Co-funded by the European Union

Anticipating Strategic Long-term Challenges

D2.1 ASTRAL LTFF HEI Teacher Training Course

Grant Agreement Project 101184483

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Copyright

© Copyright 2025 The ASTRAL Consortium

Consisting of:
BWCON GmbH (BWCON)
Hochschule der Medien (HDM)
EOLAS S.L. (EOLAS)
Lucidminds B.V. (LM)
Asociación de Industrias de Conocimiento y Tecnología de Euskadi (GAIA)
Syddansk Universitet (SDU)
MKO Investments SA (MKO)
Université Clermont Auvergne (UCA)
Universidade de Vigo (UVIGO)
Green Innovation Group A/S (GIG)

This document may not be copied, reproduced, or modified in whole or in part for any purpose without written permission from the ASTRAL Consortium. In addition, an acknowledgement of the authors of the document and all applicable portions of the copyright notice must be clearly referenced.
This document may change without notice.

Document Classification	
Title	D2.1 ASTRAL LTFF HEI Teacher Training Course
Type	Deliverable
Output	WP2 – T2.4 ASTRAL HE Teacher Training Course
Partners	ASTRAL Consortium
Authors	UCA
Dissemination Level	PU

Version Control			
Version	**Description**	**Name**	**Date**
1.0	**Initial version**	**Yingfei Yan**	**18.08.2026**
1.1	**Revised Version**	**Yingfei Yan**	**04.09.2026**
1.2	**Final Version**	**Yingfei Yan**	**28.09.2026**

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Table of Contents

1. Introduction 4
1.1 What the HE teacher course covers 4
1.2 Training outcomes 5
1.3 Syllabus validation and course planning 5
2. LTFF Curriculum 6
3. How to use the LTFF Curriculum 16
3.1. Start with a short planning conversation 16
3.2 Choose an entry pathway 17
3.3. Prepare one activity: a 30-minute teacher checklist 17
3.4. Facilitate the activity with the LTFF learning cycle 18
4. Case Studies and Practical Application 19
4.1 Purpose and structure of the case studies 19
4.2 How a case study is built and how educators use it 19
4.3. Match the case study to the teaching purpose 20
5. Assessment and Rubric Adaptation in Higher Education 21
5.1 Choose the assessment purpose 21
5.2 Common LTFF rubric 22
5.3 Adapt the rubric to the HE setting 22
5.4 Using assessment and rubrics in practice 23
5.5 Worked assessment example for A01 23
5.6 Evidence of teacher learning 24
6. ASTRAL Learning Platform 24
6.1 Resource access and platform status 24
6.2 Ways to use the learning platform 25
6.3 Combine classroom and self-learning 25
6.4 Guidelines for individual and group self-learning 26
7. Educational Innovation: Design, Realisation, Evaluation and Improvement 26
7.1 Support uptake beyond one classroom 27
7.2 A simple evaluation loop 27
8. Concluding Remarks 27

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

1. Introduction

The ASTRAL Long-Term Future Foresight Higher Education Teacher Training course supports educators who want to understand LTFF and use it to design, deliver and assess higher education learning. It brings together the ten-module curriculum, the numbered units listed in the module indexes, the case-study library, assessment resources and the learning platform into one adaptable teaching framework.

The guideline is intended for higher education educators, programme leaders, learning designers and staff involved in curriculum development. It can be applied in high-technology and deep-technology fields and adapted to other disciplines, course levels, delivery modes and learner circumstances. The central expectation is consistent across contexts: students should use evidence and structured foresight methods to examine more than one plausible future and connect the resulting insight to responsible action.

Target group: HEI educators, programme leaders, learning designers, professional-development staff, HR colleagues and other staff who support future-oriented learning.

Intended outcome: A practical understanding of the LTFF curriculum, a self-selected learning pathway and clear options for using relevant modules, cases and resources in an HEI context.

1.1 What the HE teacher course covers

This guideline is designed as a teacher-training course rather than only a collection of LTFF resources. It therefore combines LTFF knowledge with the pedagogical and educational-design capabilities needed to use foresight in higher education. The recommended syllabus covers four connected strands:

Course strand	What is covered	Implication for HE educators
LTFF concepts	Future literacy; long-term horizons; uncertainty; signals, trends and drivers; multiple plausible futures; responsible long-term thinking.	Build a shared conceptual foundation and explain why foresight is different from prediction.
Methods and tools	Horizon scanning; weak signals; trend-to-impact mapping; scenarios; systems mapping; backcasting; decision tools; roadmapping; responsible AI-supported analysis.	Experience methods as a learner before selecting, modelling and adapting them for students.
Educational innovation	Diagnosis, learning design, preparation, realisation, evaluation and improvement of LTFF teaching.	Connect LTFF activities to existing learning outcomes, teaching formats and assessment evidence.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Contextual adaptation	Field of study, course level, workload, delivery mode, learner characteristics, accessibility and local academic requirements.	Adapt examples and delivery while retaining the future horizon, central method and transparent treatment of evidence and uncertainty.

TEACHER LEARNING JOURNEY Understand LTFF -> experience methods -> design for students -> facilitate learning -> assess attainment -> evaluate and improve.

1.2 Training outcomes

By the end of an appropriate ASTRAL LTFF pathway, educators should be able to:

• explain LTFF, distinguish foresight from prediction, and justify its relevance to higher education and professional practice;

• identify signals, trends, assumptions, and uncertainties and use them to examine more than one plausible future;

• select and apply suitable LTFF methods and tools, including scanning, scenarios, systems mapping, backcasting and roadmapping;

• design an LTFF learning activity with clear objectives, learner instructions, outputs and assessment criteria;

• adapt cases and methods to a discipline while preserving the future horizon, method logic and responsible use of evidence;

• facilitate individual and collaborative learning and evaluate student attainment using rubrics, feedback, portfolios or performance tasks;

• use ASTRAL website and learning-platform resources in classroom, blended and self-directed learning; and

• review implementation evidence and improve the learning design before reuse.

1.3 Syllabus validation and course planning

D2.1 is intended to bring together the validated ASTRAL HE teacher syllabus (Interim Deliverable 2.2) and the teacher training content and materials. The project validation process calls for feedback from 12 participants, three per country, from the T2.1 co-design workshops before full course content and materials are elaborated. The course team should retain the reviewed syllabus, participant feedback, resulting changes and approved version in the project records. Include the validated syllabus in D2.1 once this process is completed.

For delivery, specify the selected module and unit outcomes, prerequisites, contact hours, self-learning hours, activities and evidence of teacher attainment. Confirm

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

these against the validated syllabus and the host institution's teaching arrangements. Activity timings in this guideline are illustrative planning options; they do not establish the agreed duration or credit value of a complete module or course.

The teacher training course and associated resources will be further reviewed during piloting and practical use with the target groups. Feedback and implementation evidence will be used to refine the materials where necessary, and updated versions of the relevant resources will be made available through the ASTRAL learning platform.

2. LTFF Curriculum

The ASTRAL teacher course develops LTFF as both a professional capability and a teaching capability. Educators first experience foresight concepts, methods and tools as learners, then consider how to adapt them to their own subjects, students and institutional conditions. The curriculum progresses from readiness and foundational future literacy to practical foresight methods, decision-making, innovation, collaboration, ethics, roadmapping and sustained application.

2.1 Overview

There are ten modules forming a progressive pathway in LTFF curriculum. Modules 0 to 2 establish readiness, concepts and mindset. Modules 3 and 4 develop practical foresight and decision skills. Modules 5 to 8 extend these skills into innovation, collaboration, ethics, and strategy execution. Module 9 supports sustained application under common organisational constraints. Institutions may use the complete sequence or select a coherent pathway.

The introductions below explain the focus of every numbered unit in the ten-module curriculum. They may be copied into a syllabus, platform page or learner brief and adapted to the subject, level and delivery mode.

The ASTRAL curriculum uses a clear hierarchy: Module -> Unit -> Learning elements and resources. A module is a coherent area of LTFF capability. A unit corresponds directly to a numbered section in the relevant Module 0-9 Index / Content Index and Learning Map; for example, "Module 3 - Unit 2: Horizon Scanning". Where an index contains decimal-numbered subsections (for example 3.1 or 3.2), these are learning elements within the unit rather than additional units unless the index explicitly identifies them as such.

Across the curriculum, modules follow a common learning logic: orientation and learning outcomes; concept or method units; application through exercises or cases; assessment and reflection; and resources or tools. This makes it possible to select only part of a module without losing the underlying learning progression.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Module component	Function	Possible HE use
Orientation	Clarifies objectives, prior knowledge and expected outputs	Connect to an existing course outcome and make the future horizon explicit.
Concept and method units	Explain the relevant LTFF concept, principle or method	Use a short lecture, slide deck, reading, video or guided platform activity.
Application units	Move from explanation to practical use	Use an ASTRAL case, local case, dataset, scenario or disciplinary challenge.
Assessment and reflection	Make reasoning and learning visible	Use a rubric, peer review, oral explanation, portfolio item or reflection.
Resources and tools	Provide templates, glossaries and reusable aids	Select only the materials needed and label required and optional resources.

When selecting individual units, retain the explanation, application and reflection needed for the intended outcome. Curriculum titles referring to businesses or SMEs identify the source context; educators can apply the concepts to a discipline, public service or institutional challenge while keeping the original resource titles and identifiers.

2.2 Modules and Units

Module 0 Future Readiness Self Assessment

This module establishes a baseline for digital, AI and uncertainty-related readiness before the main learning pathway begins. You identify strengths, gaps and organisational conditions that should shape your use of the later modules.

Unit 1 Welcome and Module Overview. This unit introduces the purpose, learning outcomes and structure of the readiness module. You locate the self-assessment within the wider LTFF pathway and define what a useful baseline should reveal.

Unit 2 Digital and AI Competence Baseline. This unit helps you examine current confidence in digital tools, data and AI-supported work. You identify capabilities that enable foresight practice and areas where additional guidance or safeguards may be needed.

Unit 3 Uncertainty Handling Baseline. This unit explores how you currently respond when evidence is incomplete, conditions change or several futures remain plausible. You recognise habits that support or restrict thoughtful action under uncertainty.

Unit 4 Organisational Foresight Culture Scan. This unit examines whether an organisation creates space for long-term thinking, diverse perspectives and challenge. You identify cultural enablers and barriers that influence whether foresight insights are used.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 5 LTFF Maturity Categories. This unit introduces categories for describing how systematically LTFF is understood and applied. You use them to locate current practice and select a realistic next step rather than treating maturity as a fixed score.

Unit 6 Assessment and Reflection. This unit consolidates the baseline results and asks you to interpret what they mean for learning and implementation. You turn the findings into a focused development priority and a reasoned learning plan.

Unit 7 Resources and Tools. This unit brings together the templates, prompts, and reference materials used in the readiness module. You select only the resources needed to document the baseline and support the next stage of learning.

Module 1 LTFF Foundations for Business

This module introduces the purpose and language of Long Term Future Foresight and explains why it matters for organisations. You distinguish foresight from prediction and connect long-term change to decisions made today.

Unit 1 Welcome and Module Overview. This unit introduces the module goals, key concepts and expected learning outputs. You consider where long-term change already affects your discipline, organisation or professional field.

Unit 2 What Is LTFF. This unit defines Long Term Future Foresight as a structured way to explore change and prepare for more than one plausible future. You learn the core vocabulary needed for later methods and cases.

Unit 3 LTFF vs Prediction. This unit compares foresight with forecasting and prediction. You practise recognising when a single expected outcome is useful and when multiple plausible futures provide a stronger basis for learning and decision-making.

Unit 4 LTFF as Structured Decision Making Under Uncertainty. This unit explains how foresight organises evidence, assumptions and uncertainty around a decision. You connect future exploration to choices, experiments and monitoring rather than treating it as speculation alone.

Unit 5 Why Foresight Matters for SMEs. This unit considers why smaller organisations need practical ways to anticipate change despite limited time and resources. You identify where foresight can reduce blind spots and support timely adaptation.

Unit 6 The Business Value of LTFF. This unit examines how LTFF can contribute to resilience, innovation, investment and strategic alignment. You learn to express its value through decisions and capabilities instead of broad claims about the future.

Unit 7 Horizon Thinking Looking 10 to 20 Years Ahead. This unit extends attention beyond immediate planning cycles. You explore how a ten- to twenty-year horizon changes the questions asked, the stakeholders considered and the assumptions that need to be tested.

Unit 8 Long Term Trends Shaping Markets. This unit introduces the analysis of sustained technological, economic, environmental, political and social change. You consider how trends interact and why their implications differ across sectors and contexts.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 9 The Human Role in an AI Driven World. This unit explores how human judgement, values and responsibility remain central when AI supports analysis. You examine where automation can assist foresight and where interpretation, challenge and accountability must remain visible.

Unit 10 Assessment and Reflection. This unit checks understanding of foundational LTFF concepts and their relevance to practice. You explain the difference between prediction and foresight and identify a suitable field of application.

Unit 11 Resources and Glossary. This unit provides definitions, readings and supporting materials for the foundations module. You use the glossary to establish shared language and the resources to deepen topics that matter in your context.

Module 2 Future Literacy and Mindset Development

This module develops the mindset needed to work constructively with uncertainty and alternative futures. You practise noticing assumptions, widening imagination and reflecting on how mental models shape present choices.

Unit 1 Welcome and Module Overview. This unit introduces future literacy as a capability that can be learned and strengthened. You review the module pathway and identify the habits of mind required for open but disciplined exploration.

Unit 2 Futures Literacy Foundations. This unit explains how people use images of the future to interpret the present and guide action. You begin to examine where these images come from and how they influence judgement.

Unit 3 Multiple Futures Thinking. This unit moves beyond one expected future by developing several plausible alternatives. You learn to compare their assumptions and implications without selecting a preferred answer too early.

Unit 4 Future Imagination. This unit strengthens the ability to describe futures that differ meaningfully from the present. You use prompts and constraints to make imaginative ideas coherent, relevant and open to critical examination.

Unit 5 Mental Model Transformation. This unit explores the beliefs and frames that make some possibilities easy to see and others difficult to consider. You practise reframing a challenge and observing how the available choices change.

Unit 6 Ambiguity Tolerance. This unit develops confidence in working when evidence is incomplete or competing interpretations remain. You practise delaying premature closure while still defining responsible next steps.

Unit 7 Cognitive Biases in Foresight. This unit introduces common biases that affect scanning, interpretation and decision-making. You learn practical ways to surface anchoring, confirmation bias, availability effects and overconfidence in individual and group work.

Unit 8 Strengthening a Future Oriented Mindset Through Curiosity Adaptability and Self Reflection. This unit turns future literacy into repeatable learning habits. You practise asking better questions, revising assumptions and reflecting on how new evidence should change your position.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 9 Assessment and Reflection. This unit asks you to demonstrate multiple-futures thinking and identify changes in your own reasoning. You compare initial assumptions with later interpretations and define one mindset practice to continue.

Unit 11 Resources and Glossary. This unit gathers the concepts, prompts and further readings used to support future literacy. You choose resources that help learners expand imagination while maintaining evidence, coherence and reflective discipline.

Module 3 Strategic Foresight Tools and Methods

This module develops practical methods for finding change, interpreting signals and building alternative futures. You apply human and AI-supported approaches while keeping sources, assumptions and limitations transparent.

Unit 1 Welcome and Module Overview. This unit introduces the strategic foresight toolkit and shows how the methods connect. You identify a challenge, future horizon and evidence need that can guide practice throughout the module.

Unit 2 Horizon Scanning. This unit explains how to search systematically for developments that may shape the future. You practise collecting diverse evidence across domains rather than relying on familiar sources or dominant trends.

Unit 3 Weak Signal Detection and Interpretation. This unit focuses on early, uncertain indications of possible change. You learn to record signals carefully, assess their relevance and avoid turning limited evidence into confident predictions.

Unit 4 Trend to Impact Mapping. This unit connects observed change to consequences for organisations, stakeholders and decisions. You trace direct and indirect impacts and test where different contexts may produce different outcomes.

Unit 5 Scenario Planning and Mini Sprints. This unit introduces scenarios as coherent descriptions of alternative operating environments. You practise a compact scenario process that moves from critical uncertainties to implications and strategic questions.

Unit 6 Backcasting and Systems Mapping. This unit combines a desired or plausible future state with analysis of the system that could enable it. You work backwards to identify dependencies, interventions and barriers between the future and the present.

Unit 7 AI Supported Horizon Scanning. This unit explores how AI can assist with searching, clustering and summarising large amounts of scanning material. You evaluate outputs against original sources and keep human judgement responsible for relevance and interpretation.

Unit 8 AI for Weak Signal Detection and Early Warning. This unit examines how AI may help identify emerging patterns and unusual developments. You design an early-warning approach that includes verification, thresholds and human review.

Unit 9 Predictive Analytics vs Long Term Foresight. This unit compares data-driven estimates of likely outcomes with exploration of structural change and alternative futures. You decide when the approaches can complement each other and where their assumptions differ.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 10 LLMs for Qualitative Sense Making. This unit considers how language models can support coding, comparison and synthesis of qualitative material. You practise prompting and checking outputs while protecting context, source integrity and uncertainty.

Unit 11 Human AI Comparison Exercise. This unit asks you to complete and compare a foresight task with human-led and AI-supported processes. You evaluate differences in coverage, originality, bias, transparency and practical usefulness.

Unit 12 Assessment and Reflection. This unit evaluates whether you can select and apply an appropriate method with transparent evidence and assumptions. You reflect on the limits of the output and explain how it informs a decision.

Unit 13 Resources and Toolkit. This unit provides templates and references for scanning, signals, scenarios, mapping and AI-supported analysis. You assemble a proportionate toolkit for the challenge, horizon and time available.

Module 4 Decision Making Under Uncertainty

This module connects foresight evidence to choices that must be made without certainty. You compare options, test failure conditions and design decisions that remain useful across several plausible futures.

Unit 1 Welcome and Module Overview. This unit introduces the relationship between uncertainty, foresight and decision quality. You select a real decision that can be examined through the methods and exercises in the module.

Unit 2 Understand Uncertainty. This unit distinguishes different sources and degrees of uncertainty. You consider what can be measured, what requires judgement and what should remain visible rather than being simplified away.

Unit 3 Decision Making Methods. This unit introduces structured approaches for comparing choices when outcomes are not fully known. You learn to match a method to the decision, evidence, reversibility and time horizon.

Unit 4 Risk Opportunity Matrix. This unit examines possible negative and positive consequences together. You use a matrix to compare likelihood, significance and preparedness while recognising that assessments may change across futures.

Unit 5 Decision Trees Applied to Real Scenarios. This unit uses decision trees to make choices, conditions and consequences explicit. You apply the technique to scenarios and identify where probabilities or assumptions require caution.

Unit 6 Quantum Threat Scenarios. This unit uses quantum technology as a context for decisions with long lead times and uncertain timing. You explore preparedness options that balance present cost with potentially high future consequences.

Unit 7 AI Failure Mode Scenarios. This unit examines how AI-enabled systems might fail technically, organisationally or ethically. You build scenarios that reveal dependencies, affected stakeholders and safeguards needed before deployment.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 8 Red Team vs Blue Team. This unit uses constructive challenge to test a proposal from opposing perspectives. You practise identifying vulnerabilities, defending assumptions and improving a decision without turning disagreement into personal conflict.

Unit 9 Assessment and Reflection. This unit asks you to justify a decision against more than one plausible future. You explain the evidence, trade-offs, residual uncertainty and conditions that would trigger review.

Unit 10 Resources and Tools. This unit brings together decision templates, scenario prompts and review tools. You select materials that make reasoning auditable and support revision as evidence or conditions change.

Module 5 Innovation and Transformation Skills

This module uses foresight to identify opportunities for innovation and prepare transformation. You connect future needs to business models, creative choices, experiments and practical implementation.

Unit 1 Welcome and Module Overview. This unit introduces innovation as a response to changing needs, systems and possibilities. You identify a challenge where foresight can widen the range of options considered.

Unit 2 What Is Innovation. This unit distinguishes innovation from ideas, invention and routine improvement. You examine how value is created, adopted and sustained for users, organisations and wider stakeholders.

Unit 3 Future Business Models. This unit explores how value propositions, partners, resources and revenue models may change over time. You develop a future-oriented business model and test it against alternative conditions.

Unit 4 Unlocking Creativity. This unit uses structured prompts and divergent thinking to move beyond familiar solutions. You generate options, combine perspectives and delay evaluation until the possibility space has widened.

Unit 5 Implementing Transformative and Innovative Strategy. This unit turns an innovation concept into a sequence of experiments, responsibilities and decisions. You identify barriers, learning milestones and evidence needed before wider commitment.

Unit 6 Assessment and Reflection. This unit evaluates whether an innovation proposal responds to future change and can be tested responsibly. You explain its assumptions, value, risks and next learning step.

Unit 7 Resources and Glossary. This unit provides innovation canvases, creativity prompts, implementation aids and key definitions. You choose the resources that best support the maturity and scope of the proposed transformation.

Module 6 Collaboration and Ecosystem Foresight

This module explores how foresight work changes when customers, partners, suppliers, regulators and communities are considered together. You practise ecosystem mapping and identify how shared vision, trust and collective intelligence can improve long-term action.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 1 Welcome and Module Overview. This unit introduces ecosystem foresight and the need to work across organisational boundaries. You identify a shared challenge that no single actor can understand or address alone.

Unit 2 Breaking Down Silos. This unit examines how separate functions, disciplines and organisations create fragmented views of change. You practise sharing evidence and connecting decisions that are usually considered in isolation.

Unit 3 Building Trust and a Shared Language. This unit explores the conditions that allow diverse participants to work with uncertainty together. You develop common terms, transparent expectations and ways to discuss disagreement safely.

Unit 4 Collaboration Roles and Dynamics. This unit makes roles, influence and participation patterns visible in foresight work. You consider how facilitation, expertise, decision authority and lived experience should contribute.

Unit 5 Cross Functional Foresight Processes. This unit designs a repeatable process that connects scanning, interpretation and action across functions. You define handovers, decision points and responsibilities so insights do not remain isolated.

Unit 6 Ecosystem Mapping. This unit maps actors, relationships, dependencies and flows within a wider system. You identify where change may propagate and where collaboration, tension or missing voices affect outcomes.

Unit 7 Sector Specific Collaboration. This unit adapts collaboration methods to the incentives, regulation and operating conditions of a sector. You determine which partners and forms of coordination are realistic for the challenge.

Unit 8 Building Shared Long Term Visions. This unit supports participants in developing a direction that reflects common interests without erasing differences. You compare desirable futures and identify principles that can guide joint action.

Unit 9 Strategic Positioning Within Your Ecosystem. This unit considers how an organisation can contribute, influence and remain resilient within a changing network. You clarify its role, dependencies and choices under alternative futures.

Unit 10 Assessment and Reflection. This unit evaluates the quality of an ecosystem analysis and collaborative response. You reflect on participation, missing perspectives, shared value and the feasibility of proposed action.

Unit 11 Resources and Tools. This unit provides mapping templates, stakeholder prompts and collaboration aids. You select tools that fit the number of participants, sensitivity of the topic and maturity of the partnership.

Module 7 Ethical Social and Human Foresight

This module examines the human, social and ethical consequences of technological and organisational futures. You identify affected groups, conflicting values and safeguards that support responsible innovation and action.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 1 Welcome and Module Overview. This unit introduces ethical and social inquiry as a necessary part of foresight. You identify a technology or strategic choice whose benefits and burdens may be distributed unevenly.

Unit 2 Ethics and Social Dimensions of Technology. This unit explores how technologies embed values and reshape relationships, access and power. You examine consequences beyond technical performance or commercial success.

Unit 3 Human Dimensions of Technology. This unit focuses on human capabilities, behaviour, identity and wellbeing in technological change. You consider how different people may experience the same future in different ways.

Unit 4 Ethical Strategies for Responsible Innovation. This unit introduces ways to integrate ethics into design and decision processes. You identify principles, review points, and safeguards before impacts become difficult to reverse.

Unit 5 Social Strategies for Foresight Futures. This unit develops responses to inclusion, participation and social impact across plausible futures. You connect stakeholder needs to practical measures and indicators.

Unit 6 Integration and Action Planning. This unit combines ethical, human, and social analysis with a concrete plan. You assign responsibilities, mitigations and monitoring signals to the proposed action.

Unit 7 Assessment and Reflection. This unit asks you to evaluate a future-oriented proposal through multiple stakeholder perspectives. You justify trade-offs and identify remaining uncertainty, unintended effects and accountability needs.

Unit 8 Resources and Tools. This unit gathers ethics prompts, stakeholder tools, and impact-review materials. You choose resources that make values, affected groups, and mitigation decisions explicit.

Module 8 Roadmapping and Long-Term Strategy Execution

This module turns foresight insight into a sequenced roadmap for action and learning. You connect vision, dependencies, milestones and monitoring signals so strategy can adapt as conditions change.

Unit 1 Module Overview. This unit introduces roadmapping as the bridge between future direction and present action. You identify the decision scope, time horizon and outputs that the roadmap must support.

Unit 2 From Foresight to Strategy Foundations of Roadmapping. This unit explains the core layers and logic of a roadmap. You connect foresight findings to strategic choices, capabilities and time-bound actions.

Unit 3 Vision Building for SMEs. This unit develops a clear and relevant future direction that can guide prioritisation. You frame the vision, so it is ambitious enough to matter and concrete enough to test.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 4 Backcasting From Future to Present. This unit begins with a defined future state and works backwards to the present. You identify necessary conditions, decisions and intermediate outcomes along the path.

Unit 5 Dependency Mapping and Strategic Sequence Planning. This unit examines which actions, resources and capabilities depend on others. You arrange work in a credible sequence and identify bottlenecks or critical assumptions.

Unit 6 Transformation Roadmaps and KPI Integration. This unit combines strategic milestones with measures that show progress and learning. You select indicators that support adaptation rather than rewarding activity alone.

Unit 7 Strategic Alignment Within SMEs. This unit connects the roadmap to priorities, resources, governance and daily work. You identify conflicts and create ownership across the people responsible for delivery.

Unit 8 Turning Foresight into Actionable Strategies. This unit converts scenarios and implications into choices, experiments and commitments. You define what should begin now, what should be prepared and what should be monitored.

Unit 9 Personal Professional Foresight Plan. This unit applies the roadmapping logic to individual professional practice. You set a direction, identify capability needs and define routines for reviewing change over time.

Unit 10 Assessment and Reflection. This unit evaluates whether the roadmap is coherent, feasible and responsive to uncertainty. You explain its assumptions, milestones, signposts and revision triggers.

Unit 11 Resources and Tools. This unit provides roadmap canvases, backcasting prompts, dependency tools and indicator guidance. You assemble the resources needed to create and maintain an actionable roadmap.

Module 9 LTFF for SMEs Application and Barriers

This module focuses on making foresight workable in everyday organisational practice. You design small routines, address common barriers and create an implementation approach that can continue after formal training ends.

Unit 1 Welcome and Module Overview. This unit introduces the challenge of moving from occasional foresight exercises to sustained practice. You identify where LTFF can enter existing routines without creating unnecessary burden.

Unit 2 LTFF Entry Points. This unit examines practical moments where future thinking can influence decisions, projects and conversations. You select entry points with a clear owner, purpose and near-term opportunity for use.

Unit 3 Develop Continuous Foresight Micro Routines. This unit designs short, repeatable activities for scanning, interpretation and review. You create a routine that fits available time and produces evidence that can inform action.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Unit 4 Apply LTFF and Foresight in Daily Operations. This unit integrates foresight questions and outputs into meetings, planning and operational decisions. You clarify how insights will be recorded, shared and revisited.

Unit 5 Barriers and Application for LTFF Implementation. This unit addresses constraints such as limited time, uncertain ownership, weak data, resistance and competing priorities. You develop proportionate responses and identify where leadership support is required.

Unit 6 Assessment and Reflection. This unit evaluates whether the proposed routines and implementation plan are realistic. You reflect on evidence of use, remaining barriers and the next improvement to test.

Unit 7 Resources and Tools. This unit provides micro-routine templates, implementation prompts and review checklists. You select a small resource set that can be maintained and reused in normal work.

3. How to use the LTFF Curriculum

This section keeps the practical structure of the original guide: define the teaching purpose, choose a coherent pathway, prepare one activity, facilitate it through the LTFF learning cycle, and then adapt and improve it. Suggested timings are indicative and should be adjusted to the credit-bearing course, cohort, student level and timetable.

3.1. Start with a short planning conversation

Before selecting a module or case, define what students should learn and what evidence will demonstrate that learning. A short planning canvas prevents LTFF from becoming an interesting discussion with no usable learning outcome.

Decide	Write down a practical answer
Purpose	What should students or colleagues be able to do differently after the activity? Use one observable verb: identify, compare, create, justify, prioritise or reflect.
Learners	Who will participate: discipline, level, prior knowledge, group size and delivery mode?
Course fit	Which existing topic, assignment, project or institutional question could provide a meaningful context?
Method and resource	Which module and case study best support the purpose? Choose one primary method, not several unrelated methods.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Time and format	How much time is genuinely available? Decide whether the work is individual, pair-based or in groups of 3–5.
Evidence of learning	What will participants submit or share? Define a small, visible output before teaching starts.
Conditions	What materials, sources, digital or AI tools are allowed? What support is needed for accessibility, language or sensitive topics?

3.2 Choose an entry pathway

Choose the smallest pathway that meets your purpose. Modules 0–3 build a foundation; Modules 4–8 are applied extensions; Module 9 supports sustained use under constraints. Begin with Module 0 whenever learners have not previously reflected on their starting point.

If your purpose is…	Suggested sequence	A realistic first use	Typical output
Introduce LTFF and future literacy	Modules 0–2	One 90-minute class or a short self-study sequence	Personal learning goal plus a short reflection on assumptions and plausible futures
Teach one practical foresight method	Module 3 + one case study	A 2–3 hour methods lab	Completed method canvas or map, with sources and assumptions recorded
Explore a decision or strategic challenge	Modules 3–4, then 8	Three linked sessions or a project sprint	Two scenarios, decision criteria and a milestone roadmap
Develop innovation with social responsibility	Modules 3, 5, 6 and 7	A themed project, capstone or workshop	Future-oriented concept, stakeholder analysis and ethical implications
Build continuing LTFF practice	Modules 0–9, selectively	A programme-wide or staff-development pathway	Portfolio, adaptation plan and a routine for reviewing change

3.3. Prepare one activity: a 30-minute teacher checklist

For a first use, select one case-study assignment from the student guideline. The cases already provide a context; your task is to make the purpose, process and output explicit for your learners.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

1. Select one learning objective and state it in a learner-friendly language. Example: “By the end of this activity, you can create two plausible futures and explain one action that remains useful in both.”
2. Read the relevant module and case study. Complete a small part of the template yourself so that you can show a worked example or explain a common difficulty.
3. Choose the case or replace only its context with a familiar disciplinary, local or institutional challenge. Keep the core method, future horizon and expected output intact.
4. Prepare a one-page activity brief: purpose, time limit, group format, materials, permitted tools, expected output and the criteria that will be used to review it.
5. Decide how learners will use evidence. Ask them to distinguish current evidence from assumptions, future possibilities and AI-generated suggestions; require sources for factual claims.
6. Plan a five- to ten-minute debrief. Without a debrief, students may complete a template without connecting the method to their discipline, professional practice or social responsibilities.

3.4. Facilitate the activity with the LTFF learning cycle

Use the four-stage cycle below to structure a case activity or a sequence of related units. The stage ranges illustrate a short facilitated activity. A complete module may require several cycles across multiple sessions, with reading, evidence gathering or revision between meetings.

Stage	What the educator does	What learners produce
1. Frame (5–15 min)	Introduce the real-world challenge, the method and the future horizon. Explain that foresight explores plausible futures; it does not predict one correct future.	A shared challenge statement and a list of initial assumptions or questions.
2. Apply (20–60 min)	Model the first step, then keep groups focused on evidence, uncertainty and the method. Ask probing questions rather than supplying answers.	A draft PESTLE map, scenario card, Five Forces diagram, story, stakeholder map, Strategy Canvas or roadmap.
3. Interpret (10–25 min)	Ask groups to compare outputs, identify patterns, tensions and implications, and consider whose perspectives are missing.	One or two plausible futures, plus an explanation of key assumptions and uncertainties.
4. Act and reflect (10–20 min)	Connect the future insight back to a decision, innovation, teaching topic or next experiment. Close with a short individual reflection.	A recommendation, adaptive action or next test, with a short reflection on method quality.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Match the stages to the institution's teaching periods. At the end of a session, save the current output, state the unfinished question and set a precise next task. At the next meeting, review that evidence before continuing. Shorter sessions should retain interpretation and reflection, with suitable research or refinement assigned as self-work.

4. Case Studies and Practical Application

4.1 Purpose and structure of the case studies

The current ASTRAL working library contains 16 case studies. They connect foresight methods to organisational, public-service and policy challenges. Some describe documented practice; others use an organisation as a teaching context for applying a method or exploring a possible future. Check the case's evidence and framing before presenting a method as something the organisation actually used. The cases support method understanding, critique and transfer rather than supplying model answers. The library spans complementary method families. The mapping below shows teaching emphases, including activities proposed in the case materials.

4.2 How a case study is built and how educators use it

Case files generally contain a short summary and classification, context, implementation, impact, reflection questions and resources, followed by a section for HE instructors and educators. The educator section is especially important: it converts the case narrative into possible discussion prompts, exercises, debates, role-play, module links or assignment ideas. It should be treated as a starting teaching design rather than a script.

Case section	Purpose	How can it be used
Summary and classification	Identifies the organisation, challenge, method and curriculum links	Screen for relevance and alignment with the intended module/unit outcome.
Context	Explains the challenge and conditions	Use as pre-class reading or to frame the activity.
Implementation	Shows how the method was used	Model method steps and compare practice with the formal method description.
Impact	Reports outcomes and consequences	Invite critique of evidence, limitations, attribution and transferability.
Reflection and resources	Supports discussion and further inquiry	Select questions and extension sources appropriate to student level.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

HE educator section	Offers teaching prompts and activities	Convert the suggestion into a learner brief with outcome, timing, roles, output, rubric criteria and debrief.

4.3. Match the case study to the teaching purpose

Use the complete case materials and, where available, the corresponding D2.2 assignment as the activity instructions. The full list below supports selection by method and purpose. Suggested module links are teaching connections and may extend the original case classification; select specific units before delivery.

Case Studies	Primary method	Suggested modules	Suggested HE use
Capita: After the Breach Risk-Opportunity Matrix	Risk Opportunity Matrix	4, 5, 7, 8	Compare pause, continue and redesign options after a cyber incident; justify a decision and turn it into a controlled roadmap.
BlaBlaCar	Blue Ocean Strategy and ERRC	5	Analyse value innovation and non-customers; build an Eliminate Reduce Raise Create proposal for a mobility platform.
DHL	Horizon scanning and trend radar	3, 5, 8	Examine how signals are identified, prioritised and translated into innovation themes and strategic action.
Danish Drones	Flash Fiction and participatory futures	2, 3, 7	Use far-future citizen narratives to identify needs, concerns and policy implications; extend through role play.
EU Policy Lab Futures Garden	Horizon scanning and speculative design	3, 4, 5, 6, 8	Connect scan findings with future artefacts; critique emotional engagement, policy implications and participation.
GoPro Blue Ocean Strategy	Blue Ocean Strategy and Strategy Canvas	5	Compare GoPro with traditional cameras, identify value shifts and propose a future market space.
Lime PESTLE Analysis	PESTLE analysis	2, 3, 4	Map external drivers in urban mobility, compare markets and debate business strategy against public regulation.
NHS RFID Roadmapping	Scenario-driven technology roadmapping	3, 4, 6, 7, 8	Build scenarios, map stakeholders and dependencies, then define milestones and decision points for system-wide adoption.
Spain 2050 Project	Horizon scanning Delphi scenarios and backcasting	1, 3, 4, 8	Critique institutionalised national foresight and connect long-term proposals with anticipatory governance and implementation.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Case study Spotify Porter's Five Forces	Porter Five Forces	3, 4, 5	Test how technological, regulatory and behavioural changes reshape competitive forces and strategic options.
Swiss Railway	Flash Fiction and needs discovery	2, 3, 7	Interpret far-future traveller stories to surface needs, values and tensions before designing responses.
TESLA	Blue Ocean Strategy and Strategy Canvas	5	Examine market creation and later competition; debate scaling, mission and future value innovation.
Too Good To Go	PESTLE analysis and plausible futures	3, 4, 7, 8	Separate current conditions from possible change, compare futures for food waste platforms and propose adaptive action.
Strategic Foresight on the AI Revolution and its Impact on Europe	Narrative strategic foresight and roadmapping	3, 4, 7, 8	Debate technological leverage and sovereignty, build a positive alternative vision and roadmap actions.
Strategic Foresight in SMEs: Integrating Continuous Micro-Routines into Agile Workflows	Continuous foresight routines	2, 3, 5, 8, 9	Design a repeatable 30-minute routine and test how foresight can be integrated into agile workflows.
Siemens AG	Innovation typologies business models experimentation and roadmapping	5, 8	Analyse transformation choices, prototype a business model, design experiments and transfer lessons to SMEs.

The Capita case is an educational application of a Risk-Opportunity Matrix to a cyber-incident context; it does not establish that Capita used that exact matrix. Similarly, fictional futures are material for interpreting assumptions, needs and values. They are not observed weak signals or evidence that an imagined event has occurred.

5. Assessment and Rubric Adaptation in Higher Education

ASTRAL assessment resources should make LTFF reasoning visible. Strong evidence shows how a student selected and applied a method, distinguished evidence from assumptions, compared plausible futures, considered stakeholders and derived a justified action or reflection. A polished presentation alone is not sufficient evidence of attainment.

5.1 Choose the assessment purpose

The table below distinguishes the main assessment purposes supported by the ASTRAL materials and indicates the types of evidence that can be used for each purpose in a higher education setting.

Purpose	Suitable evidence	Use in HE

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Diagnostic	Module 0 self-assessment and learning goal	Identify support and pathway needs; normally do not grade personal readiness.
Formative	Method canvas, signal log, draft scenarios, peer feedback	Provide feedback while students can still revise the work.
Summative	Case assignment, presentation, roadmap or scenario report	Grade method use and reasoning as well as the final product.
Portfolio	Selected outputs, feedback, revisions and reflection	Show development and transfer across several modules or units.
Oral / reflective	Viva, structured discussion or learning commentary	Check individual understanding and changes in judgement, especially after group work.

5.2 Common LTFF rubric

The common rubric below provides a shared reference for judging the quality of LTFF work. It focuses on the visibility and quality of students' reasoning and can be selectively applied according to the learning outcomes of the activity.

Criterion	Beginning	Developing	Competent	Advanced
Method application	Method absent or unsuitable	Main steps present with gaps	Method applied correctly and transparently	Methods integrated/adapted with clear rationale
Evidence and uncertainty	Claims unsupported; assumptions hidden	Some sources and assumptions identified	Credible evidence separated from assumptions and uncertainty	Sources checked; limitations and sensitivity evaluated
Alternative futures	One forecast treated as certain	Alternatives named but weakly differentiated	Two or more plausible futures and implications compared	Coherent futures include signposts and sensitivity to change
Stakeholders and responsibility	Important stakeholders/impacts missing	Main stakeholders and one impact identified	Different interests, ethics and unintended effects analysed	Conflicting values examined and practical mitigations proposed
Action and transfer	Recommendation generic or disconnected	Action partly follows from analysis	Feasible adaptive action follows from analysis	Action prioritised, monitored and transferred thoughtfully

Select and adapt the criteria before issuing the task. For A01, two futures are an explicit requirement. For A02 value innovation, assess the Strategy Canvas, ERRC reasoning and proposed test; use the alternative-futures criterion only if contrasting futures are included in the brief. For A05 Flash Fiction, assess interpretation and strategic reasoning, keeping imagined details separate from factual evidence; literary style is not the LTFF learning outcome.

5.3 Adapt the rubric to the HE setting

The common rubric is a reference framework, not a mandatory grading scale. Educators should select only criteria aligned with the approved course outcomes and may map the four performance levels to local grades, change weights or terminology, and add discipline-specific criteria.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

- Outcome alignment: grade only criteria that demonstrate the intended learning outcome.
- Student level: introductory work may use one method; advanced work should justify method choice, limitations, integration and transfer.
- Evidence format: written, oral or visual products are acceptable when they provide equivalent evidence of reasoning.
- Group and individual attainment: assess a shared artefact separately from contribution records, individual reflection or oral explanation when individual grading is required.
- AI use: define permitted assistance in advance and require disclosure, source verification and identification of the student's own judgement.
- Moderation: use exemplars, marker calibration or sampling in line with local quality-assurance procedures.

ASSESSMENT NOTE Give students the selected rubric criteria with the assignment brief, before they begin. This makes the rubric a learning tool as well as a grading tool.

5.4 Using assessment and rubrics in practice

A practical HE assessment sequence is: (1) start from the approved course learning outcome; (2) identify the module/unit and learner output that provide evidence of that outcome; (3) decide whether the task is diagnostic, formative, summative or portfolio-based; (4) select only the relevant rubric criteria and adapt descriptors or weights to the local level and grading system; (5) give the criteria to students before the task; (6) collect individual evidence where group work is used; and (7) review attainment patterns and refine the task or rubric before the next delivery. This keeps the ASTRAL rubric aligned with institutional assessment practice rather than treating it as a fixed parallel grading scheme.

5.5 Worked assessment example for A01

Use the A01 outputs from Section 3.5 as evidence for the selected outcomes. The mapping below illustrates competent performance and supports adaptation of the common rubric. The course team should confirm the required standard, local grade mapping and any weighting before students start.

Outcome and evidence	Relevant rubric criterion	Competent performance for A01
Analyse external change: six-row PESTLE table and source list.	Method application; evidence and uncertainty.	Relevant evidence is dated and traceable; possible changes and uncertainties are separated from current facts.
Compare plausible futures: two future summaries for 2035.	Alternative futures.	The futures differ on a consequential uncertainty, remain coherent and explain different implications.
Consider affected people: stakeholder impacts in the table and recommendation.	Stakeholders and responsibility.	The analysis considers different interests and a relevant ethical or unintended effect.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Justify a response: 300-word recommendation.	Action and transfer.	A feasible action follows from the analysis, with an explanation of its usefulness and limits across the futures.

Use the draft exchange during interpretation for formative feedback. In an illustrative developing submission, a group may cite a current food-waste figure and then state that regulation will certainly tighten by 2035. Feedback could be: “Keep the figure as dated evidence, label future regulation as an uncertainty, and show how the recommendation changes under a second regulatory direction.” Assess the revised reasoning at submission using the criteria supplied in advance.

With group submissions, judge the shared table, future summaries and recommendation separately from individual attainment. Ask each student to explain one source, one assumption and one revision they contributed, orally or in a short reflection. State how group and individual evidence affect the local mark; do not infer individual understanding from the group product or contribution count alone. Where evidence is insufficient, use the institution’s normal follow-up process.

Before marking, two educators can independently apply the descriptors to the same sample, compare their reasons and clarify ambiguous wording. After marking, review a sample across performance levels and note recurring difficulties. Use those findings to improve the brief and teaching support for the next cohort.

5.6 Evidence of teacher learning

For participants in the teacher training course, collect an adapted activity plan, a learner brief with selected criteria, and a short facilitation or peer-review reflection. Assess whether outcomes, unit selection, workload, teaching steps, accessibility and evidence of student attainment are aligned. Following a pilot or peer rehearsal, ask the teacher to explain one revision and its evidence. These artefacts demonstrate teacher capability in learning design and evaluation; student attainment is assessed through the classroom task.

6. ASTRAL Learning Platform

6.1 Resource access and platform status

The resources described throughout this guideline are organised for access through the ASTRAL website and learning platform, including module indexes and content, slide decks, case studies, assignments, templates, checklists, rubrics, glossaries and supporting resources. The platform and its final navigation are still being completed, so this guideline does not prescribe menus, buttons or technical steps that may change. Instead, it explains how educators can use the resources pedagogically in an HE setting.

Educators may use the resources directly in a teacher-mediated route, or ask students to navigate assigned learning resources themselves. Student navigation should always be purposeful: specify the starting module/unit, required and optional materials, order of use, task, expected output, deadline, checkpoints and evidence of completion. Classroom teaching and self-learning may therefore be combined rather than treated as separate versions of the course.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

6.2 Ways to use the learning platform

The table below compares three ways of using the ASTRAL learning platform in HE teaching. The appropriate model depends on learner autonomy, available class time and how much of the learning process is expected to take place independently.

Model	Best used when	Educator responsibilities	Student responsibilities
Teacher-mediated	Time is limited, students are new to LTFF or only one unit is needed	Curate the exact resources, explain sequence, model the method, provide brief and criteria.	Use the selected materials and produce the specified output.
Learner-navigation	Students need autonomy, flexible access or a longer pathway	Provide starting point, required/optional resources, checkpoints, deadlines, support and completion evidence.	Navigate the assigned route, manage individual/group work, document sources and submit evidence.
Hybrid	Preparation/refinement can occur online while method use benefits from facilitation	Allocate each stage deliberately and connect online work visibly to classroom activity.	Arrive prepared, contribute to the facilitated task and revise after feedback.

6.3 Combine classroom and self-learning

The sequence below connects self-learning and classroom activity. In the A01 example in Section 3.5, preparation produces source notes for the in-class PESTLE task, peer feedback guides revision, and the revised output provides assessment evidence. Use the same visible connection when adapting the sequence to another case or to several sessions.

Learning stage	Suggested platform resource	Student activity	Educator action
Before class	Selected unit pages, slides, case introduction or short reading	Review concepts and record one question, signal or assumption.	Provide a direct route, clear purpose and proportionate preparation.
Opening class	Learning outcome and method overview	Compare preparation and agree a future-oriented challenge.	Clarify method, output, roles and assessment criteria.
Application	Case, assignment brief and template	Apply the method individually or in groups.	Model the first step, monitor evidence use and support inclusion.
Between sessions	Saved template, evidence log and guidance	Research, refine scenarios, develop a canvas or prepare a roadmap.	Set checkpoints and explain how contributions will be recorded.
After class	Rubric, peer-review checklist and reflection prompt	Revise and submit the output or complete self-assessment.	Provide feedback and connect the result to the next unit.

For learner navigation, issue one concise resource route alongside the assignment. For A01 this can read: “Start with Module 3 Units 2 and 4 and Module 4 Unit 2; read the Too Good To Go case introduction; use the A01 brief and PESTLE format; bring two dated sources to class; revise after peer feedback.” Attach current links or files, distinguish required and optional reading, and add the deadline and support contact.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

6.4 Guidelines for individual and group self-learning

- Individual self-learning: provide a short sequenced route, estimated workload, a worked example or template, at least one checkpoint and a clear support route. Require a complete individual artefact, source record and short self-assessment.
- Pairs: assign complementary roles such as evidence lead and method lead, but require both students to be able to explain the output.
- Groups: define roles, shared workspace, milestones and responsibility for integration. Use contribution records, peer feedback and individual reflection or oral checks alongside the group product.
- Open exploration: use only after required core resources are clear. Give search prompts and quality criteria and ask students to justify the resources they selected.

Check readiness through a small product such as a source note, draft or question, rather than relying only on whether a learner opened a resource. If students could not access the material, provide an accessible file or equivalent print version and a route to complete preparation. In group self-work, use named roles and a shared draft with checkpoints; each student should still be able to explain the group's reasoning.

7. Educational Innovation: Design, Realisation, Evaluation and Improvement

The D2.1 teacher course also addresses the underlying process of educational innovation: LTFF must be designed into a subject, realised with learners, evaluated against learning evidence and improved before reuse. The cycle below can be used for one activity, a connected module sequence or a larger course redesign, and makes explicit how the ASTRAL resources support design, delivery and evaluation rather than functioning as stand-alone content.

The table below translates the educational innovation cycle into practical educator decisions and a minimum output for each phase. It can be used to plan either a single LTFF activity or a broader course-level implementation.

Phase	Educator decisions	Minimum output
Diagnose	Identify learner level, prior knowledge, discipline, timetable, delivery mode and a suitable future-oriented challenge.	Context and learner profile
Design	Select outcomes, modules/units, method, resources, work mode and assessment evidence.	Activity or module plan
Prepare	Test the method, prepare examples, check accessibility and define evidence/AI-use conditions.	Learner brief and resource set
Realise	Frame the challenge, model the method, facilitate inquiry and monitor participation.	Completed learner output

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483

Evaluate	Review attainment, learner experience, timing, inclusion and fit with the course.	Feedback and evaluation evidence
Improve	Revise the brief, examples, timing, support or assessment before reuse.	Documented change for the next delivery

7.1 Support uptake beyond one classroom

Where several colleagues are interested, start with a small implementation cycle rather than requiring full curriculum rollout. Each educator can pilot one bounded activity, save an adapted learner brief and collect limited evidence. A programme team can then compare course fit, learner attainment, accessibility and platform issues before deciding whether a longer pathway or shared staff-development offer is justified.

7.2 A simple evaluation loop

After each use, record enough evidence to make one practical improvement. Useful review questions include: Did the selected module and units align with the course outcome and student level? Could students apply the method rather than only describe it? Were evidence, assumptions and uncertainty distinguished? Were multiple plausible futures and stakeholder perspectives considered? Did classroom and self-learning stages connect visibly? Did the rubric capture the intended learning? Were platform instructions and accessibility arrangements sufficient?

In the A01 example, compare the first PESTLE draft with the final submission. If sources are sound but futures remain too similar, add a short model of contrasting uncertainty directions before the next run. If the method is understood but groups cannot finish, reduce the evidence search scope or allocate explicit self-work time. If individual explanations reveal uneven understanding, rotate roles and add an earlier individual checkpoint. Record the problem, evidence, change and what will be checked at the next delivery.

8. Concluding Remarks

The ASTRAL LTFF teacher course is designed as an adaptable HE framework that connects modules, units, methods, cases, assessment and learning-platform resources. Educators can begin with one coherent learning purpose and expand only when useful. Effective implementation keeps the future horizon explicit, makes evidence and uncertainty visible, gives students opportunities to apply and reflect on methods, and uses evaluation evidence to improve subsequent teaching.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them. Grant Agreement Project 101184483