



3D ACADEMY

Enhancing the skills of VET providers in the field of 3D technologies

3DAcademy Blended Training Programme for VET Trainers, teachers and industry professionals

Training in 3D Technologies – A Manual for Newcomers

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Foreword

Welcome to the **Trainers Manual** for the **3DAcademy Blended Training Programme for VET Trainers, teachers and industry professionals**. In a world rapidly reshaped by digital innovation, 3D technologies – encompassing scanning, modelling, and printing – stand out as transformative tools across countless industries, from manufacturing and healthcare to architecture and creative arts. The demand for skilled professionals who can harness these technologies is growing exponentially, creating both a challenge and an exciting opportunity for Vocational Education and Training (VET). How do we, as educators and industry trainers, equip ourselves and our learners with these vital, future-ready skills, especially when we might be starting from the basics ourselves?

The **3DAcademy project**, funded by the Erasmus+ programme, was conceived to answer this need precisely. Recognising the diverse realities of VET institutions and workplaces across Europe – varying levels of equipment, trainer expertise, and learner backgrounds – we developed a flexible, blended training programme designed to make 3D technology education accessible and effective. Whether you're a VET teacher introducing students to additive manufacturing, an industry professional onboarding new employees, or a training provider expanding your programme offerings, this manual provides the practical tools and flexible pathways you need to succeed.

This manual connects theory to practice and learning to employability. We map the curriculum to recognised VET competencies and the European Qualifications Framework (EQF), helping you articulate the value of this training to learners and employers. You'll find four concrete, distinct training scenarios, each carefully designed to match different learner needs, time constraints, and resource availability. We understand that your reality might be a single 3D printer in a shared workshop, or perhaps no equipment at all—yet you still need to prepare learners for a workforce where these technologies are increasingly standard.

What makes this manual different is its foundation in real VET practice? The combination of the online **3D academy**.**The EU platform** for theoretical learning and your hands-on guidance creates a blended approach that maximises both learning efficiency and practical skill development. In addition, it has been tested across multiple European countries, refined through trainer feedback.

As you explore these pages, remember that this manual is a toolkit, not a prescription. Start with the scenario that matches your current situation, adapt the methods to your learners' needs, and gradually expand as your confidence and resources grow. The modular structure means you can begin with basic awareness and progressively build toward professional competencies. Most importantly, focus on what's achievable in your context. Your role as a trainer is to bridge the gap between digital possibility and practical reality, helping learners see 3D technology not as mysterious or intimidating, but as an accessible tool for innovation and career development.

We invite you to join the growing community of 3DAcademy trainers across Europe who are transforming how 3D technologies are taught and learned.

The 3DAcademy consortium



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How to Use This Manual

Welcome to the 3DAcademy Training Manual – your practical guide to introducing learners to 3D technologies.

This version is designed for trainers, educators, or facilitators who may not have formal teaching or VET experience but want to confidently deliver short, hands-on 3D printing sessions.

How to navigate the manual?

- Each section includes learning goals, tools, and examples.
- You can adapt the activities to your group, space, and available equipment.
- The training can be delivered as short modules or as a full course following one of the 3 learning scenarios:
 - Scenario 1 – Onboarding: short awareness or discovery session (1–2 days)
 - Scenario 2 – Sprint: structured beginner training (30–40 hours)
 - Scenario 3 – Extended: longer project-based training (80–100 hours)
- This manual will help you move learners from discovery to confidence – one print at a time.





CHAPTER 1: INTRODUCTION

PURPOSE: Understand the purpose of the 3DAcademy training programme, its contents, objectives and target groups

READING TIME: 15 minutes

1.1 Overview of 3DAcademy

The 3DAcademy – Blended Training Programme for VET Trainers/Teachers (3DAcademy TP) addresses the growing need for 3D technology expertise in vocational education. Developed by a consortium of education and industry partners, the programme bridges VET and rapidly evolving 3D technologies, including scanning, modelling, and printing, with applications across manufacturing, healthcare, automotive, architecture, and product development. The 3DAcademy TP was developed as part of the Erasmus + funded project 3DAcademy - Enhancing the skills of VET providers in the field of 3D technologies (Ref. 2023-1-BG01-KA220-VET-000158373).

The **blended approach combines online modules with hands-on sessions**, enabling flexible theory acquisition and practical application. It serves VET educators, students, and adult learners seeking to upskill or reskill. Alignment with the European Qualifications Framework (EQF) ensures standardised, measurable learning outcomes and recognised qualifications across Europe.

The 3DAcademy programme delivers practical 3D technology training through three targeted scenarios, each designed for specific audiences, purpose and timeframes. Whether you're onboarding new employees online, delivering sprint learning to students, or facilitating an extended expert track, through the 3DAcademy we have tried to provide you with everything needed for successful implementation. Our objective with this training manual is to modernise VET and foster innovation—preparing learners for current demands and empowering them to drive future technology integration.

Table 1: 3DAcademy at a glance - Three delivery scenarios

Scenario	Target Group	Format	Duration	Practical	Goal
Scenario 1 Onboarding foundation	New employees	100% online	4 weeks (20–25h)	Post-course at workplace	How to use equipment / Understand technology
Scenario 2 Sprint learning with practice	Students	Blended (≈70/30)	≈1 month (30–40h)	2-day practical training	Intro knowledge + practical experience
Scenario 3 Extended (Expert track with capstone)	Advanced learners	Blended (≈60/40)	6–8 weeks (80–100h)	Weekly practical training + capstone	Upskilling for advanced roles





Piloting (bonus scenario)	Students (15–19)	F2F + online prep	1–3 weeks	4–5 × 45' sessions	Test, collect feedback and foster interest
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Each scenario serves a distinct purpose. For example, Scenario 1 is planned to new employees for safe workplace tool handling through self-paced online learning. Scenario2 combines online theory with intensive practical training to give students hands-on experience. The Extended expert scenario develops advanced competencies through sustained blended learning culminating in a capstone project.

This is focused training, not comprehensive certification. You're building specific, applicable skills within realistic timeframes. The programme's strength lies in matching content depth to available hours – we don't pretend 25 hours creates master technicians, nor do we waste 100 hours on basics for advanced learners.

1.2 Objectives and goals

The 3DAcademy is designed to be as customizable and as trainers/learners' needs-oriented as possible. Therefore, your particular training programme objectives depend entirely on which scenario you're delivering. Each has distinct, achievable goals scaled to training hours and learner needs.

- **In Scenario 1 (Onboarding Foundation)**, your primary objective is to prepare new employees for supervised equipment use in their workplace. Over 20-25 hours of online learning, learners will understand fundamental 3D workflows, recognize different technologies and their applications, identify safety hazards, and comprehend basic design principles. Your target is to have learners that arrive at the workplace knowing what to expect, speaking the technical language, and ready to begin hands-on training under supervision.
- **Scenario 2 (Sprint Learning with Practice)** aims to provide students with their first complete 3D creation experience. Through 30-40 hours combining online preparation (≈70%) with intensive practical training (≈30%), learners progress from theory to tangible output. The online component ensures they understand core concepts before entering the workshop, maximizing valuable hands-on time. During the 2-day practical training, each student will operate 3D printers, troubleshoot common issues, and complete at least one successful print from their own design. Your target is to have students leave with both a physical object they created and the confidence to continue exploring 3D technologies.
- **Scenario 3 (Extended Expert Track with Capstone)** develops advanced 3D technology competencies through comprehensive blended learning. Over 80-100 hours across 6-8 weeks, combining online learning (≈60%) with regular practical training (≈40%), learners deepen their expertise in complex problem-solving, workflow optimization, and project management. The extended timeframe allows for iterative skill development, with weekly practical sessions building toward a substantial capstone project that demonstrates professional-level capabilities. Your target is to have learners complete a portfolio of advanced work, successfully execute their capstone project, and develop the confidence to lead 3D technology initiatives or train others.

Beyond these scenario-specific objectives, the 3DAcademy programme develops transferable competencies valuable across technical fields: systematic problem-solving, attention to detail, technical communication, and quality awareness. These objectives were validated through





piloting in four countries (Bulgaria, Serbia, Croatia, and Bosnia and Herzegovina), where VET students aged 15-19 tested the **3DAcademy online platform** through short introductory training sessions. This piloting phase evaluated student interest in 3D technologies, tested content flow, assessed material effectiveness, and confirmed the platform's viability as a delivery tool. The positive feedback and lessons learned from these pilot sessions shaped the final programme design that served as the basis for this Training Manual.

1.3 Target groups and potential learners

The 3DAcademy programme serves diverse learner groups through three targeted scenarios. Scenario 1 addresses new employees needing workplace 3D knowledge. Scenario 2 provides VET students and career changers with hands-on introduction. Scenario 3 offers advanced specialization for those with existing foundation. Detailed learner and trainer profiles are provided in Section 2.5.

! Your scenario selection depends on three critical factors: what you want to achieve, who your learners are, and what resources you have available. Consider your trainer profile—are you stronger in online delivery or hands-on instruction? Evaluate your existing setting—do you have equipped workshops or mainly classroom spaces? What is your organisation – are you a school, a VET provider or a company? Assess your capacities realistically—can you manage intensive practical days or is distributed online learning more feasible?

Each scenario makes different demands. Scenario 1 requires strong online facilitation skills but minimal physical resources. Scenario 2 needs equipped training spaces and concentrated instructor availability for practical days. Scenario 3 demands both sustained online engagement and regular practical facility access. Match your ambitions to your limitations: it's better to deliver Scenario 1 excellently than struggle through Scenario 3 without adequate resources. Remember that learners can progress through scenarios sequentially—today's Scenario 1 graduate becomes tomorrow's Scenario 3 candidate.

1.4 3DAcademy Learning Path

The 3DAcademy learning experience follows a simple and motivating path that anyone can understand and apply:

Table 1: Step | What Happens | Learning Focus

Step	What Happens	Learning Focus
1. Discover	Learners explore what 3D printing is and see real examples.	Curiosity, awareness, inspiration
2. Practice	They try simple printing tasks under guidance.	Basic operation, safety, teamwork
3. Create	They design and print their own small product.	Independence, creativity, confidence

Trainer Tip: You don't need to complete all three steps at once. Even a single short activity can spark interest and start the learning journey.





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CHAPTER 2: PROGRAMME STRUCTURE AND REQUIREMENTS

PURPOSE: Define who can enrol and what they need to succeed
 READING TIME: 20 minutes

2.1 Entry-Level Requirements

The 3DAcademy training programme was developed with the both learners and trainers needs in mind and to maintain accessible entry requirements while ensuring learners can meaningfully participate in their chosen scenario. Requirements scale appropriately—Scenario 1 needs only basic digital literacy, while Scenario 3 requires demonstrable foundation knowledge.

What are the basics for learners?

Regardless of the chosen scenario, all learners must meet fundamental requirements for programme participation. (Table 2). These include age requirements (16+ or completion of compulsory education), basic computer literacy sufficient for navigating the 3DAcademy training platform, download and edit files, open computer programmes, and language proficiency adequate for following technical instructions and safety protocols. Learners with physical limitations can absolutely participate with appropriate accommodations arranged in advance.

Table 2: Entry requirements for each scenario

Requirement Category	Scenario 1: Onboarding Foundation	Scenario 2: Sprint Learning	Scenario 3: Extended Expert Track
Prior 3D Experience	None required	None required	Foundation level mandatory*
Time Availability	1 hour/day for 4 weeks	3-4 hours/week + 2 full days	10-12 hours/week for 6-8 weeks
Technical Access	Computer + internet	Computer + attend practical venue	Regular access to 3D equipment
Learning Setting	Independent online	Classroom/group + practical	Blended with project work
Assessment Readiness	Online quizzes	Practical demonstration	Capstone project

*Foundation level = completed Scenario 1/2 or demonstrable equivalent experience.

Further Reading: See Section 4.3 for detailed competency requirements by scenario





Since the Programme incorporates a **blended learning approach**, participants need a certain level of digital competence. This includes familiarity with general software tools such as office applications (e.g., Microsoft Word, Excel) and internet navigation. These basic skills are essential for engaging with the Programme's online modules, which provide theoretical knowledge and case studies relevant to 3D technologies. In addition, participants should be prepared to work with 3D design software, which will be introduced throughout the Programme. Basic understanding and experience with digital design or modelling tools will be advantageous, although no prior experience with specific 3D design software is required.

Before enrollment, trainers should verify learner readiness through simple screening tools. For Scenario 1, this might be a brief online self-assessment confirming computer access and time availability. Scenario 2 requires confirmation of practical training attendance—many programmes fail when learners discover they cannot attend the mandatory 2-day practical sessions. Scenario 3 demands evidence of foundation knowledge through portfolio review, completion certificates from earlier scenarios, or practical skills demonstration.

 *Tooltip: Use Administrative Template C-1 "Entry Requirement Checklist" for systematic screening.*

2.2 Recommended skills and competencies

While entry requirements establish minimum thresholds, certain skills significantly enhance learning success. As a trainer, you'll recognise these aren't mandatory prerequisites but strengths to identify and develop throughout the programme. These skills become especially important for learners transitioning into roles where 3D technologies are central to daily work.

Creativity plays a significant role in 3D design and innovation. Participants are encouraged to think outside the box and experiment with new ideas and applications for 3D technologies. Whether designing a custom product, creating a new prototype, or developing innovative solutions for real-world challenges, creativity is essential. Throughout the Programme, learners are prompted to explore new possibilities for using 3D technologies in fields such as healthcare, manufacturing, automotive design, and product development. The ability to think creatively will not only enrich participants' learning experiences but will also make them highly competitive in industries that value innovation and original thinking.

Solving problems step-by-step - When prints fail (and they will), learners need patience to find out why. Was the bed not level? Temperature too high? File corrupted? **VET learners who see problems as puzzles to solve do better than those who expect everything to work the first time.** You're building troubleshooting resilience. Share your own failure stories. When learners understand that even experienced trainers face daily problems, they develop patience for systematic problem-solving. This mirrors workplace reality where technicians spend more time fixing issues than running perfect prints.

In both the educational environment and the workforce, the ability to **collaborate** with others is essential. The Programme includes group projects and collaborative activities where participants will need to work effectively with their peers. This may involve brainstorming ideas, dividing tasks, and troubleshooting issues together. In many professional settings, 3D design and technology-related projects are executed in teams, so being able to collaborate productively with diverse groups is a vital skill.





Digital confidence enables independent exploration of software features beyond taught functions.

Further Reading: Chapter 4.3 shows how these skills develop through each module

2.3 Alignment with the European Qualifications Framework (EQF)

The [European Qualifications Framework \(EQF\)](#) provides a common language for describing qualification levels across Europe. It uses eight reference levels, from basic (Level 1) to doctoral (Level 8), based on learning outcomes—what a learner knows, understands, and can do. For VET-related training programmes, Levels 3-5 are most relevant, representing progression from skilled worker to specialist technician.

Each EQF level describes increasing complexity in knowledge (theoretical and factual), skills (cognitive and practical), and responsibility (autonomy and accountability). As a VET trainer, you're likely familiar with your national framework—the EQF helps translate these qualifications across European borders, supporting learner mobility and recognition.

From the learners perspective, EQF alignment might be abstract it helps learners understand how their training fits into broader career pathways—critical when they're investing time and money in development.

The 3DAcademy programme provides foundational skills contributing to EQF Level 3-4 competencies, with contact hours appropriate for introductory and intermediate training rather than full qualifications. Each scenario achieves different depths of learning. This alignment helps you set appropriate expectations with learners and employers. In the core of the programme stands the assumption that the programme doesn't replace full VET qualifications but provides valuable stepping stones (**Table 3**).

Table 3: 3DAcademy Training Programme EQF alignment :

Scenario	EQF Alignment	Knowledge	Skills
Scenario 1: Introduction to 3D Technologies (20-25h)	Pre-Level 3 foundation	Basic facts about 3D processes	Recognise equipment and hazards
Scenario 2: Basic 3D Skills Certificate (30-40h)	Partial Level 3 outcomes	Understands principles and procedures	Operates equipment with guidance
Scenario 3: 3D Technology Practitioner (80-100h)	Selected Level 4 and Level 5 competencies	Specialized in chosen area	Solves non-routine problems

 **Tip:** Check your national framework for how 3DAcademy hours might contribute to broader qualifications





This table replaces EQF descriptors for this beginner manual and provides a clear, practical view of learning progress.

Table 4: Progress Overview Table

Stage	What you learn?	What you can do after?
Discover	Understand what 3D printing is and how it works.	Explain how a 3D printer functions.
Practice	Prepare, slice, and print simple 3D models safely.	Operate a printer with support and follow safety steps.
Create	Design and modify basic models.	Complete a print independently and reflect on the result.

2.4. Duration

The 3DAcademy Training Programme is designed to provide a comprehensive learning experience that covers both theoretical knowledge and practical skills. It offers three distinct duration options, each carefully designed to balance learning objectives with practical constraints. The indicative duration of the Programme is 120 hours, which are divided in **Table 4** below:

Table 5: 3DAcademy duration and delivery format

Scenario	Total Duration	Calendar Time	Weekly Commitment	Delivery Format
Scenario 1: Onboarding Foundation	20-25 hours	4 weeks	5-6 hours/week	100% online self-paced
Scenario 2: Sprint Learning	30-40 hours	4 weeks	Variable + 2 intensive days	70% online + 30% practical
Scenario 3: Extended Expert Track	80-100 hours	6-8 weeks	10-12 hours/week	60% online + 40% practical

For each of the three scenarios, the provided breakdown ensures a balanced approach to learning, **where participants gain a solid theoretical understanding and the opportunity to develop hands-on expertise**, while shorter, scenario-based versions of the programme offer flexible adaptations for specific learner groups.

Tip: As a trainer, you'll need to adapt these durations to local contexts. School holidays, examination periods, and equipment availability all affect scheduling. The programme allows $\pm 20\%$ flexibility without compromising outcomes.





2.5. Trainers and learners' profiles

The 3DAcademy Training Programme aims to foster a professional and inclusive learning environment. The training programme is flexible, but its success depends on a good match between the scenario, the trainer, and the learners. Your existing skills, your school's resources, and your institutional goals are critical factors in selecting the right path.

This section provides a clear overview of both sides of the training equation. First, **Table 6** details the recommended trainer profile for each scenario, helping you identify which one you are best equipped to deliver. Following that, Table 6 breaks down the target learner profiles and their specific objectives, which you can use to recruit, guide, and support your students effectively.

The profile of educators and instructors is crucial. The different scenarios offer different learning paths, a wide range of participants, pre-existing skills, etc. While technical knowledge remains important across all scenarios, the balance between online facilitation, practical instruction, and project mentoring varies significantly.

As we noted in **Chapter 1**, your own profile and resources are critical factors in scenario selection. Each scenario demands a different set of skills **from you as the trainer**.

Table 6: Recommended trainer profiles

Scenario	Trainer Profile	Key skills required	Example Profile
Scenario 1: Onboarding Foundation	Digital Learning Facilitator with basic knowledge and equipment access	<p>Core skills: You can manage online learning platforms, communicate clearly through written/video formats, and explain technical concepts simply. You understand basic 3D workflows and safety principles.</p> <p>Focus: You're comfortable showing equipment via webcam, creating engaging demos, and answering beginner questions patiently. You can demonstrate "this is what a 3D printer looks like and how it moves" without deep troubleshooting knowledge.</p>	<p>A VET teacher with STEM classroom, access to 3dprinter / scanner .</p> <p>You have basic knowledge and are motivated to explore the topic further.</p> <p>You want to use this scenario to to introduce your students to 3D technologies, increase their interest, and make the training process more engaging, while also building your own confidence.</p>





Scenario	Trainer Profile	Key skills required	Example Profile
<p>Scenario 2: Sprint Learning</p>	<p>Practical Skills Instructor</p>	<p>Core skills: All skills from Scenario 1, plus practical, in-person teaching ability. You must be able to confidently and safely manage a group in a workshop.</p> <p>Focus: You are proficient in operating 3D printers, troubleshooting common print failures, and guiding the full "design-to-print" cycle during the intensive 2-day practical session.</p>	<p>A VET teacher in machinery/engineering school with equipped workshop.</p> <p>You have solid technical skills and workshop management experience.</p> <p>You want to use this scenario to add practical 3D competencies to your existing curriculum, improving student employability and modernizing your programme offerings.</p>
<p>Scenario 3: Extended Expert Track</p>	<p>Project Mentor & Facilitator</p>	<p>Core skills: All skills from Scenarios 1-2, plus deep technical expertise and project management ability. You can evaluate complex work and provide constructive critique.</p> <p>Focus: You are a mentor, not just an instructor. You're experienced with multiple 3D technologies, understand industry applications, and can guide capstone projects. You facilitate peer learning, knowing when to step back and let experienced learners share their knowledge. You can connect</p>	<p>An in-house trainer at a manufacturing company, or an advanced VET trainer / provider with comprehensive 3D lab and facilities, partnering with industry.</p> <p>You are tasked with upskilling experienced technicians or high-achieving VET graduates.</p> <p>You have extensive 3D expertise and understand workplace applications.</p> <p>You want to use this scenario to provide advanced specialization for top students or returning graduates, preparing them for leadership roles in 3D technology implementation.</p>





Scenario	Trainer Profile	Key skills required	Example Profile
		learning to real industry requirements.	

💡 Tooltip: It is important to be absolutely honest about your own profile and resources.

Are you a VET teacher in a general or STEM-focused school who is new to 3D technology? **Scenario 1** is a perfect starting point. **You can use its 100% online, self-paced structure to introduce your students to 3D concepts, workflows, and safety.** This allows you to act as an "Online Facilitator" and build your *own* confidence with the materials before moving on to managing complex, hands-on practical assignments.

Are you a teacher in a technical or machinery-focused VET school? Perhaps you and your students are already familiar with advanced equipment like CNC machines and just need to learn this new *additive* process. **Scenario 2** is a perfect fit. Your students can cover the 3D-specific theory online—leveraging their existing technical knowledge—and you can then confidently manage the 2-day practical session in your workshop to guide them through their first successful print.

Scenario 3 should only be tackled by trainers with significant, demonstrable industry or technical experience who can mentor advanced learners on complex capstone projects.

Understanding your learners is equally important as knowing your own trainer profile. Each scenario targets specific learner profiles with distinct characteristics, needs, and constraints. Recognising these differences helps you adjust your teaching approach, set an appropriate pace, and provide relevant examples. The following table outlines typical learner profiles for each scenario—while individual learners vary, these patterns help you prepare for the most common needs and expectations that you might encounter across learner groups. **(Table 7).**

Table 7: Learner profiles by scenario

Scenario	Primary target group	Key Learning Objectives	Ideal learner profile
Scenario 1	<ul style="list-style-type: none"> New employees in companies using 3D tech Staff transitioning to digital manufacturing 	<ul style="list-style-type: none"> Understand 3D workflows and terminology Get familiar with the equipment Comprehend basic design principles Prepare for supervised workplace training 	<ul style="list-style-type: none"> Adults with secured employment No prior 3D experience required Can dedicate 1hr/day for 4 weeks Has workplace application planned
Scenario 2	<ul style="list-style-type: none"> VET school students (16-19) Adult learners reskilling via VET providers 	<ul style="list-style-type: none"> Complete full creation cycle (design to print) Operate 3D printers safely Troubleshoot common issues 	<ul style="list-style-type: none"> Available for 2-day practical training Basic computer skills Interest in hands-on learning





Scenario	Primary target group	Key Learning Objectives	Ideal learner profile
	<ul style="list-style-type: none"> Career explorers in technical fields 	<ul style="list-style-type: none"> Create first successful print 	<ul style="list-style-type: none"> Exploring career options
Scenario 3	<ul style="list-style-type: none"> VET graduates seeking specialization Experienced hobbyists going professional Professionals adding 3D to skillset 	<ul style="list-style-type: none"> Master complex problem-solving Optimize production workflows Complete professional capstone project Develop training/leadership capability 	<ul style="list-style-type: none"> Prior 3D foundation knowledge Clear professional goals Can commit 10-12hr/week Access to equipment for practice

Tooltip: Use these learner profiles to guide your recruitment and set clear expectations. In any real VET classroom, you will have a mix of learners.

For **Scenario 2**, you might have a technical student from a machinery background (like the example) alongside a student from a design or arts program. The first may be excellent with the hardware but struggle with the creative design software, while the second is the exact opposite. Your job as a trainer is to use this diversity to your advantage—encourage them to peer-mentor!

For **Scenario 1**, your 'new employee' learners might have very different backgrounds (e.g., a senior manager vs. a young apprentice). The key is that their *motivation* is the same: they need to understand this technology for their job. Focus your online support on that shared, practical goal.

The following sections detail each target group's specific characteristics and training considerations.

Scenario 1: Onboarding Foundation – New Employees

This scenario targets newly hired staff entering companies that use 3D technologies, regardless of their previous technical background. **Your learners are typically adults who need rapid orientation before beginning workplace duties. They may be recent graduates entering their first technical role, experienced workers transitioning from traditional manufacturing to digital processes, or administrative staff who need to understand the technologies their company uses.** These learners share common characteristics: they have secured employment but lack 3D-specific knowledge, they're motivated by immediate workplace application, and they need flexible online learning that fits around initial job responsibilities. Expect varied digital literacy levels and potentially some anxiety about learning new technologies quickly.

Scenario 2 serves students in VET schools and adult learners seeking reskilling through VET providers. The student cohort typically includes 16-19 year-olds in technical or general education programmes exploring career options in digital manufacturing, design, or engineering. Adult learners in this scenario are often career changers, unemployed individuals in retraining programmes, or workers seeking to upgrade their skills while maintaining current employment. In the VET classroom environment, this scenario fits well within regular school scheduling, allowing integration with existing curricula while providing distinct 3D technology focus. The blended format accommodates typical classroom constraints—online components can be assigned as homework or completed during computer class sessions, while the 2-day





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practical training can be scheduled during project weeks, before holidays, or as special intensive workshops. For adult learners, the concentrated practical training minimizes time away from work or job searching. Both groups benefit from the structured progression from theory to practice, the peer learning environment during hands-on sessions, and the achievement of creating their first 3D printed object.

Scenario 3: Extended (Expert Track with Capstone) – Advanced Learners

This is suitable for learners with an existing 3D technology foundation seeking specialised expertise for career advancement. These participants include VET graduates from Scenarios 1 or 2 ready for deeper learning, experienced hobbyists transitioning to professional practice, workplace technicians preparing for supervisory roles, or professionals adding 3D capabilities to complement existing skills (engineers, designers, architects). This group brings valuable prior experience—they understand basic workflows, have operated 3D equipment, and recognise common challenges. They're investing significant time (80-100 hours) with clear professional goals: leading 3D technology projects, training colleagues, optimising production workflows, or establishing 3D services. The extended format with weekly practical training allows iterative skill development and sustained project work impossible in shorter scenarios. These learners might ask complex questions, share their own experiences, and expect industry-relevant content. They appreciate deeper theoretical understanding, exposure to multiple technologies and materials, and the opportunity to tackle real-world problems through their capstone project. Success requires recognising their existing knowledge while addressing gaps, facilitating peer learning among experienced participants, and ensuring capstone projects align with their professional objectives.





CHAPTER 3: DELIVERY METHODS AND PLATFORM

 **PURPOSE:** Understand how to deliver the programme using the 3DAcademy's blended model, how to use the online platform as a teaching tool, and how to structure your online, theoretical and practical sessions for each scenario.

 **READING TIME:** 25 minutes

3.1 Blended learning approach - integration of online and in-person sessions

The 3DAcademy programme is built on a blended learning model. This approach is designed to be flexible and efficient, combining self-paced online learning with essential hands-on practical sessions. Your role as a trainer is to guide your learners through both components.

Blended learning solves real VET challenges. Not every school has multiple 3D printers for daily use, but most have computer access for online learning. Not every learner can attend daily classes, but most can find time for online modules. Not every trainer is expert in all 3D technologies, but the platform provides consistent, quality content that trainers facilitate rather than create from scratch.

Think of it this way:

- The Online component (via the 3DAcademy Platform) is where your learners acquire theory. This is also the place where you can increase / update your knowledge on 3dtechnologies. They will watch videos, read different content (structured in modules), and learn the "what" and "why" of 3D technologies (like safety, terminology, and software basics). This is delivered through the **3DAcademy.eu** platform. You will find more information on how to use the platform in the subsequent sections of the manual.
- The practical (face-to-face) component (Your Workshop/Lab/STEM cabinet) is where your students will *apply* that theory. This is the valuable, hands-on time where they practice the "how"—operating 3Dprinters, scanner, modeling, and managing projects under your direct supervision.

This model helps you "flip the classroom." You don't have to waste precious workshop time lecturing on basic concepts. Your learners study the theory online at their own pace, so when they come to you for the practical sessions, they are prepared and ready to *do*.

How the three scenarios utilise the blended learning approach:

- In Scenario 1: You will use a 100% online approach or 90/10. Your focus is entirely on facilitating the online platform, guiding discussions, and assessing digital work. Any "practical" component happens later, at the learner's workplace. If you deliver this scenario in your school, you can carry it out in your STEM cabinet, where presumably you will have access to 3d printers/scanners, which you can show to students. Check the additional (optional bonus scenario) which was used to pilot the approach. You can use this in your school as it combines a bit of theory and workshop classes.
- In Scenario 2: You use a blended (70% Online / 30% Practical) model. Y his scenario exemplifies classic blended learning. Learners complete Basic Modules 1-4 online over three weeks, building a theoretical foundation. The intensive 2-day practical training transforms theory into hands-on skills.
- In Scenario 3: This is a deeper blended (60% Online / 40% Practical) model. Learning is balanced more evenly, with online theory modules ($\approx 60\%$) running in parallel with weekly practical training and capstone project work ($\approx 40\%$). Learners study advanced modules





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online, apply concepts in weekly practical sessions, then return online to deepen understanding. This spiral approach allows complex skill development impossible in pure online or pure face-to-face delivery. The capstone project integrates all elements—online research, practical execution, peer collaboration.

3.2 The 3DAcademy Online Platform – your training assistant

The 3DAcademy platform (<https://3d-academy.eu/>) is your teaching assistant, your digital classroom. Think of the platform as your course textbook, video library, and assessment tool rolled into one. You don't need to be a tech expert to use it. If you can check email and use basic websites, you can manage the platform. The 3DAcademy platform is at the heart of the blended learning model that lies at the heart of the 3DAcademy Training Platform.

While your learners see a simple, online platform with presentation of content in modules (**Register > Learn > Get Certificate**), your role as a "Educator" is far more powerful. This role gives you the tools to create and manage your own private cohort.

Here is the basic process you will follow as a trainer:

1. **Register and get approved:** First, register on the platform at <https://3d-academy.eu/register>. Select "Educator" as your role. A 3DAcademy administrator will approve your account within 48 hours, granting you "Group Leader" permissions.
2. **Familiarise yourself with the Platform:** Once you have your account approved, you can log in and explore the platform from a student's perspective. Review the public-facing 'Courses' page, but also click through the modules assigned to you. Understand the flow of content, watch the videos, and see how the quizzes work. This is essential for planning how your practical sessions will connect with the online theory.
3. **Read the 'Educator's Guide':** Once approved, you will gain access to the full '**Educator's Guide**' (provided in **Annex 1** of this manual). This technical guide provides step-by-step instructions with screenshots for every action you need to take.
4. **Access your dashboard:** Once logged in, you will see your **WordPress Dashboard**. Look for the "**LearnDash LMS**" menu item on the left-hand side. This is where all your group and course management tools reside.
5. **Create your "Group":** Following the guide, navigate to LearnDash LMS > Groups. Here, you will create a new **Group** and give it a specific name (e.g., "VET Machinery School - Class of 2025"). You must assign yourself as the Group Leader .
6. **Enroll your students:** As your students register on the platform, you will find their user accounts under your group management settings and add them to your Group. This ensures their progress is only visible to you.
7. **Assign courses:** Within your Group settings, you will then select and assign the specific online modules (e.g., "Module 1: Introduction to 3D Technologies") to your Group. Your students will then see these courses available in their accounts. The platform contains nine modules (Basic 1-5, Advanced 1-4). **Chapter 4** will detail exactly which modules align with each scenario and learning pathway
8. **Monitor progress:** This is your main teaching tool. From the "**Group Administration**" tab, you can track your students' progress, see who has completed the online theory, check their quiz results, and export reports.

 **Tooltip:** Use the "Group Reports" feature *before* you start your 2-day practical session in Scenario 2. By checking the quiz results, you can see which students struggled with the "Slicing" module, for example. You can then plan to give them extra, targeted support during the hands-on





workshop. Remember, you cannot start this process until your Educator account is approved by a project Partner.

Table 8: Overview of the platform administration and permissions

Pathway	Permission	Student	Educator	Project Partner	Educational Specialist	Business Representative	VET Expert	Employee
Webpage	Access Courses	✓	✓	✓	✓	✓	✓	✓
LearnDashLMS - Groups - Add Group	Group Students	✗	✓	✓	✓	✓	✓	✓
LearnDashLMS - Reports - Filter by courses or users	Track Student Progress	✗	✓	✓	✓	✓	✓	✓
Available on Reports page - Export User Course Data (Upper right corner)	Export Grade Data	✗	✓	✓	✓	✓	✓	✓
Users Panel on the left - Status	Approve Educators	✗	✗	✓	✗	✗	✗	✗
Top Panel - Translate Site	Translate Content	✗	✗	✓	✗	✗	✗	✗
LearnDashLMS - Groups - Add Group - Users	Add/Remove Users from Groups	✗	✓	✓	✓	✓	✓	✓
LearnDashLMS - Reports - Edit	Enroll / unenroll Users from Courses	✗	✓	✓	✓	✓	✓	✓

Technical guide: The detailed "Educator's Guide" PDF is available in platform Resources, showing every click from login to report export.

Admin note: You cannot create groups until your Educator account is approved. If awaiting approval after 48 hours, contact your national 3DAcademy coordinator.

3.3. Platform functionalities and content overview

In this section, we will be exploring your "digital classroom" and training assistance, i.e. the 3DAcademy online training platform.

Here is a simple tour of the platform's main areas, both for the public and for you as a trainer.

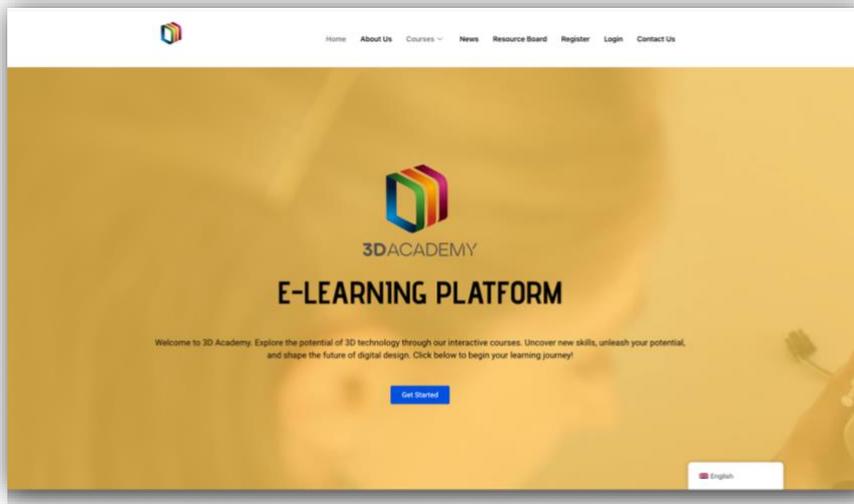
The main page of the platform





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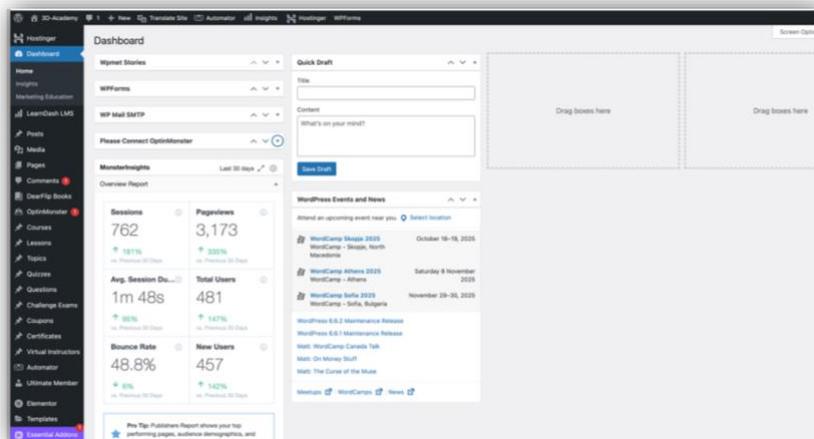


This is what you and your students will see *before logging in or when exploring the site.*

- **Homepage:** This is the main landing page, which introduces the 3DAcademy project and the E-Learning Platform.
- **Courses Page:** This is the "Course catalogue". It outlines the **8-step learner journey** (from registration to certificate) and shows the available modules, which are structured into a Basic Stream and an Advanced Stream.
- **Registration / Account:** This is where you and your students will create your accounts. As a trainer, you will register as an "Educator," and your account must be approved by a project administrator before you can gain trainer privileges .
- **Other sections: Resources, news, contacts, etc.**

The Trainer's "Control Panel" (What You See When Logged In)

Once your "Educator" account is approved, you will have access to the platform's backend, which is built on WordPress. This is your "control panel" for managing your students.



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To access it, you log in and click the "3D-Academy" link in the top admin bar to reach your Dashboard.

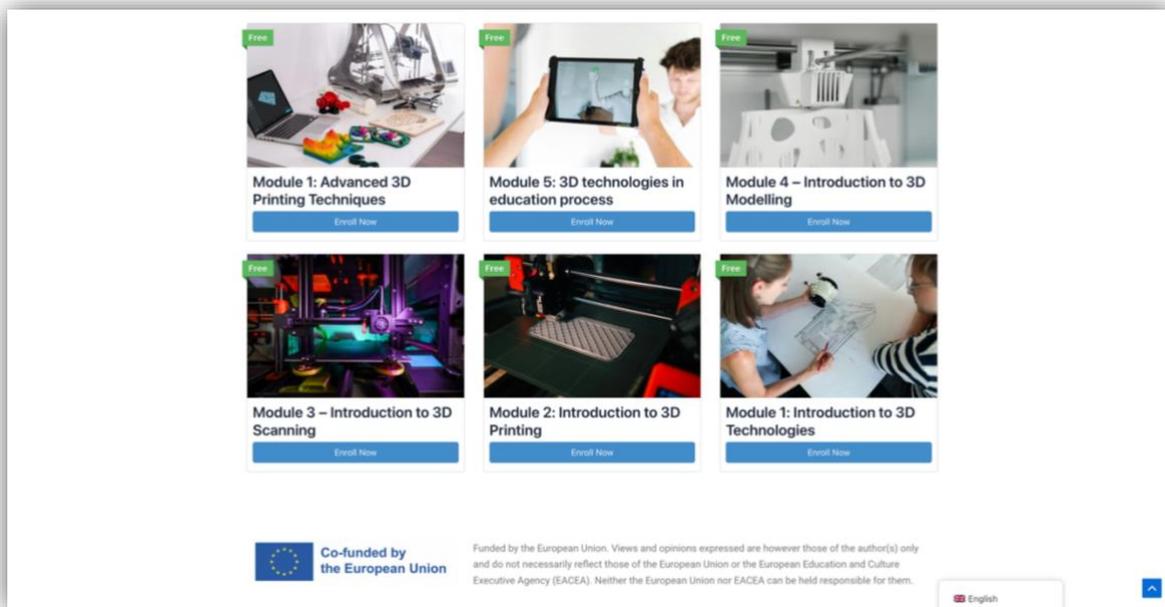
Your main work will be done in three key areas, which are all part of the "LearnDash LMS" menu on the left-hand side:

1. **Users:** This is the master list of everyone registered on the platform. You will use this to find your students' accounts after they have registered.
2. **Groups:** This is the *most important tool* for you. A "Group" is your private digital classroom. You will create a Group (e.g., "VET Machinery School - Class of 2025") and then:
 - Assign yourself as the **Group Leader** .
 - Enroll your registered **Users (students)** into your Group .
 - Assign the online **Courses (modules)** to your Group .
3. **Group Administration / Reports:** This is your monitoring tool. From here, you can see your Group's progress, check quiz results, and export reports for assessment. Check the assessment Guidelines provided in Chapter 6.

 **Tooltip:** The platform is just the *tool* for delivering the online modules. This training manual (and the detailed Educator's Guide in Annex 1) provides the *method* and *guidance* on how to use it effectively.

3.4 The 3DAcademy Online Courses

The 3DAcademy platform contains nine self-contained modules organised in two levels: Basic (Modules 1-5) and Advanced (Modules 1-4). Each module is divided into units with specific learning outcomes, readings, and resources. These modules are located on the "Courses" section of the Platform.



As a trainer, the [3d-academy.eu platform](https://3d-academy.eu) provides you with a full library of pre-built online modules. These are the digital resources you will assign to your "Group." The curriculum is divided into two main streams: the Basic Stream (including 5 training modules) and the Advanced Stream (4 training modules).



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The basic stream represents the core curriculum for all learners. It consists of five modules designed to take a student from zero knowledge to a confident beginner. The Advanced modules cover complex, professional-level skills. The table below outlines the structure of each module.

Table 9: 3DAcademy online modules overview

Module title	Number of units	Unit titles	Key skills covered
Basic modules			
Module 1: Introduction to 3D Technologies	5	1. 3D printing basics 2. 3D scanning basics 3. 3D modeling basics 4. Applications 5. Basic readings	Tech comparison, Scanning principles, Modeling concepts, Industry applications
Module 2: Introduction to 3D Printing	6	1. Polymer 3D printing 2. Metal 3D printing 3. Materials 4. Slicing software 5. Post-processing 6. Basic readings	Material selection, Slicing (G-code), Post-processing, Troubleshooting
Module 3: Introduction to 3D Scanning	5	1. 3D scanning technologies 2. Hardware and software 3. Data Processing 4. Hands-On Projects 5. Basic readings	Scan principles, Hardware/Software, Data processing, Mesh repair, Hands-on scanning
Module 4: Introduction to 3D Modelling	5	1. Understanding 3D Modeling 2. Setting Up Workspace 3. Core Techniques 4. Creation Best Practices 5. Basic readings	Modeling concepts, Workspace navigation, Core techniques (Extrude, Bevel)



Module title	Number of units	Unit titles	Key skills covered
Module 5: 3D technologies in education process	5	<ol style="list-style-type: none"> 1. Applications in subjects 2. Implementation workflow 3. Getting started 4. Future trends 5. Basic readings 	Classroom integration, Project design, Full workflow, Career trends, Pedagogy
Advanced modules			
Module 1: Advanced 3D Printing	5	<ol style="list-style-type: none"> 1. Advanced Technologies/Materials 2. Optimization/troubleshooting 3. Complex Projects (DfAM) 4. Applications/Future Trends 5. Basic readings 	DfAM, Topology Optimization, Advanced materials, Generative Design
Module 2: Advanced 3D Scanning	5	<ol style="list-style-type: none"> 1. Advanced Technologies 2. Automation 3. GD&T 4. Advanced Applications 5. Basic readings 	GD&T, Metrology, Automation (Robotics), Advanced data, Industry 4.0
Module 3: Advanced 3D Modelling	5	<ol style="list-style-type: none"> 1. Parametric Modeling 2. Freeform Modeling/Sculpting 3. Softwares 4. Practical examples 5. Basic readings 	Parametric design, Freeform sculpting, Retopology, Software comparison
Module 4: Future trends/solutions	5	<ol style="list-style-type: none"> 1. Roots and history 2. Case Studies 3. Challenges and Solutions 4. Future Trends 	Case study analysis, Bioprinting, 4D Printing, AI integration, Sustainability



Module title	Number of units	Unit titles	Key skills covered
		5. Resources/Self-Assessment	

Tip: In the following chapters, we will build the detailed curriculum and lesson plans for each scenario, and we will refer back to these specific modules and units. For example, the Scenario 2 curriculum will tell you to assign "Basic Modules 1-4" as online prep, and its practical lesson plan will focus on the hands-on skills from "M2, Unit 4" (Slicing) and "M3, Unit 4" (Hands-On Scanning).

Each basic module requires approximately 4-6 hours of online study. Advanced modules need 2-3 hours. These times assume:

- Watching all videos
- Reading core content
- Attempting quizzes
- Reviewing additional resources

Language and Accessibility

Platform content is provided in five languages (English, Bulgarian, Serbian, Croatian and Bosnian) with technical terminology explained.

Tip: Preview each module yourself before assigning. Takes 30 minutes to skim through and identifies where learners might need extra support.

The 3DAcademy's blended learning approach and online platform provide the framework for programme delivery. You now understand how online and practical components complement each other, how to manage your learners through the platform's group system, and what content the nine modules contain.

These are your tools—the platform handles content delivery and tracking while you focus on facilitation, practical instruction, and learner support.

The next chapter shows you exactly how to sequence these modules for each scenario and transform platform content into effective learning experiences.





CHAPTER 4: TEACHING AND LEARNING

PURPOSE: How to structure your online, theoretical and practical sessions for each scenario. Its goal is to provide you with detailed, step-by-step curricula (or "playbooks") for successfully delivering all four training scenarios.

READING TIME: 45 minutes

4.1 Guidelines for organising and delivering the trainings – scenario playbook

The following guidelines provide you with detailed, ready-to-use curricula for each training scenario. The idea of these guidelines is to serve as implementation playbooks that take you from programme setup through final assessment.

Each playbook follows the same structure: programme overview, weekly or session-by-session breakdown, specific platform module assignments, practical activities, assessment points, and troubleshooting tips. Each playbook follows the same structure: programme overview, weekly or session-by-session breakdown, specific platform module assignments, practical activities, assessment points, and troubleshooting tips. The piloting scenario has been tested across four countries (Bulgaria, Serbia, Croatia, Bosnia and Herzegovina) and refined based on actual delivery experience. Scenarios 1-3 are structured delivery plans based on VET best practices and the platform's content capabilities, designed to be adaptable to your specific context.

You can follow them exactly as written for reliable results, or adapt them to your specific context while maintaining the core learning progression. The playbooks assume you've already registered on the platform (**Chapter 3**) and understand your learner profiles (**Chapter 2**).

Piloting scenario: Introduction to 3D Technologies – short course for both industry and VET

- **Purpose:** Test the 3DAcademy platform and generate interest in 3D technologies among VET students
- **Duration:** 1-3 weeks, 4-5 sessions × 45 minutes (3-4 hours total)
- **Format:** Face-to-face with online self-preparation between sessions
- **Target group:** VET students aged 15-19, technical specialties
- **Minimum participants:** 10 students

Pre-training tasks and setup

These preparatory steps ensure smooth programme delivery and prevent common first-session problems. Complete all items on the checklist—equipment failures or missing materials will derail your carefully planned sessions.

Two weeks before	One week before
<ul style="list-style-type: none"> • Issue open call for participants • Register as educator on platform and get approval • Complete Module 5 (3D in Education) for self-preparation • Book STEM cabinet/lab for all sessions • Order/prepare printed certificates 	<ul style="list-style-type: none"> • Test all equipment (printer, scanner, computers) • Prepare material samples (FDM, SLA, SLS examples) • Download TinkerCAD exercise files • Print 3DAcademy keychains for distribution • Create attendance sheets





SESSION 1: Introduction to 3DAcademy and 3D Technologies

This opening session creates first impressions and sets expectations for the entire programme. Your goal is to spark curiosity while ensuring all students successfully access the platform – without this foundation, subsequent sessions won't work.

Platform Content: Module 1 / Units 1-4 (3D printing, scanning, modelling basics, applications)

Proposed duration: 45 minutes

Materials Needed:

- Sample prints from different technologies (FDM, SLA, SLS, PolyJet)
- 3D printer and scanner (for demonstration)
- Projector for platform demonstration
- 3DAcademy banner
- Registration handouts with platform URL

Example agenda for Session 1

Time	Activity	Trainer Actions	Key Points
0-5 min	Welcome & Project intro	Show 3DAcademy banner, explain EU funding, introduce yourself	Create excitement about free access to technology
5-15 min	What is 3D printing?	Use Module 1/Unit 1 content, pass around FDM sample	"This plastic part was built layer by layer, like stacking paper"
15-25 min	What is 3D scanning?	Use Module 1/Unit 2, show scanner or phone app	"We turn real objects into digital twins"
25-30 min	What is 3D modeling?	Use Module 1/Unit 3, show TinkerCAD interface briefly	"Tomorrow you'll design your own objects"
30-35 min	Applications showcase	Use Module 1/Unit 4, show medical/automotive examples	Connect to local industry if possible
35-40 min	Platform registration	Guide through registration process on projector	Ensure everyone writes down login details
40-45 min	Homework assignment	Assign Module 1 completion before Session 2	"The quiz is easy if you watch the videos"

SESSION 2: 3D Modelling

Students move from passive learning to active creation, designing their first 3D object using TinkerCAD. This hands-on experience transforms abstract concepts from Session 1 into tangible understanding of how digital objects are constructed.





Platform Content: Module 4 / Units 1-3 (Understanding, Workspace, Techniques)

Proposed duration: 45 minutes

Materials Needed:

- Computers with internet (1 per student or pairs)
- TinkerCAD accounts ready
- Exercise file: Simple keychain design
- Projector for demonstration

Pre-Session Check:

- Verify Module 1 completion rates
- Load TinkerCAD on all computers
- Have backup design ready

Example agenda for Session 2

Time	Activity	Trainer actions	Key points
0-5 min	Review & Module check	Check who completed Module 1, quick recap	Praise completers, encourage others
5-10 min	Theory: How 3D models work	Module 4/Unit 1 - vertices, edges, faces	"Think of it like digital LEGO blocks"
10-15 min	TinkerCAD introduction	Module 4/Unit 2 - interface tour	Project your screen, go slowly
15-35 min	Hands-on: Design keychain	Guide through basic shapes, holes, text	Walk around, help struggling students
35-40 min	Save and export	Show STL export process	"We'll print the best one next week"
40-45 min	Homework & questions	Assign Module 4 completion	Individual help for those struggling

SESSION 3: 3D Scanning

Students learn how physical objects become digital files, either using professional scanners or smartphone apps. This session works even with minimal equipment—the Polycam app on student phones provides sufficient scanning experience to understand the technology.

Platform content: Module 3 / Units 1-2, Module 5 / Unit 3

Proposed duration: 45 minutes

Materials needed (Option A - Scanner Available):





- 3D scanner with software
- Object to scan (statue, tool, toy)
- Reference point stickers
- Computer for processing

Materials needed (Option B - Smartphone Scanning):

- Student smartphones
- Polycam app (free version)
- Simple objects (shoes, mugs)
- Good lighting setup

Example agenda for Session 3 (option B)

Time	Activity	Trainer actions	Key points
0-5 min	Review & Module check	Check Module 4 completion	Link modeling to scanning
5-15 min	Theory: Scanning principles	Module 3/Unit 1 - how scanning works	"Like taking photos from every angle"
15-20 min	App installation	Guide Polycam download and setup	Help those without phones pair up
20-35 min	Hands-on scanning	Students scan their shoe/object	"Move slowly, overlap your shots"
35-40 min	View and discuss results	Compare scan quality, discuss uses	"Not perfect, but good enough for many uses"
40-45 min	Homework	Assign Module 3 completion	"Try scanning something at home"

SESSION 4: 3D Printing

The main session of the piloting scenario where students see their digital designs become physical objects. Despite the longer duration, you can use print time for discussions about materials, troubleshooting, and applications.

Platform content: Module 2 / Units 1, 3, 4, Module 5 / Unit 3

Proposed duration: 60-90 minutes / *Note: Longer session due to print time*

Materials needed:

- FDM 3D printer (tested and calibrated)
- PLA filament (loaded)





- Slicing software (Cura/PrusaSlicer)
- Spatula, pliers for removal
- Small test file (20-30 min print)

Example agenda for Session 4

Time	Activity	Trainer actions	Key points
0-5 min	Safety briefing	Emphasize hot nozzle (220°C), moving parts	"Never reach in while printing"
5-15 min	How FDM printing works	Module 2/Unit 1 - layer by layer process	Show failed prints as examples
15-25 min	Slicing demonstration	Import STL, set parameters, show preview	"Slicer is like giving directions to printer"
25-30 min	Start print	Begin printing small keychain/test object	"First layer is critical"
30-50 min	Theory while printing	Materials (Module 2/Unit 3), troubleshooting	Watch print, discuss what's happening
50-60 min	Remove and post-process	Remove print, clean support if needed	Let students take turns removing
60-70 min	Reflection & homework	Assign Modules 2 & 5 completion	"You've completed full workflow!"

SESSION 5: Overview and next steps

This closing session celebrates achievements and connects learning to future opportunities. Beyond distributing certificates, you're planting seeds for continued engagement with 3D technologies through career discussions and programme progression options.

Platform content: Module 5 / Unit 4 (Career prospects)

Proposed duration: 45 minutes

Materials needed:

- Printed certificates
- Evaluation forms
- Company visit arranged (optional)
- Platform completion reports

Example agenda for session 5





Time	Activity	Trainer actions	Key points
0-10 min	Platform check	Verify all modules completed, help stragglers	Show completion certificates on platform
10-20 min	Career pathways	Module 5/Unit 4 - discuss local opportunities	"3D skills enhance any technical career"
20-30 min	Evaluation forms	Distribute and collect feedback	"Your input shapes the programme"
30-40 min	Certificate ceremony	Hand out printed certificates, photos	Make it celebratory
40-45 min	Next steps	Explain Scenarios 1, 2, 3 options	"This was just the beginning"

Optional: Company visit to local 3D printing business

Assessment and documentation

The piloting scenario uses simplified assessment compared to the comprehensive framework detailed in Chapter 6, focusing on participation and platform completion rather than complex competency evaluation.

Required documentation:

- Attendance sheet (every session)
- Photos (minimum 5 per session)
- Platform registration list
- Student evaluation forms
- 2-3 video testimonials

Assessment method:

- Formative: Module quiz completion (through the platform)
- Practical: Successful creation of 3D model/print
- Participation: Attendance at a minimum 4 sessions
- Certificate: Awarded for completing all platform modules (automatically through the platform)





SCENARIO 1: ONBOARDING FOUNDATION - New Employee 3D Technology Preparation

Purpose: Prepare new employees for supervised 3D technology use in the workplace

Total Duration: 20-25 hours of learning

Target Group: New employees with no prior 3D experience

Platform Delivery: Self-paced online with trainer check-ins

This scenario is perfect for learners who need a "theory-first" approach. For new employees, this course is the ideal digital onboarding tool that prepares them for their first day in the workshop. For VET students, this is an excellent way to introduce 3D technologies in your STEM cabinet, even before you have a full practical class plan.

The 20-25 hours of content can be delivered in three different intensity levels, depending on your context, learner availability, and organizational needs. Choose the format that best fits your situation:

Intensive format (1 week)

- 4-5 hours daily over 5 days
- Suitable for: Dedicated onboarding weeks, urgent role filling, full-time training availability
- Structure: Daily modules with immediate check-ins
- Advantage: Complete immersion, rapid deployment to workplace
- Challenge: Information overload risk, requires full-time commitment

Accelerated format (2 weeks)

- 2-2.5 hours daily over 10 working days
- Suitable for: Balanced onboarding, part-time availability, mixed with other training
- Structure: Module completion every 2-3 days with bi-weekly check-ins
- Advantage: Better retention, time for practice between modules
- Challenge: Maintaining momentum over two weeks

Extended format (4 weeks)

- 1-1.5 hours daily over 20 working days
- Suitable for: Employees already working, gradual integration, minimal daily disruption
- Structure: Weekly module completion with weekly check-ins
- Advantage: Best retention, minimal workplace disruption, time for reflection
- Challenge: Requires sustained motivation over longer period

Once the learner is motivated, you register them on the 3d-academy.eu platform. As their Group Leader, you will guide them through the following curriculum. The curriculum below is presented in the 4-week extended format as the most common implementation, but can be easily compressed by combining daily activities. The key is maintaining the module sequence—Module 1 must precede Module 2, regardless of delivery speed.

Pre-training tasks and setup





Successful onboarding starts before the employee's first day, requiring coordination between HR, supervisors, and trainers. This preparation phase prevents the common scenario where new employees wait idle while access issues are resolved.

The following four-week curriculum provides detailed daily guidance for the extended format, but can be adapted to intensive or accelerated delivery by combining activities. Each week builds on the previous, moving from broad concepts to workplace-specific application. The daily time allocations include video watching, reading, quizzes, and note-taking—learners should complete activities in one sitting when possible for better retention. While the platform content is fixed, your check-ins and support level should adjust based on learner progress and confidence

WEEK 1: Introduction to 3D Technologies

This foundational week builds technical vocabulary and conceptual understanding entirely through online learning. New employees work through platform modules at their own pace, building knowledge that will later be applied in the workplace.

Platform Content: Basic Module 1 - Complete all units online

Duration: 5-6 hours

Learning Objectives:

- Understand basic 3D printing, scanning, and modelling concepts through online content
- Recognise different technology types from videos and animations
- Navigate the 3DAcademy platform confidently
- Build technical vocabulary for workplace communication
- Complete Module 1 with 70% minimum assessment score.

Session plan:

Day	Platform content	Time	Online learning activities	Additional tasks for learners
Day 1	Platform orientation + Module 1/Unit 1	60-75 min	Register, watch intro videos, explore platform navigation	Write down 3 questions about 3D printing
Day 2	Module 1/Unit 2 (Scanning)	60 min	Complete unit videos and readings, take unit quiz	Research "3D scanning applications" online (15 min)
Day 3	Module 1/Unit 3 (Modeling)	60 min	Study modeling principles through platform content	Watch one YouTube tutorial on any CAD software (20 min)
Day 4	Module 1/Unit 4 (Applications)	60 min	Review all application case studies in module	Identify which applications relate to your industry
Day 5	Module 1/Unit 5 + Module Quiz	60-90 min	Complete resources section and final module assessment	List key terms you've learned for check-in discussion





Week 1 Orientation session - 15 minutes online

- Verify platform access working
- Confirm Module 1 completion (should be 100%)
- Answer technical questions
- Preview Week 2 content
- Share photos of actual workplace equipment

WEEK 2: 3D Printing Fundamentals

Week 2 focuses on printing technologies relevant to the workplace, deliberately skipping advanced content that new employees won't immediately use. This selective approach prevents information overload while ensuring workplace readiness.

Platform Content: Basic Module 2 - Units 1, 3, and 6 (skip Units 2, 4, 5 for now)

Duration: 5-6 hours

Learning Objectives:

- Understand polymer 3D printing processes through platform modules
- Recognise materials and their properties from online resources
- Identify safety considerations and common problems from videos
- Complete Module 2 selected units with 80% minimum score
- Build a knowledge base for future equipment interaction

Session plan:

Day	Platform content	Time	Online learning activities	Additional tasks for learners
Day 6	Module 2/Unit 1 (Part 1)	75 min	Study FDM/FFF technology videos and animations	Google "FDM technology" - read one article
Day 7	Module 2/Unit 1 (Part 2)	60 min	Learn about SLA/SLS through platform content	Watch a YouTube video comparing FDM vs SLA (10-15 min)
Day 8	Module 2/Unit 3 (Materials)	90 min	Complete materials unit including properties tables	Create personal notes on PLA vs ABS differences
Day 9	Module 2/Unit 6 (Resources)	60 min	Review additional readings and videos provided	Bookmark 2 useful resources for future reference
Day 10	Module 2 Assessment	60 min	Complete module quiz and review incorrect answers	Prepare material questions for check-in





WEEK 3: Scanning Basics & Introduction to CAD (5-6 hours)

This week introduces digital creation and capture tools, even if the employee won't immediately operate them. Understanding these processes enables better communication with design teams and recognition of workflow bottlenecks.

Platform Content: Module 3 (Units 1-2 only) + Module 4 (Units 1-2 only)

Duration: 5-6 hours

Learning Objectives:

- Understand scanning principles through online demonstrations
- Recognize CAD interface elements via TinkerCAD exploration
- Comprehend file formats and digital workflow concepts
- Complete Modules 3 and 4 (selected units) with 70% minimum score
- Prepare mentally for future software training

Session plan:

Day	Platform content	Time	Online learning activities	Additional tasks for learners
Day 11	Module 3/Unit 1	60 min	Understand scanning principles through videos	Research "photogrammetry" online (15 min reading)
Day 12	Module 3/Unit 2	60 min	Learn about scanner types via platform content	Download Polycam app to explore interface (don't scan)
Day 13	Module 4/Unit 1	75 min	Study 3D modeling fundamentals online	Create free TinkerCAD account and explore interface
Day 14	Module 4/Unit 2	75 min	Learn workspace setup through tutorials	Try placing and moving shapes in TinkerCAD (practice only)
Day 15	Modules 3 & 4 Quiz	60 min	Complete both module assessments	Note which concepts were challenging

WEEK 4: Assessment and Workplace Preparation

The final week consolidates online learning and prepares employees for their transition to supervised workplace practice. This week confirms theoretical understanding while setting clear expectations for the hands-on phase that follows.

Platform Content: Review all completed modules

Duration: 5-7 hours





Learning Objectives:

- Consolidate theoretical knowledge through comprehensive assessment
- Review all safety requirements through platform content
- Demonstrate readiness via 80% minimum final assessment score
- Document learning outcomes for supervisor discussion
- Prepare for transition to practical training.

Session plan:

Day	Focus Area	Time	Online Activities	Additional tasks
Day 16	Safety Review	90 min	Re-watch all safety segments from modules	Complete online safety checklist quiz
Day 17	Workflow Review	75 min	Review platform content on 3D workflows	Create your own workflow diagram digitally
Day 18	Quality Concepts	60 min	Study quality sections in modules	List 5 quality checkpoints you've learned
Day 19	Final Assessment	90 min	Complete comprehensive platform assessment	Achieve 80% minimum score
Day 20	Completion	60 min	Download certificate, review all notes	Prepare summary of learning for supervisor

Learner certification and transition to workplace practice

This 4-week online course is the first formal step on the 3DAcademy "qualification ladder." It validates the learner's theoretical knowledge.

- **Completion:** Once the learner completes all modules and the final assessment, you will guide them to download their **Certificate of Completion** from the platform.
- **Progression:** This certificate signifies they have moved from "**Newcomer**" to "**Foundation Learner**." They are now officially prepared for the next level: "**Supervised Operator**" (which is achieved through the on-the-job training in Step 3).

After they have spent time in the workshop, they could eventually move on to the **Scenario 3: Extended Expert Track** to formalize and deepen their practical skills.

 **Tooltip:** As you noted, **Basic Module 5: 3D technologies in the education process** is not assigned to the "new employee" learners in this scenario, as its focus is pedagogy. However, we **strongly recommend** you review Module 5 *yourself*. It's an excellent resource for you as a trainer and will give you great ideas for integrating 3D tech into other VET classes, which is perfect prep for delivering Scenario 2.





SCENARIO 2: SPRINT LEARNING WITH PRACTICE - VET Student 3D Technology

Introduction

Purpose: Provide VET students and adult learners with a complete 3D creation experience from design to physical print

Total duration: 30-40 hours (20-25 hours online + 10-15 hours practical)

Target group: VET school students (16-19) and adult learners reskilling through VET providers

Format: Blended learning - 70% online preparation + 30% intensive practical training

This scenario is perfect for learners who need hands-on validation of their learning. For VET schools, it fits within term schedules while maximising limited equipment access through concentrated practical days. For adult learners, it minimises time away from work while providing tangible proof of new skills—everyone leaves with an object they designed and printed themselves. As with the previous scenario, the 30-40 hours of content can be delivered in three different intensity levels, depending on your context, learner availability, and equipment scheduling. The online portion (Weeks 1-3) is flexible, but the practical days must be consecutive:

Intensive format (2 weeks)

- Week 1: 20-25 hours online (4-5 hours daily)
- Week 2: 2-day practical workshop (10-15 hours)
- Suitable for: Holiday programmes, dedicated short courses, urgent reskilling needs

Standard format (4 weeks)

- Weeks 1-3: Online modules (6-8 hours per week)
- Week 4: 2-day practical workshop (Friday-Saturday)
- Suitable for: Regular VET terms, working adults, mixed availability groups

Extended format (5-6 weeks)

- Weeks 1-4: Online modules (5-6 hours per week)
- Week 5 or 6: 2-day practical workshop
- Suitable for: Minimal weekly disruption, exam periods, equipment scheduling conflicts

Once learners are enrolled in your VET programme or reskilling course, register them on the 3d-academy.eu platform as a group. The curriculum below is presented in the 4-week standard format as most common for VET schools, but can be compressed or extended based on your chosen intensity.

Pre-training tasks and setup

Successful delivery requires coordinating online preparation with practical resources. This preparation phase ensures equipment is available, materials are ordered, and learners understand the mandatory attendance requirement for practical days.

Two weeks before

One week before





<ul style="list-style-type: none">• Book workshop/lab for 2-day practical session• Test all 3D printers and computers• Order sufficient filament (500g per 5 learners)• Create platform group and enrollment list• Send joining instructions with practical dates emphasized	<ul style="list-style-type: none">• Assign Module 1 on platform• Verify all learners registered successfully• Share practical session dates again (critical!)• Prepare attendance/safety forms• Test slice software on all computers
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The programme divides into two distinct phases that build upon each other. Phase 1 (online) provides theoretical foundation and design skills, while Phase 2 (practical) transforms this knowledge into tangible outcomes. The online modules must be completed before practical days—unprepared learners cannot participate safely or effectively in hands-on sessions.

PHASE 1: ONLINE PREPARATION (Weeks 1-3)

The following three-week curriculum provides comprehensive preparation for the practical workshop. Each week has specific focus areas that directly support hands-on success. While learners work at their own pace online, regular check-ins ensure they're progressing appropriately and understanding concepts correctly.

WEEK 1: Foundation and Design Focus (8-9 hours online)

This intensive first week builds core knowledge while introducing design skills. Unlike Scenario 1's workplace focus, learners here prepare for creative production, knowing they'll print their own designs.

Platform content: Basic Module 1 (complete) + Basic Module 4 (complete)

Learning Objectives:

- Master fundamental 3D technology concepts through platform content
- Create first 3D models in TinkerCAD independently
- Understand the workflow they'll execute during practical days
- Begin personal design project for printing
- Complete both modules with 75% minimum score

Session plan:

Days	Platform content	Time	Key activities	Preparation tasks
1-2	Module 1 complete	3-4 hrs	Watch all videos, complete quiz	Brainstorm what to print
3	Module 4/Units 1-2	2 hrs	Understand 3D modeling theory	Create TinkerCAD account
4-5	Module 4/Unit 3 + practice	3-4 hrs	Design 3 different models	Export STL files for review





WEEK 1: Online meeting and discussion (30 minutes virtual):

- Verify TinkerCAD proficiency via screen share
- Review design feasibility (size, complexity, time)
- Form groups of 3-4 for practical days
- Confirm practical attendance (crucial!)
- Address design concerns

WEEK 2: Printing Mastery (8-9 hours online)

Week 2 provides comprehensive printing knowledge, ensuring efficient use of limited practical time. Deep understanding of materials, processes, and troubleshooting prevents confusion during hands-on work.

Platform content: Basic Module 2 (complete - all 6 units)

Learning Objectives:

- Understand polymer printing technologies in detail
- Master material properties and selection criteria
- Navigate slicing software concepts confidently
- Recognize common problems and solutions
- Complete Module 2 with 80% minimum (safety critical)

Session plan:

Days	Platform content	Time	Focus areas	Practical Prep
6-7	Module 2/Units 1-2	3 hrs	FDM/SLA technologies	Note which school uses
8	Module 2/Unit 3	2 hrs	Material properties	Choose for your design
9	Module 2/Unit 4	2 hrs	Slicing software intro	Install Cura/PrusaSlicer
10	Module 2/Units 5-6	2 hrs	Post-processing, resources	Review troubleshooting

Week 2 Online meeting and discussion (20 minutes virtual):

- Confirm slicer software installed
- Review material choices
- Verify Module 2 completion
- Remind about practical requirements
- Final design adjustments

WEEK 3: Integration and Final Preparation (4-6 hours online)

The final online week ensures complete readiness, adding educational context while finalising designs. The lighter training plan allows focus on practical preparation.





Platform content: Basic Module 5 + Safety review + Design finalization

Learning Objectives:

- Understand educational applications of 3D technology
- Complete all safety requirements before lab access
- Finalize and optimize design for printing
- Achieve 100% module completion
- Prepare for collaborative practical work

Session plan::

Days	Platform content	Time	Purpose	Final tasks
11-12	Module 5 complete	3 hrs	Educational context	Understand applications
13	Safety review	1 hr	All safety content	Pass safety quiz 100%
14	Design check	1 hr	Verify printability	Slice design, check time
15	Pre-practical brief	1 hr	Review expectations	Prepare questions

Week 3 Online meeting and discussion (30 minutes - mandatory):

- Verify 100% module completion
- Confirm safety quiz passed
- Check STL files ready
- Review practical schedule
- Address last concerns

PHASE 2: INTENSIVE PRACTICAL TRAINING

The practical days convert online knowledge into hands-on experience. These sessions need careful planning to maximise equipment usage while ensuring every learner succeeds. Usually, this phase should not last more than 2 days, depending on overall group dynamics, motivation, and the availability of a relevant industrial partner to visit.

Before practice, checklist and prerequisites:

- All assigned modules 100% complete
- STL file ready on USB drive
- Practical attendance confirmed
- Signed safety declarations

PRACTICAL DAY 1: From design to print (6-7 hours)

Draft agenda:





- 09:00-09:30: Safety briefing and equipment orientation
- 09:30-10:30: Design review and final adjustments
- 10:45-12:00: Slicing workshop - parameters and settings
- 13:00-14:30: First prints launch - all groups start
- 14:45-16:30: Monitor prints while covering theory
- 16:30-17:00: Clean up and Day 2 planning

Mandatory objective: Ensure every group successfully starts at least one print

PRACTICAL DAY 2: Completion and way forward (5-7 hours)

Draft agenda:

- 09:00-09:30: Remove completed prints from Day 1
- 09:30-10:30: Post-processing workshop
- 10:30-12:00: Second print attempts (advanced features)
- 13:00-14:00: Showcase and peer feedback session
- 14:00-15:00: Future pathways discussion and certificates
- 15:00-16:00: Deep clean and maintenance training

Mandatory objective: Every learner leaves with at least one successful print

Learner certification and progression

This scenario is a significant step in the learner's journey.

1. **Completion:** The learner receives the **Certificate of Completion** after finishing all online modules and the 2-day practical.
2. **Progression:** This learner has now applied the theory. They have proven they can complete the full "design-to-print" workflow. They have moved from "Foundation Learner" to a "**Supervised Operator**" or "**Assistant 3D Technician**." They are a perfect candidate for an internship or progression to Scenario 3.

 **Tooltip:** The "Gate" in Week 3 is the most important part of this scenario. Do not let unprepared students into the 2-day practical; it wastes valuable, limited hands-on time. The 2-day sprint is about process, not perfection. A failed print that the student learns to troubleshoot is more valuable than a perfect print they don't understand. Explicitly tell your students how these activities map to the "3D Technician" VET standards 11 –it shows them the real-world value of their work.

SCENARIO 3: EXTENDED EXPERT TRACK – The VET Qualification Plan

Target Group: VET graduates seeking specialization, experienced hobbyists, or professionals upskilling. Learners *must* have prior 3D foundation knowledge²²²².

Delivery Format: Blended (approx. 60% Online / 40% Practical). This is a "spiral" model: learners study advanced theory online (SAP), then apply it in a weekly guided lab (UTR/VPUP).

Intensity: 80-100 total hours over 6-8 weeks.





Learning Objectives (Aligned with EQF Level 4 VET Standards):

Upon successful completion of this scenario, a learner will be able to:

1. **Observe safety and operations:** State and observe all safety rules for operating multiple 3D printing technologies (e.g., FDM and SLA).
2. **Orient in technologies:** State the printing principles and available materials for different 3D printing technologies.
3. **Prepare 3D models:** Evaluate, modify, and choose the correct orientation and placement for a 3D model, respecting the limits of the selected technology.
4. **Manage printing operations:** Enter parameters, select materials, start and supervise prints on *at least two types of 3D printers*, and optimize parameters in case of failure.
5. **Inspect and optimise parts:** Check the dimensions and surface quality of a printed part, propose parameter adjustments, and *modify the original source 3D model in CAD software* to improve the result.

Curriculum Structure (80-100 Hours)

This plan details an 8-week "Spiral Model" leading to a capstone project.

Week 0: Foundation assessment

- **Self-Paced Online (SAP):** Learners are given access to **Basic Modules 1-4** for review.
- **Guided Learning (VPUP):** You conduct a 30-minute 1-on-1 "Intake Interview" with each learner to assess their prior knowledge and professional goals.
- **Assessment (Formative):** Learners must pass a "Foundation Gateway Quiz" that covers M1-M4 content before they can begin Week 1.

Curriculum delivery

Week	Key Topic	Self-paced online (SAP) on the 3DAcademy platform	In – person / hands-on
Week 1	Advanced printing	Adv. Module 1: Units 1 (Adv. Tech/Materials).	VPUP: Safety briefing. Demo of FDM vs. SLA workflows. UTR: Learners print the <i>same</i> test part on <i>two different printers</i> (FDM & SLA).
Week 2	DfAM & Optimization	Adv. Module 1: Units 2 (Optimization) & 3 (DfAM).	VPUP: Live demo of advanced slicer settings (e.g., tree supports, adaptive layers). UTR: Given a "problematic" 3D model, learners must <i>modify</i> it for printability, <i>choose orientation</i> , and print it.
Week 3	Parametric Modeling (CAD)	Adv. Module 3: Unit 1 (Parametric Modeling).	VPUP: Demo of parametric (constraint-based) design in CAD software (e.g., Fusion 360). UTR: Learners model a simple, multi-part assembly with





Week	Key Topic	Self-paced online (SAP) on the 3DAcademy platform	In – person / hands-on
			defined tolerances (e.g., a snap-fit case).
Week 4	Freeform modeling	Adv. Module 3: Unit 2 (Freeform/Sculpting).	VPUP: Demo of sculpting tools (Blender, ZBrush) and the concept of <i>retopology</i> . UTR: Learners sculpt a simple organic shape and attempt to retopologize it for printing.
Week 5	Metrology & inspection	Adv. Module 2: Units 1 (Adv. Scanning) & 3 (GD&T).	VPUP: Demo of inspection tools (calipers, 3D scanner) and GD&T concepts. UTR: Learners print a test object, then <i>check its dimensions</i> and <i>surface quality</i> .
Week 6	Capstone Kick-Off	Adv. Module 4: Units 1 (History) & 2 (Case Studies).	VPUP: Capstone Project Briefing. As a group, brainstorm real-world problems. UTR: Learners (individually or in teams) define their capstone project scope, goals, and required materials.
Week 7	Capstone project Work	<i>(Self-directed research for project)</i>	VPUP: 1-on-1 mentoring sessions. UTR: Full lab session dedicated to project work. This is where they <i>test, fail, and optimize</i> . (e.g., "Learner <i>modifies the original CAD model</i> based on their Week 5 inspection").
Week 8	Final Assessment	<i>(Prepare final presentation/documentation)</i>	VPUP: "Final Project Presentations." UTR: "Final Practical Demonstration." Learners present their final project and documentation, justifying their design and process decisions.

Learner certification and progression

This scenario is designed to formally validate a learner's skills to an industry-recognised level.

1. **Completion:** The learner receives the **3DAcademy Certificate of Completion**.
2. **Progression:** This learner has now demonstrated skills consistent with an **EQF Level 4 "3D Printing Operator"** or **"3D Technician"**³³³³. They have moved from "Supervised Operator" to an **"Independent 3D Technician,"** capable of project management, quality control, and mentoring others, making them a "Product Leader" in the making.





Tooltip: Your role here is Mentor and Assessor. The online modules (SAP) are just the start. The real learning happens in the UTR labs. Your assessment must be practical. Use the Czech VET standard as your guide: can the learner demonstrate and orally verify their skills? For example, it is not enough to say they know how to optimise a print; they must do it in the lab (Competency 4d) and modify the original CAD file based on the results (Competency 5e). This capstone project is their final exam.

4.2 Learning Outcomes by Scenario

In section 4.1, we built the detailed "playbooks" for delivering each scenario. This section now provides a high-level overview of the specific learning outcomes your learners will achieve in each path. While the **online modules** (detailed in Chapter 3) provide the foundational knowledge, each **scenario** frames that knowledge to achieve a different goal—from a theory-ready to an industry-aligned professional.

Learning outcomes define what learners will know, understand, and be able to do after completing each scenario. These outcomes progressively build from awareness-level knowledge in the Piloting Scenario to professional competencies in Scenario 3. Each scenario uses specific platform modules to achieve targeted outcomes appropriate to the learner's context and available time.

Table 10: Learning outcomes per scenario

Scenario	Core modules	Learning outcomes per scenario	Assessment focus	EQF level
Scenario 1: Onboarding Foundation	Basic Modules 1-4 (Module 5 is optional for the trainer)	<ul style="list-style-type: none"> • Explain the core principles and vocabulary of 3D printing, scanning, and modelling. • Describe the complete 3D printing workflow, from a digital model to a physical part. • Identify the main 3D printing technologies, materials, and their use cases. • Recognize key safety hazards and operational basics for 3D printing. 	Online assessments 80% Safety knowledge 100% Workflow comprehension	Level 3 Foundation
Scenario 2: Sprint Learning	Basic Modules 1-4 (Module 5 is a key trainer resource)	<ul style="list-style-type: none"> • Operate a 3D printer safely and independently, including setup and basic maintenance. • Prepare a 3D model for printing by correctly using slicing software (orientation, supports, infill). • Execute a full "design-to-print" workflow, turning a digital idea into a physical object. 	Practical print success Safety compliance Problem-solving ability	Level 3-4 Applied





Scenario	Core modules	Learning outcomes per scenario	Assesment focus	EQF level
		<ul style="list-style-type: none"> • Perform a basic 3D scan and process the resulting mesh data. • Troubleshoot common 3D printing failures (e.g., bed adhesion, stringing). 	Portfolio evidence	
Scenario 3: Extended Expert Track	Basic Modules 1-4 (as prerequisite) Advanced Modules 1-4 (as core)	<ul style="list-style-type: none"> • Prepare 3D Models: Evaluate, modify, and choose the correct orientation and placement for a 3D model, respecting the limits of the selected technology. • Manage Printing Operations: Enter parameters, select materials, start and supervise prints on <i>at least two types of 3D printers</i>, and optimize parameters in case of failure. • Inspect and Optimise Parts: Check the dimensions and surface quality of a printed part, propose parameter adjustments, and <i>modify the original source 3D model in CAD software</i> to improve the result. • Apply advanced DfAM, GD&T, and parametric/freeform modeling concepts to a project. 	Capstone project quality Technical documentation Professional presentation Peer teaching ability	Level 4-5 Professional
Piloting scenario ("Taster")	Parts of Basic Modules 1-4	<ul style="list-style-type: none"> • Gain familiarity with the 3D workflow (design, scan, print). • Create a simple 3D model using basic tools (e.g., TinkerCAD). • Operate a 3D printer and scanner with heavy, step-by-step guidance. • Generate interest and assess learner motivation for 3D technologies. 	Platform quiz completion Successful model creation Attendance participation	Awareness Pre-Level 3

4.3 Competency development map

In vocational education is about building **competencies**. A competency is more than just knowing something; it's the proven ability to **apply** that knowledge and skill effectively in a real-world work situation.

This is where frameworks like the **European Qualifications Framework (EQF)** and national **VET Occupational Standards** (like the ones we referenced for Scenario 3) become crucial. They define





exactly *what* a person needs to be able to *do* to be considered competent in a specific job role, e.g. "3D Technician" or a "3D Printing Operator".

This map below is your guide to understanding exactly which competencies are developed in each part of the 3DAcademy programme. It bridges the "what" (the online modules) with the "how" (the scenario playbooks) and connects them to the "why" (the formal VET competencies and job readiness).

Table 11: Competency map

Competency Type	Specific Competency (VET Standards)	Developed in Modules	Assessed in Scenarios
Basic technical	1. Orientation in 3D Technologies - Understand principles, materials	Basic Module 2	Piloting: Quiz Scenario 1: Assessment Scenario 2: Theory test
Basic technical	2. Prepare 3D Models - Slicing, orientation, supports	Basic Module 2 (Unit 4) Basic Module 4	Scenario 2: Day 1 practical Scenario 3: Week 2 lab
Basic technical	3. Make 3D Objects - Operate printer, safety, post-process	Basic Module 2 Basic Module 5	Scenario 2: Both practical days Scenario 3: Weekly labs
Basic technical	4. Measure and Scan Shapes - Operate scanner, clean mesh	Basic Module 3	Piloting: Session 3 Scenario 3: Week 5
Advanced technical	5. Manage and Optimize Printing - Use 2+ printer types, optimize	Advanced Module 1 Advanced Module 4	Scenario 3: Weeks 1-2 Scenario 3: Capstone
Advanced technical	6. Inspect and Optimize Parts - Check dimensions, modify CAD	Advanced Module 2 Advanced Module 3	Scenario 3: Week 5 Scenario 3: Capstone
Transferable	7. Planning and Organizing - Manage project, time	Basic Module 5 Advanced Module 4	Scenario 3: Full 8-week process



Competency Type	Specific Competency (VET Standards)	Developed in Modules	Assessed in Scenarios
Transferable	8. Problem-Solving - Diagnose failures, find solutions	Basic Module 2 Advanced Module 1	Scenario 2: Day 2 Scenario 3: Throughout
Transferable	9. Communication - Teamwork, presentations	Developed in sessions	Scenario 2: Group work Scenario 3: Final presentation

4.4 Teaching Strategies and Methods

Now that you have the curriculum plans (the "what" to teach), let's focus on how to teach it effectively. The 3DAcademy blended model gives you flexibility, but choosing the right teaching strategies is key to engaging your VET learners and ensuring they develop real, applicable competencies.

This section outlines best practices suited for teaching 3D technologies in a VET setting, keeping in mind typical classroom realities. For each of the provided methods there is a brief description along with simple instruction on how to apply it in the context of the 3DAcademy Training Programme.

1. Flipped Classroom

What it is: The flipped classroom inverts traditional teaching by moving lecture content online for self-paced study, reserving face-to-face time exclusively for hands-on application and problem-solving. Think of it like learning to drive—you wouldn't spend your expensive instructor time reading the highway code together when you could study that at home and use driving lessons for actual practice. In 3D printing contexts, learners watch videos about how FDM printers work, study material properties, and learn safety protocols online. Then when they arrive at your workshop, they immediately start leveling beds, loading filament, and troubleshooting prints with your expert guidance.

How to use it: Implementation varies across scenarios based on available contact time. In the Piloting scenario, assign just 15-20 minutes of platform exploration between sessions—enough to maintain momentum without overwhelming school students. Scenario 1 represents pure flipped learning where all theoretical content is delivered through the platform with virtual check-ins replacing physical presence entirely. Scenario 2 follows the classic flipped model where three weeks of online preparation (watching modules, practicing in TinkerCAD, understanding workflows) culminates in two intensive practical days where every minute counts. Scenario 3 uses a spiral approach, cycling weekly between new online content and practical application, allowing deeper understanding through repeated theory-practice connections.





Further Reading:

- Vanderbilt University Center for Teaching - Flipping the Classroom: Provides a concise overview of the model, benefits, and steps for implementation. While university-focused, the principles are widely applicable. <https://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom/>
- Edutopia - Flipped Learning: Edutopia offers numerous articles and resources on flipped learning, often with practical examples from various educational levels, including secondary and potentially VET-related contexts. <https://www.edutopia.org/videos/flipped-learning-a-new-approach> (Video introduction) <https://www.edutopia.org/search?query=flipped%20classroom> (Search results for various articles)

2. Project-Based Learning (PBL)

What it is: Project-Based Learning engages learners in solving real-world problems through extended projects that integrate multiple skills and result in tangible products. Unlike traditional exercises that teach isolated skills (today we learn CAD, tomorrow we learn slicing), PBL mirrors how 3D printing actually works in industry—you receive a client brief, research solutions, design, prototype, test, iterate, and deliver. For example, instead of teaching support structures as an abstract concept, learners design a phone stand that requires strategic support placement, print it, evaluate the result, and refine their approach. The project drives the learning rather than the curriculum driving isolated activities.

How to use it: The scale and complexity of projects match available time and learner capability. The Piloting scenario uses a micro-project approach where designing and printing a personalized keychain over four sessions introduces the complete workflow while maintaining achievable scope. In Scenario 1, learners plan theoretical projects aligned with their future workplace needs, developing project proposals without physical execution. Scenario 2 implements sprint PBL where the entire two-day practical becomes one intensive project—from receiving the design challenge Friday morning to presenting finished prints Saturday afternoon. Scenario 3 elevates PBL to professional level through the 8-week capstone project, incorporating client requirements, iterative development, documentation, and formal presentation, mirroring real industry projects.

Further Reading:

- PBLWorks (Buck Institute for Education): <https://www.pblworks.org/what-is-pbl>
- Edutopia - Project-Based Learning: <https://www.edutopia.org/project-based-learning>

3. Problem-Based Learning

What it is: Problem-Based Learning starts with an authentic problem that learners must solve through investigation, hypothesis testing, and application of knowledge they develop along the way. In 3D printing, problems are everywhere—why did the print detach mid-job? What causes this weird stringing between towers? How can we reduce print time without sacrificing strength? Rather than teaching solutions to problems learners haven't encountered yet, PBL presents the problem first, making the learning immediately relevant. For instance, show learners a warped print and ask them to determine causes and solutions. They'll research thermal dynamics, bed adhesion techniques, and material properties because they need this knowledge to solve the immediate problem.





How to use it: Problem complexity scales with learner experience and available resources. In the Piloting scenario, use simple observational problems—show failed prints and guide learners to identify visible issues like poor bed adhesion or obvious stringing. Scenario 1 employs theoretical problem-solving where learners analyze failure scenarios through case studies and platform content, developing diagnostic thinking without equipment access. Scenario 2 introduces hands-on problem-solving where learners receive a print with specific defects and must adjust parameters to eliminate issues during their practical time. Scenario 3 presents complex optimization challenges like reducing part weight by 30% while maintaining strength, requiring advanced understanding of infill patterns, wall thickness, and material properties.

Further reading: Cornell University Center for Teaching Innovation - Problem-Based Learning: <https://teaching.cornell.edu/teaching-resources/engaging-students/problem-based-learning>

4. Demonstration-practice method

What it is: The demonstration-practice method follows a structured progression from trainer modeling through guided practice to independent performance, essential for safety-critical operations. The "I do, We do, You do" sequence ensures correct technique from the start, preventing bad habits and equipment damage. When teaching nozzle replacement, the trainer first demonstrates while explaining each step and safety consideration, then guides a learner through the process with prompting, finally observes silent independent performance. This method is particularly crucial for procedures where mistakes cause injury or damage—resin handling, hot-end maintenance, or bed leveling where excessive force damages surfaces.

How to use it: Every practical scenario requires demonstration-practice for initial equipment introduction, regardless of learners' claimed experience. Begin each new technique with full demonstration at normal speed to show the end goal, then repeat slowly with commentary explaining decisions and highlighting critical points. During guided practice, use gradual release—initially provide step-by-step verbal guidance, then just safety reminders, then silent observation with intervention only for errors, finally full independence. Document competence achievement for each critical skill, maintaining training records that verify safe independent operation. This method naturally combines with other approaches—demonstrating within PBL projects, using peer practice for non-critical skills, and scaffolding the complexity of demonstrated techniques.

Further reading:

- TWI Institute - Job Instruction: This is the primary source for the official TWI methodology, explaining the 4-step process (Prepare, Present, Try, Follow-up) in detail: <https://twi-institute.com/job-instruction/>
- Lean Enterprise Institute - Job Instruction Overview: Provides a concise explanation of JI within the context of lean manufacturing, which is highly relevant to VET. <https://www.lean.org/lexicon/job-instruction>

Table 12: Preferred teaching method based on the current context

Your context	Recommended teaching method	Justification
Limited equipment	Flipped classroom, Problem-based (theoretical)	Maximizes equipment time when available



Your context	Recommended teaching method	Justification
Mixed abilities	PBL with differentiated projects, Demonstration at varied paces	Projects scale to ability, demos ensure safety for all
Short timeframe	Problem-based learning, Demonstration-practice	Focuses on essential troubleshooting and safety
Industry preparation	Project-based learning, Problem-based optimization	Develops real-world project and troubleshooting skills
Young learners (16-19)	PBL for engagement, Demonstration for structure	Projects motivate, clear demos provide security
Adult learners	Problem-based, Flipped self-directed study	Leverages experience, respects autonomy
Online only	Flipped classroom, Problem-based (case studies)	Both work without equipment access

Mini Lesson templates

These ready-to-use templates can be delivered as stand-alone sessions or combined into a short course.

Lesson 1: Explore the Printer (30 minutes)

 **Goal:** Recognise main printer parts and explain their function.

 **Materials:** 3D printer, labels or post-its.

Steps:

1. Show the printer and label each part (bed, nozzle, extruder, filament).
2. Ask learners what they think each part does.
3. Run a short demo print.

 **Reflect:** "What surprised you most about how it works?"

Lesson 2: Model Your Name Tag (60 minutes)

 **Goal:** Learn basic 3D modelling and slicing.

 **Materials:** Computers with TinkerCAD, slicer software, PLA filament.

Steps:

1. Open TinkerCAD and design a simple name tag.
2. Export STL, open in slicer, set layer height and speed.





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3. Save G-code and print.

 *Reflect:* “What would you change if you printed it again?”

Lesson 3: Print and Reflect (30 minutes)

 *Goal:* Observe, analyse, and improve print results.

 *Materials:* Prints from previous sessions.

Steps:

1. Compare prints in small groups.
2. Identify common issues (stringing, poor adhesion).
3. Brainstorm simple fixes.

 *Reflect:* “How can we improve print quality next time?”

Trainer in Action

 *Example:* “When I asked learners to find one object at home that could be 3D printed, they came back with creative and funny ideas. It was a great way to make the topic personal.”





CHAPTER 5: IMPLEMENTATION REQUIREMENTS

PURPOSE: This chapter provides practical guidance on the physical, digital, and material resources needed to deliver 3D technology training effectively. It helps you plan infrastructure, select appropriate equipment, and ensure safe learning environments matched to your chosen scenarios.

READING TIME: 30 minutes

5.1 Physical space and equipment

Successfully delivering 3D technology training requires careful planning of physical spaces and equipment selection aligned with learning objectives, target groups, and available resources. Requirements scale from basic demonstration setups to professional training environments. While Scenario 1 is primarily online, Scenarios 2 and 3 depend heavily on your workshop, lab, or STEM cabinet.

Table 13: Physical space requirements by scenario

Scenario	Minimum Space	Layout Requirements	Capacity	Layout / Distribution
Piloting	40-50 m ²	Single multipurpose room	10-15 learners	<ul style="list-style-type: none"> Working table / bench (2 m²) Student seating with sightlines Sample display area
Scenario 1	None (online)	Home/workplace computer access	Unlimited	<ul style="list-style-type: none"> Learner's own study space Stable internet connection
Scenario 2	60-80 m ²	Clean Zone (40%): CAD stations Production Zone (40%): Printers, post-processing Storage (20%): Materials, tools	12-20 learners	<ul style="list-style-type: none"> CAD stations (20 m²) Printing zone (20 m²) Post-processing table (10 m²) Material storage (5 m²)
Scenario 3	100-150 m ²	Multi-zone professional layout	8-12 learners	<ul style="list-style-type: none"> Design studio (30 m²) Multi-technology print farm (40 m²) Metrology station (10 m²) Project storage (20 m²)

Ventilation: *Crucial*, especially for SLA resins or FDM materials like ABS. Consider Local Exhaust Ventilation (LEV).

Safety: Fire extinguishers, first aid kit, clear safety signage, easily accessible PPE.

Storage: Organized, appropriate storage for materials (filament, resin), tools, and consumables.





The following table outlines minimum functional specifications. You should aim for reliable equipment suitable for a VET learning environment.

Table 14: Equipment specifications by scenario

Equipment Category	Purpose	Minimum Functional Specifications	Notes for Selection
Computers	<ul style="list-style-type: none"> • Access platform • Run CAD/Slicer software. • Process scan data 	<ul style="list-style-type: none"> • Modern OS (Win 10/11, macOS). • RAM: 8GB minimum, 16GB+ highly recommended for CAD/scan processing. • CPU: Multi-core processor capable of handling CAD tasks. • Graphics: Dedicated graphics card recommended for smoother CAD performance. • Stable Internet 12, compatible browser 13, PDF/Office readers 14. 	Software requirements vary. Check the specs for the CAD/Slicer software you plan to use. Laptops offer flexibility but ensure they meet performance needs.
FDM Printer(s)	<ul style="list-style-type: none"> • Foundational printing technology for Scenarios 2 and 3. 	<ul style="list-style-type: none"> • Technology: Fused Deposition Modeling. • Build volume: Approx. 200x200x200mm suitable for most VET projects. • Heated bed: Essential for printing materials like ABS, PETG. • Reliability: Choose models known for ease of use and maintenance in educational settings. • Material capability: Must reliably print PLA, PETG. ABS capability is a plus but requires better ventilation/enclosure. 	For Scenario 2, one reliable printer can work with good scheduling. For Scenario 3, multiple printers (ideally 2+) are highly recommended to manage project workflows and reduce bottlenecks.
SLA/Resin Printer(s)	<ul style="list-style-type: none"> • High-detail printing. • Required for Scenario 3 to meet VET standard competency (using 2+ technologies). 	<ul style="list-style-type: none"> • Technology: LCD/MSLA (Vat Polymerization) common and cost-effective for VET. • Build volume: Approx. 120x70x150mm suitable for smaller, detailed parts. 	Requires dedicated post-processing (washing / curing). Consider the recurring cost and safe handling/disposal of resins and IPA. Crucial for demonstrating multi-technology competence.



Equipment Category	Purpose	Minimum Functional Specifications	Notes for Selection
		<ul style="list-style-type: none"> • Resolution: XY resolution typically 50 microns or better. • Safety: Must be used with appropriate safety enclosure/ventilation and PPE. 	
3D Scanner	<ul style="list-style-type: none"> • Capture geometry for Scenarios 2 & 3. • Reverse engineering & inspection tasks. 	<ul style="list-style-type: none"> • Technology: Structured Light (handheld or desktop) or capable Photogrammetry setup. • Accuracy: Sufficient for educational projects (e.g., 0.1mm - 0.5mm). Higher accuracy needed for metrology tasks (Scenario 3). • Software: Must include software for mesh processing (cleaning, aligning, closing holes)¹⁷. • Export: STL, OBJ formats minimum. 	<p>Consider ease of use and the size/type of objects typically scanned in your VET field. Photogrammetry can be a low-cost start but requires more user skill for good results.</p>
Post-processing tools	<ul style="list-style-type: none"> • Finishing printed parts. 	<ul style="list-style-type: none"> • FDM: Basic hand tools (flush cutters, pliers, deburring tool, files, sandpaper). • SLA: Nitrile gloves, safety glasses, wash station (IPA bath or automated cleaner), UV curing station (dedicated UV lamp or chamber). 	<p>Safety equipment (PPE) is paramount, especially for resin handling. Ensure adequate supply of consumables like gloves and IPA.</p>

 **Tooltip:** Your equipment choice directly impacts what your learners can achieve. While meeting the minimums allows delivery, having access to multiple FDM printers for Scenario 2 drastically improves workflow. For Scenario 3, access to both FDM and SLA printers is essential to build the multi-technology competencies required by VET standards. Always prioritise reliability and safety when selecting equipment for a learning environment. Refer to **Annex 3** for detailed equipment lists and potential suppliers.



Table 15: Software requirements and licensing

Software category	Free options	Educational licenses	Installation / setup notes
3D Modeling (Beginner)	<ul style="list-style-type: none"> Tinkercad (Web-based) SketchUp Free (Web-based) FreeCAD (Desktop) 	<ul style="list-style-type: none"> Autodesk Fusion 360 (Free for Education/Personal) Onshape (Free Plan / Edu) 	Web-based options require no installation. Desktop apps vary (15-60 min). Fusion 360 requires account registration.
3D Modeling (Advanced)	<ul style="list-style-type: none"> Blender (Desktop) FreeCAD (Parametric) 	<ul style="list-style-type: none"> Autodesk (Fusion 360, Inventor, Maya) SolidWorks (Edu) PTC Creo (Edu) Rhino 3D (Edu discount) 	Blender is powerful but has a steep learning curve. Parametric CAD (Fusion, SolidWorks) requires more powerful PCs.
Slicing Software	<ul style="list-style-type: none"> Ultimaker Cura PrusaSlicer Bambu Studio /Rin) 	<ul style="list-style-type: none"> GrabCAD Print (Stratasys - Free) Formlabs PreForm (Free) 	Installation is usually quick (10-30 min). Requires configuration specific to your printer model and materials.
Scanning Processing	<ul style="list-style-type: none"> Mesh before the course startsroom (Photogrammetry - Desktop) COLMAP (Photogrammetry - Desktop) Scanner-bundled basic software (often limited) 	<ul style="list-style-type: none"> Autodesk ReCap Pro (Edu) Metashape (Edu discount) 	Photogrammetry often requires significant processing time & GPU power. Scanner software installation varies.
File Repair	<ul style="list-style-type: none"> Meshmixer (Autodesk - Free) MeshLab (Open Source) 3D Builder (Windows) Blender (Built-in tools) 	<ul style="list-style-type: none"> Autodesk Netfabb (Edu / Free trial) 	Meshmixer & 3D Builder are user-friendly. MeshLab is powerful but less intuitive. Netfabb offers automated repair.

💡 Tooltip: Before the course starts, run a "digital infrastructure check". Can all the required software be installed on the lab computers? Can learners access the 3d-academy.eu platform without firewall issues? Can they download a sample PDF and upload a test file? Resolving IT issues *before* Week 1 saves significant time and frustration for both you and your learners. Communicate clearly with your IT support team about the course requirements.

5.2 Materials and Consumables

Beyond the main equipment (printers, scanners, computers), running practical 3D technology sessions requires a steady supply of materials and consumables. Proper selection, storage, and handling are crucial for successful prints and, most importantly, for safety.





This section provides an overview of the common materials you will need, particularly for FDM and SLA printing used in Scenarios 2 and 3. The primary materials you'll use depend on your printer technology:

Table 16: Common 3D Printing Materials for VET

Material Type	Technology	Common Examples	Key Properties	Typical VET uses	Storage notes
Filaments	FDM	<ul style="list-style-type: none"> • PLA (Polylactic Acid) • PETG (Polyethylene Terephthalate Glycol) • ABS (Acrylonitrile Butadiene Styrene) • TPU (Thermoplastic Polyurethane) 	<ul style="list-style-type: none"> • PLA: Easy to print, biodegradable, rigid but brittle. • PETG: Stronger than PLA, good layer adhesion, moderate flexibility. • ABS: Very strong, high temp resistance, durable (requires heated bed & enclosure/ventilation). • TPU: Flexible, rubber-like, abrasion resistant (can be tricky to print). 	<ul style="list-style-type: none"> • PLA/PETG: Prototypes, visual models, jigs, educational tools. • ABS: Functional parts, enclosures, snap-fits (use with caution due to fumes). • TPU: Flexible grips, seals, phone cases. 	<ul style="list-style-type: none"> • Store ALL filaments in airtight containers with desiccant to prevent moisture absorption, which ruins print quality. • ABS requires good ventilation during printing.
Liquid Resins	SLA / MSLA	<ul style="list-style-type: none"> • Standard Resin: (Various colors) • Tough / Durable Resin: • Flexible Resin: • Castable Resin: (Jewelry/Dental) 	<ul style="list-style-type: none"> • Standard: Good detail, relatively brittle. • Tough: Improved impact resistance, mimics ABS properties. • Flexible: Rubber-like properties. • Castable: Burns out cleanly for investment casting. 	<ul style="list-style-type: none"> • High-detail visual models, miniatures. • Functional prototypes requiring higher strength (Tough Resin). • Specialized applications (Dental models, jewelry masters). 	<ul style="list-style-type: none"> • Store resins in opaque bottles, away from UV light, in a cool, dark place. • Requires mandatory PPE (gloves, safety glasses) during handling. • Requires IPA for washing and UV light for curing.



Essential Consumables

Beyond the printing materials themselves, you will need various consumables for operation, post-processing, and maintenance:

- **Isopropyl Alcohol (IPA):** Used extensively for cleaning SLA prints. Requires safe storage and handling procedures (flammable). Ensure good ventilation when using.
- **Gloves:** Nitrile gloves are essential when handling liquid resins and IPA.
- **Safety Glasses:** Mandatory when working with resins, IPA, or removing supports.
- **Paper Towels / Absorbent Wipes:** For cleaning up spills (especially resin) and general workshop use.
- **Flush Cutters / Pliers / Deburring Tools:** For removing FDM supports.
- **Sandpaper (various grits):** For smoothing FDM prints.
- **Scrapers:** For removing prints from the build plate (often supplied with printers, but spares are useful).
- **Adhesives (for build plate):** Glue stick or specialized print adhesives can help with FDM bed adhesion, especially for materials like ABS.
- **Spare Parts (Printer specific):** It's wise to keep common spare parts on hand, such as FDM nozzles, PTFE tubing, or spare resin vats (FEP film) for SLA printers, to minimize downtime.
- **Cleaning Supplies:** Brushes, swabs for cleaning printer mechanisms.

💡 Tip: Material costs add up! PLA filament is generally the most cost-effective and easiest to print, making it ideal for beginners in Scenario 2. For Scenario 3, factor in the higher cost of specialized resins or engineering filaments when planning capstone projects. Always check the **Safety Data Sheets (SDS/MSDS)** for any new filament or resin you purchase, and ensure your storage and handling procedures comply (see Section 5.3 Safety). Consider involving students in inventory management and material handling (with proper training) as part of their learning. Refer to Annex 3 for a detailed consumables list template.

When it comes to 3D scanning it is a much more complicated process that when for professional use requires specific aids to improve data capture quality, especially with challenging surfaces (shiny, dark, or transparent objects).

Table 17: Scanning equipment list

Item Category	Examples	Purpose	Usage notes
Surface Treatments	<ul style="list-style-type: none"> • Matting Spray (Temporary) • Developer Spray (for CMM/Metrology) 	<ul style="list-style-type: none"> • Reduces reflectivity/transparency on shiny or dark objects, allowing scanners (especially structured light) to capture geometry accurately. • Creates a uniform, matte white surface. 	<ul style="list-style-type: none"> • Temporary sprays are designed to sublimate (evaporate) after a few hours, leaving no residue. • Use in well-ventilated areas. • Requires careful application for even coating.





Item Category	Examples	Purpose	Usage notes
			<ul style="list-style-type: none"> May need cleaning post-scan.
Reference Aids	<ul style="list-style-type: none"> • Coded/Uncoded Reference Markers (Dots/Targets) • Scale Bars 	<ul style="list-style-type: none"> • Help scanning software align multiple scans accurately, especially for larger objects or those lacking distinct geometric features. • Provide dimensional reference for scaling. 	<ul style="list-style-type: none"> • Markers must be applied randomly but sufficiently across the object's surface. • Software must be configured to recognize the specific markers used. • Scale bars ensure dimensional accuracy.
Cleaning Supplies	<ul style="list-style-type: none"> • Microfiber Cloths • Lens Cleaning Solution/Wipes • Compressed Air 	<ul style="list-style-type: none"> • Maintain the cleanliness of scanner lenses and calibration plates, which is critical for accuracy. • Remove dust or debris from objects pre-scan. 	<ul style="list-style-type: none"> • Follow scanner manufacturer's recommendations for cleaning optics. • Avoid abrasive materials on lenses. • Ensure objects are clean and dry before applying markers or spray.
Calibration Tools	<ul style="list-style-type: none"> • Calibration Plates/Boards • Calibration Spheres/Artifacts 	<ul style="list-style-type: none"> • Used regularly to calibrate the scanner, ensuring its accuracy and compensating for environmental changes (temperature, etc.). 	<ul style="list-style-type: none"> • Calibration procedures are specific to the scanner model. • Must be handled carefully and stored safely to maintain their precision.



In regard to 3D modelling is primarily a digital process, so it doesn't involve physical materials in the same way printing or scanning do. In general, you need to plan for software and hardware solutions that were explained in details in the previous sections.

5.3 Safety requirements

A safe learning environment is mandatory when working with 3D technologies. While 3D printing is generally safe, it involves hot surfaces (up to 260°C), moving mechanical parts, and potentially hazardous materials (resins, solvents). Your safety infrastructure must protect learners while allowing hands-on learning. Beyond basic equipment, you need clear procedures, proper training, and a culture where safety concerns are immediately addressed.

Table 18: Safety measures list

Safety Area	Minimum requirements	Importance	Check / test
Ventilation	<ul style="list-style-type: none"> • Windows that open (minimum) • Desk fan for fume direction • Extraction fan for resin work (ideal) 	Prevents headaches and complaints. ABS smells bad, resin fumes are actually hazardous. Inspectors will check this.	Can you smell the printer from across the room? Time to improve ventilation.
Fire safety	<ul style="list-style-type: none"> • Your existing workshop extinguisher • Fire blanket near printer (€20) 	You're heating plastic to 200°C+. Your insurance requires this. One small fire ruins your programme.	Can every learner point to the extinguisher? Do they know when NOT to use water?
First aid	<ul style="list-style-type: none"> • Standard workshop kit • Add burn gel (€10) • Know who's first-aid trained 	Burns from hot nozzles are the most common injury. Having burn gel shows you're prepared.	Is the kit visible? Not locked away? Check expiry dates during term breaks.
PPE basics	<ul style="list-style-type: none"> • Safety glasses when removing prints (€2 each) • Box of nitrile gloves for resin (€15) • Share or individual - your choice 	Protects from snapping plastic and skin irritation. Shows professional standards to visiting employers.	Start each session with "Where are your safety glasses?" Make it routine.
Emergency stop	<ul style="list-style-type: none"> • Know where printer power switches are • Extension cord with switch (€10) 	When something goes wrong, you need to cut power fast. Learners panic - make it obvious.	Run a "find the emergency stop" drill in week 1.



Safety Area	Minimum requirements	Importance	Check / test
	<ul style="list-style-type: none">• Label the main breaker		
Clear signs	<ul style="list-style-type: none">• "Hot Surface" sticker on printers (€5)• "Wash Hands" by resin station• Your existing workshop rules apply	Reminds learners this is real equipment. Covers you legally. Shows inspectors you're serious.	Are signs at eye level? In learners' languages? Not covered by projects?
Chemical safety	<ul style="list-style-type: none">• Resin: Spill tray and paper towels• IPA: Store in metal cabinet• Waste container with lid	Only needed for resin printing. Your existing chemical procedures probably cover this.	Do learners know the difference between regular waste and chemical waste?

Quick readiness and Safety checklist

Before each session, make sure the following are ready:

- | <input checked="" type="checkbox"/> Item | Check |
|---|-------|
| <input type="checkbox"/> Printer tested and calibrated | |
| <input type="checkbox"/> Filament loaded and material verified | |
| <input type="checkbox"/> Ventilation and safety glasses available | |
| <input type="checkbox"/> Example model test-printed | |
| <input type="checkbox"/> Computers and slicer software ready | |
| <input type="checkbox"/> Students briefed on lab rules and safety | |





CHAPTER 6: ASSESSMENT AND QUALITY ASSURANCE

PURPOSE: To provide trainers with flexible guidelines for evaluating learner progress across the three 3DAcademy delivery scenarios, ensuring consistent standards and quality.

READING TIME: 25 minutes

This chapter provides trainers with flexible guidelines for evaluating learner progress across the three 3DAcademy delivery scenarios. The evaluation approach assesses consistent learning outcomes aligned with EQF Level 3, while recognising that different scenarios provide different contexts for demonstrating these outcomes. Assessment in VET is not just about giving grades; it's about verifying competency and guiding development. Quality assurance ensures the programme remains effective and relevant.

6.1 General evaluation principles

The 3DAcademy programme aims for all learners to achieve the following learning outcomes, consistent with EQF Level 3:

- **Knowledge:** Learners demonstrate knowledge of facts, principles, processes and general concepts related to 3D printing, scanning, and modeling technologies.
- **Skills:** Learners use a range of cognitive and practical skills to create 3D designs, operate equipment safely, and solve routine technical problems.
- **Responsibility and Autonomy:** Learners take responsibility for completing 3D technology tasks, adapt their approach to different situations, and work with some independence under supervision.

These learning outcomes are developed through three integrated competency areas:

- **Digital design** - Creating and modifying 3D objects
- **Technical operation** - Using 3D technology safely and effectively
- **Applied problem-solving** - Applying knowledge to vocational challenges

While learning outcomes remain constant, the context for demonstrating them varies:

Table 19: Assessment context by scenario

Scenario	Target group	Duration	Assessment context	What can be assessed?
Scenario 1: Onboarding Foundation	New employees, VET students (theory intro)	4 weeks (Online)	Theoretical / Simulated (No mandatory equipment access)	<ul style="list-style-type: none"> • Knowledge (fully) • Cognitive skills (e.g., planning, analysis) • Responsibility and Autonomy (in self-directed study)





Scenario 2: Sprint Learning	VET students, Adult learners	~1 month (Blended)	Supervised Practice (Online prep + 2-day practical)	<ul style="list-style-type: none"> • Knowledge (fully) • All Skills (cognitive and practical) • Responsibility and Autonomy (in practical tasks)
Scenario 3: Extended Expert Track	VET grads, Professionals	6-8 weeks (Blended)	Complex Projects (Ongoing online + weekly practical labs)	<ul style="list-style-type: none"> • All outcomes at greater depth • Advanced applications • Problem-solving complexity • Knowledge sharing / mentoring

6.2 Assessment Criteria

Trainers should use the following comprehensive framework to assess EQF Level 3 learning outcomes across all scenarios, adapting the methods based on the context provided by each scenario.

Table 20: Framework for assessing EQF Level 3 outcomes

Learning outcome domain	What to assess	Evidence to collect	Assessment methods
KNOWLEDGE (Knows facts, principles, processes, concepts)	<ul style="list-style-type: none"> • How 3D printers work (FDM, SLA) • Safety procedures & risks • Material properties (PLA, ABS, Resin) • Basic design principles • File formats & slicing workflow • Common print/scan problems 	<ul style="list-style-type: none"> • Explanations of processes • Material selection rationales • Safety protocol descriptions • Problem identification logs • Design decision notes 	<ul style="list-style-type: none"> • Knowledge Tests: Platform quizzes, short written/oral questions. • Case Study Analysis: Apply knowledge to scenarios. • Documentation Review: Assess design notes/reports. • Q&A Discussions: Probe understanding.





Learning outcome domain	What to assess	Evidence to collect	Assessment methods
<p>SKILLS (Can complete tasks and solve problems)</p>	<ul style="list-style-type: none"> • Software navigation & use (CAD, Slicer) • 3D object creation/modification • File preparation & slicing • Equipment operation* • Problem diagnosis • Quality checking* 	<ul style="list-style-type: none"> • Completed 3D design files (e.g., .stl) • Slicer project files/screenshots • Printed objects* • Scan data files (raw/processed) • Photos/videos of process • Troubleshooting logs 	<ul style="list-style-type: none"> • Practical Exercises: Software tasks, design challenges. • Practical Demonstration*: Observe equipment use. • Simulation Tasks: Use slicer previews. • Portfolio Review: Assess collected work. • Product Evaluation*: Assess quality of prints/scans.
<p>RESPONSIBILITY AND AUTONOMY (Takes responsibility, adapts behavior)</p>	<ul style="list-style-type: none"> • Independent task completion • Safety compliance* • Quality ownership • Appropriate help-seeking • Time management • Adaptation to challenges 	<ul style="list-style-type: none"> • Self-directed work logs • Safety checklists* • Quality self-reflections • Communication records • Project timelines/plans • Problem-solving attempts 	<ul style="list-style-type: none"> • Observation Checklists*: Record behaviors during practicals. • Self-Assessment Forms: Learner reflects on process. • Project Management: Assess planning/execution. • Reflection Journals: Capture learning process. • Peer Feedback: Assess collaboration.

*Where equipment is available and a practical assessment is possible (Scenarios 2 & 3).





Trainers must adapt their assessment approach based on the scenario they are delivering. Each scenario provides different opportunities for learners to demonstrate their achievement of learning outcomes.

- **When teaching Scenario 1 (Online-Only)**, trainers should focus the assessment on what learners can show without equipment. Collect evidence of theoretical understanding (Knowledge) through written explanations, design plans (cognitive Skills), and self-directed learning logs (Responsibility & Autonomy). Do not mark learners down for lacking hands-on skills - instead, document their theoretical readiness for future practical training using the tools in Annex 2 (A).
- **When teaching Scenario 2 (Blended)** trainers can assess all learning outcomes fully. Use the online weeks (Phase 1) to evaluate Knowledge and planning Skills (formative). Then use the 2-day practical workshop (Phase 2) to assess hands-on Skills and workplace behaviors like Responsibility & Autonomy (summative). This scenario provides the most complete picture of learner achievement against the baseline EQF Level 3 outcomes. Use Annex 2 (A) tools for both online and practical evidence.
- **When teaching Scenario 3 (Extended)** trainers should take advantage of multiple practical sessions (weekly labs) to assess learning outcomes iteratively. Document how learners improve over time (using tools like Annex A2), tackle increasingly complex challenges (moving towards advanced module outcomes), and develop greater Autonomy. The Capstone Project serves as the final, comprehensive summative assessment. Use Annex 2 (A) tools, potentially including Annex 2 (A3) for tracking.

 **Tooltip:** Always assess learners based on what your scenario makes possible. A learner who masters theory and planning in Scenario 1 has succeeded within that context, just as much as a learner who completes practical projects in Scenario 2. Document achievements within context, not against an impossible standard.

6.3 Scenario 1: Online-only assessment plan

Trainers delivering the online-only scenario guide learners through all five basic modules of the 3DAcademy platform to achieve theoretical understanding aligned with EQF Level 3 learning outcomes. Since equipment access is unavailable, the assessment focuses on the knowledge component fully, cognitive skills through planning exercises, and autonomy through self-directed learning. Each module's self-assessment quiz primarily evaluates knowledge, while trainer supplements assess planning skills and learning responsibility. The condensed timeframe requires efficient pacing while ensuring all learning outcomes are addressed theoretically. Evaluation should follow the learning path adopted by each learner or cohort, recognising that some may progress through modules in different sequences based on workplace priorities or prior knowledge.



Table 21: Scenario 1 Assessment Plan (Example - 4 Week Model)

Week	Basic Modules Covered	Knowledge Assessment Methods	Skills (Cognitive) Assessment Methods	Assessment methods
1	Module 1: Introduction to 3D Technologies	<ul style="list-style-type: none"> Platform Quiz Q&A in Live Session 	<ul style="list-style-type: none"> Application planning exercise (Forum Post) 	<ul style="list-style-type: none"> Self-paced completion Time management
2	Module 2: Introduction to 3D Printing	<ul style="list-style-type: none"> Platform Quiz Q&A in Live Session Materials knowledge (Short Answer) 	<ul style="list-style-type: none"> Virtual slicing task description (Report section) 	<ul style="list-style-type: none"> Module scheduling Help-seeking record
3	Module 3: 3D Scanning	<ul style="list-style-type: none"> Platform Quizzes Q&A in Live Session 	<ul style="list-style-type: none"> Workflow planning description (Report section) Mesh concepts (Short Answer) 	<ul style="list-style-type: none"> Learning journal Progress reflection
4	Module 4: 3D Modelling (start)	<ul style="list-style-type: none"> Final test – random questions from all modules 	<ul style="list-style-type: none"> Final Report (Planning sections) 	<ul style="list-style-type: none"> Self-assessment Future learning plan

Record all assessment evidence using the Learning Achievement Record (Annex A1).

6.4 Scenario 2: Blended Programme

For the blended scenario, trainers guide VET students through all basic modules to achieve full EQF Level 3 learning outcomes through combined online and practical assessment. The online phase focuses on knowledge acquisition and cognitive skill development, while the practical workshop enables demonstration of hands-on skills and workplace autonomy. Module 5 directly supports these educational learners in understanding classroom applications. Evaluation must align with the specific learning path chosen, whether following the suggested sequence or adapting to institutional needs. Trainers should document the chosen path and ensure all three learning outcome components are assessed for each completed module.

Table 22: Scenario 2 assessment plan (Example)

Phase	Module coverage	Knowledge assessment	Skills assessment	Responsibility and autonomy
Weeks 1-2 Online	Basic Modules 1-2 complete	<ul style="list-style-type: none"> Platform self-assessment Principles explanation Safety test (100%) 	<ul style="list-style-type: none"> Design exercises Software navigation Planning documents 	<ul style="list-style-type: none"> Independent study





	Basic Module 3 begin			<ul style="list-style-type: none"> • Deadline management • Forum participation
Week 3 Online	Basic Modules 3-4 complete Basic Module 5	<ul style="list-style-type: none"> • Process understanding • Educational applications 	<ul style="list-style-type: none"> • Portfolio preparation • Teaching concepts • Workshop planning 	<ul style="list-style-type: none"> • Peer collaboration • Self-directed practice • Equipment preparation
Week 4 Practical Day 1	Apply Basic Modules 2-3	<ul style="list-style-type: none"> • Explain procedures • Material selection • Problem identification 	<ul style="list-style-type: none"> • Operate printer • Complete scanning • Troubleshoot issues 	<ul style="list-style-type: none"> • Safety compliance • Quality ownership • Time management
Week 4 Practical Day 2	Apply Basic Module 4 Optional: Advanced Module 1 Unit 3 (DfAM concepts only)	<ul style="list-style-type: none"> • Justify decisions • Connect theory-practice 	<ul style="list-style-type: none"> • Create final object • Optimize design • Document process 	<ul style="list-style-type: none"> • Work independently • Help peers • Reflect on learning

Document both online and practical assessments using the Learning Achievement Record (Annex A1) and optional Practical Observation Notes (Annex A2).

6.5 Scenario 3: Extended programme

The extended programme enables a comprehensive assessment of all EQF Level 3 learning outcomes with advanced application depth. Learners progress through all basic modules with full practical application, then advance through specialised modules that deepen each component. The extended timeframe allows multiple demonstrations of each learning outcome, building from standard to complex applications. Evaluation follows the adopted learning path, which may vary based on learner backgrounds and goals. Trainers should maintain a flexible assessment that documents the achievement of all three components at increasing complexity levels throughout the programme progression.

Table 23: Scenario 2 assessment plan (Example)

Phase	Module coverage	Knowledge assessment	Skills assessment	Responsibility and autonomy assessment
Weeks 1-3	All 5 Basic Modules	<ul style="list-style-type: none"> • Platform quizzes • Concept explanation • Process rationales 	<ul style="list-style-type: none"> • Basic printing/scanning • Software proficiency • Problem-solving 	<ul style="list-style-type: none"> • Self-paced learning • Project planning • Quality standards





Weeks 4-5	Advanced Modules 1-2 Advanced printing/scanning	<ul style="list-style-type: none"> Advanced materials Automation principles GD&T understanding 	<ul style="list-style-type: none"> Multi-material printing Complex scanning Quality inspection 	<ul style="list-style-type: none"> Process optimization Independent research Peer mentoring
Week 6	Advanced Module 3 Advanced modelling	<ul style="list-style-type: none"> Parametric concepts Software comparison Design theory 	<ul style="list-style-type: none"> Complex work CAD Sculpting techniques Tool integration 	<ul style="list-style-type: none"> Creative exploration Skill selection Time allocation
Weeks 7-8	Advanced Module 4 Capstone integration	<ul style="list-style-type: none"> Case analysis Future applications 	<ul style="list-style-type: none"> Capstone execution Technical mastery Knowledge transfer 	<ul style="list-style-type: none"> Project leadership Mentoring peers Teaching others Professional conduct

Track progression and achievements throughout the programme using the Learning Achievement Record (Annex A1), Practical Observation Notes (Annex A2), and potentially the Module Tracking Sheet (Annex A3).

6.6 Recording achievements

Trainers need to keep track of two types of evidence:

- 1) From the platform** - The 3DAcademy platform automatically saves module completion dates and quiz scores. Trainers can access these reports directly from the platform dashboard.
- 2) From your teaching** - Since platform quizzes mainly test Knowledge, trainers must also document evidence that shows Skills and Responsibility and Autonomy, especially in Scenarios 2 and 3.

Keep records of / Observe:

- Design files (.stl, CAD source files) and project plans learners create.
- Slicer project files and parameter settings used.
- Photos or short videos of learners performing practical tasks.
- Completed Practical Observation Notes (Annex A2).
- How do independent learners work and troubleshoot?
- Any additional exercises or assignments you set.
- Which modules each learner completes and in what order (can use Annex A3 or platform data).

At the end of each scenario, trainers use the Learning Achievement Record (Annex A1) to document the final assessment decision for each learner. This simple form captures evidence





summary for all three learning outcome components (Knowledge, Skills, Responsibility and Autonomy) and provides space for the overall achievement decision.

6.7 Quality assurance

Quality assessment means applying consistent EQF Level 3 standards while adapting methods to each scenario's context. Trainers should focus on evidence of learning rather than rigid procedures. Therefore, for consistent quality, trainers should:

- Meet with other trainers monthly to discuss assessment decisions
- Share examples of learner work to ensure similar standards
- Use the same Achievement Record form for all learners
- Be transparent with learners about assessment criteria from day one

When you adapt an assessment method for specific circumstances, document what you changed and why - this helps other trainers facing similar situations. Most importantly, be transparent with learners from day one about what you're assessing and how. Show them the Achievement Record form, explain what evidence you need to see, and provide regular feedback on their progress toward meeting the learning outcomes.

Table 24: Quick troubleshooting guide

Problem	Possible Cause	Quick Fix
Print not sticking to bed	Bed too cold or dirty	Clean bed, increase temperature
Filament not extruding	Nozzle clogged	Pre-heat and clean nozzle
Layers misaligned	Loose belts	Tighten printer belts
Print stringing	High temperature	Lower nozzle temperature by 5–10°C
Print stops mid-way	Filament tangled or power loss	Check spool and restart

Simple reflection questions

At the end of each session, ask learners:

- What went well in today's print?
- What did not go as planned?
- What will you try differently next time?

💡 Tooltip: Focus on what learners **CAN demonstrate within their scenario**. A theoretical understanding shown through careful planning is as valid as hands-on skills in its context. Track common challenges across your groups and share insights with other trainers - if many learners struggle with the same module, the teaching approach may need adjustment, not the learners.

Remember: good assessment helps learning, not just measures it. Keep documentation simple,





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provide regular feedback, and always consider each learner's progress within their possible context.



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CHAPTER 7: PROGRAMME EVALUATION AND QUALITY ASSURANCE

PURPOSE: To provide trainers and training providers with practical tools and approaches to evaluate the 3DAcademy programme's effectiveness, align with EQAVET principles, and drive continuous improvement.

READING TIME: 20 minutes

This chapter guides you on how to evaluate whether the 3DAcademy programme effectively achieves its goals and how to continuously improve its delivery. While Chapter 6 focused on assessing *learner* performance, this chapter examines *programme* effectiveness, drawing on the **European Quality Assurance in Vocational Education and Training (EQAVET)** framework.

7.1 Why evaluation matters?

Programme evaluation is essential in VET. Frameworks like **EQAVET** encourage providers to systematically track effectiveness, focusing on outcomes like high completion rates, successful learner progression (to jobs or further education), the actual use of acquired skills, and continuous quality improvement. This isn't just about compliance; it ensures our training genuinely prepares learners for the world of work 🧐🔧.

Evaluation differs from learner assessment. Instead of grading individuals, it asks: *Is the programme working?* For 3DAcademy, we focus on three key questions:

1. Are the **delivery scenarios** (Scenario 1, 2, 3) achieving their specific goals?
2. Is the **e-learning platform** (3d-academy.eu) effectively supporting learning?
3. Do the **modules successfully develop** the intended competencies outlined in Chapter 4?

Tooltip: Effective evaluation looks beyond the classroom. It considers not just immediate reactions (**Kirkpatrick Level 1**) and knowledge gained (**Level 2**), but whether learners *apply* their skills later (**Level 3**) and the real impact this has on their work or studies (**Level 4**). By regularly collecting evidence, you can identify quick improvements and contribute to the programme's long-term development.

Each scenario has specific goals that you should monitor through observation and data. The **Weekly Programme Evaluation form (Annex B1)** provides a simple structure for this.

- **Scenario 1 (Online):** Goal is workplace readiness (theory). Success means learners understand safety and concepts *before* practical training.
 - **Monitor:** Track online module completion rates (target >80%?). If rates are low, investigate barriers (e.g., technical issues, time constraints).
 - **Follow-up:** Ask employers/supervisors: Do employees arrive better prepared?
- **Scenario 2 (Blended):** Goal is efficient blending of theory and practice. Success means workshop time is used for *hands-on skills*, not re-teaching online content.
 - **Observe:** Are you spending significant practical time covering basics from Modules 1-4? If yes, the online prep or the "gate" check might need strengthening.





- **Scenario 3 (Extended):** Goal is developing advanced, industry-aligned competencies. Success means learners demonstrate progression towards EQF Level 4 skills and complete a meaningful capstone.
 - **Track:** Monitor weekly lab progress. Are learners building systematically? Are they ready for advanced roles or further technical education upon completion?

Platform and module effectiveness:

- **Platform:** Check completion rates vs. quiz scores. Are learners finishing modules? Do high quiz scores correlate with practical ability (in Scenarios 2 & 3)? Keep a simple log of recurring technical issues reported by learners.
- **Modules:** Does completing specific modules lead to demonstrable competency? After Module 2 (Printing), can learners explain material selection? After Module 4 (Modelling), can they create functional designs? The real test is the **Three-Month Follow-Up (Annex B4)** – are learners *using* these skills?

7.3 Evaluation approach

Effective evaluation should be integrated into your regular teaching, not treated as a separate administrative burden.

- **During Delivery:** Use the **Weekly Programme Evaluation (Annex B1)** for quick, immediate observations (10 mins/week).
- **End of Programme:**
 - Use the **End-of-Programme Evaluation (Annex B2)** for your overall assessment of the cohort's run.
 - Distribute the **Quick Learner Feedback Form (Annex B3)** to gather participant perspectives (anonymously).
- **Post-Programme (Crucial):** Conduct the **Three-Month Follow-Up Survey (Annex B4)** via email or phone. This tracks actual skill application, identifies the most valuable modules, and gathers evidence for EQAVET indicators.

 **Tooltip:** Consider tracking a few key numbers monthly or per cohort: completion rate (target >80%), learner satisfaction (target 4/5?), skills use after three months (target >70%), and any qualitative feedback from employers or receiving institutions.

7.4 Evaluation tools

Annex B of this Manual provides example evaluation tools designed for ease of use:

1. **Annex B1: Weekly Programme Evaluation:** For your quick weekly notes during delivery.
2. **Annex B2: End-of-Programme Evaluation:** Your summary assessment of the completed programme run.
3. **Annex B3: Quick Learner Feedback Form:** Anonymous feedback from participants at the end.
4. **Annex B4: Three-Month Follow-Up Survey:** Essential for tracking long-term impact and skill use.

Instructions: Keep documentation simple. Adapt these tools to your context but retain the core questions that help demonstrate programme impact and inform improvements.





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7.5 Putting Evaluation to Work

Evaluation isn't extra work; it's a tool for improvement. When you know where learners struggle, you can adjust your teaching. When you know which skills are used in the workplace, you can emphasize them. Documenting concrete results—like graduates getting jobs using 3D skills or employees improving workplace processes—demonstrates the real value of your training efforts.

- **For Companies:** Evaluation data (e.g., faster onboarding, fewer errors) helps justify the training investment and shows a clear return.
- **For VET Institutions:** Demonstrating industry-relevant skills and positive learner outcomes helps secure support for programmes like 3DAcademy and satisfies EQAVET requirements.

 **Tooltip:** Think of evaluation as professional learning. Share insights informally with colleagues. Learn from challenges without blame. This continuous feedback loop makes the programme better for everyone.





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Reflection and next steps

Congratulations – you’ve completed your first steps into the world of 3D printing!

Here are a few ideas to keep learning:

- Try designing a more complex object, like a phone stand or pencil holder.
- Experiment with different materials or colours.
- Visit online communities (Thingiverse, Printables) to find and share designs.
- Consider progressing to the **Advanced Manual for VET Teachers** to explore professional applications.

Remember: Every print teaches you something new. Celebrate both the successes and the “beautiful failures” – they’re part of the journey.



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Annexes:

1. Annex 1: Educator's Guide for the 3DAcademy Platform ([LINK](#))
2. Annexes 2: Evaluation and assessment tools
 - Learning Achievement Record (Annex A1);
 - Practical Observation Notes (Annex A2);
 - Module Tracking Sheet (Annex A3);
 - Weekly Programme Evaluation: For your quick weekly notes during delivery (Annex B1).
 - End-of-Programme Evaluation: Your summary assessment of the completed programme run (Annex B2).
 - Quick Learner Feedback Form: Anonymous feedback from participants at the end (Annex B3).
 - Three-Month Follow-Up Survey (Annex B4).
3. Annex 3: Equipment, materials and consumables lists





Annex A1. LEARNING ACHIEVEMENT RECORD

3DAcademy LEARNING ACHIEVEMENT RECORD

Learner Name: _____ Date: _____

Scenario: 1 (Online-Only) 2 (Blended) 3 (Extended)

Modules Completed: All Basic Modules (1-5)
 Advanced Modules (specify): _____

ASSESSMENT OF LEARNING OUTCOMES

KNOWLEDGE (understanding of 3D technology principles)

Platform (built-in) self-assessment average: _____%

Other evidence: _____

Achievement: Yes Not Yet

SKILLS (ability to complete 3D technology tasks)

Theoretical only (designs/plans)

Practical demonstration

Evidence: _____

Achievement: Yes Not Yet

RESPONSIBILITY & AUTONOMY (independent work, adaptation)

Works independently

Needs some support

Requires significant guidance

Evidence: _____

Achievement: Yes Not Yet

OVERALL ACHIEVEMENT DECISION

All learning outcomes achieved for this scenario

Partial achievement - specify: _____

Further support recommended

Trainer Name: _____ Signature: _____





ANNEX A2. PRACTICAL OBSERVATION NOTES (OPTIONAL - SCENARIOS 2 & 3)

PRACTICAL OBSERVATION NOTES

Learner: _____ Date: _____ Activity: _____

What did the learner do well?

What challenges did they face?

How independently did they work?

- Completely independent
- Needed occasional guidance
- Required significant support

Safety compliance: Excellent Good Needs reminder

Key learning moment observed:

Trainer signature: _____





ANNEX A3. MODULE TRACKING SHEET (OPTIONAL - EXTENDED PROGRAMMES)

MODULE COMPLETION TRACKING

Learner: _____ Start date: _____

BASIC MODULES

	Date Completed	Platform Self-assessment average
<input type="checkbox"/> Module 1: Intro to 3D Tech	_____	_____ %
<input type="checkbox"/> Module 2: 3D Printing	_____	_____ %
<input type="checkbox"/> Module 3: 3D Scanning	_____	_____ %
<input type="checkbox"/> Module 4: 3D Modelling	_____	_____ %
<input type="checkbox"/> Module 5: 3D in Education	_____	_____ %

ADVANCED MODULES

	Date Completed	Platform Self-assessment average
<input type="checkbox"/> Module 1: Advanced Printing	_____	_____ %
<input type="checkbox"/> Module 2: Advanced Scanning	_____	_____ %
<input type="checkbox"/> Module 3: Advanced Modelling	_____	_____ %
<input type="checkbox"/> Module 4: Future Trends	_____	_____ %

Notes on learning path variations:





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ANNEX B1: WEEKLY PROGRAMME EVALUATION

Week Ending: _____ Scenario: _____ Number of Learners: _____

What worked particularly well this week?

Main challenges encountered:

Specific improvements to try next week:

Issues needing coordinator attention:

Completion rate this week: _____% (EQAVET Indicator 4) Average quiz scores: _____%

Time to complete: 10 minutes





ANNEX B2: END-OF-PROGRAMME EVALUATION

PROGRAMME EFFECTIVENESS SUMMARY

Scenario: _____ Dates: _____ Learners Started: _____ Completed: _____

SCENARIO EFFECTIVENESS

Did this scenario achieve its intended purpose?

- Yes
- Partially
- No, evidence:

PLATFORM EFFECTIVENESS

Platform-supported learning:

- Very well
- Adequately
- Poorly Main platform issues:
- _____

MODULE-COMPETENCY ALIGNMENT

Learners developed expected competencies:

- Yes
- Partially
- No. What gaps were identified: _____

STAKEHOLDER FEEDBACK (if available)

Employer/Institution satisfaction: _____

Key stakeholder suggestions: _____

THREE IMPROVEMENTS TO RECOMMEND

1. _____
2. _____
3. _____

Time to complete: 15 minutes





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ANNEX B3: QUICK LEARNER FEEDBACK FORM

LEARNER PROGRAMME FEEDBACK (Anonymous - takes 2 minutes)

What helped you learn most?

What was most confusing or difficult?

How likely are you to use these skills in your work/studies?

- Very likely
- Likely
- Unsure
- Unlikely

One suggestion for improvement:

Would you recommend this programme?

- Yes
- No, please clarify





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ANNEX B4: THREE-MONTH FOLLOW-UP SURVEY

3D TECHNOLOGY SKILLS APPLICATION (Sent via email/phone 3 months after training)

Since completing the 3DAcademy training:

- How often do you use 3D technology skills? _____
- Which module content proved most useful in practice? _____
- What prevents you from using the skills more? _____
- Rate your confidence applying 3D solutions (1-5): _____
- Give one specific example of using your learning: _____

Employment/Education Status (EQAVET Indicator 5):

- Employed (same role)
- Employed (new role)
- In education/training
- Seeking employment

For company trainers: Has the employee taken on new 3D-related tasks? Yes No
For education: Has the student progressed to advanced technical studies? Yes No

