



Innovative Skills for an Old Vocation

Innovative Skills for Training Management

WP 04



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Content

1	Introduction.....	3
2	Training Management (TM).....	4
2.1	Skills to be trained	5
2.1.1	Hard skills	5
2.1.2	Soft Skills.....	6
2.2	Training Management Tools.....	14
2.2.1	Training SOP	14
2.2.2	Training management software	19
3	Digitalisation in TM.....	21
3.1	New Era of Robots	21
3.2	Artificial Intelligence (AI).....	21
3.3	Big Data	24
3.4	3D Printing	25
3.5	Combination of Digitalisation and Sciences	25
3.6	Virtual and Augmented Reality , Digital Twins	25
4	Globalisation in TM.....	29
4.1	Demography	29
4.2	Economic and Social Factors	30
4.3	Qualification / Training / Knowledge	31
4.4	Markets and Consumers.....	32
4.5	Compliance	32
5	Sustainability in TM	34
5.1	Green Awareness.....	34
5.2	Energy and Process Efficiency	35
5.3	Resource Efficiency & Sustainable Materials.....	35
5.4	Sustainable Design & Circular Economy	35
5.5	Chemical Safety	35
5.6	Social Responsibility	35
5.6.1	Key Pillars & Footwear-Specific Applications	36
5.6.2	Navigating Technological Change and "Just Transitions"	37
6	Case study and Project Work	38
6.1	Case Study I.....	38
6.2	Case Study II	39

6.3 Project Work	40
7 List of Figures and Tables	43
8 References	44

1 Introduction

This manual is a joint product of all partners from the Erasmus+ project "Innovative Skills for an Old Vocation" (ISOV, 2024-1-DE02-KA220-VET-000254492, <https://isov-project.eu/>). As all sectors, the sector of industrial footwear production faces the mega-trends of globalisation, digitalisation and sustainability. Main aims of the project are the development, pedagogical structuring and piloting of courses for apprentices, students and/or employees in industrial footwear production in Germany, Portugal and Romania, based on scientifically developed impact analyses on which of the dimensions of the trends influence which of the 18 Spheres of Activity (SoA) of the sector. The courses and the manuals refer to 12 chosen concrete SoA in which the participants are working, are supposed to work, or want to work.

Basic materials for the courses are the manuals. As the estimated impact of the dimensions respective sub-dimensions of the trends differ between partner countries and as the equipment of training providers with modern technology is differing, as well, the manuals follow a modular structure:

Chapter 2 documents the, partly shortened or updated, "state of the art" manual from previous projects "Integrating Companies in a Sustainable Apprenticeship System" (ICSAS, <http://icsas-project.eu/>) respective "Developing Innovative and Attractive Continuous Vocational Education and Training (DIA-CVET, <https://dia-cvet.eu/>).

Chapters 3-5 illustrate the expected impact of the various (sub-)dimensions of the 3 trends in the near future (up to 5 years) on the work-processes of the chosen SoA.

This approach has the huge advantage that, for example, if the sub-dimension "additive manufacturing" is estimated to have high impact on a certain SoA and a training provider has no 3-d printer, he can, with respect to this sub-dimension, rely on the "old" manual referring to subtractive manufacturing – but still impart the impact of other subdimensions, where the equipment is available.

Finally, chapter 6 offers a case study of apparent good practice, demonstrating not only what, but also exemplarily how to teach.

Or, to put it different, this manual should not be read as a "receipt", where all condiments should be added or imparted in a fixed row and a defined quantity – but as a "toolbox", aiming at inspiring trainers to impart not only "state of the art" knowledge, skills and competences (KSC) – but to prepare their apprentices, students or participants in continuous vocational education and training (CVET) for upcoming work-processes.

2 Training Management (TM)

Effective training management ensures that employees in footwear manufacturing have the knowledge, technical skills, and confidence required to perform their tasks safely, efficiently, and consistently. Well-structured training supports productivity, product quality, process reliability, compliance, and the continuous improvement of manufacturing operations^{1,2}.

From a business perspective, targeted training helps reduce production errors, material waste, machine downtime, workplace accidents, and employee turnover. It ensures that employees understand standardized processes, quality requirements, and safety procedures while enabling companies to adapt to new technologies, materials, and production methods. From an employee perspective, training supports professional development, increases motivation and confidence, improves flexibility across production areas, and contributes to job satisfaction.

In the footwear industry, training covers a wide range of production-related competencies, including:

- **Hard skills:** Technical knowledge and practical abilities required for specific manufacturing processes, such as operating cutting machines, optimizing material cutting layouts, handling leather, textiles, and synthetic materials, performing stitching and sewing operations, managing lasting processes, carrying out sole attachment and final assembly, conducting quality inspections, operating production software, and handling materials and warehouse processes.

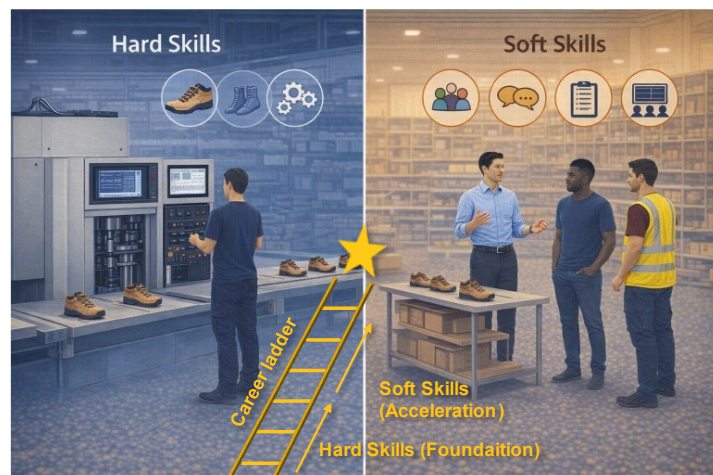


Fig. 1: Hard and Soft Skills

- **Soft skills:** Interpersonal and organizational abilities that support effective teamwork and production performance, such as communication, problem-solving, leadership, time management, teamwork, and continuous improvement thinking.

Training management involves planning, organizing, conducting, documenting, and evaluating employee training activities to ensure employees obtain or maintain the competencies required for their roles³.

¹ Noe, R. A. (2020). Employee Training and Development (8th ed.). McGraw-Hill Education.

² Dessler, G. (2020). Human Resource Management (16th ed.). Pearson.

³ International Organization for Standardization. (2015). Quality management systems – Requirements (ISO Standard No. 9001:2015).

2.1 Skills to be trained

2.1.1 Hard skills

Employees must be trained in company procedures and policies, including topics such as sickness reporting, leave requests, conduct, timesheets, diversity, health and safety, and access regulations.

In addition, role-specific training may be required for new or existing employees.

Some training must be repeated regularly. Required training and retraining intervals should be documented in the company's training matrix within the training SOP (see chapter 2.3).

Hard skill area	Description and examples in footwear production
Machinery operation	Safe and efficient operation, setup, adjustment, and basic maintenance of footwear production equipment, including cutting, skiving, sewing, lasting, sole attachment, finishing, and inspection systems. Includes energy-efficient machine use, predictive maintenance, machine performance monitoring, IoT-enabled equipment monitoring, and understanding the impact of machine performance on productivity, resource consumption, waste generation, and product quality.
Material knowledge	Understanding the properties, performance characteristics, processing requirements, and quality attributes of footwear materials, including leather, textiles, synthetic materials, foams, rubber, adhesives, recycled materials, and bio-based alternatives. Includes material selection, defect identification, storage and processing requirements, traceability, sustainability assessment, lower-impact materials, circular material concepts, responsible sourcing, certifications, and awareness of environmental and human rights risks associated with raw material sourcing. Increasingly, this also includes knowledge of Digital Product Passports (DPPs) and regulatory requirements related to material transparency and product lifecycle information.
Pattern, cutting, and preparation processes	Knowledge of cutting methods, digital and conventional nesting techniques, component identification, and preparation processes such as skiving, splitting, punching, perforating, and reinforcement application. Includes understanding material behaviour during cutting and preparation, appropriate tool and equipment selection, dimensional accuracy, component quality, material-efficiency strategies, and waste reduction. Increasingly, this also includes digital cutting systems, AI-supported nesting optimization, and data-driven planning, as well as design-for-manufacturing and design-for-circularity principles to improve material utilization, reduce waste, and facilitate repair and recycling.
Stitching and upper manufacturing	Practical skills in sewing operations, machine adjustment, thread and needle selection, seam construction, and assembly techniques for producing durable, functional, and consistent shoe uppers. Includes interpreting technical specifications, maintaining stitch quality, troubleshooting sewing defects, selecting appropriate reinforcement and material combinations, and ensuring accurate and efficient assembly. Increasingly, this also includes durability- and repairability-oriented manufacturing practices, ergonomic workplace practices, and production methods that reduce resource consumption, rework, and waste while supporting product longevity and more sustainable and circular footwear manufacturing.
Lasting and assembly processes	Understanding of lasting methods, shoe construction principles, component alignment, adhesive application, sole attachment, pressing, and finishing operations to achieve the required fit, function, quality, and appearance. This includes selecting and applying appropriate assembly techniques, ensuring process consistency, and maintaining product performance standards. Modern footwear professionals should also understand low-impact assembly technologies, water-based adhesive systems, and design-for-repair principles, as well as how construction and material choices influence product durability, recyclability, and end-of-life options, supporting more sustainable footwear manufacturing.
Quality control and inspection	Ability to perform quality checks according to company standards, regulatory requirements, and customer specifications, including the inspection of materials, components, stitching quality, dimensional accuracy, bonding strength, finishing quality, functional performance, and final product appearance. Includes identifying and documenting defects, implementing corrective actions, and ensuring consistent product quality throughout the manufacturing process. Increasingly, this also covers verification of material traceability, product safety, environmental and social compliance, as well as the use of digital quality monitoring, data-driven quality management, and AI-assisted defect detection. Knowledge of preventive quality approaches supports early identification of issues, root-cause analysis, reduction of rework, scrap, and waste, and continuous improvement of production efficiency and sustainability performance.

Chemical handling and process safety	Knowledge of the safe handling, storage, preparation, application, and disposal of chemicals used in footwear production, including adhesives, primers, cleaners, solvents, coatings, and finishing agents. Includes understanding chemical properties, application and storage requirements, PPE, waste management, and compliance with SDS, occupational health and safety requirements, and company standards. Increasingly, this also covers RSLs, MRSLs, chemical risk assessment, substitution strategies, ZDHC principles, and the environmental and human health impacts of chemical use. Familiarity with responsible chemical management systems supports regulatory compliance, worker safety, pollution prevention, and more sustainable footwear production.
Production documentation and traceability	Ability to complete, maintain, and interpret production records, work instructions, quality documentation, non-conformance reports, process monitoring data, and traceability records to support consistent manufacturing, regulatory compliance, and continuous improvement. Includes accurately documenting production activities and deviations, analysing process information, and maintaining reliable information flow through digital documentation and data management systems. Increasingly, this also covers supplier and material traceability, chain-of-custody requirements, responsible sourcing documentation, ESG-related data, Digital Product Passport (DPP) requirements, and information supporting environmental and human rights due diligence across the footwear value chain.
Digital tools, ERP, and production systems	Competence in using digital systems to support production planning, material management, inventory control, quality assurance, and employee training, including ERP, MES, QMS, and LMS platforms where applicable. This should be complemented by the ability to use data analytics and AI-based applications, interpret digital twins and sustainability dashboards, and work with automated reporting systems. Technicians should also understand the responsible handling and use of production and sustainability data, including considerations related to data quality, transparency, security, and compliance.
Sustainable Design, Manufacturing and Resource Management	Application of sustainability and resource-efficiency principles across footwear design and production. Includes design for durability, repairability, reuse, disassembly, recyclability, and material recovery, as well as waste reduction, material yield optimization, energy and water efficiency, circular production concepts, recycling and reuse opportunities, process improvement, and measurement of environmental performance indicators at factory level.
Safety procedures and workplace organization	Knowledge of occupational health and safety requirements, including personal protective equipment (PPE), ergonomic working practices, machine safety, emergency procedures, and workplace organization methods such as 5S. This should include an understanding of worker well-being, inclusive and culturally aware workplaces for both local and migrant workers, human rights, grievance mechanisms, and the importance of a strong safety culture in responsible manufacturing environments.
Regulatory Compliance and Product Stewardship	Knowledge of evolving regulatory requirements affecting footwear products and manufacturing operations. Includes product compliance, sustainability reporting requirements, due diligence obligations, Digital Product Passport frameworks, product lifecycle information management, and compliance documentation needed to support market access and customer requirements.

Tab. 1: Recommended Hard Skills Training for Footwear Manufacturing

2.1.2 Soft Skills

Soft skills are interpersonal, cognitive, and self-management skills that influence how people communicate, collaborate, make decisions, solve problems, and respond to situations in the workplace. Unlike technical skills, they are often demonstrated through observable behaviour and developed through practice and experience.

For this reason, soft-skills development should not be limited to understanding concepts or definitions. Learners should have opportunities to apply skills in realistic workplace situations, reflect on their own behaviour, receive feedback, and identify concrete changes for future situations.

The following sections describe key soft skills and provide a basis for their practical development through workplace scenarios, case studies, role plays, group activities, and structured reflection.

2.1.2.1 Communication Skills

Effective communication is essential in the workplace. It helps employees share ideas, solve problems, build trust, and improve teamwork, productivity, and quality.

Communication skills are best developed by practising communication in realistic situations rather than only learning communication principles. Workplace situations may include giving or receiving feedback, explaining a problem to a colleague, communicating with a customer, participating in a meeting, or dealing with a misunderstanding.

1. Active Listening

Active listening means fully focusing on and understanding the speaker while providing thoughtful feedback. It encourages teamwork, knowledge sharing, and collaboration.

Important active listening skills include:

- asking open and probing questions,
- summarizing key points,
- showing empathy,
- using encouraging verbal and non-verbal signals such as eye contact, nodding, and attentive posture.

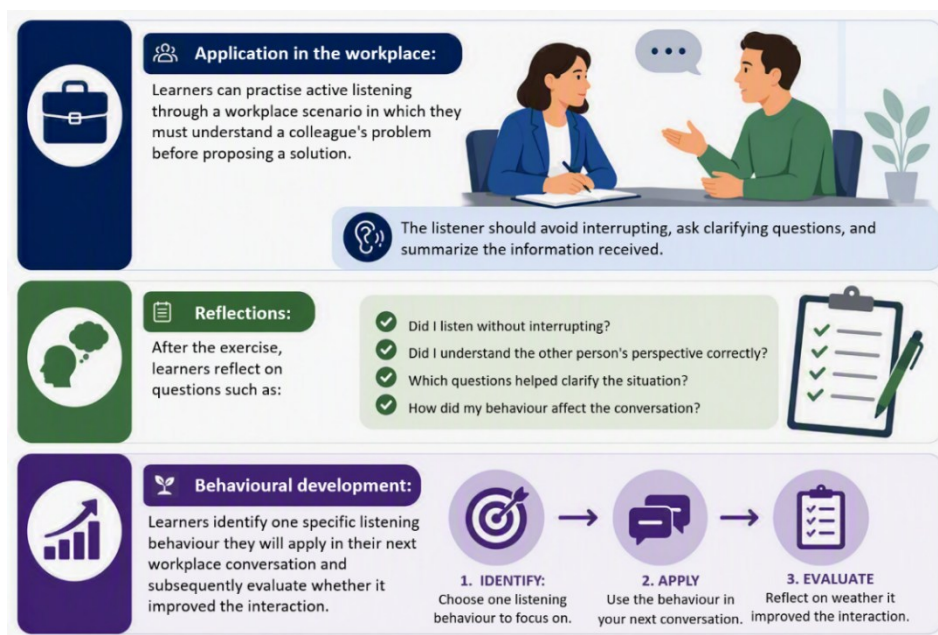


Fig. 2: Active Listening infographic

2. Communication Methods

Different situations require different communication methods, such as emails, phone calls, meetings, reports, or presentations. Choosing the right method helps avoid misunderstandings and ensures appropriate communication.

Employees should be trained in verbal, non-verbal, written, and visual communication.



Fig. 3: Communication methods infographic

3. Non-verbal Communication

Body language, facial expressions, tone of voice, posture, and gestures strongly influence communication and perception. Understanding non-verbal signals can improve interpersonal interactions and help employees respond appropriately to others.



Fig. 4: Non-verbal communication infographic

4. Emotion and Empathy

Emotional awareness and empathy help employees understand others' perspectives and respond appropriately. Active listening, perspective-taking, and questioning can strengthen empathy and communication.

At the same time, employees should manage their own emotions professionally and avoid inappropriate reactions in the workplace.



Fig. 5: Emotion and empathy infographic

2.1.2.2 Critical Thinking

Critical thinking is the ability to objectively evaluate information, arguments, and evidence, independent of personal beliefs. It is a key professional skill that helps employees solve problems logically and from multiple perspectives.

It involves using facts and data while avoiding emotional bias, recognizing cognitive biases, and identifying assumptions. It also includes distinguishing strong from weak arguments, evaluating relevance, and drawing logical conclusions.

Critical thinking supports innovation by enabling structured problem-solving and creative solutions.

In the workplace, it can be developed by encouraging questions, discussion, and explanation of reasoning, as well as by practicing information gathering, analysis, and evidence-based decision-making.

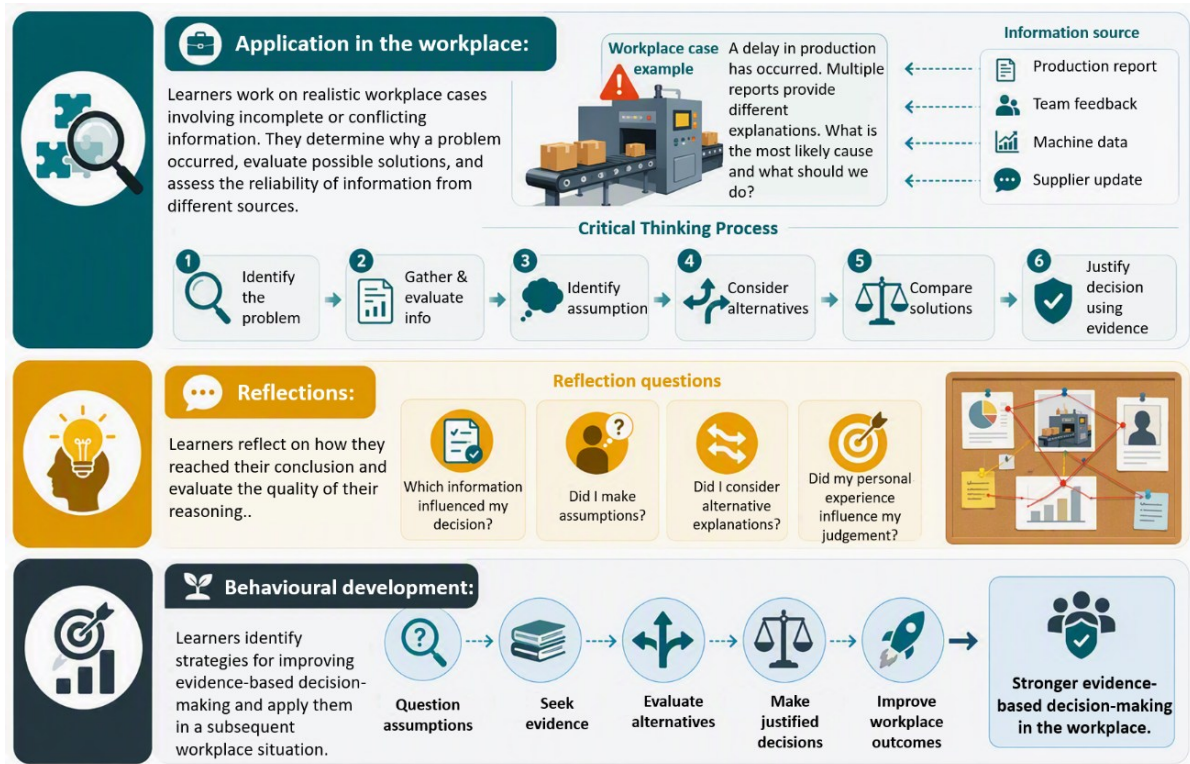


Fig. 6: Critical thinking infographic

2.1.2.3 Leadership

Leadership is the ability to organize people, build teams, and motivate them to achieve shared goals. It requires a combination of skills and can be applied in different ways depending on the situation.

Key leadership skills include:

- **Decision-making:** evaluating situations, comparing options, and choosing and communicating effective solutions.
- **Delegation:** assigning tasks appropriately and trusting others to carry them out, rather than doing everything oneself.
- **Conflict management:** identifying and resolving workplace conflicts fairly through communication, assessment, and negotiation.
- **Motivation and inspiration:** creating a positive environment, encouraging engagement, and helping employees feel valued and aligned with common goals.
- **Mentoring and development:** supporting employees' growth, sharing knowledge, and helping them reach their potential.

Additional important traits include accountability, communication, empathy, flexibility, resilience, and self-awareness. While many leadership skills can be developed, not everyone needs to be a leader; effective teams require a balance of leadership and support roles.



Fig. 7: Leadership infographic

2.1.2.4 Teamwork

Teamwork skills are essential in most jobs. Effective collaboration with colleagues, clients, and managers helps achieve goals efficiently and improves overall work quality and satisfaction.

Successful teamwork relies on communication as well as skills such as receiving feedback, emotional intelligence, self-awareness, and the ability to handle conflicts. Strong teams improve motivation, support problem-solving, and help balance both success and failure through shared responsibility.

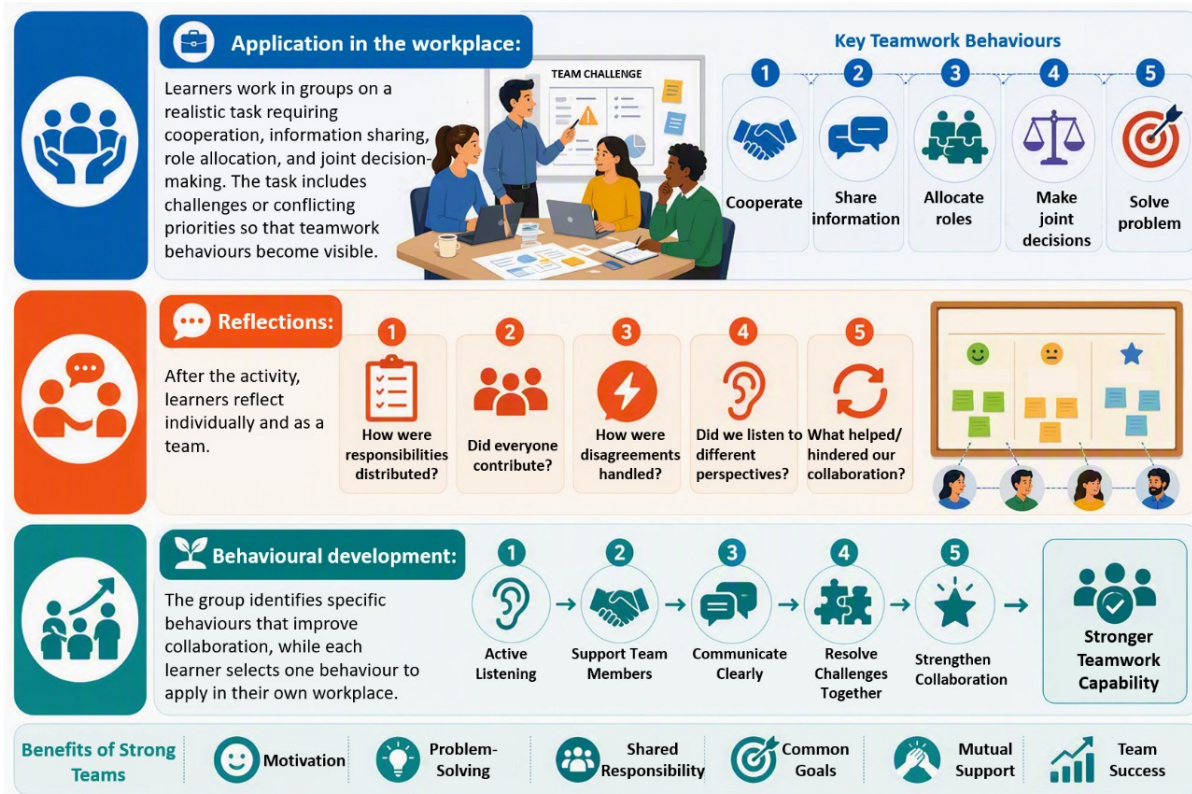


Fig. 8: Teamwork infographic

2.1.2.5 Work Ethic

Work ethic describes a strong commitment, reliability, and responsibility toward one's work. It includes being punctual, dependable, and willing to go beyond minimum requirements to achieve goals.

A strong work ethic also involves respecting others' time, maintaining good attendance, meeting deadlines, and ensuring quality in one's own work. It often includes self-discipline, planning, and time management skills that support consistent and professional performance.



Fig. 9: Work ethic infographic

2.2 Training Management Tools

A successful training management system combines clear structure, defined responsibilities, and a digital system (software) that ensures training is planned, tracked, and continuously improved.

It starts with defining training needs by:

- identifying all company roles
- defining required hard skills (e.g. technical processes, safety, compliance)
- defining soft skills (e.g. communication, leadership, teamwork)
- linking each role to specific competencies
- separating onboarding training from recurring or refresher training needs

Once the required competencies for a role have been defined, training needs must be identified for each employee. Appropriate training is then assigned, planned, and delivered. Following completion, the effectiveness of the training should be evaluated to verify that the required competencies have been achieved. All training activities must be documented, and records should be maintained to demonstrate employee competence. The company should also monitor training validity and ensure that refresher or retraining is scheduled and completed whenever required, for example due to defined retraining intervals, changes in processes or equipment, new regulations, or identified competency gaps.

These role-specific competency requirements and training procedures should be documented in Standard Operating Procedures (SOPs) that define the overall training management process. Where necessary, the main training SOP should be supplemented by additional SOPs or work instructions covering specific processes, equipment, or training topics.



2.2.1 Training SOP

SOPs (Standard Operating Procedures) are written step-by-step instructions that define how a specific task or process should be performed to ensure consistency, quality, and compliance. The first step in implementing successful training management in the company is to create such a standard training procedure for training (Training SOP). Within the SOP, a number of topics, such as those listed below, need to be addressed. The topics listed below are examples, for each company there will be differences depending on the size and organisational structure of the company. The first step is to clarify the needs of the company and develop the training procedure based on this. If the content becomes too extensive for a single document, separate SOPs may be created to cover specific training needs and procedures in more detail.

1. Purpose (describe the purpose of the SOP)

In this section, clearly state why the SOP exists by explaining its intended goal, such as ensuring consistency, safety, quality, and compliance in the described process.

For example: The purpose of this SOP is to describe the procedure for effective training of personnel working at the manufacturing site X of company Y. The described procedure ensures that all employee receives appropriate training required to execute their duties and responsibilities successfully.

2. Scope (describe the scope of the SOP)

In this section, define the boundaries of the SOP by specifying what processes, activities, people, or situations it applies to and where it does not apply.

For example: this procedure applies to all employees involved in the design, technical development, supply chain, manufacturing, quality testing, packaging, storage and transportation of the produced footwear.

3. Definitions (describe terms and abbreviations used in this document)

In this section, list and explain all key terms, acronyms, and abbreviations used in the document to ensure clear understanding and avoid ambiguity.

For example:

Training: is a process that improves the employee's competence in terms of knowledge, experience, behaviour and the skills necessary to perform assigned tasks in order to achieve the required business objectives.

Trainer: the trainer is an employee who has sufficient knowledge, qualifications, experience and training skills and is responsible for developing and delivering training related to the function and operation. The trainer is designated by the head of the department.

Trainee: The trainee is an employee who is undergoing training for a specific job or skill.

Training matrix: it is a document that lists all SOPs and topics on which training is required for individuals with certain job descriptions/responsibilities.

4. Responsibility (define responsibilities)

In this section, specify who is responsible for each part of the process and clearly outline their roles and accountability to ensure proper execution of the SOP.

For example:

- a) The department head shall be responsible to assign training responsibility to a certified or sufficiently qualified trainer, provide training capacities and materials and ensure that no work shall be assigned to employees until the required training has been conducted. The department head shall identify training topics and ensure complies with this SOP.
- b) The training coordinator shall identify individual training needs, schedule and maintain the training certificates.
- c) The trainer shall be responsible to conduct the training, determine training success and provide training documents and certifications
- d) The individual employee shall be responsible for updating their training file and submit external training certificates to the training coordinator

5. Trainee categories and training matrix

In this section, define the different trainee categories (e.g., new employees, existing staff, visitors, contractors) and determine the training needs for the different categories and.

For example:

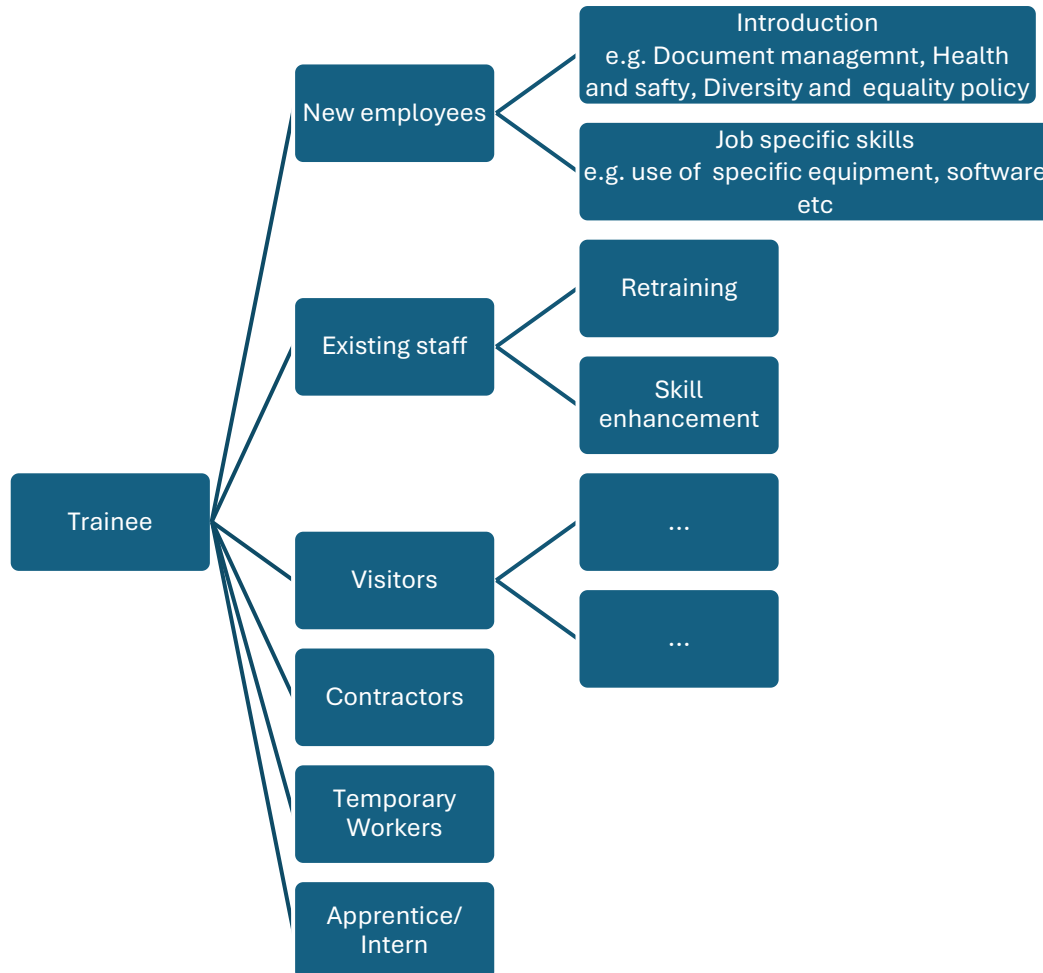


Fig.10 :Trainee categorization and training requirements

New employees require comprehensive onboarding training, including company policies, safety instructions, role-specific procedures, and both hard and soft skills relevant to their position. This ensures they can perform their tasks safely and effectively from the start.

Existing staff require ongoing and refresher training to maintain competence, adapt to process changes, and comply with updated regulations or internal standards. This may also include advanced or development training for career progression.

Contractors must receive targeted training relevant to their tasks and workplace access, especially focusing on safety rules, site regulations, and specific operational requirements. Their training is typically more limited but highly focused on risk control.

Visitors require only basic safety and site awareness training, such as emergency procedures, restricted areas, and general conduct rules. This ensures safe presence on site without requiring operational knowledge.

Temporary workers: Require task-specific training covering relevant work procedures, safety requirements, and workplace rules to ensure they can perform assigned activities safely and correctly within the limited duration of their employment.

Apprentices/Interns: Require structured training that combines practical workplace experience with theoretical learning. Training should cover basic company procedures, safety requirements, technical skills, and professional development appropriate to their educational level and responsibilities.

These training requirements are structured in a **training matrix**, which maps each trainee group (and/or role) to the required training categories. The matrix typically includes:

- Training topic or module
- Target group or role
- Training type (mandatory, optional, or role-specific)
- Frequency (one-time, annual, etc.)
- Training options (see point 6 below)
- Status tracking (completed, pending, expired). typically managed through a Learning Management System (LMS) or equivalent digital training record system.

The training matrix acts as a central control tool, ensuring transparency, compliance, and consistency across the organization. It allows management to quickly identify training gaps, plan resources, and ensure that all personnel meet the required competency and safety standards.

For example:

Training Topic / Module	New Employees	Existing Staff	Contractors	Visitors	Frequency	Type	Training Option	Status Tracking
Company induction	✓	—	—	—	One-time	Mandatory	In-house	LMS
Health & safety basics	✓	✓ (refresher)	✓	✓	Twice a year*	Mandatory	Self-training	LMS
Emergency procedures	✓	✓ (refresher)	✓	✓	Twice a year*	Mandatory	Self-training	LMS
Data protection / GDPR	✓	✓	✓	—	Annual	Mandatory	Self-training	LMS
Role-specific SOP training	✓ (role-based)	✓ (updates)	—	—	As needed	Mandatory	Self-training/In-house	LMS
Machine / equipment operation	✓ (role-based)	✓ (refresher)	—	—	Every 1–3 years	Mandatory	In-house	LMS
Communication & teamwork	✓	✓	—	—	Optional/ongoing	Development	External	LMS
Leadership training	—	✓ (selected)	—	—	As needed	Development	External	HR records
Site access rules	✓	✓	✓	✓	One-time + update	Mandatory	In-house	Access control

Tab. 2: Example Training Matrix. *Safety training may be conducted at least twice per year to reinforce knowledge, maintain awareness, and support the consistent application of safety procedures. Regular training and practical exercises can help employees retain key safety information and develop appropriate responses to hazardous or unexpected situations.

Observations from footwear production environments indicate that safety procedures are not always readily recalled when training intervals are longer. Regular refresher training can therefore support knowledge retention, reinforce safe working practices, improve compliance with established procedures, and contribute to a stronger overall safety culture.

Given the potential risks associated with manufacturing environments, a training frequency of at least twice per year may be considered appropriate, particularly where risks are significant, procedures change frequently, or previous assessments indicate gaps in safety awareness.

6. List of training options

In this section, provide an overview of training options, listing each training type including their requirements (such as availability of internal expert, learning platform, budget...) and scope (such as seminars, workshops, practical or theoretical...).

For example:

- Self-training and certification (determine requirements and scope)
- In-house training (determine requirements and scope)
- External training (determine requirements and scope)

7. Training evaluation

Training evaluation is an ongoing process with the aim of determining the effectiveness of current training measures regarding short- and long-term learning outcomes and improving training activities where appropriate. The evaluation approach can be based on Kirkpatrick's four-level model, which assesses **(1) reaction** – participants' satisfaction and perception of the training, **(2) learning** – the knowledge and skills acquired, **(3) behaviour** – the transfer and application of newly acquired competencies in the workplace, and **(4) results** – the impact of training on organizational performance and objectives⁴.

For sustainability-oriented training, this framework can be complemented by an additional dimension, **impact**, focusing on the longer-term contribution of training to organizational resilience, sustainability, and continuous improvement. Relevant indicators may include fewer quality defects and workplace accidents, lower employee turnover, increased satisfaction among learners, employees, and companies, improved collaboration, reduced material consumption, stronger compliance performance, and enhanced supplier development.

For example: Training effectiveness shall be evaluated after each training session using standardized feedback questionnaires and, where applicable, knowledge tests or practical assessments. Evaluation results shall be reviewed by the responsible training coordinator, considering feedback, competency achievement, and observations of workplace application. If less than 80% of participants meet the defined competency criteria, or if recurring negative feedback or insufficient transfer of skills into practice is identified, a corrective action process shall be initiated. This process may include a review of training content, adjustment of training methods, additional trainer support, or the implementation of refresher training. The longer-term impact of training shall be evaluated using relevant department-specific KPIs, as defined in the applicable

⁴ Alsalamah, A., & Callinan, C. (2021). Adaptation of Kirkpatrick's four-level model of training criteria to evaluate training programmes for head teachers. *Education Sciences*, 11(3), 116.

departmental KPI documentation. Training-specific evaluation records shall document the training assessed, applicable indicators, evaluation period, results, and any corrective actions.

8. Training documentation

In this section, specify how training records are created, stored, and maintained to ensure proper documentation, traceability, and compliance.

For example: The implementation and success of the training must be documented. The original training certificate shall be entered in the respective trainees file and a copy shall be given to the respective head of department.

2.2.2 Training management software

Training management software is essential for ensuring scalability, traceability, and automation of all training activities. It replaces manual tracking (e.g. spreadsheets) with a centralized system that improves accuracy, compliance, and efficiency across the organization. It enables companies to manage training consistently across departments, locations, and employee groups while maintaining complete documentation for audits and quality management systems⁵.

The selection of suitable software should consider the company's size, available budget, level of digital maturity, language requirements, existing IT infrastructure, and specific compliance or audit requirements. Smaller companies may benefit from simple and cost-effective solutions, while larger organizations may require more advanced systems with integrated reporting, workflow management, and connection to existing HR or quality management systems.

2.2.2.1 Core features

1. Digital training matrix

Provides a structured overview of all required training by role, department, or employee. It clearly shows training requirements and current status.

2. Automatic reminders and notifications

Sends alerts for upcoming, due, or overdue training to employees and managers, ensuring deadlines are not missed.

3. E-learning modules and quizzes

Allows delivery of digital training content, including interactive lessons, tests, and knowledge checks to verify understanding.

4. Certificate and qualification management

Stores training certificates, qualifications, and proof of completion in a centralized and accessible system.

⁵ Abid, A., Tufail, A. H., Ahmed Salem, O. M., A. Nawaz, N., Farooq, U., Abid, I., & Ishaq, K. (2024). An evaluation framework and comparative analysis of the widely used learning management systems. Plos one, 19(12), e0311111.

5. Audit-ready documentation

Ensures all training records are traceable, time-stamped, and easily exportable for internal or external audits.

6. Employee training history tracking

Maintains a complete record of all completed training, including dates, results, and validity periods.

2.2.2.2 Common types of training software

1. Learning Management Systems (LMS)

Focused on delivering and managing training content and learning progress.

Examples include platforms such as Moodle, Blackboard, and 360Learning. These systems are often used for structured e-learning and blended learning programs.

2. HR systems with training modules

Integrated HR platforms that include training as part of broader employee management functions such as onboarding, performance, and development tracking.

Examples include SAP SuccessFactors and BambooHR.

3. Quality Management Systems (QMS)

Systems designed for regulated environments where training is linked to compliance, safety, and quality standards.

Examples include ETQ Reliance, MasterControl and TrackWise Digital. These systems are especially common in industries with strict regulatory requirements.

3 Digitalisation in TM

Digitalisation enables a shift toward personalized training, where learning content, pace, and methods are tailored to individual needs rather than standardized for entire groups. By using data from performance metrics, assessments, and learning behaviour, digital training systems can identify specific skill gaps and automatically recommend relevant content or adaptive learning paths. This approach increases motivation and effectiveness, as learners engage with training that is directly relevant to their roles and development goals.

At the same time, digitalisation supports continuous learning by embedding training into everyday work processes instead of limiting it to isolated courses or scheduled sessions. Digital platforms allow employees to access short learning units, real-time support, and updated knowledge whenever challenges arise, making learning an ongoing process that evolves alongside changing tasks, technologies, and organizational needs.

3.1 New Era of Robots

While robots and automation may change the content of training, such as teaching employees how to operate, program, or collaborate with robotic systems, they are unlikely to fundamentally alter training management itself, as the processes for planning, delivering, documenting, and tracking learning will largely remain the same independent of the training topic. For example, the introduction of robotic systems in footwear production may create new training needs related to robot safety, human-machine interaction, basic robot operation and programming, maintenance fundamentals, fault recognition, and emergency stop procedures. Employees may need to understand safe working zones, risk prevention measures, correct interaction with collaborative robots (cobots), basic troubleshooting, and when to involve specialized maintenance personnel. These competencies should be integrated into the existing training management system through updated competency profiles, training matrices, qualification requirements, and refresher training schedules. The underlying training management processes—identifying needs, assigning appropriate training, evaluating effectiveness, and maintaining records—remain applicable regardless of whether the subject is traditional production skills or advanced automation technologies.

3.2 Artificial Intelligence (AI)

In the future, AI is expected to play an increasingly important role in training management, gradually transforming it from a primarily administrative function into a more strategic, data-driven, and adaptive system. Routine tasks such as scheduling, progress tracking, and certification management are likely to become increasingly automated, allowing training managers to focus more on strategy, culture, and employee development.

AI is also expected to enhance personalized learning by recommending content, learning paths, and development opportunities based on individual skill gaps, performance data, and organizational needs, making training more targeted and efficient ^{6,7}.

⁶ Vergara, D., Lampropoulos, G., Antón-Sancho, Á., & Fernández-Arias, P. (2024). Impact of artificial intelligence on learning management systems: A bibliometric review. *Multimodal technologies and interaction*, 8(9), 75.

⁷ Firat, M. (2023). Integrating AI applications into learning management systems to enhance e-learning. *Instructional Technology and Lifelong Learning*, 4(1), 1-14.

AI use in hard and soft skill training

A major driver of this shift is the emergence of **AI assistants**—such as ChatGPT, Claude, or Gemini—which are user-facing tools powered by **Large Language Models (LLMs)**. LLMs are a sophisticated type of AI system (umbrella field) trained on massive datasets to process natural language, retrieve information, and solve complex problems. In the workplace, these assistants act as the interface for the underlying models, allowing users to leverage AI for learning and decision-making. By providing on-demand guidance through a conversational interface, these tools improve accessibility and efficiency in professional training and development.

AI assistants powered by LLMs can support simple tasks such as locating software functions, drafting emails, or summarizing documents, as well as more advanced activities including coding support (e.g. Python, MATLAB, C++), data analysis, report structuring, project planning, and troubleshooting technical issues. In this way, **AI assistants can contribute to both hard skills** (technical knowledge, programming, data handling) **and soft skills** (communication support, structured thinking, and problem-solving approaches).

However, alongside these benefits come serious risks. **Overreliance on AI systems and AI assistants can erode both hard and soft skills**. Employees may lose technical competence in key areas if they increasingly depend on AI-assisted tools for coding, calculations, or analysis. Similarly, soft skills such as critical thinking, problem-solving, creativity, and judgment can decline if users accept outputs from AI assistants without reflection. LLMs, which form the core of many AI assistants, are trained on large datasets that may contain biased, outdated, or incorrect information. As a result, uncritical use of outputs generated by AI assistants can propagate errors, reinforce stereotypes, or lead to flawed decisions in both technical and interpersonal contexts.

To mitigate these risks, companies must train employees not only to use AI assistants effectively but also responsibly. This includes understanding how to protect sensitive company data, evaluating the accuracy of AI-generated outputs, identifying potential biases, and knowing when human judgment must override AI-generated suggestions. By combining the efficiency of AI assistants with human oversight, organizations can ensure that employees retain essential skills, maintain critical thinking capabilities, and apply technical knowledge thoughtfully rather than blindly following automated advice.

Ultimately, the future of training management will be a collaborative ecosystem in which AI systems and AI assistants powered by LLMs support the development of both hard and soft skills through personalized guidance, on-demand problem-solving, and real-time learning support. At the same time, **humans will continue to play a crucial role in overseeing and applying key soft skills such as critical thinking, ethical judgment, creativity, and interpersonal decision-making**—areas where AI systems can assist but cannot fully replace human insight. By combining AI-driven efficiency with conscious human oversight, organizations can enhance overall competence, prevent skill erosion, and ensure that both technical expertise and essential cognitive and interpersonal abilities continue to develop⁸.

AI use in development of training material

AI can significantly support and streamline the development of training materials, transforming how learning content is created, delivered, and updated. This includes a range of AI systems, from Large Language Models (LLMs) to multimedia generation and adaptive learning platforms.

⁸ As'ad, M., & Al Omari, A. (2025). The great AI mistake: why job replacement is the wrong strategy. *AI & SOCIETY*, 40(7), 5583-5584. Jadhav, R., & Danve, J. (2026). The AI Skills Shift: Mapping Skill Obsolescence, Emergence, and Transition Pathways in the LLM Era. arXiv preprint arXiv:2604.06906.

Generative AI has increasingly been used to support the creation, adaptation, and refinement of learning content, enabling trainers and educators to develop learning materials more efficiently^{9,10}.

LLMs, which power AI assistants such as ChatGPT, can generate training scripts, summaries, quizzes, explanations, and interactive dialogue. These tools can support both hard skills (technical procedures, programming, data analysis) and soft skills (communication, problem-solving, and leadership simulations)¹¹.

Other AI applications further enhance training delivery by transforming how content is consumed. Text-to-speech systems, such as ElevenLabs or Microsoft Azure AI Speech, convert written training material into realistic spoken narration. Avatar animation and AI video generation and translation tools, such as Synthesia¹², HeyGen, or D-ID, can create digital presenters that synchronize speech, lip movements, gestures, and facial expressions with generated scripts. This allows written content or presentation slides to be transformed into fully produced video training modules. Additionally, AI-powered translation and dubbing tools can translate these videos into multiple languages while preserving voice tone and lip synchronization, helping organizations deliver consistent, global training content with unprecedented efficiency¹³.

These AI-driven solutions enable organizations to scale training efficiently, deliver consistent content across locations and languages, and create more interactive learning experiences¹⁴. In some cases, AI-powered avatars and assistants can also provide real-time guidance or simulate workplace scenarios, further supporting the development of both hard and soft skills¹⁵.

AI as Partner and Rival in the Workplace

AI is increasingly replacing a wide range of white-collar jobs, particularly those involving routine cognitive tasks such as document processing, analysis, reporting, and structured decision support. In many cases, this transformation is not limited to explicit training of systems by workers, but also includes the passive generation of behavioural data—such as mouse movements, interaction patterns, and workflow decisions—that can be used to improve AI models over time. In this sense, workers themselves become a source of training data, which raises the possibility that the optimisation of these systems may reduce or replace the need for the very human activities that generated the data in the first place.

AI functions as both a workplace partner and a competitive force. On one hand, it enhances productivity by automating repetitive tasks and supporting more complex decision-making, enabling workers to focus on higher-level reasoning and creative problem-solving. On the other hand, it accelerates the restructuring of job roles and increases the pace at which specific skills

⁹ Ngo, T. N., & Fians, G. (2026). Between prompting strategies and ethical concerns: How EAP teachers develop materials with Generative AI. *Journal of English for Academic Purposes*, 81, 101680.

¹⁰ Digital Learning Institute. (2026). AI for Learning in 2026: Tools, Workflows, and Assessment. Retrieved from <https://www.digitallearninginstitute.com/blog/ai-for-learning-in-2026-what-s-new-what-s-next-and-what-it-means-for-educators>

¹¹ Ngo, T. N., & Fians, G. (2026). Between prompting strategies and ethical concerns: How EAP teachers develop materials with Generative AI. *Journal of English for Academic Purposes*, 81, 101680.

¹² Synthesia. (2026). AI in Learning & Development Report 2026. Retrieved from <https://www.synthesia.io/reports/ai-in-learning-and-development-report-2026>

¹³ Venture Harbour / G2 Product Analysis (2026) The Best AI Avatar Video Generators. Retrieved from <https://ventureharbour.com/best-ai-avatar-software/#:~:text=After%20testing%20platforms%2C%20two,that%20doesn't%20look%20uncanny>

¹⁴ VirtualSpeech. (2026). Top 40 AI Training Stats in 2026 (for Corporate and Education). Retrieved from <https://virtualspeech.com/blog/ai-training-statistics>

¹⁵ Lind, S. J. (2025). Can AI-powered avatars replace human trainers? An empirical test of synthetic humanlike spokesperson applications. *Journal of Workplace Learning*, 37(1), 19-40.

become obsolete. This creates a dual pressure on training management: supporting immediate productivity gains while also preparing for continuous workforce transformation.

In response, training management is likely to evolve toward continuous and adaptive learning systems that prioritise ongoing capability development rather than fixed qualifications. Greater emphasis will be placed on transferable skills such as critical thinking, systems thinking, and digital literacy, alongside the ability to effectively collaborate with AI-enabled workflows for optimised productivity.^{16,17} At the same time, AI-driven analytics may increasingly inform training strategies by identifying emerging skill gaps and predicting future competency needs.

Overall, AI as both partner and rival will reshape training management into a more dynamic and uncertain system, where learning is no longer a discrete career stage but an ongoing requirement for maintaining relevance in an environment where human work and machine learning systems are increasingly intertwined¹⁸.

Responsible AI Use in an Evolving Technological Environment

Responsible AI use in a company increasingly needs to be integrated directly into training management, as rapidly evolving technologies continuously reshape skill requirements and working practices. From a training perspective, organisations must ensure that employees are not only aware of how to use AI systems, but also understand the associated risks related to data security, intellectual property, trade secrets, privacy, and content reliability. Training programs therefore need to move beyond basic tool instruction and include ongoing capability development that helps employees critically evaluate AI outputs, recognise potential data exposure risks, and apply appropriate safeguards in everyday workflows.

At the same time, training management must adapt to the pace of technological change by becoming more continuous and responsive. As AI systems and digital tools evolve, employees require regular updates on new functionalities, emerging risks, and revised compliance requirements. This creates a need for modular, updatable training structures rather than fixed one-time courses. In this context, training becomes a key governance mechanism: it not only enables effective use of technology but also ensures that its deployment remains secure, legally compliant, and reliable in practice. The effectiveness of these efforts is further complicated by the fact that regulatory frameworks for AI are still evolving and, in some areas, remain incomplete or inconsistent across regions, which increases the responsibility placed on companies to self-regulate and define internal standards¹⁹.

3.3 Big Data

Big data and AI are closely interconnected in shaping the future of training management, creating a data-driven, adaptive learning ecosystem. Big data provides the raw insights—collected from multiple sources such as employee performance metrics, engagement with training platforms, production efficiency, and quality control data—that AI systems can use to identify patterns, predict skill gaps, and recommend targeted learning interventions. For example, recurring errors

¹⁶ As'ad, M., & Al Omari, A. (2025). The great AI mistake: why job replacement is the wrong strategy. *AI & SOCIETY*, 40(7), 5583-5584. Jadhav

¹⁷ R., & Danve, J. (2026). The AI Skills Shift: Mapping Skill Obsolescence, Emergence, and Transition Pathways in the LLM Era. *arXiv preprint arXiv:2604.06906*.

¹⁸ Chatlani, N., Fox, G., & Solihin, Y. (2026, April). Generative AI and The Future of Knowledge Work: Exploring Perceptions of Job Replacement, Job Augmentation, and Organizational Responsibility.

¹⁹ Gunasekara, L., El-Haber, N., Nagpal, S., Moraliyage, H., Issadeen, Z., Manic, M., & De Silva, D. (2025). A systematic review of responsible artificial intelligence principles and practice. *Applied System Innovation*, 8(4), 97.

detected in quality control or decreases in production efficiency may indicate that employees could benefit from additional training in specific technical procedures or operational tasks.

AI, including Large Language Models (LLMs) and adaptive learning algorithms, can analyse these datasets to personalize training by recommending relevant modules, exercises, or interactive scenarios tailored to identified learning needs. By linking operational and learning data in this way, organizations can move beyond generic training programs and use evidence from real-world work processes to proactively develop both hard skills (technical competencies) and soft skills (problem-solving, collaboration), ensuring that learning initiatives are aligned with actual business needs and measurable outcomes.

However, the integration of production data, learning data, and employee performance information requires careful consideration of data protection, transparency, and ethical use. In accordance with GDPR (General Data Protection Regulation) principles and applicable national regulations, employees should be informed about what data is collected, how it is processed, and for which purposes it is used. Data-driven systems should support competence development, training planning, and workplace improvement rather than becoming tools for unjustified employee surveillance. Clear governance rules, appropriate access controls, and transparent communication are essential to ensure that AI-supported training management is implemented responsibly and maintains employee trust.^{20,21}

3.4 3D Printing

While 3D printing may influence the type of learning content, such as introducing modules on additive manufacturing techniques or prototyping, it is unlikely to fundamentally change training management itself, as the processes for planning, delivering, and tracking training will remain largely the same independent of the topic.

3.5 Combination of Digitalisation and Sciences

Advances in neuroscience, psychology, and digitalization are increasingly influencing training design (Learning architecture and pedagogy) and training management (Learning organisation: who, when, where) in order to maximise learning efficiency. Research on attention, memory, cognitive load, motivation, and emotional engagement shows that active participation, repetition, feedback, and practical application improve long-term learning effectiveness. As a result, concepts such as adaptive feedback, spaced repetition, and gamification are becoming more integrated into modern training systems. At the same time, technologies such as virtual reality (VR), augmented reality (AR), AI-generated simulations, conversational AI tutors, wearable technologies, and digital twins of dangerous or inaccessibility machinery are enabling more immersive and interactive learning environments²².

3.6 Virtual and Augmented Reality, Digital Twins

Advances in virtual reality (VR) and augmented reality (AR) are expected to significantly reshape both training design and training management by enabling more immersive, data-rich, and adaptive learning environments. A key development in this direction is the integration of digital

²⁰ In *Proceedings of the Extended Abstracts of the 2026 CHI Conference on Human Factors in Computing Systems* (pp. 1-5).

²¹ Chen, C. H. (2024). Influence of employees' intention to adopt AI applications and big data analytical capability on operational performance in the high-tech firms. *Journal of the Knowledge Economy*, 15(1), 3946-3974.

²² Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory: The role of educational neuroscience and artificial intelligence in redefining learning efficacy. *Brain sciences*, 15(2), 203.

twins, which are virtual representations of physical systems that continuously update using real-world data. Together, **VR, AR, and digital twins** will allow training to shift from static instruction toward dynamic, real-time simulation of actual working environments.

In training design, VR will increasingly be used to recreate complex or high-risk environments where real-world practice is difficult, expensive, or unsafe. AR will complement this by embedding instructional guidance directly into the physical workplace, enabling learning during task execution. Devices such as Meta Quest 3 and Microsoft HoloLens 2 already illustrate how immersive simulation and real-world augmentation can be combined.

Digital twins extend this further by linking training environments directly to real operational systems. For example, a trainee could interact with a virtual replica of a production line, machine, or building that behaves according to live or historically accurate data. This makes training scenarios more realistic in a functional sense, not just visually. However, this also increases system complexity, which directly affects cognitive demand.

A major shift in training management will be the move toward continuous, data-driven ecosystems. Performance data from VR/AR sessions and digital twin interactions can be aggregated to track learning progression, predict skill gaps, and adapt training pathways automatically. While this improves personalization and operational insight, it also increases the density of information being processed by both learners and trainers.

This is where **cognitive overload** becomes a critical constraint. Cognitive overload occurs when the amount of information and task demands exceed the brain's capacity to process and integrate information effectively. In VR, AR, and digital twin environments, this risk is amplified because learners are often exposed to multiple synchronized data streams: real-time system behaviour (from the digital twin), spatial visualizations, instructional overlays, and active task execution²³.

In VR-based training, high-fidelity simulations can unintentionally shift cognitive effort away from skill acquisition toward environmental interpretation. Novices may spend significant mental resources understanding navigation, object interaction, and system rules rather than developing procedural competence. This reduces learning efficiency even if the simulation appears highly realistic²⁴.

In AR-based training, cognitive overload is often caused by the layering of digital information onto physical tasks. If AR overlays are poorly structured or too numerous, learners experience split attention between the real-world task and digital guidance. This increases mental effort and can slow down learning, especially in dynamic environments where rapid decision-making is required²⁵.

Digital twins introduce an additional layer of complexity. Because they often reflect real-time system states, learners may be exposed to a continuous flow of changing data. If not carefully filtered, this can create information saturation, where learners struggle to distinguish relevant

²³ Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory: The role of educational neuroscience and artificial intelligence in redefining learning efficacy. *Brain sciences*, 15(2), 203.

²⁴ Sagehorn, M., Johnsdorf, M., Kisker, J., Gruber, T., & Schöne, B. (2026). Working memory load and search efficiency in conventional monitor-based 2D versus 3D virtual settings: analysis of response times and parietal induced alpha activity in a modified Sternberg task. *Experimental Brain Research*, 244(4), 62.

²⁵ Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory: The role of educational neuroscience and artificial intelligence in redefining learning efficacy. *Brain sciences*, 15(2), 203.

signals from background system noise. In training contexts, this can lead to superficial task execution rather than deep understanding of system behaviour^{26,27}.

From a training management perspective, these technologies enable unprecedented monitoring and feedback capabilities. However, more data does not automatically improve learning outcomes. If feedback from VR, AR, and digital twin systems is too frequent or too detailed, it can itself become a source of cognitive overload, disrupting learning rather than supporting it.

To mitigate these risks, future training design will need to prioritize cognitive efficiency over technological richness. This includes structured information sequencing, progressive disclosure of system complexity, and context-aware filtering of digital twin data so that only relevant variables are shown at any given time. Similarly, AR interfaces must minimize unnecessary overlays, and VR environments should avoid overwhelming realism that does not directly contribute to learning goals²⁸.

In summary, VR, AR, and digital twins together will enable highly advanced training ecosystems that closely mirror real-world systems and operations. However, their success will depend not on the amount of information they can deliver, but on how effectively they manage cognitive load. Without careful design, the same systems that enable deeper learning could instead overwhelm learners and reduce training effectiveness.

Technology	Main Benefits	Main Risks / Limitations	Cost & Implementation Effort	Typical Use Cases in Footwear Training	Suitability
Virtual Reality (VR)	Immersive learning; safe simulation of hazardous or expensive processes; repeatable practice; high learner engagement	Cognitive overload, motion sickness, visual fatigue, hardware discomfort, high development effort	High. Requires 3D environments, headsets, dedicated space, technical support	Machine operation, production line training, safety procedures, maintenance, emergency scenarios	Best for complex practical skills that are difficult or unsafe to train in reality
Augmented Reality (AR)	Learning during real work; contextual guidance; reduced need for supervision; supports just-in-time learning	Split attention, information overload from overlays, device limitations, usability challenges	Medium to High. Requires AR devices or tablets, content creation, maintenance	Assembly guidance, quality inspection, machine setup, maintenance instructions, repair procedures	Well suited for workplace-based training and task support
Digital Twins	Realistic representation of production systems; real-time data integration; scenario testing; supports predictive and adaptive training	Information saturation, high system complexity, dependence on accurate data integration	Very High. Requires digital infrastructure, sensors, data integration, continuous updates	Production planning, process optimization, predictive maintenance, factory simulations	Most suitable for advanced technical training, management training, and Industry 4.0 environments

Tab. 3: Comparison of VR, AR, and Digital Twins for Footwear Training

²⁶ Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory: The role of educational neuroscience and artificial intelligence in redefining learning efficacy. *Brain sciences*, 15(2), 203.

²⁷ Sagehorn, M., Johnsdorf, M., Kisker, J., Gruber, T., & Schöne, B. (2026). Working memory load and search efficiency in conventional monitor-based 2D versus 3D virtual settings: analysis of response times and parietal induced alpha activity in a modified Sternberg task. *Experimental Brain Research*, 244(4), 62.

²⁸ Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging cognitive load theory: The role of educational neuroscience and artificial intelligence in redefining learning efficacy. *Brain sciences*, 15(2), 203.

Beyond cognitive factors, several practical constraints will also determine their real-world value. One major limitation is the cost and time required to develop training content. High-quality VR simulations, AR overlays, and digital twin integrations demand detailed 3D modelling, system mapping, programming, and continuous updates. Unlike traditional training materials, these environments are not easily produced or modified, which makes scaling training programs slower and more expensive.

Another important factor is the effort needed to prepare and maintain the learning environment. VR and AR training often require dedicated physical spaces, calibrated equipment, and technical setup before sessions can even begin. For digital twin-based systems, additional infrastructure is needed to ensure reliable data integration between real-world systems and their virtual counterparts. This increases operational complexity for training organizations.

There are also physical and physiological constraints that directly affect usability. Prolonged use of head-mounted displays can lead to discomfort due to device weight and heat buildup, as well as visual fatigue. Motion sickness remains a common issue in VR, especially when there is a mismatch between visual motion cues and physical movement. These effects can reduce training duration, limit session intensity, and negatively influence learner engagement and retention.

Taken together, these factors highlight that the effectiveness of VR-, AR-, and digital twin-based training is not only a question of instructional design or cognitive load management, but also of practical feasibility. Even highly advanced systems may fail to deliver value if they are too costly to develop, too complex to maintain, or physically uncomfortable to use over meaningful training durations.

As a result, an increasingly important responsibility within training management will be the systematic evaluation of the feasibility and effectiveness of these technologies. Companies will need to assess whether VR, AR, and digital twin-based training tools actually improve performance outcomes in relation to their cost, implementation effort, and operational constraints. This includes not only measuring learning effectiveness, but also evaluating scalability, integration with existing workflows, maintenance requirements, and return on investment. In practice, this means training management will shift toward a more evidence-based decision-making role, where the adoption of innovative learning technologies is not driven by novelty, but by their demonstrated value for specific organizational goals and contexts.

Aspect	Implication for Training Management
Learning effectiveness	Highly effective when matched to appropriate learning objectives and designed to manage cognitive load.
Development effort	Considerably higher than conventional e-learning due to 3D modelling, programming, and continuous maintenance.
Scalability	Depends on hardware availability, infrastructure, and content maintenance. AR generally scales more easily than VR and digital twins.
Return on investment	Greatest where training is expensive, safety-critical, or requires repeated practice; less favourable for simple theoretical content.
Recommendation for footwear sector	Use conventional digital learning for theoretical knowledge, AR for workplace guidance and operational tasks, VR for complex practical skills, and digital twins primarily where digitally connected manufacturing systems already exist.

Tab. 4: Overall considerations regarding VR-, AR- and digital twin-based training.

4 Globalisation in TM

Globalisation is reshaping training management by increasing the need for standardised yet adaptable training systems across geographically distributed workforces. Companies now operate across multiple countries, which requires training programs that can be delivered consistently while still accounting for cultural, linguistic, and regulatory differences. In the future, globalisation is likely to further accelerate real-time, networked training ecosystems where knowledge, performance data, and best practices are shared instantly across international site.

4.1 Demography

Demographic change is becoming a key driver of how training management is structured, particularly in Europe. An ageing workforce means companies must increasingly focus on upskilling and reskilling older employees, often requiring training formats that are more flexible, less physically demanding, and adapted to prior experience levels. At the same time, it is crucial to retain those experienced workers, as they hold highly valuable subject-specific knowledge that is difficult to formalise or replace. However, this group may require additional support when adopting new digital tools and emerging technologies, which are increasingly embedded in modern work environments. Effective knowledge retention therefore requires approaches that combine formal written records with social learning processes, as tacit knowledge is often transferred most effectively through interaction and collaboration between generations²⁹.

In parallel, younger employees often enter the workforce with strong digital familiarity but different learning expectations shaped by multimedia environments. They frequently prefer interactive, visual, and flexible learning formats that allow them to engage with content in shorter, more personalised learning units. This creates a need for training systems that can effectively bridge generational differences in learning preferences and technological comfort. Rather than viewing these differences as a challenge alone, organisations can use them as an opportunity for reciprocal learning, where younger employees contribute digital competencies while gaining practical expertise from experienced colleagues. Intergenerational learning approaches can support knowledge exchange and strengthen organisational adaptability, particularly when structured opportunities for collaboration are provided³⁰.

For industries such as footwear manufacturing, attracting younger generations requires a shift in how vocational careers are positioned. Traditional perceptions of footwear production as primarily manual work need to be complemented by a stronger emphasis on its modern, technology-driven aspects. Today's footwear sector increasingly combines craftsmanship with digital design, 3D modelling, virtual prototyping, automation, data-driven product development, and sustainable manufacturing approaches. Highlighting these elements can help demonstrate that footwear careers offer opportunities in creativity, technology, and innovation rather than only traditional production tasks. Furthermore, linking vocational careers to sustainability challenges—such as circular materials, recycling, eco-design, and transparent supply chains—can increase their attractiveness among younger generations who increasingly consider environmental responsibility when choosing career paths. The broader transformation of work and skills in Europe also

²⁹ Fasbender, U., & Gerpott, F. H. (2022). Knowledge transfer between younger and older employees: A temporal social comparison model. *Work, Aging and Retirement*, 8(2), 146-162.

³⁰ Singh, S., Thomas, N., & Numbudiri, R. (2021). Knowledge sharing in times of a pandemic: An intergenerational learning approach. *Knowledge and Process Management*, 28(2), 153-164.

highlights the need for new approaches to skills development that combine technological competence, adaptability, and lifelong learning³¹.

Many regions face a declining interest in entering blue-collar or skilled manual professions, which contributes to persistent labour shortages in sectors such as manufacturing, construction, and logistics. The footwear industry is similarly affected, as younger generations may not always perceive manufacturing careers as attractive or future-oriented. One possible response is a gradual rethinking of traditional multi-year apprenticeships toward more flexible training ecosystems. Instead of replacing apprenticeships entirely, they could be restructured into modular pathways where foundational vocational skills remain, but are delivered through shorter, stackable learning units combined with targeted, sector-specific skill modules.

In such a model, training management would coordinate dynamic learning trajectories rather than fixed programmes. Learners could enter the workforce earlier, gaining employable competencies step by step, while continuing to build deeper expertise over time through microcredentials and specialised modules aligned with industry needs. This could make vocational careers more accessible and adaptable, particularly for individuals who are hesitant to commit to long training cycles. For the footwear sector, modular pathways could combine introductory modules on footwear fundamentals with specialised learning opportunities in areas such as digital product development, sustainable materials, footwear testing, automation, or smart manufacturing.

At the same time, this approach could help balance speed and depth in skill formation, allowing industries to respond more quickly to changing technological and production demands without losing the structured progression and quality assurance traditionally associated with apprenticeships. While still conceptual in many respects, such a system points toward a more agile and responsive future for vocational training management, where learning is continuous, modular, and closely integrated with labour market realities.

4.2 Economic and Social Factors

Economic and social factors are likely to significantly reshape training management by increasing both external pressure and internal complexity in how organisations develop skills.

On the economic side, the footwear industry faces intense global cost competition, increasing pressure for shorter product development and production lead times, rising customer expectations regarding product quality and customisation, growing demands from brands and retailers on suppliers, and persistent labour shortages in many manufacturing regions. In parallel, companies are facing increasing environmental and regulatory requirements driven by European legislation, including obligations related to sustainability reporting, resource efficiency, chemical management, waste reduction, and circular economy principles. Regulations such as the EU Strategy for Sustainable and Circular Textiles, the Corporate Sustainability Reporting Directive (CSRD), the Ecodesign for Sustainable Products Regulation (ESPR), and requirements related to extended producer responsibility are increasing the need for new knowledge and competencies across the footwear value chain. Employees therefore require training not only in production technologies but also in areas such as sustainable materials, life cycle assessment, traceability, circular design, and compliance processes.

³¹ Feyer, C. (2024). Reinventing Skills—Changing Paradigms and the EU Response. *Intereconomics*, 59(3), 132-135.

On the social side, shifting expectations around work, flexibility, and lifelong learning will influence how training is designed and delivered. Employees increasingly expect personalised, accessible, and meaningful learning opportunities that fit into diverse life situations rather than rigid, one-size-fits-all programmes. At the same time, broader societal challenges such as demographic ageing, migration, and unequal access to education will require training systems to become more inclusive and adaptable. Together, these economic, environmental, and social forces will likely push training management toward more flexible, modular, and learner-centred systems that balance organisational efficiency, regulatory compliance, and individual development needs.

Together with rapid technological change, productivity competition, and cost constraints, these developments will push companies to prioritise more efficient, scalable, and measurable training systems that demonstrate a clear return on investment. As production processes, digital tools, and sustainability requirements continue to evolve, companies will need to continuously upskill and reskill employees at a pace that traditional training cycles often cannot match. This is likely to accelerate the adoption of digital, modular, and data-driven training approaches that enable faster competence development while minimising production disruptions.

4.3 Qualification / Training / Knowledge

Qualification and training knowledge will significantly reshape training management in the future, as highlighted across the developments discussed in Chapters 3–4. Rather than being based on fixed, once-off certifications, qualifications are likely to become more modular, continuous, and closely aligned with rapidly changing technological, economic, and demographic conditions. Training management will increasingly focus on maintaining up-to-date competency profiles instead of static credentials, integrating microlearning, digital certifications, and workplace-based assessment.

A key element of this transformation will be the practical implementation of microcredentials. Instead of requiring employees to complete large qualification programmes, knowledge and skills can be acquired through shorter, targeted learning modules that address specific competency gaps. For example, a footwear production employee could complete separate modules on digital pattern development, sustainable materials, quality control, or the operation of specific automated machinery. Successful completion could be documented through digital certificates or role-based badges that provide transparent evidence of acquired competencies. These credentials could be combined into individual learning pathways, allowing employees to build qualifications progressively according to their current role, career goals, and organisational needs. To ensure that competencies remain relevant, microcredentials could also include regular refresher cycles or renewal requirements, particularly for rapidly changing areas such as digital technologies, regulatory requirements, and sustainability practices.

A key addition to this shift is the growing recognition of individual learning needs, meaning that training pathways will need to be more personalised in order to account for differences in prior experience, learning pace, cognitive preferences, and access to technology. This reflects the growing need for lifelong learning systems where knowledge is continuously updated in response to AI-driven job changes, evolving skill demands, and new workplace technologies, making qualification processes more dynamic and adaptive than traditional models.

4.4 Markets and Consumers

Markets and consumer expectations increasingly influence training management by raising the pressure on organisations to deliver higher quality, faster, and more consistent outcomes in both products and services. As competition intensifies, companies are required to ensure that employees are not only technically competent but also able to maintain efficiency, adaptability, and customer-oriented performance under changing conditions. This drives training management toward more performance-focused systems, where skill development is closely linked to measurable output quality and operational standards. At the same time, rising consumer expectations for reliability, speed, and personalised experiences push organisations to continuously upgrade workforce capabilities rather than relying on static skill sets. In competitive markets, training therefore becomes a strategic tool for maintaining differentiation, ensuring that employees can meet evolving quality benchmarks while also responding flexibly to shifting customer demands.

4.5 Compliance

Training management is increasingly shaped by the need to comply with formal regulations and internationally recognised standards such as ISO 9001³², which emphasise consistent quality assurance, documented processes, and continuous improvement. In this context, training is not only a tool for skill development but also a core component of organisational compliance systems. Companies must ensure that employees are properly qualified for their roles, that competencies are regularly updated, and that training activities are clearly documented and auditable.

In the footwear industry, compliance-related training extends beyond quality management and must address a broad range of requirements, including chemical safety, occupational health and safety, labour and social compliance standards, product safety regulations, and specific customer or brand requirements. Employees may require training on topics such as the safe handling of chemicals and materials, restricted substance requirements, responsible sourcing principles, workplace standards, testing procedures, and customer-specific quality expectations. These requirements are particularly relevant in globally connected supply chains, where companies must demonstrate not only product conformity but also responsible production practices and transparency.

Standards and certifications can provide an important starting point for establishing processes, structuring organisational learning, and developing deeper knowledge. However, their value depends on how effectively they are integrated into the organisation's daily operations. They are most effective when used as tools for organisational and individual development rather than solely as mechanisms for demonstrating compliance to external stakeholders.

Practical experience in footwear manufacturing indicates that certification processes can also create a risk of a compliance-oriented approach in which companies focus primarily on preparing for external audits rather than embedding the underlying requirements into everyday operations. For example, workplace safety procedures may be carefully implemented and demonstrated during audit periods but receive less attention in routine operations before and after the audit. This highlights the importance of integrating standards and certification requirements into regular workflows, employee training, monitoring, and management practices so that compliance

³² International Organization for Standardization. (2015). Quality management systems – Requirements (ISO Standard No. 9001:2015).

becomes part of the organisation's day-to-day culture rather than an activity performed primarily for audit purposes. In this context, training management plays a key role in translating formal requirements into sustained workplace practices. Training records, competency assessments, and certification processes can therefore form part of broader evidence systems for audits and customer evaluations, while also supporting actual competence and continuous improvement. As standards evolve and regulatory expectations become more complex, training management must ensure traceability, consistency, and accountability in how skills are developed and maintained across the organisation. This requires integrated approaches that connect quality management systems, sustainability objectives, and operational competence development.

5 Sustainability in TM

Sustainability is increasingly emerging as an important guiding framework for training management in the future, particularly through its environmental, economic, and social dimensions. However, its influence on training management should be understood in a differentiated way. In many cases, sustainability initially acts as a content- and orientation-level driver, shaping which competencies are taught and which priorities are emphasised within existing systems. For example, topics such as sustainable materials, energy efficiency, resource optimisation, chemical management, circular design, and responsible production practices are increasingly integrated into qualification frameworks without necessarily requiring a complete redesign of training structures.

At the same time, sustainability can also influence the management processes surrounding training. As environmental and social requirements become increasingly linked to regulatory obligations, customer expectations, and supply chain transparency, companies may need to adapt training priorities, define new sustainability-related competency targets, introduce relevant performance indicators, and ensure that acquired skills are measurable and auditable. In the footwear industry, this may include supplier training on restricted substances, sustainable sourcing requirements, traceability processes, circular production methods, and compliance with evolving European sustainability requirements. Training documentation and competency records may increasingly become part of sustainability reporting, customer audits, and broader evidence systems demonstrating responsible business practices.

Beyond these operational aspects, certain dimensions of sustainability—particularly those related to social responsibility and large-scale workforce transitions—may have a broader systemic influence on training management. These aspects extend beyond adapting training content and can affect access structures, learning pathways, and organisational responsibility for long-term competence development. This becomes especially relevant in the context of AI-driven labour market transformation, where sustainability is increasingly connected to questions of inclusion, employability, equal access to learning opportunities, and societal resilience. Organisations may therefore need to consider not only how employees acquire new skills, but also how training systems support different workforce groups during periods of technological and economic change.

Overall, sustainability should therefore not be understood as a uniform driver of structural change in training management. Rather, it represents a multi-layered influence: primarily a content and competency driver in many technical and environmental areas, while potentially becoming a more system-shaping factor through its social dimension and its long-term interaction with technological transformation. As a result, future training management will need to balance the integration of new sustainability-related knowledge with broader considerations of accessibility, workforce development, and organisational responsibility^{33,34}.

5.1 Green Awareness

While green awareness may influence the content of training, such as introducing modules on energy efficiency, sustainable production practices, waste reduction, or environmental

³³ As'ad, M., & Al Omari, A. (2025). The great AI mistake: why job replacement is the wrong strategy. *AI & SOCIETY*, 40(7), 5583-5584.

³⁴ Jadhav, R., & Danve, J. (2026). The AI Skills Shift: Mapping Skill Obsolescence, Emergence, and Transition Pathways in the LLM Era. *arXiv preprint arXiv:2604.06906*.

compliance, it is unlikely to fundamentally alter training management itself, as the processes for planning, delivering, and tracking learning will largely remain the same independent of the topic.

5.2 Energy and Process Efficiency

While energy and process efficiency may influence the content of training, such as introducing modules on energy-saving operating procedures, process optimisation techniques, or efficiency-related performance standards, it is unlikely to fundamentally alter training management itself, as the processes for planning, delivering, and tracking learning will largely remain the same independent of the topic.

5.3 Resource Efficiency & Sustainable Materials

While resource efficiency and the use of sustainable materials may influence the content of training such as introducing modules on material selection, recycling practices, waste reduction, and sustainable production methods, it is unlikely to fundamentally alter training management itself, as the processes for planning, delivering, and tracking learning will largely remain the same independent of the topic.

5.4 Sustainable Design & Circular Economy

While resource sustainable design & circular economy may influence the content of training such as introducing modules on introducing design-for-reuse principles, lifecycle thinking, repairability standards, or circular production systems, it is unlikely to fundamentally alter training management itself, as the processes for planning, delivering, and tracking learning will largely remain the same independent of the topic.

5.5 Chemical Safety

While chemical safety may influence the content of training, such as introducing modules on handling hazardous substances, emergency procedures, or compliance regulations, it is unlikely to fundamentally alter training management itself, as the processes for planning, delivering, and tracking learning will largely remain the same independent of the topic.

5.6 Social Responsibility

Social responsibility has a broader and more structurally relevant influence on training management compared to many other sustainability subtopics, as it is closely linked to workforce inclusion, ethical labour practices, human rights, employee well-being, occupational health and safety, diversity and equal opportunity, and long-term societal stability. These issues are reflected not only in international frameworks such as the UN Guiding Principles on Business and Human Rights (UNGPs) and the standards of the International Labour Organization (ILO), but also in company-specific policies and Codes of Conduct. For example, the Deichmann Code of Conduct³⁵ emphasizes principles such as respect for human rights, non-discrimination, fair working conditions, integrity, and responsible behaviour throughout the organisation. Consequently, social responsibility is reflected in training content through topics such as diversity and inclusion, ethical decision-making, responsible

³⁵ Deichmann SE. (2026). DEICHMANN Code of Conduct for supply chain participants.
https://corpsite.deichmann.com/deichmann.com/1_shared_media/en/code_of_conduct_en.pdf.

leadership, human rights awareness, compliance, workplace safety, and anti-discrimination practices. However, its influence increasingly extends beyond content into the design principles of training systems themselves. Specifically, it shapes how organisations ensure equitable access to learning opportunities, how development pathways are distributed across different employee groups, and how fair transitions are managed during technological and organisational change. In this way, social responsibility becomes a guiding principle for creating inclusive and sustainable workforce development systems rather than merely a topic addressed within individual training programmes.

5.6.1 Key Pillars & Footwear-Specific Applications

To transition from theoretical social responsibility to structural training management, companies—particularly in labour-intensive sectors like footwear manufacturing—must embed specific ethical pillars into their educational ecosystems:

1. Responsible Recruitment & Migrant Worker Integration

Ensuring training is accessible to vulnerable, outsourced, or foreign contract workers, mitigating risks of forced labour.

Footwear Example: Implementing Responsible Recruitment training for third-party HR agents on the "Employer Pays Principle" (ensuring workers do not pay recruitment fees). For migrant workers in Tier 1 assembly factories, training modules (covering safety, rights, and contracts) must be delivered in their native languages rather than just the host country's language.

2. Fair Labour & Safe Working Conditions

Structuring training schedules and environments to respect workers' physical well-being, legal working hours, and fair compensation.

Footwear Example: Designing Safe Working Conditions programs that train lasting and assembly-line workers on ergonomics and the safe handling of hazardous solvents and adhesives used in shoe bonding. To support Fair Labour, training must occur during paid working hours, ensuring workers do not have to sacrifice piece-rate wages or take unpaid overtime to complete mandatory compliance courses.

3. Gender Inclusion & Career Progression

Using training as a deliberate tool to dismantle systemic gender disparities in promotion and pay.

Footwear Example: While the stitching lines of footwear factories are heavily staffed by women, management roles are historically held by men. Gender Inclusion manifests as targeted leadership and technical training pathways designed to help female line-workers transition into supervisory, quality assurance, or technical pattern-making roles.

4. Supplier Training & Capacity Building

Extending training resources outward to suppliers rather than restricting professional development to headquarters.

Footwear Example: Footwear brands conducting direct Supplier Training for subcontracted factory management. This includes training factory owners on lean manufacturing and advanced production planning to reduce the bottlenecking that leads to illegal, excessive overtime for workers during peak shoe-release seasons.

5. Operational Grievance Systems

Training the workforce on how to safely report exploitation, harassment, or safety violations.

Footwear Example: Conducting factory-wide, interactive training on Grievance Systems, ensuring every worker knows how to access and use anonymous hotline apps or physical suggestion boxes, while simultaneously training factory supervisors on non-retaliation policies.

5.6.2 Navigating Technological Change and "Just Transitions"

The social relevance of Training management becomes particularly relevant as automation and AI reshape occupational structures and create uneven impacts across skill levels and demographic groups. Recent international research emphasises that without deliberate policy and organisational intervention, technological change can amplify inequalities in access to reskilling and career progression opportunities, making inclusive training systems a key mechanism for mitigating social risk^{36,37}. In this context, social responsibility begins to affect not only what is taught, but also who receives training, under what conditions, and with what long-term developmental support. This includes considerations such as equal access to upskilling pathways, targeted support for vulnerable worker groups, and structured reskilling programs for roles affected by automation.

Furthermore, global frameworks on the future of work highlight that companies are increasingly expected to take an active role in managing just transitions, ensuring that workforce transformation does not lead to long-term exclusion or social fragmentation^{38,39}. This shifts training management toward a more ethically and socially embedded function, where learning systems contribute not only to organisational performance but also to broader societal resilience.

Overall, social responsibility represents the sustainability dimension with the strongest potential to influence training management beyond content alone, as it directly connects workforce development to questions of equity, access, and societal cohesion in an increasingly technology-driven labour market⁴⁰.

³⁶ International Labour Organization (ILO) (2024). World Employment and Social Outlook 2024: Greening and Digitalizing the Global Economy. ILO, Geneva.

³⁷ OECD (2023). OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition. OECD Publishing.

³⁸ World Economic Forum (2023). The Future of Jobs Report 2023. Geneva.

³⁹ International Labour Organization (ILO) (2024). World Employment and Social Outlook 2024: Greening and Digitalizing the Global Economy. ILO, Geneva.

⁴⁰ OECD (2024), Training Supply for the Green and AI Transitions: Equipping Workers with the Right Skills, Getting Skills Right, OECD Publishing, Paris, <https://doi.org/10.1787/7600d16d-en>.

6 Case study and Project Work

6.1 Case Study I

EuroStep Footwear is a growing European footwear manufacturer supplying international brands. Over the past years, the company has invested in new production technologies, sustainability initiatives, digital systems, and workforce development. However, management increasingly recognizes that technical investments alone do not guarantee long-term success.

Although training activities are conducted regularly, recurring challenges continue to appear across the organization. New employees are onboarded differently depending on the department, training records are inconsistent, and competence levels vary between teams. Quality issues, safety incidents, and documentation errors still occur despite high training attendance rates.

At the same time, the workforce is becoming more diverse. Employees come from different countries, speak different languages, and possess varying educational backgrounds. New regulatory expectations related to sustainability, traceability, human rights due diligence, Digital Product Passports, and responsible chemical management require additional competencies throughout the organization.

To address these challenges, the company appoints a new Training Manager and launches an ambitious transformation project. The goal is to move beyond traditional training administration and create a modern learning system that supports operational excellence, innovation, sustainability, safety, and employee development.

Throughout the transformation journey, the Training Manager must address a range of interconnected challenges:

- establishing a structured but practical training management system;
- ensuring that training leads to real behavioural change rather than attendance alone;
- creating inclusive learning opportunities for a diverse workforce;
- developing capable internal trainers and learning champions;
- strengthening safety culture and employee engagement;
- integrating digital and AI-supported learning tools responsibly;
- embedding sustainability and due diligence topics into technical training;
- measuring training effectiveness through operational results;
- increasing trust in worker communication and grievance mechanisms;
- supporting continuous learning across the company's supplier network.

As the company evolves, training increasingly becomes a strategic tool rather than a compliance activity. The central question is no longer:

"How do we deliver training?"

but rather:

"How do we build a learning organization that continuously develops people, improves performance, and prepares the footwear industry for future challenges?"

6.2 Case Study II

How Governance Drives Talent Management at Adidas

Adidas relies on a workforce of over 64,000 employees across 180 nationalities to drive brand equity and financial success. To attract, develop, and retain this talent, Adidas integrates its formal governance policies directly with its developmental HR strategies. Formal policies provide the secure, equitable foundation required for an innovative, performance-driven culture to thrive^{41,42,43}.

Adidas' talent management strategy is built on several pillars:

1. **Creating a level playing field for everyone:** adidas promotes an inclusive culture where diverse talents are treated fairly and given equal opportunities to contribute and succeed.
2. **Women in leadership positions:** Women held 41% of leadership positions at adidas.
3. **Attracting, developing, and retaining key talent:** adidas strengthens its employer brand through talent development, strong recruitment practices, and recognition as a leading global employer.
4. **Building role-model leaders who empower people:** adidas develops leaders at all levels through leadership programs that emphasize inclusion, accountability, and people-centered leadership.
5. **Creating a premier employee experience:** adidas supports employee well-being and engagement through flexible working models, health initiatives, and regular employee feedback.
6. **Instilling a mindset of continuous learning:** adidas fosters continuous learning through digital learning platforms, development programs, and ongoing upskilling and reskilling opportunities.
7. **Recognizing and rewarding both individual and team performance:** adidas uses competitive and equitable reward systems to motivate employees and support a high-performance culture.

To operationalize these pillars, Adidas utilizes a strict framework of global policies. These governance structures are not just for compliance; they are the direct enablers of the company's talent management goals:

- **Fostering Inclusion via the Fair Play Code of Conduct:** This policy mandates ethical behavior and anti-discrimination across the value chain, actively creating the respectful environment necessary for 180 diverse nationalities to collaborate and innovate.
- **Driving Upskilling via the Global Training Policy:** By formalizing mandatory learning expectations monitored through a central Learning Management System (LMS), this policy provides the infrastructure for the 'Learning Campus'—Adidas' digital portal for continuous, role-based skill development.

⁴¹ adidas AG. (2025). Impact, risk and opportunity management (ESRS S1 – Own workforce). adidas Annual Report 2025. <https://report.adidas-group.com/2025/en/group-management-report-sustainability-statement/esrs-s1-own-workforce/impact-risk-and-opportunity-management.html>.

⁴² adidas AG. (2026). People and culture. In Annual report 2025. <https://report.adidas-group.com/2025/en/group-management-report-our-company/description-of-business-model/people-and-culture.html>

⁴³ Editorial Team, Talent Management Institute. (2024, September 6). Talent management at Adidas: Fostering a culture of growth and performance. Talent Management Institute. <https://www.tmi.org/blogs/talent-management-at-adidas-fostering-a-culture-of-growth-and-performance>.

- **Enabling Well-being via Flexibility & Safety Policies:** The *Company Agreements on Working Location Flexibility* and *Health & Safety Policies* (aligned with ISO 45001) structurally support the company's work-life balance initiatives, allowing for mobile working and ensuring a safe baseline for all employees.
- **Retaining Talent via the Rewards Strategy Policy:** This policy dictates consistent, equitable total compensation globally, establishing the framework necessary to offer retention-boosting benefits like the employee stock purchase plan.

Built upon this secure policy foundation and guided by its six core values, Adidas deploys targeted initiatives to accelerate employee growth and engagement:

- **Acquisition & Leadership Grooming:** Adidas consistently ranks as a top employer (recognized by Forbes and Universum) due in part to modern acquisition strategies like pre-boarding mobile apps. For future executives, Adidas utilizes the **Talent Carousel**—a highly selective 24-month program rotating high-potential employees through cross-functional and international roles.
- **Performance & Learning Evolution:** Shifting away from rigid annual appraisals, Adidas implemented **'MyBest'**, a platform prioritizing continuous, high-quality feedback to encourage stretch goals. This is complemented by the **Learning Campus**, offering equitable access to online learning resources and interactive skill-building.
- **Workplace Innovation & Well-being:** To stimulate collaboration in a hybrid world, Adidas has redesigned global offices with flexible seating and **'maker labs'** equipped with 3D printing for rapid prototyping. Well-being is actively supported through corporate gyms, hybrid sports classes, tools for digital disconnection, and psychosocial consultations.
- **Continuous Feedback:** Employee experience is continually monitored through the **'People Pulse'** survey, allowing leadership to adapt policies like flexi-time and parental leave planning to meet workforce needs effectively.

Conclusion At Adidas, talent management is structurally embedded into the core business model. By tightly integrating rigorous workforce governance (ensuring safety, fairness, and compliance) with progressive, culture-driven developmental initiatives, Adidas guarantees an empowered and agile workforce. This people-first approach ensures the company remains highly competitive, innovative, and capable of meeting consumer demands globally.

6.3 Project Work

1. Assignment Title

Designing a Future-Proof Training Management System for a Footwear Company under Digitalisation, Globalisation, and Sustainability Pressures

2. Assignment Purpose

This project assesses your ability to apply Training Management (TM) principles in a real industrial footwear context, with a focus on how training systems are shaped by digitalisation, globalisation, and sustainability trends. Students will analyse, design, and improve a training management system that supports workforce development in an environment influenced by AI, automation, demographic change, and sustainability requirements. The aim is to develop a structured and future-oriented training system that ensures competence development, compliance, and organisational adaptability.

3. Your Task:

You are part of a training and development team in a medium-sized industrial footwear company operating in Germany, Portugal, or Romania. The company is facing major transformation pressures:

- Increasing automation and use of AI-supported systems
- Introduction of digital tools such as VR training, LMS platforms, and data-driven production systems
- Sustainability requirements (circular economy, resource efficiency, compliance standards such as ISO 9001)
- Workforce challenges including ageing employees, skills shortages, and declining interest in manual professions
- Increasing global competition and customer expectations for quality, speed, and transparency

The company currently uses a traditional training system based on manual SOPs, Excel-based training matrices, and irregular training updates.

Management has requested a redesign of the training management system that is future-oriented, scalable across countries, and compliant with industry standards.

You are required to design a complete Training Management Concept (TMC) for the company and present it to the management.

Your solution must integrate:

- Mapping of training needs across roles in footwear production
- Design of a Training SOP (structure, responsibilities, training matrix logic)
- Integration of digital training tools (e.g., LMS, AI support, VR/AR, big data)
- Consideration of globalisation (multi-country training consistency)
- Consideration of sustainability (all three pillars)
- Inclusion of a responsible AI and compliance training element
- Critical evaluation of feasibility (cost, cognitive load, implementation limits)

4. Deliverables

- A Training Management Concept (TMC) that includes:
 - Training needs identified across roles in footwear production
 - Training SOP structure (purpose, scope, responsibilities, documentation)
 - Example training matrix (role-based competency structure)
 - Digital training system concept (LMS + AI + optional VR/AR/digital twin)
 - Short Introduction about importance on responsible AI use in the workplace
 - Sustainability integration overview (environmental, economic, social)
 - Critical reflection section (limitations, risks, feasibility, workload)
- A presentation of said concept using MS Power Point

5. Expected Learning Outcomes

- Students will be able to:
- Understand and apply Training Management principles in an industrial context
- Design structured Training SOPs and competency systems
- Integrate digitalisation technologies into training systems (AI, LMS, VR/AR)
- Evaluate the impact of globalisation and demographic change on training
- Apply sustainability principles to workforce development
- Critically assess feasibility, risks, and limitations of future training systems
- Link training systems to compliance and quality frameworks (e.g., ISO 9001)
- Be able to present a concept

6. Grading Criteria

Criterion	Description	Points
Basic - (Total: 100 Points)		
Training Management Concept (TMC)	Training System Understanding	15
Training SOP Design	Training SOP Design inkl. roles and training matrix	15
Digitalisation Integration	Digitalisation Integration	10
Globalisation & Demography	Consideration of multi-country context and workforce changes	10
Sustainability Integration	Integration of environmental, economic, and social dimensions	10
Analysis & Problem Identification	Ability to identify training system challenges and gaps	10
Critical Feasibility Analysis	Critical Feasibility Analysis	10
Clarity & Structure	Logical structure, readability, and organization	10
Presentation Quality	Visuals (process map, tables, clarity), Oral presentation	10

Tab. 5: Grading Criteria

7 List of Figures and Tables

Fig. 1: Hard and Soft Skills	4
Tab. 1: Recommended Hard Skills Training for Footwear Manufacturing	6
Fig. 2: Active Listening infographic	7
Fig. 3: Communication methods infographic	8
Fig. 4: Non-verbal communication infographic	8
Fig. 5: Emotion and empathy infographic	9
Fig. 6: Critical thinking infographic	10
Fig. 7: Leadership infographic	11
Fig. 8: Teamwork infographic	12
Fig. 9: Work ethic infographic	13
Fig. 10 : Trainee categorization and training requirements	16
Tab. 2: Example Training Matrix..	17
Tab. 3: Comparison of VR, AR, and Digital Twins for Footwear Training	27
Tab. 4: Overall considerations regarding VR-, AR- and digital twin-based training.	28
Tab. 5: Gading Criteria	42

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