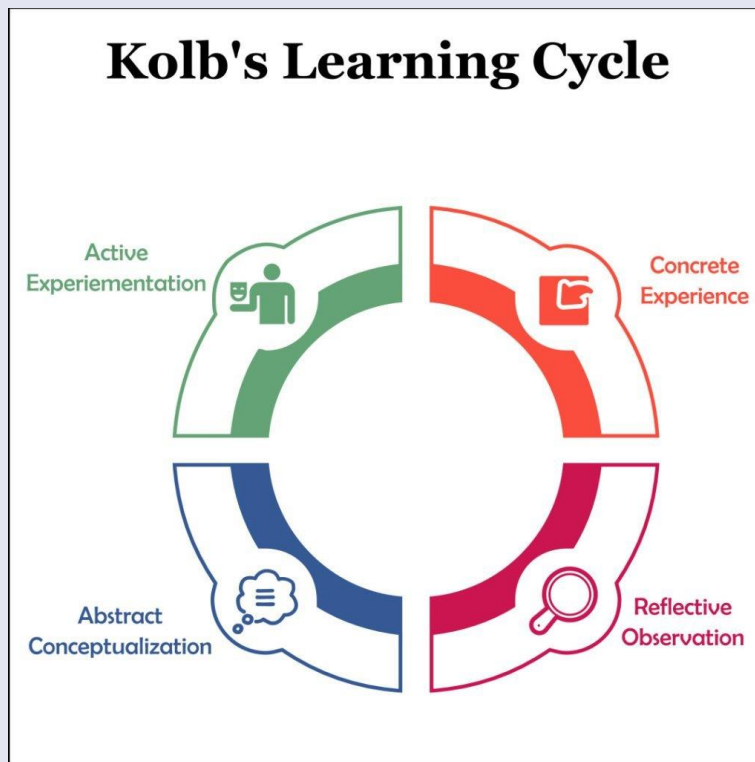


Figure 1. Kolb's experiential learning cycle describes a four-stage process for learning. Learning through experience is emphasized, where individuals actively engage, reflect, analyze, and then apply their learning (<https://www.simplypsychology.org/learning-kolb.html>).

Participants who take part in well-designed disaster simulations consistently demonstrate significantly better preparedness, faster response times, and increased confidence in dealing with emergencies. With regular simulations and hands-on exercises incorporated throughout, training on disaster management ensures that learners not only learn about the theory of Disaster Risk Management (DRM) but are also able to apply it. Each module proposed by DRM-FRAME links new knowledge to a practical task, echoing the vocational education and training (VET) ethos of competence development while mirroring real-world issues as closely as possible.

Adult Learning Principles: Underpinning all the above is a commitment to core adult learning (andragogy) principles. The content is relevant and problem-centered, directly tied to real-world challenges learners may face in disaster risk management (making the learning immediately applicable). The training respects learners' existing knowledge and experiences – treating those as assets to build on – rather than assuming a blank slate. Modules encourage learners to self-direct their learning path when appropriate (for instance, optional advanced readings for those who want more depth, or the ability to test out of what they already know via the platform's assessment tool). The curriculum focuses on competency development – what learners can do after training – not just abstract knowledge. Where theory is introduced, it is quickly connected to practical application to maintain engagement for busy adult learners. Moreover, motivation is kept high by showing how skills gained can improve the learners' effectiveness in their professional or civic roles (e.g. how mastering risk assessment techniques will enable them to protect their community better). The approach also

fosters reflection and critical thinking, encouraging learners to think about how DRM concepts apply in their own context and to evaluate case studies or past disasters critically. These facets align with best practices in adult education and ensure the training is learner-centered and respectful of the adult learner profile.

In summary, DRM-FRAME's pedagogical strategy is a modern blended learning model tailored to VET and adult learners, characterized by active learning methods, extensive use of digital tools, collaborative exercises, and flexibility to accommodate a range of backgrounds. It aims to produce not just knowledge gain but true competence – empowering learners to “effectively apply what they learn to real disaster risk management challenges”. By combining the above elements, the program creates a dynamic learning journey rather than a static lecture course. The next section details how these methodologies and tools are concretely implemented across the curriculum's modules and training activities.

○ **Innovative learning methods and practical training experiences in DRM**

Acquiring disaster management competency requires a break from conventional classroom learning. DRM-FRAME emphasizes the need for pedagogical innovation—mainly experiential learning and reflective practice-based approaches—to prepare learners to respond effectively in real emergencies and complex challenges. In the following paragraphs, we discuss multiple methods and how they relate to disaster risk management and training on civil protection. These methods are proposed below in Table 1 as training/teaching methods for the different modules and sub-modules.

- **Scenario-Based Learning:** Scenario-based learning presents learners with realistic problem scenarios and asks them to apply their knowledge to make decisions or solve problems. For example, learners might be given a scenario of an approaching hurricane and asked to develop a preparedness plan or presented with a post-earthquake damage situation and tasked with prioritizing response actions. These scenarios can be communicated through text, multimedia, or simulation (for heightened realism). Scenario-based learning situates knowledge in context, requiring learners to integrate information from various domains (e.g. logistics, communication, public safety) – mirroring the interdisciplinary nature of DRM. It also teaches critical thinking and decision-making under uncertainty, key skills for disaster managers. Learners get to see the consequences of their decisions in the scenario debrief, which reinforces learning. As noted, the curriculum uses tabletop exercises and computer simulations to facilitate scenario-based learning; this method has strong support in emergency management training literature, where practical scenario exercises are shown to improve coordination and reveal gaps that theoretical learning alone might not identify. By working through multiple scenarios (ranging from local incidents to large-scale disasters), learners build a mental repertoire of strategies, and a deeper understanding of how theoretical principles play out in dynamic situations.
- **Simulation exercises and functional drills** are the cornerstone of experiential Disaster Risk Management (DRM) training. These exercises span a broad range, from tabletop simulations—discussion-based walkthroughs of emergency scenarios—to functional drills, where participants take on their actual roles in a simulated context, to full-scale drills involving actual equipment and actors. Tabletop and functional exercises can be implemented with minimal resources and via virtual means and are often strongly recommended for training purposes. Disaster preparedness research highlights

the value of such exercises in terms of testing plans and developing proficiency: “Studies have shown that many forms of SimEx... have their benefits... There is no doubt that SimEx is an excellent tool for improving disaster planning and response.” (Mahdi et al., 2023). These drills allow participants to rehearse standard operating procedures, including Incident Command System procedures, while also encouraging teamwork. Most importantly, debriefing sessions and lessons learned after each simulation have a special role in participants training. It is during these moments of reflection that the most significant learning takes place—participants and instructors review what went well, discuss challenges, and brainstorm ways to improve. These reflective discussions close the gap between practice and theory, often leading participants to articulate best practices or updated plans of action that can be transferred to real-world contexts. By taking part in simulations, students experience the pressures and uncertainties of disaster all within a safe environment intended to prepare the mind as well as the body. This aspect of their simulation is pivotal because disaster response is as much a matter of technical skill as of decision-making under stress. Simulation has proven to give responders increased self-confidence as it lessens the anxiety that might otherwise ensue.

- Analysis of case studies:** In particular for disaster risk management (DRM), the analysis of past disasters and efforts is an excellent learning tool across several topics. This approach is a rigorous exploration of authentic events, going into what actually happened, the rationale behind specific outcomes, the sharing of experience and the lessons that can be drawn out. Learners might, for instance, consider the reaction to the 2004 Indian Ocean tsunami or a successful flood preparedness initiative for a local community, all under the aegis of structured questions. Such an approach is most effective in transferring tacit knowledge and emphasizing practical illustration of abstract ideas. It grounds learning in reality, frequently exciting an emotional response or recalling an evocative tale that assists with retention. Students get the chance to criticize decisions taken within the case, argue alternatives, and thus draw lessons from both previous successes and failures. Case study utilization is supported by pedagogic research as an active learning way of developing analytical and reflection skills, fitting with the standard practice of after-action review and lesson-learning that professionals conduct after genuine disasters.
- Problem-Based Projects:** Problem-based projects foster self-directed learning, as learners must identify what knowledge or tools they need to solve the problem, thereby possibly going beyond the provided materials (e.g., consulting external resources or scientific literature – which also builds information literacy). They also develop project management and collaboration skills. In a training context, such projects are usually scaffolded with check-ins or interim feedback (the instructors might review an outline of a plan before the final submission). By tackling a complex problem from start to finish, learners gain confidence in their ability to apply a systematic approach to the challenges they are requested to face. This method aligns with competency-based education where demonstrating the ability to produce a work output is key. It also connects with work-based learning trends in VET – essentially, the training simulates work tasks so closely that it prepares learners for job performance (something EU policy encourages, as seen in the emphasis on work-based learning in VET).
- Role-Playing and Drills for Soft Skills:** Soft skills training focuses on developing non-technical abilities that enhance human interactions, leadership and overall effective management. In particular some aspects of disaster management training involve developing soft skills – communication, leadership, negotiation, and empathy. Role-playing builds empathy by putting learners in others’ shoes, and it improves communication techniques as participants experiment with wording and approaches in a safe setting. Such drills can be done live in class or via video-conference in breakout groups, possibly recorded for review. A facilitator observes or later debriefs the interactions,

highlighting good practices (active listening, clear instructions, cultural sensitivity, etc.) and pointing out areas to improve.

- **Overview of Training modules in DRM-FRAME, Target audiences and recommended Teaching methods**

The DRM-FRAME curriculum unfolds as a carefully structured sequence of modules, each one exploring a vital topic area, and with sub-modules discussing specific issues within the disaster risk management area. Each module explicitly specifies its target audience, either beginner students, practitioner professionals, or a mixture of both, and proposes the most appropriate primary teaching method specific to the topic and the learners it addresses. Careful consideration in this ensures that the pedagogical approach laid out earlier is skillfully executed across each of the curriculum's modules using less complex methods on introductory topics and beginner learners and more complex, specialized approaches on advanced topics and advanced learners, all nicely integrated within the process.

Table 1 provides a detailed breakdown of all the modules and sub-modules, outlining both the target audience and the recommended teaching approach or methodology for each. The training approach proposed to be applied is suited to the content complexity as well as the learners' prior knowledge. "Experts" are intended experienced DRM professionals and "Non-experts" learners with little prior DRM expertise (general public, volunteers, etc.).

The table clearly shows how a range of methods—from interactive e-learning lectures and quizzes to experiential drills and simulations—are mapped to different content areas. "Interactive lecture (e-learning)" implies an online module with multimedia content and knowledge checks; "simulation exercise" refers to scenario-based drills; "case-based learning" uses real or hypothetical case studies for analysis, etc. Notably, content aimed at non-experts, such as DRM introductory terminology or public preparedness guidelines, tends to use more popular and instructive methods, including multimedia lectures, gamified quizzes, and step-by-step exercises. Conversely, content aimed at experts, such as complicated logistics or field operations, employs more challenging experiential methods, including complex simulations and project-based exercises. Moreover, content relevant to both groups tends to combine these approaches to promote inclusivity. This modular mapping succinctly captures the considered pedagogical design to tailor training approaches to the needs of learners and accomplish module outcomes.

The thorough mapping ensures the pedagogical principles—active learning and the incorporation of technology, for example—are infused throughout all aspects of the program. Moreover, it signifies the innovative nature of the DRM-FRAME pedagogical approach; there are few conventional civil protection courses that provide such a range of methods or address such a wide range of learners. Thus, the course is aligned with the project's aim of developing an innovative vocational education and training course in disaster risk management that not only ensures flexibility and inclusivity but is competency-based as well.

Table 2. Target audience and teaching methodology per module and sub-module.

Module	Sub-module	Target audience	Recommended teaching methodology
Module 1: Introduction to Disaster Risk Management	<i>Submodule 1.1: DRM Terminology</i>	Mainly non-experts	Interactive lecture (e-learning) with multimedia examples; self-paced glossary study and quiz for terminology mastery.
	<i>Submodule 1.2: Understanding the DRM Cycle</i>	Experts and non-experts	Blended learning via illustrated case study (real-life disaster timeline) and guided discussion; interactive scenario walk-through of each cycle phase.
	<i>Submodule 1.3: The importance of Risk Assessment</i>	Experts and non-experts	Case-based learning with examples of risk assessments; group exercise to identify risks in a scenario; use of basic GIS maps to visualize risk factors.
Module 2: Emergency Preparedness and Response	<i>Submodule 2.1: Preparedness and Response – The Core Concept</i>	Experts	Simulation exercise (tabletop scenario) of an emergency situation; role-playing command roles to practice decision-making; supported by lecture on core concepts.
	<i>Submodule 2.2: Community Preparedness and Response</i>	Non-experts	Community drill simulation and role-play; interactive e-learning module for public awareness (e.g. “what to do” scenarios, gamified quiz); simple step-by-step guides for personal preparedness.
	<i>Submodule 2.3: Emergency and Response Plan</i>	Experts and non-experts	Workshop-style activity to develop a basic emergency plan using templates; collaborative planning exercise (either

			in-person or virtual breakout groups); review of sample emergency plans (case study).
Module 3: Community Engagement and Participation	<i>Submodule 3.1: Participatory Planning</i>	Experts and non-experts	Role-playing exercise simulating a community planning meeting; participatory mapping activity using GIS tools to include community input; experiential learning through designing a mini community plan.
	<i>Submodule 3.2: Community Engagement in Emergency Preparedness</i>	Experts and non-experts	Analysis of real-world community engagement case studies (discussion-based); development of an outreach or public education campaign plan; use of multimedia (videos of community drills) to spark discussion.
	<i>Submodule 3.3: The impact of Disasters on Communities and mitigation strategies</i>	Experts and non-experts	Case study review of a disaster’s long-term impact (e.g. economic and psychosocial effects); reflective discussion or journal exercise for learners to consider long-term recovery strategies; expert talk or webinar followed by Q&A.
Module 4: Advanced Technologies in DRM	<i>Submodule 4.1: Decision Support Systems (DSS)</i>	Experts and non-experts	Demonstration-based learning (hands-on demo of a DSS tool or software); guided exploration of a simple decision-support system on the platform; scenario-based use-case where learners interpret

			DSS outputs for decision making.
	<i>Submodule 4.2: Use of Simulation Technologies</i>	Experts and non-experts	Immersive simulation exercises using computer-based models; possible virtual reality (VR) or interactive simulation on the e-platform of a disaster scenario; debrief sessions to discuss simulation outcomes and learning points.
Module 5: Inclusive DRM and Vulnerable Populations	<i>Submodule 5.1: DRM for Vulnerable Groups</i>	Experts and non-experts	Scenario role-play focusing on assisting a vulnerable group (e.g. evacuation of persons with disabilities); group discussion on inclusivity challenges; use of case studies highlighting needs of elderly, disabled, children, etc., with problem-solving tasks.
	<i>Submodule 5.2: Safeguarding Cultural Heritage</i>	Experts and non-experts	Case-based and project-based learning; analysis of past incidents where cultural heritage was at risk; an activity to create a brief plan to protect a heritage site in a given scenario; incorporation of maps/photos of heritage sites for risk assessment.
Module 6: Logistics and Resource Management in Disasters	<i>Submodule 6.1: Understanding Logistics in Disaster management</i>	Experts	Practical simulation of disaster logistics (e.g. managing relief supply chain in a simulated disaster); use of a logistic management game or software; problem-solving exercise allocating

			resources under time constraints (tabletop drill).
	<i>Submodule 6.2: Logistics of Governmental, Local Community, Volunteer and Foreign Aid resources</i>	Experts	Advanced scenario simulation with cascading events (e.g. an earthquake triggering secondary disasters); crisis management exercise that unfolds in stages; team-based problem solving to adapt to evolving scenario; debrief focusing on decision-making under uncertainty.
	<i>Submodule 6.3: Logistics for moving resources in Times of crisis</i>	Experts	Scenario-based simulation involving coordination of transport routes under stress; integration of GIS tools to plan evacuation and resource movement; time-bound tabletop drill followed by debrief.
	<i>Submodule 6.4: Resource Types and Interrelations</i>	Experts and non experts	Interactive e-learning module with infographics and flowcharts explaining resource classifications (human, material, financial); followed by group discussion and quiz-based assessment; applied exercise to map interrelations in a hypothetical crisis.
	<i>Submodule 6.5: Challenges in Logistics and Resource management</i>	Experts	Problem-based case study exploring real-life logistical failures (e.g., delays, bottlenecks); small group task to redesign flawed logistics plans; facilitated critical

			discussion around systemic vulnerabilities.
	<i>Submodule 6.6: Strategies for Improving Disaster Logistics</i>	Experts	Workshop-based learning session where participants brainstorm and co-develop strategic improvements; presentation of real innovation examples (e.g., last-mile delivery via drones); peer review of strategic plans.
	<i>Submodule 6.7: Practical applications of disaster logistics and Lessons Learned</i>	Experts and non-experts	Case analysis of logistics in recent disasters; reflective discussion on effectiveness of supply chain decisions; cross-role simulation where participants act as logistics managers, responders, and coordinators; synthesis session with key takeaways.
Module 7: Major Disasters of the 21st Century	<i>(No sub-modules – entire module content)</i>	Experts and non-experts	Case study method – detailed analyses of major recent disasters through multimedia (documentaries, reports); interactive timeline and GIS mapping of disaster events; moderated discussion forums for lessons learned.
Module 8: Good Practices and Lessons Learnt	<i>(No sub-modules – entire module content)</i>	Experts	Seminar and collaborative review – expert-led presentations of best practices; round-table discussions or webinars to share lessons learned; compilation of guidelines and checklist creation exercise for best practices.

Module 9: Practical Considerations for Risk and Disaster Management	<i>Submodule 9.1: Implementing Risk Management Plans</i>	Experts	Project-based learning – learners draft or critique a risk management plan for a hypothetical scenario; guided by templates and instructor feedback; possibly a field assignment to apply planning in a local context.
	<i>Submodule 9.2: Field Operations in Disaster Response</i>	Experts	Simulation and drill – a realistic field operation scenario (virtual drill) requiring coordination (could use role assignments like Incident Command System roles); hands-on practice with emergency procedures (through scenario injects and time-bound tasks); emphasis on teamwork and communication.
	<i>Submodule 9.3: Managing the Emotional and Social Dimensions of Disasters</i>	Experts	Role-play and reflective practice – scenarios where learners practice responding to distressed survivors or stressed team members; facilitated discussion on psychosocial support techniques; inclusion of stress management and self-care workshops or exercises.

As seen in Table 2, the methods across each module cover a range from self-paced online learning to large-scale simulations. For example, *Module 1: Introduction to DRM* is largely designed for beginners; it uses an interactive e-learning lecture with multimedia examples to introduce learners to key terms (*Module 1.1*), and a blended learning case study method to clarify the DRM cycle (*Module 1.2*). It is also augmented by quizzes and a glossary, aimed at facilitating the learning of basic concepts. Such approaches are consonant with the need to develop foundational knowledge in an interesting but consumable manner for those who are starting out. Conversely, *Module 6: Logistics and Resource Management*, designed for experienced practitioners, uses practical simulations and problem drills—such as conducting a simulated disaster supply chain under time pressure—to replicate the actual

logistical problems that experts may face and therefore offer a realistic test of their abilities. Likewise, *Module 9: Practical Field Considerations* relies on advanced simulations, drills, and role-playing scenarios evoking emotional responses, all aimed at experienced responders to develop specialized skills such as incident coordination and stress management. Intermediate modules covering both groups—such as *Module 2 on Emergency Preparedness* and *Module 3 on Community Engagement*—mix the approaches to suit a mixed audience. For instance, *Module 2.2 (Public Preparedness)* targets non-experts through community drills and gamified “what-to-do” scenarios aimed at imparting personal preparedness actions, while *Module 2.1 (Core Concepts for Response)* provides experts with a tabletop command simulation to model their decision-making. Both sub-modules are within the domain of emergency response but are carefully designed to address the needs and skill levels of the learners. This responsive methodology ensures the project's utility and effectiveness for its diverse target groups.

By tailoring instruction to each module, DRM-FRAME successfully addresses the wide variety of learning outcomes needed: it promotes knowledge gain through lectures and readings, develops skill-building through exercises and simulations, and facilitates attitude change through reflective discussion and role-play. The design of each module is based on international best practices and educational research specific to its topic. Consider, for example, the *community engagement training in Module 3*, which involves participatory mapping and role-play of town hall meetings—an approach consistent with literature indicating that community-based disaster planning is best learned through participation and simulation of inclusive processes. Conversely, the module on *Advanced Technologies (Module 4)* uses demonstrations and hands-on experimentation with tools like Decision Support Systems and VR simulations, replicating the training approaches commonly used in technical fields where mastery of software and interpretation of its outputs are paramount. Throughout the curriculum, assessment activities—quizzes, group debriefings, and plan development exercises—are integrated seamlessly to reinforce learning and provide valuable feedback.

Below the main training methods proposed for the different modules, are summarized:

Simulation exercises and functional drills are the cornerstone of experiential Disaster Risk Management (DRM) training. These include, for instance, the tabletop exercise in Module 2.1, which takes expert learners through the first hours of a disaster scenario and has them make decisions as if they were the emergency managers on shift. Meanwhile, Module 9.2 envisions a more complex functional simulation run virtually, where each learner takes on a role in an integrated response to a compound disaster, such as an earthquake with cascading effects.

Analysis of case studies: For example, Module 3 is devoted to community engagement and features a comprehensive analysis of real-case examples, whilst Module 7 is devoted in its entirety to significant disaster case studies. Based on DRM-FRAME sessions, case studies become a common topic of group debate or assignments, where learners might play the roles of case stakeholders or write short report-style essays comprising recommendations. By comparing a range of case studies, pupils develop an awareness of contextual variation, seeing that a strategy that works well in one nation might collapse in another.

Problem-Based Projects: Beyond reacting to scenarios, learners in DRM-FRAME will engage in problem-based learning projects where they must create or design a solution to a given challenge. For example, in Module 9.1 (Implementing Risk Management Plans), expert learners undertake a project to draft a risk management plan for a hypothetical scenario or critique an existing plan. In Module 5.2, learners might design a plan to protect cultural heritage sites from disasters. These projects are open-

ended and mimic real tasks a DRM professional might handle. They require learners to research, apply frameworks (like risk assessment or contingency planning), and often work in teams to produce a tangible output (a written plan, a presentation, a set of recommendations).

Role-Playing and Drills for Soft Skills: In order to train different soft skills (communication, leadership, negotiation, and empathy), DRM-FRAME suggests role-playing exercises and drills focused on human interaction. For instance, Module 5.1 includes role-play scenarios about assisting vulnerable groups during an evacuation, and Module 9.3 involves role-playing interactions to practice psychosocial support (e.g., how to talk to disaster survivors or manage team stress). In these exercises, learners assume roles (e.g., a shelter manager and a distraught evacuee, or a crisis leader and a media reporter asking tough questions) and act out a situation. Given the critical importance of effective communication in emergencies and the need for inclusive DRM (addressing needs of diverse populations), these experiential learning cycles involving people skills are essential. They reinforce the human dimension of DRM, complementing the technical skills acquired elsewhere. Moreover, they foster attitudes of collaboration and ethical responsibility in learners – for example, understanding why including community members in planning (practiced via a participatory role-play) leads to better outcomes.

It is remarkable that at the center of "active learning" in the DRM-FRAME is a set of innovative and experiential learning methods, such as scenario-based learning, simulations, case studies, projects, and role-plays. These methods strongly resonate with the needs of adult learners and the demands of disaster risk management (DRM) education, providing context-rich learning, hands-on experiences, and the development of critical competencies. A study on disaster reduction education in Botswana showed that experiential learning is both an effective and functional way of teaching disaster risk reduction (DRR) knowledge, with lecturers integrating its components into their teaching effortlessly whenever the opportunity presents itself. Our approach builds on the fundamental finding that it turns learners from passive information receivers into active contributors who reflect critically, think deeply, and thus develop the requisite competencies. Additionally, this approach is strongly aligned with the project's innovation priority—to move beyond traditional pedagogical approaches and adopt innovative learning practices in civil protection. Indeed, few standard vocational education and training (VET) courses in related fields, such as public safety, have provided such a wide range of simulations and problem-based learning activities, making DRM-FRAME a pioneer in the development of a "learning by doing" culture in disaster education.

○ Synchronous and asynchronous modes of learning/training

DRM-FRAME's proposed training strategy thoughtfully combines synchronous (real-time) and asynchronous learning modalities to optimize learning and accommodate different training needs. Each modality has distinct advantages, and balancing them yields a flexible yet cohesive learning experience (a hallmark of blended learning design).

Asynchronous learning involves activities that learners can undertake at their own convenience, free from the restrictions of an organized schedule. **In the DRM-FRAME delivered framework**, most of the theoretical materials are provided asynchronously—these encompass readings, pre-recorded lectures, self-study online modules, and forums on which participants post when they prefer. This learning process offers full flexibility, which is necessary for an international cohort of adult learners

who might live in different time zones and manage work or family responsibilities. It offers learners the freedom to absorb the information according to their pace, enabling them to stay on complex subjects for a long time or skip areas they already grasp, thanks to the adaptive path element.

The asynchronous forums allow deep reflection; learners get the opportunity to ponder the material and write thoughtful answers for questions on public engagement methods, ensuring a deeper grasp of the matter. Also, all the materials are kept and retrievable for revisiting and rereading whenever one needs them, ensuring a better comprehension of the topics involved. Nevertheless, asynchronous learning might struggle with low participation if learners feel alone or fall into procrastination. To prevent this, the project carefully integrates synchronous aspects and social learning into the platform, such as active forum discussions for participant interactions and the inclusion of gamified quizzes to add an element of immediate challenge.

Synchronous learning involves real-time sessions with instructors or peer-to-peer facilitation manifested as live webinars, virtual classrooms, or on-site workshops. **In the DRM-FRAME proposed training strategy** synchronous mode of teaching is recommended for certain modules that may be formed in interactive and practical sessions; for example, they might comprise a live online seminar with an invited expert that involves a Q&A session (Modules 7 or 8 might be taught in the form of webinars with experts discussing lessons learnt from major disasters) or even a real-time multi-user simulation exercise that requires participants to respond in real-time to developments in the scenario. The immediacy provided by synchronous learning enables learners to ask questions and clarify on the spot, with facilitators able to check for understanding and modify approach accordingly.

Moreover, it is excellent for developing certain soft skills, such as team communications; for example, a synchronous role-play using a video conference forces the participants to exercise speaking and coordination skills as if they were with the person. The disadvantage is the coordination problems and lack of flexibility; accordingly, synchronous events will therefore be properly scheduled with perhaps a number of time alternatives or recorded for the benefit of non-attendees.

▪ ***Modes of training in DRM-FRAME platform***

The technical architecture of the platform is built to accommodate asynchronous learning. This will be offered by different means (documents, presentations, videos), allowing the trainees to read consult them in their own pace and as many times they wish, to read them online and/or to download them.

As described in Chapter 2, social media may be used as learning means as they can offer room for direct communication and exchange. The platform will make use of these capabilities of social media, promoting a dedicated page in which members that will follow it, will have the chance to interact. Should country- or topic-specific group discussions be needed, groups of members can be easily created for messages exchange. This will be the alternative of dedicated platform's communication plugins, allowing both general group discussions, enabling synchronous chats or national-level meetups in the local languages of participants as required.

Moreover, the platform will comprise a double-assessment tool that in addition to validate the knowledge acquired after attending the online course, will have the possibility to guide the learning process before the start, by questioning the trainees understanding prior to their exposure to the

curriculum's content. In particular, the pre-assessment tool incorporated in the platform customizes learning pathways based on the specific needs of each learner and/or the characteristics of the area or type of risk being addressed. This will be accomplished with the trainees going through a set of questions for each submodule for pre-assessment of their level of knowledge and existing gaps. Guided by the responses (following a consistent scoring system), the integrated algorithm to the tool suggests the most suitable learning pathway, proposing modules of highest interest yet lowest understanding. On the other hand, the final evaluation, which is distinct from the pre-assessment of diagnostic nature, measures the knowledge gained after completing the module(s) and the training's effectiveness.

○ **Adjusting Strategies for Expert and Non-Expert Learners**

The DRM-FRAME training audience is mixed, including those who are new to the sector—community members, students, and those new to DRM—along with experienced practitioners, such as civil protection professionals and emergency managers. Developing training that addresses both sides of this divide requires an approach tailored to their differing prior knowledge, competencies, and learning needs. While the curriculum is modular to enable some self-selection—allowing experts to pursue advanced themes while non-experts can take up basic materials—in many cases, the training will be for mixed groups or will follow a track that moves from introductory to more advanced approaches. An understanding of the distinct learning modes of the experts and novices thus becomes critical in influencing the approach and the level of content delivered. This section outlines the learning requirements of non-expert and expert learners, explaining how pedagogical approaches are adapted for each, drawing on tested educational theory and aspects of project design.

Non-Expert Learners (Novices): These learners typically have no or limited professional experience in disaster risk management. They may be community volunteers, members of the public interested in learning about resilience, or professionals in completely different domains. For non-experts, training needs to begin with building a solid knowledge base—presenting essential terms, concepts, and frameworks in ways that are easy to understand. The content should avoid being bogged down by technical jargon or assuming any pre-existing knowledge.

Accordingly, the early modules for novices (like Modules 1 and 2.2) focus on providing clear explanations of basic concepts (such as the DRM cycle and basic terminology) using simple instructional approaches. An interactive lecture, augmented with compelling visuals and accessible examples, is effective in conveying new knowledge to novices, just as Module 1.1 does. Furthermore, novices benefit from real-world examples and analogies that connect new concepts to ones already familiar. For example, explaining risk using an analogy (like comparing it to common hazards such as crossing a street) can improve understanding among laypersons. Since novices do not have a mental framework for the domain, the training provides structured support: step-by-step instructions (such as how to create a family emergency plan), checklists, and simple decision rules (such as “if you smell gas, do X”). This scaffolding is embedded in the curriculum developed for public-facing materials, such as personal preparedness guides included in Module 2.2.

Novices tend to have a higher cognitive load when presented with complicated tasks; everything is new, so it is hard for them to determine what is of most importance. Consequently, the support provided to novices is substantial: DRM-FRAME uses guided exercises specifically designed for them, similar to an online tutorial teaching the correct use of a fire extinguisher or providing a step-by-step

walkthrough of a case study. In accordance with the expertise reversal effect in instructional psychology, a strategy beneficial to novices can be an impediment to experts and vice versa. We resolve this by giving novices a lot of support, which we progressively reduce as their competence grows, a process referred to as fading scaffolds. For example, in a novice module, there may be a fully worked example of a risk assessment; next, they would work through one with some guidance; eventually, an expert should be able to perform the activity unaided.

Motivations for non-experts tend to arise from a deep sense of personal relevance and an intrinsic interest. Training capitalizes on this by emphasizing how knowledge of disaster risk management (DRM) empowers individuals and their communities, as summarized in the phrase, “Knowing what to do in a disaster can save your life and others’.” The modules for the public integrate engaging and accessible materials—ranging from scenarios based on familiar community settings to interactive quizzes or games intended to maintain interest, along with evocative appeals such as a video interview with a disaster survivor that positions preparedness as an urgent issue of life and death. In addition, non-experts might need to be encouraged to develop their self-efficacy, as the topic may be perceived as overwhelming. The instructional strategy overcomes this obstacle by starting tasks that are readily accomplishable while using positive reinforcement. For instance, a novice who passes an online test not only enhances their self-efficacy but also facilitates retention of key concepts.

In groups, non-experts will sometimes experience a feeling of shyness, especially if they are among experts. Facilitators work to create a welcoming environment, noting that there are no silly questions and urging experts to be mentors instead of dominators. They even group participants by experience level for some activities so that novices have a chance to speak more openly. With time, these novices will contribute more naturally as their knowledge grows.

Expert Learners: These are participants with substantial prior experience or training in DRM (or related fields like firefighting, military, emergency medicine). They come with well-formed mental models, terminology familiarity, and perhaps strong opinions shaped by their experience. For experts, the training must offer advanced, challenging material – they will disengage if content is too basic or if teaching is too didactic. Thus, modules targeting experts (Modules 6, 8, 9, etc.) dive into complex topics (like logistics under crisis, lessons learned from past decades of disasters) and use problem-centered, analytical approaches. Rather than teaching facts, we often present experts with problems or debates: e.g., “Here’s a new technology or a contentious policy – how would you incorporate or address it?” This leverages their knowledge and pushes them to extend it. For example, in an expert workshop on best practices (Module 8), instead of enumerating known best practices, the training might have them critique case studies or develop improved guidelines based on collective expertise.

Experts relish the freedom that comes from exploration and independence in learning and thrive in succinct, vital instructions. In fact, excessively specific instructions result in boredom or even frustration due to the expertise reversal effect. Therefore, expert methods adopt open-ended activities: simulations that have no strict scripts, projects in which they develop their own approach, as well as peer-to-peer transfer of expertise. A classic example of an expert simulation is the presentation of a scenario with roles along with it unfolding according to participants' actions with the facilitators occasionally introducing new turns of events—the method tests and develops their capacity for planning and responding based on their prior practice. Feedback for experts comes in the course of guided reflection as they readily identify most of the successes and failures of an exercise with little prompting.

One of the most fundamental approaches is leveraging their known expertise with the power of peer learning. These veteran learners, generally managers, are used to driving and have a treasure trove of experience to give. Training makes them co-creators of learning; for example, a group of experts might work together on creating a “standard operating procedure” for a specific scenario from the ground up, blending each member's individual experience. Not only does this create a desired outcome but it also reinforces their expertise and enables peer learning, as one expert shows a skill they have mastered and the others learn it. During their blend of sessions, these professionals can also coach less experienced learners —such as in a breakout session where an expert coaches novices in creating a community plan with the experts benefiting from each other. Finally, the network features on the platform enable the exchange of resources among experts — such as sharing a plan template that they apply in practice—richening the learning experience.

In the content, experts often are drawn to innovative and sophisticated subject matter. Such advanced content is included in the training, with discussions on climate change's influence on DRM policy, the use of AI for disaster response, and inter-agency coordination challenges, among others. In addition, we explicitly include research findings and theoretical models more in our expert modules, while we might simplify such concepts for beginners. Experts appreciate evidence-based practice and might even be willing to criticize or argue with specific models; we welcome this by including references and encouraging critical discussion. For example, in an expert seminar, we introduce contrasting perspectives from institutions such as the OECD and UN, and invite lively debate.

In the case of soft skills, although experts have ample field experience, training can still work to further refine those skills, especially in areas of leadership, strategy, and innovation. Role-play techniques, for example, can be adapted for these experienced professionals by presenting more complex emotional situations—such as dealing with political pressures in disaster responses. In addition, experts often appreciate exploring their own journeys through the prism of new frameworks introduced in training, which invites such reflection. For example, after learning a new international guideline, experts can be asked to consider how their past operations conform, where they differ, and what changes they would make in future activities.

Finally, motivation for experts can be tied to professional growth and networking. They likely attend to update their knowledge, earn a credential, or connect with peers. The training emphasizes cutting-edge practices (so they feel they're learning something new and valuable for career advancement) and provides ample discussion/networking opportunities. The interactive platform serves as a professional network hub for them as well, possibly continuing after the course to exchange information (as mentioned, the platform will function as a networking tool connecting various target groups).

▪ ***Application in DRM-FRAME platform***

In practice, the two-stage assessment system in DRM-FRAME, already explained in 3.1.4, is intended to differentiate between approaches: an opening assessment will identify experts and novices and provide the possibility of tailored guidance to different content streams or to additional materials as required, based on the knowledge and learners preferences. Such flexibility is embedded in the very structure of the pedagogical model.

To summarize the differences and strategies:

- **Novices** get more structure and support: step-by-step guidance, foundational theory, frequent feedback, and simpler, highly engaging tasks to build confidence. They learn what and how, starting from basics. For example, a novice activity might be a guided checklist for home emergency kit preparation, reinforced by a quick quiz.
- **Experts** get more autonomy and challenge: complex problems, minimal guidance (to not stifle their existing schema), opportunities to apply and synthesize knowledge in new ways. They focus on why and how to improve, dealing with advanced scenarios. An expert activity might be an unscripted simulation where they have to coordinate a multi-agency response, followed by a peer debrief on improving inter-agency collaboration.

Instructional research strongly emphasizes the need for individualization: "Instructional techniques that work well with beginner learners become irrelevant or even counterproductive with advanced learners." It is therefore necessary to provide extensive instructional support for novices; with experts, on the other hand, "minimal support is best" in providing freedom of action that their substantial expertise has earned them. DRM-FRAME ensures both novice learners and veteran professionals receive learning that is appropriately challenging, pertinent, and rewarding. The dual strategy is also a form of differentiated instruction within one course—a hallmark of pedagogical maturity.

- Digital and ICT tools for teaching and training within DRM-FRAME – the Interactive platform

At the core of the pedagogical approach is the tactical integration of digital and ICT tools, aimed at enhancing the learning process. The DRM-FRAME project aims to utilize a digital interactive platform including different technologies to support both synchronous and asynchronous learning, promoting engagement through interactivity and hands-on simulations through a participatory Web GIS platform, replicating real-world contexts in the virtual environment.

The content we have developed (curriculum, methodologies) feeds directly into designing the platform layout: to accommodate modules and resources, integrating tools (GIS, assessment engine, networking features), and populating the platform with the learning content and activities according to our methodology. It's fully aligned with the content page suggestions and structure outlined in the official project application. The interactive platform that is being developed is described as a **“learning, communication and cooperation tool”** with functions such as e-learning space, GIS visualization, the double assessment tool, and group communication features. In our pedagogical approach, we have explicitly planned for each of those functions which are considered for the technical development:

- E-learning space: used for modules delivery (asynchronous learning, multimedia content).
- GIS visualization: used in simulations and risk assessment training.
- Double assessment: used for personalized paths and validating competences.
- Group communication: used for collaborative learning, discussions, and social interaction.

The platform is not merely the vehicle for the delivery of a significant amount of the training but is the embodiment of the pedagogical and technical innovation of the project. In the following final section, we show how the adopted approach enriches the capabilities of the platform as well as its configuration toward meeting the pedagogical framework—which includes factors such as the delivery of the content, the user experience, as well as the interactivity. By ensuring each methodological element maps to a platform feature, we maximize the platform's utility and justify its development. For example, the **participatory web GIS** isn't just a fancy add-on; it directly supports learning outcomes in hazard analysis and engages learners in interactive risk modeling, which is pedagogically justified. Similarly, the **networking capability** isn't extraneous; it's leveraged to meet the social learning objective and create a sustainable community of practice that can continue beyond the project (which adds to impact and sustainability of results).

One can foresee that once the platform and the project are complete, a learner's journey might look like this: They log in to the platform, take a pre-assessment that directs them to a custom set of modules. They complete an online lesson with videos and graphics on their own. They then join a scheduled live simulation exercise with peers through the platform's conferencing tool. They discuss in forums in between sessions, maybe uploading their mini-project for feedback. They use the GIS tool to complete an assignment mapping risks in their locality. At the end, they take a final quiz on the platform and receive a digital badge or certificate. All along, the platform tracks their progress and fosters connections with others. This seamless integration of content, method, and medium is exactly what WP4 aims for, and what our pedagogical approach requires.

○ E-learning platforms and Learning Management Systems (LMS)

At the center of the training delivery is an interactive online platform, to be developed within WP4 of the project, that acts as the Learning Management System (LMS). This platform will house all the e-learning modules, resources, and activities. Students will use this platform to work through the module content, which can include reading materials, video lectures, infographics, and other types of media. The LMS is designed for asynchronous learning, giving participants the power to work through lessons at their own pace and according to their own schedules—a critical consideration for adult learners who tend to work and have other obligations. Within each online module, the platform supports interactive elements such as quizzes, knowledge checks, and flashcards to augment the learning experience; for example, a self-test on DRM terminology is waiting in Module 1.1. These tools illustrate the concept of retrieval practice, known to strengthen retention, while also allowing learners to gauge their understanding in real time. In addition, the platform supports assignments and feedback—participants can complete a short-written reflection or multiple-choice test, then receive automated feedback or input from instructors.

Crucially, the LMS is not just a content repository, but an active communication and collaboration hub. The platform will include shortcuts for quick access to DRM-FRAME social media account(s) through which participants will have the possibility for synchronous interaction. This considered design maintains a blended synchronous-asynchronous model: students first engage with foundation knowledge on their own terms via the e-learning modules, before coming together in real time—whether in person or through video meetings—for discussions, group work, or live expert lectures. This approach has garnered significant traction, notably accelerated by the experiences necessitated by the COVID-19 pandemic, where “all OECD countries made use of online platforms in VET... and many used hybrid models, providing in-person classes for practice-oriented elements and remote learning for theory” (OECD, 2023). DRM-FRAME’s approach follows this best practice, using the LMS for its strengths—flexible, scalable delivery of theoretical and background material—while holding back essential practical exercises for interactive sessions, whether held in person or virtually.

From a technical perspective, the LMS will integrate features aimed at effectively measuring outcomes and progress. Analytics on learning will monitor meticulously learners’ quiz scores, the amount of time spent on modules, and more, enabling instructors to target areas where learners struggle and tailor the support accordingly. Moreover, it will serve as the platform for delivery of the dual tool prepared in WP4: when learners join up, they will receive an initial test of their existing expertise, allowing the system to adjust their learning paths—inviting specialists to skip introductory modules or offering additional tools for beginners. This is one type of adaptive learning software that promises increased efficiency in the training process as well as individualization. Also, a final test and certification test can run through the LMS in order to ensure the measurement of learning outcomes for each of the learners against the project’s competency framework.

In nature, the e-learning platform is the framework within which the DRM-FRAME training is based, enabling extensive accessibility with the potential for multilingualism, self-learning, and the incorporation of diverse digital learning objects. Its implementation is a reflection of modern vocational education and training (VET) practice. Leveraging a powerful learning management system, DRM-FRAME ensures a seamless continuity of learning across geographies and timetables and forms a sound base for all of the other digital augmentations that ensue.

○ Participatory web GIS simulation platform

One of the most compelling aspects of WP4 is the incorporation of geospatial data into participatory web-GIS within the platform. This innovation is directly applicable in the educational design of risk assessment, scenario visualization, and community mapping modules. As set out, our strategy induces learners to explore hazard maps, identify risk hotspots, and even add local information through a participatory mapping exercise. The GIS plugin within the platform will enable this by hosting relevant maps—in this case, layers of flood zones, infrastructure, and demographics for a given case study—while providing tools that allow learners to interact with them, such as enabling learners to pan, zoom, and even draw within them and annotate.

The platform will host various types of GIS data (vector, raster) and web map services, to enable a better comprehension of scenarios and case studies. The user will get the opportunity to envision disaster risk management by a participatory web GIS simulation platform depicting various case studies/scenarios. Access to GIS within the platform brings the technology-enriched methodology alive—taking abstract learning into an interactive ride. Moreover, it encourages digital competences: as learners work with the GIS interface, they become accustomed to technologies used by real-life disaster risk management professionals, underpinning our dual-benefit hypothesis.

- Conclusions

The **DRM-FRAME Erasmus+ project** represents an ambitious and innovative effort to advance disaster risk management education within a Vocational Education and Training paradigm. In this 30-page report, we have presented a comprehensive standalone guide to the *“Teaching Methodologies, Tools, and Methods to be used within the Pedagogical Approach and Training Activities”* of the project, aligning each element with both educational best practices and the project’s operational framework (particularly the interactive training platform of WP4).

We began with a narrative introduction to VET in the EU context, establishing that effective DRM training can significantly benefit from the principles of flexibility, competency-focus, and inclusivity that underpin modern VET policy. The relevance of this endeavor is underscored by global and European calls for integrating disaster risk reduction into educational programs and building resilient communities through capacity building. With disasters growing in frequency and impact globally, the need for well-trained professionals and informed citizens has never been more critical.

The pedagogical approach outlined is **learner-centered and experience-rich**, employing modular blended learning, technology-enhanced tools, and collaborative methods to ensure that learning is **practical, engaging, and tailored** to diverse learner profiles. We highlighted scientific and policy references throughout: from OECD findings on digital tool adoption in VET, to UNESCO’s advocacy for immersive learning technologies, to peer-reviewed evidence of experiential learning’s effectiveness in DRR education and the impact of simulation training on emergency preparedness. These citations lend credibility and currency to our approach, demonstrating that DRM-FRAME’s methodology is at the cutting edge of educational research and aligned with international standards (EU, OECD, UNESCO guidelines on quality VET and DRR).

We provided a detailed mapping of modules to methods (Table 1), ensuring transparency in how each part of the curriculum will be delivered. This mapping also serves as a content plan for the development team and illustrates compliance with the project’s content outline (as per the application). Visual elements like the table, and potentially others (figures of learner profiles or platform screenshots in the future), help summarize complex information in accessible formats.

Special attention was given to the use of **digital and ICT tools** – a defining feature of this project. The report analyzed how the e-learning platform (LMS), gamified activities, VR/AR simulations, and the blend of synchronous/asynchronous delivery all interlock to create a rich learning ecosystem. We emphasized that these are not gimmicks but carefully chosen tools to meet pedagogical ends: improving engagement (gamification improves motivation), enabling safe skills practice (VR for safe simulation of dangerous scenarios), fostering flexibility (asynchronous modules for self-paced learning), and enhancing collaboration (the platform’s communication features for peer learning).

Innovative methods like problem-based projects, case studies, and role-plays were discussed with an eye on the DRM/civil protection context – illustrating, for instance, how a role-play can teach emergency communication skills or how a project to create a local risk reduction plan can spur real-world application. These methods align with a competency-based approach, ensuring that by the end of the training, learners can **demonstrably do** certain tasks (not just know things). The inclusion of these methods also responds to the Erasmus+ priority of innovation in VET: we are not delivering a conventional course, but a multidimensional learning experience that pushes the envelope of vocational training in this sector.

We also differentiated strategies for **expert vs. non-expert learners**, acknowledging that a one-size-fits-all approach would be ineffective across our broad audience. By implementing differentiated instruction – more guidance for novices, more challenge and autonomy for experts – the program ensures each learner is appropriately supported and stretched. This inclusive approach means the *same program* can benefit a volunteer firefighter and a city emergency manager, each getting what they need. It also reflects EU values of lifelong learning by accommodating various entry points and prior experience levels.

Finally, by aligning everything with the **interactive platform**, we demonstrated the feasibility and coherence of the plan. The methodologies described are not abstract ideals; they are directly tied to features being built (GIS, assessment tools, etc.) and to deliverables expected (like the pilot training and its evaluation). This integrative perspective should give confidence to project stakeholders that the team has a clear, implementable pedagogical vision that leverages the partnership's strengths (HEIs, VET providers, tech developers, civil protection experts) and produces a tangible outcome: an interactive training program that is modern, effective, and scalable.

In conclusion, **DRM-FRAME's pedagogical approach** stands as a model for how vocational training can be applied to disaster risk management and civil protection. It combines the **scientific rigor** of academia (grounded in literature and evidence) with the **practical wisdom** of the DRM practitioner community, delivered through a **state-of-the-art digital platform**. The methodologies and tools we have detailed will prepare learners not only to understand DRM concepts but to act competently and confidently in real disaster situations – thereby contributing to the overarching goal of building a safer, more resilient society. This comprehensive alignment of content, method, and technology is expected to make DRM-FRAME a flagship project in the VET and DRM nexus, and a sustainable training resource that can be expanded or replicated in the future.

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