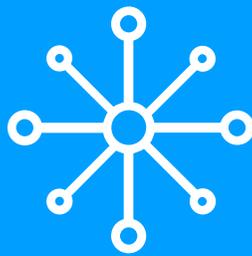
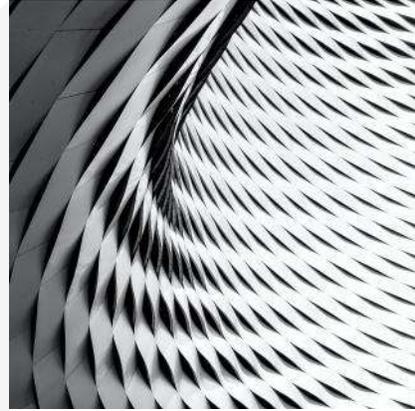




Selection of Methodologies

Project Result 1 Task 1



»» Publication Information

Lead author:	Travel2Fit (Greece)
Contributors:	ENAIP (Italy); Atlantis Engineering SA (Greece); Green Destinations (The Netherlands); Berufsschule für Handel und Reisen (Austria); X23 (Italy)
Publication date:	15 July 2022

»» Project Information

Call for proposals:	KA220-VET - Cooperation partnerships in vocational education and training
Project title:	DGI Tourism
Proposal number:	2021-1-IT01-KA220-VET-000033136
GA number:	KA220-VET-FF542C7A
Project duration and start:	24 Months; February 15, 2022
Lead beneficiary:	X23 (Italy)
Project partners:	ENAIP (Italy); Travel2Fit (Greece); Atlantis Engineering SA (Greece); Green Destinations (The Netherlands); Berufsschule für Handel und Reisen (Austria)
Project website:	www.dgi-tourism.eu
Project contact:	Marika Mazzi Boém - Lead Partner marika.mazzi.boem@x-23.org

» Table of Contents

03

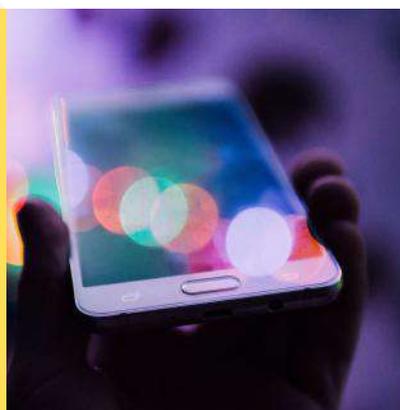
Introduction

06

Methodology

07

State of the Art:
Applicable Methodologies &
Innovation Management

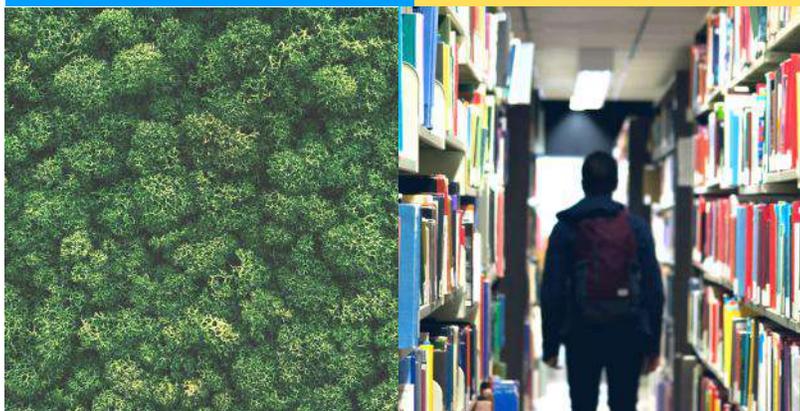


43

Stakeholder Mapping
& Early Analysis
Activities

45

Conclusion



» Introduction

Even before the emergence of Covid19 pandemic, the tourism sector was under major structural transformations, including behavioral tourism & digital shifts.¹ Covid-19 accelerated the sectoral changes radically, fostering discussions about sustainable development as many actors are now more willing to embrace resilient methods for the industry's environmental, social and economic growth.

EU has already embraced these shifts with dedicated activities, including the following:

- European Agenda for Tourism 2050 as indicated in the Communication "Tourism and Transport in 2020 and beyond" of 13 May 2020²
- European Tourism Convention action points
- New Industrial strategy for the European industry to lead the twin green and digital transition³
- "European Green Deal" provides a strategic framework for the green transformation of the tourism ecosystem. Among the most relevant initiatives are the Circular Economy Action Plan, Sustainable and Smart mobility strategy, Biodiversity Strategy, Renovation wave for buildings, and new Climate Adaptation Strategy."⁴
- European Pact for Skills⁵
- 100 intelligent cities challenge with a specific thematic track for green and digital transition in tourism⁶
- The Transition Pathway for Tourism⁷



¹ https://ec.europa.eu/growth/sectors/tourism/support-business/digital_en

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=159119111789&uri=CELEX:52020DC0550>

³ https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en

⁴ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

⁵ <https://ec.europa.eu/social/main.jsp?catId=1517&langId=en>

⁶ <https://www.intelligentcitieschallenge.eu/themes/green-and-digital-transition-tourism>

⁷ <https://ec.europa.eu/docsroom/documents/49498>



DGI Tourism Project Objectives



Establish a novel training methodological framework for the VET sector



Develop adaptable and transferable training material by tourism experts



Propose a path for tourism professionals to adapt to post-covid market needs



Perform trials and assess results, offer feedback to VET centres

For more information:

[DGI Tourism Project Website](#)



In light of these transitions, travel professionals (hoteliers, tour operators, travel agents, etc.) would need to adapt with continuous training and capacity-building activities to offer specialized products to their clients, as one-size-fits-all is no longer a viable solution. From the travelers' perspective, it is also evident that new age and social media-backed habits encourage a growing desire to be a responsible traveler with an interest in new modes of travel, including slow, active & safe tourism. More specifically, new influencers seek more "off-the-beaten-track" and niche destinations rather than glamorous, crowded destinations. In their quest, paying attention to the environmental impact is critical.

To adapt to these evolving sectoral requirements, travel professionals must become increasingly familiar with digital, green, and innovative practices for tourism product development.

The DGI Tourism project aspires to address these needs by proposing an innovative VET offering expected to help VET students & travel professionals adapt and align to the market needs and economic challenges, proposing an intelligent skills mix (including green and digital).

The first logical step towards this direction is the identification, internal assessment and elaboration of methodological frameworks currently being followed by consortium partners (serving as baseline), that are considered relevant for the final definition of the DGI Tourism methodological framework. A similar procedure is also followed for the identification of a set of other methodologies borrowed from industrial and business sectors, as several aspects of them could be applicable in the context of the project as well. Innovation management is also examined, as the ambition of the project is to foster changes in the VET offering for travel professionals, based on environmental and sectoral needs. Finally, preparatory activities for the definition of the project's lean methodological framework are conducted. More specifically, consortium partners contributed in mapping relevant stakeholders from EU, in order to form and sustain a DGI Tourism community which would be reached within the project's lifetime to collect feedback and increase the project's visibility.

Report Structure

1**Introduction**

Captures general information, offering the overall positioning of the report.

2**Methodology**

Discusses the methodology followed for implementing the tasks associated with Project Result 1.

3**State-of-the-Art of Applicable Methodologies & Innovation Management**

Describes a wide set of methodologies (both baseline methodologies and other methodologies from EU industry and business sectors) that would be considered within the project. Innovation management is also examined as a reference point for handling educational changes.

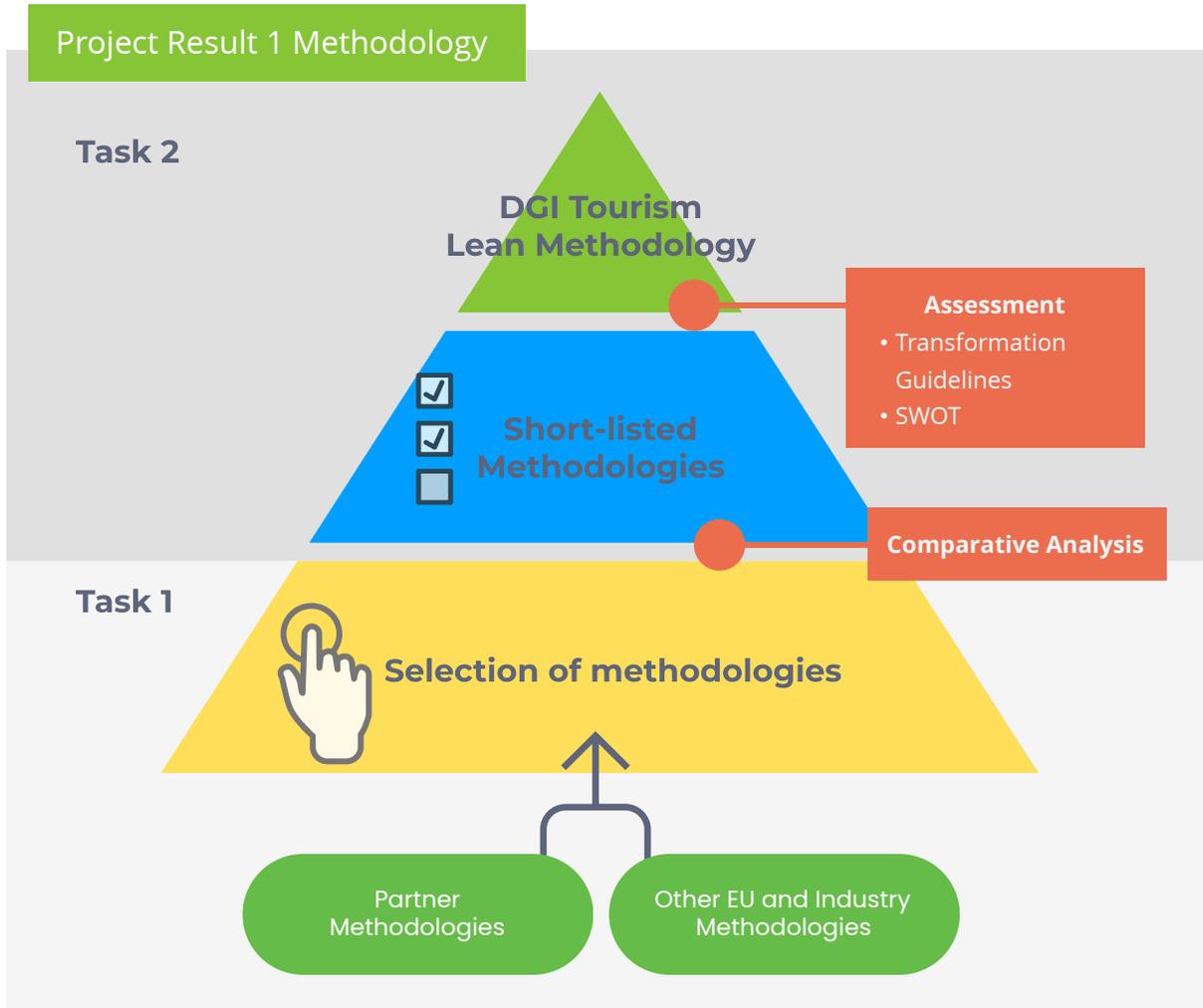
4**Stakeholder mapping & early analysis activities**

Presents the ecosystem mapping activities which were identified as important to be conducted, early in the project's lifetime

5**Conclusion**

Concludes the report.

» Methodology



Project Result 1 Task 1 (PR1/T1) aims to build an overarching view of existing methodologies and select the most appropriate ones to serve project needs. For this, a dedicated spreadsheet was created to facilitate partner reporting.

PR1/T1 objectives

1

Identify methodologies or quality assurance models that are currently using, either in E&T frameworks or in their daily activities.

2

Identify other methodologies or quality assurance models, used in EU industrial or business sectors that could be applicable in the context of the DGI Tourism project.

As a preparatory step for PR1/Task 2 activities, an internal comparative analysis is planned to narrow down the most relevant methodologies to the project's goals. As such, a short-listed view of digital, green, innovative methodologies is identified, which will be analyzed in greater detail for the final development of the DGI Tourism lean methodological framework.

This last step will involve the following:

- Guidelines describing the adaptive transformation of the various methodologies for the field of VET with a focus on the specialties of the reconfiguration topic
- Aspects of responsibility on the use of digital technology
- Performing assessment methodologies like SWOT analysis.

» State of the Art: Applicable Methodologies & Innovation Management

This section presents the methodologies and quality assurance models that have been identified by the consortium partners as relevant to the outcomes of the DGI Tourism Project. They are classified into two groups:

- Baseline Methodologies - those that are already exploited by consortium partners and could be reconfigured in a way that addresses the project needs.
- Other EU and Industry Methodologies - those that were identified in EU industrial & business environments and maintain interesting aspects that could add value

For each presented methodology, the following elements are considered:

- Project dimension (digital, green, or innovative)
- Key characteristics
- Framework
- Relevance to education (when not primarily used in education)
- Measuring results
- Most common market applications
- Project considerations (pain & strong points)

1 Lean Methodology



Lean methodology is a way of optimizing an entity's people, resources, effort, and energy toward creating value for the customer. It was initially introduced into the manufacturing world to address needs that arose after the 2nd World war manufacturing crisis.⁸ The results obtained by using lean approaches in manufacturing were promising and, as such, have been steadily introduced in other sectors, including the service sector.

Key Characteristics



Cost-effective, high quality results through continuous process improvements



Increased productivity of the organisations through customer-centric process analysis



All processes contributes to adding value to the end product, as defined by the customer

Framework



It is vital that lean thinking implements continuous identification and minimisation of waste -- any process or product feature that do not add value. In the startup world, lean methodology is a common framework that allows new entities to adapt and pivot based on customer and macro-environmental requirements. A minimum viable product is developed, which constitutes the smallest product form that allows small iterative learn-build-measure cycles (Figure 2) to alleviate risks of failure.

⁸ Ohno, T. Toyota Production System: Beyond Large-Scale Production; Productivity Press: Cambridge, MA, USA, 1988

Relevance to education

In the education system⁹, lean can be seen as a philosophy that aims to provide a new thinking of how education processes should be reorganized to provide equal or even more value while cutting down aspects that do not add value to the education. In this context, the lean framework can be applied in two different perspectives¹⁰:



Lean Education

applying lean techniques to the educational system or in one of its stages (i.e. primary, secondary, or higher education)



Lean Teaching

applying lean techniques in the classroom or for teaching (i.e. knowledge transfer). Considered a building block for lean education¹¹

Measuring Results

- Measuring how many non-value added activities (waste) are eliminated, is an indicator of progress.

Common Market Applications

- Manufacturing
- Engineering
- Software development
- Startups

Project considerations

Lean methodology can be readily applied in Education. Opportunities can be mapped by teachers and students. When continuous improvement cycles of Learn-Build-Measure are in place, outcomes can be evaluated to increase value of the educational environment.

However, education & training rely on a complex web of processes. Many stakeholders are reluctant in using a methodology stemming out of the manufacturing world into education. Strong leadership, culture, and training is necessary.

⁹ Ohno, T. Toyota Production System: Beyond Large-Scale Production; Productivity Press: Cambridge, MA, USA, 1988

¹⁰ Martinez, S. Lean Teaching: A New Trend in Education. In Didactics of Mathematics: New Trends and Experience, 1st ed.; Magreñán, A., Ed.; Nova Sciences: New York, NY, USA, 2020

¹¹ Emiliani, B. Lean University: A Guide to Renewal and Prosperity; The CLBM: Wethersfield, CT, USA, 2015

2

Competence-Oriented Learning



Competency-based learning is an approach to education that focuses on the student's demonstration of desired learning outcomes as central to the learning process.

Key Characteristics



Based on pre-determined competences



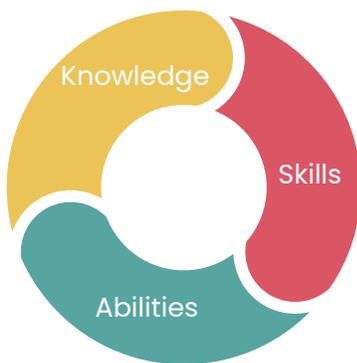
Progression based on demonstration of mastery



Traditional focus on skills and vocation

Framework

A key characteristic of this type of learning is its focus on skills, mastery and competences. Despite the fact that in other learning models, the necessary content of skills or concept is presented to students gradually and the success is aggregated, in a competency-based learning system, learners are not allowed to continue until they have demonstrated mastery of the desired learning outcomes.



This approach to education is similar to outcomes-based learning in that said outcomes—in this case, called 'competencies'—are identified beforehand, and students are frequently assessed. In this way, competency-based learning can be thought of as a form of outcomes-based learning.

Measuring Results

A baseline is required in this approach in order to assess its achievement. At this point learners evaluate themselves against the competency model the first time. Subsequently, a preferably self-directed, based on the personalized knowledge that they own, development has to take place. At a next step, success can be measured through a competency based assessment tool. This could either be software, or a paper based process for assessing a person's level of competence and identifying development needs.

Common Market Applications

- Education

Project Considerations

Competence based learning enables learners with work or family commitments to study at their own pace. Therefore, it is considered to be a suitable educational method for this project.

In a system with deep and diverse support systems, solid assessment forms, and clear and manageable learning outcomes that are accessible to all learners, competency-based learning could prove to be a valuable tool, that could decrease incompetence (including time spent learning), while increasing the pedagogical accuracy and the accomplishments of students.

Among its assets, the flexibility that offers gives students coming from different knowledge backgrounds and literacy levels the benefit to proceed at their own pace. However, this approach ends up making it difficult to recognize and acknowledge the most critical competencies, the key assessment and supportive to the students ways.

3 Work-Based Learning



Work-based learning is an educational method that immerses students in the workplace, prompting them to learn about the environment in which they'll be working. It offers real-life, practical work experiences, to better prepare the student for the challenging world of employment. For many proponents, they see it as a merging of theory with practice.

Work-based learning can be a win-win-win situation favoring the learner, the employer, and society. Apprenticeships, a significant type of work-based learning, have an essential role in tackling youth unemployment through earning while learning contracts. It is the ideal training ground in which the subject can develop learning both in the area of knowing how to do and in that of knowing how to be.

The European Commission launched in 2013 the European Alliance for Apprenticeships¹² (leaving EU Member States, social partners, companies, other relevant actors, and the European Commission) for the development of apprenticeship / learning schemes in the workplace of high quality.

Key Characteristics



Learning through acting. A global involvement of the person involved in the learning activity is assumed in all dimensions: cognitive, affective, value, motor.



Deductive learning, starting from experience, coming to possess it as a wealth of experience



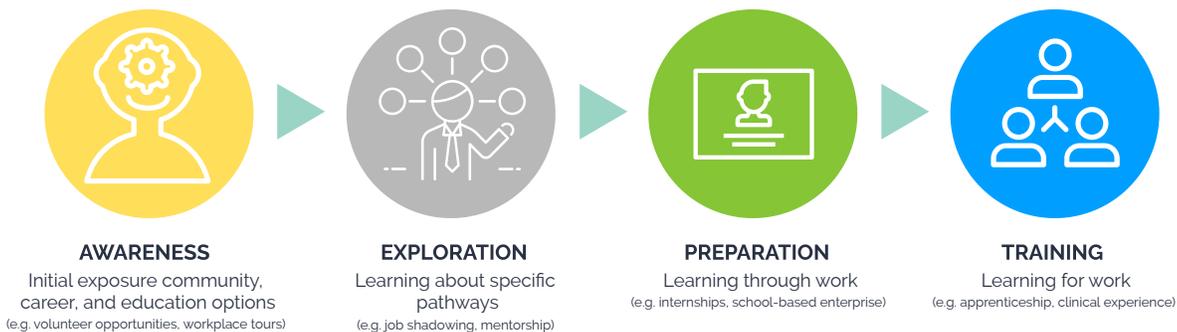
Learning from mistakes. The error, the mistake, the lack, seen as a resource from which to learn and not as a brake that hinders the discovered possibility.

¹² <https://ec.europa.eu/social/main.jsp?catId=1554&langId=en>

Framework

Learning through doing can take on different connotations from time to time concerning the pedagogical device put in place and the formative awareness of those who make it possible or of those who turn out to be a subject/object. The variables that we can observe in the relationship to learning through doing can be traced back to the degree of formalization and pedagogical intentionality that underlies them and the earning context, be it a specific context dedicated to learning or a life or work context.

The Work-Based Learning Continuum¹³



Measuring Results

Outcomes are measured through an assessment toolkit that takes into account different learning ambitions:

- skills of the professional profile of training and of the reference company role
- areas of activity in which they are explained / implemented
- expected results / indicators which show the level of achievement of competence and autonomy.

Common Market Applications

- Education
- Labor and Employment

Project Considerations

The work-based learning approach tends to minimize the gap between expected professional results and training objectives. It is an approach that addresses the professional dimension in its complexity, placing the emphasis on the acquisition not only of specialist skills, but to the aspects as well of the ways to do so and understanding how to be so.

¹³ <https://www.hawaii20.org/p-20-initiatives/college-career-pathways/work-based-learning/>

4 Total Productive Maintenance



Total productive maintenance (TPM) is the process of utilizing resources, including machines, equipment, employees and supporting processes to maintain and improve the integrity of production and the quality of systems.

Key Characteristics



Continuous improvement



Maximize staff capacity and competencies

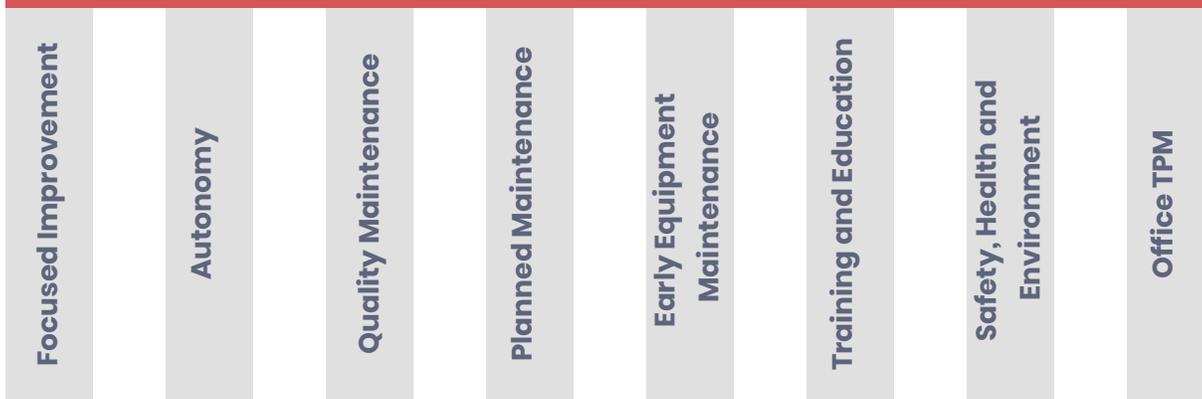


Increase quality of goods and services

Framework

By forming a productive team with no gaps or overlaps, TPM pillars offer the structure to define and enhance everyone's job, from top management to shop floor employees. Everyone is aware of what must be done and how to accomplish it correctly the first time.

Pillars of Total Productive Maintenance



Relevance to education



Soft Skills Training

Communication skills, diversity training, and teamwork training.



Technical Training

Upgrading problem solving and equipment related skills.

The goal of training and education in TPM is to develop suitable and efficient training methods, provide the necessary training infrastructure, and disseminate information about the other TPM pillars

Measuring Results

- Reports, essays, research projects, case study analysis

Common Market Applications

- Industries
- Health & Safety
- Environment
- Administration

Project considerations

Building a business organization and culture that continuously adapts to changes in the economic climate and technological advancements, introducing more complex machinery, and developing more modern management techniques is the goal of the TPM approach.

5

Burns Model of Sustainability Pedagogy



Green

Based on Okanagan indigenous teachings, the Burns Model of Sustainability Pedagogy is a learning framework that encourages the learners' shift towards more sustainable and regenerative values and intentions.

Key Characteristics



Provides an alternative to a transmissive learning paradigm

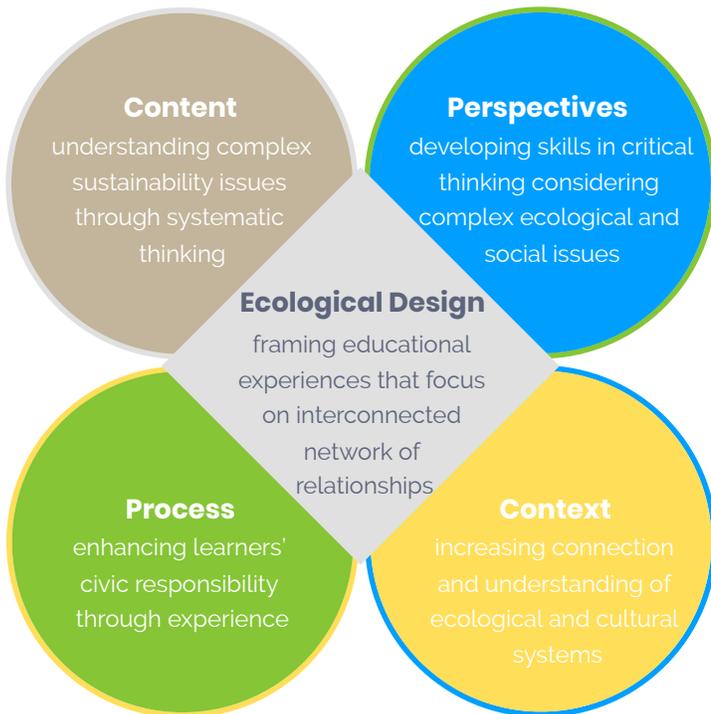


Teacher-led delivery of educational material



Designing educational approaches grounded in eco-centric values

Framework



Several studies have implemented the model to small-scale successes in higher academic and vocational education.^{14 15 16} This model provides a novel way of honing students toward sustainable thinking.

¹⁴ Burns, Heather L., "Education as Sustainability : an Action Research Study of the Burns Model of Sustainability Pedagogy" (2009). Dissertations and Theses. Paper 942. <https://doi.org/10.15760/etd.942>

¹⁵ Jacob D.B. Sherman & Heather L. Burns (2015) 'Radically different learning': implementing sustainability pedagogy in a university peer mentor program. *Teaching in Higher Education*, 20:3, 231-243, DOI: 10.1080/13562517.2014.993962

¹⁶ Burns, H., Kelley, S., and Spalding, H. (2019). "Teaching Sustainability: Recommendations for Best Pedagogical Practices" *Journal of Sustainability Education*, Vol. 19.

Measuring Results

As with most sustainability pedagogical methods, a theory-based impact evaluation approach using mixed quantitative and qualitative approaches is most appropriate. Analyses are done using triangulation and complementarity of results.¹⁷

Common Market Applications

- Education

Project Considerations

Existing proven methodological frameworks and approaches hardly incorporate how sustainability can be taught in higher and vocational education. With sustainability, regeneration, and transformation becoming highly relevant in tourism education, it is imperative that sustainability pedagogy must also be considered in creating the methodological framework for the project.

However, as with any novel framework, the model needs more robust measures to assess and evaluate impact and efficiency, particularly in how it can be incorporated into national framework and standards of vocational education and training.

¹⁷ Sossé Q, Wagner J, Hopper C. Assessing the Impact of ESD: Methods, Challenges, Results. Sustainability. 2021; 13(5):2854. <https://doi.org/10.3390/su13052854>

6 Design Thinking



Design thinking is a human-centered approach to innovation (innovation management approach)—anchored in understanding customer's needs, rapid prototyping, and generating creative ideas—that will transform the way you develop products, services, processes, and organizations. By using design thinking, decisions are made based on what customers really want instead of relying only on historical data or making risky bets based on instinct instead of evidence.

Key Characteristics



All design activity is social in nature



Experiment at the limits of your knowledge



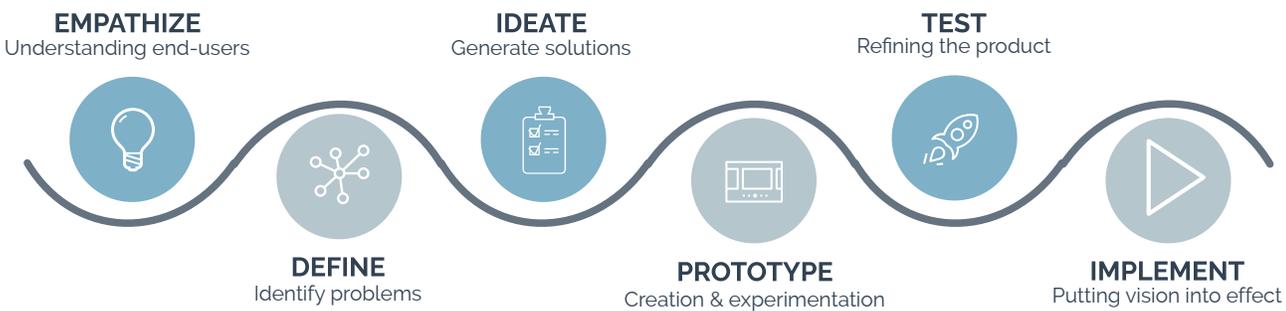
Basic human needs remain unchanged



Making ideas tangible in the form of prototypes

Framework

Design thinking encourages learners to take an enquiry stance, think divergently, and develop reflexivity. It is highly collaborative and versatile that can be adapted with other methodologies. It is a non-linear process which allow to maximize creativity and push the limits of product development.



Measuring Results

Creating a measurement framework in design thinking is based on the following criteria¹⁸:

- Customer feedback – the feedback from the consumers after using the product or service to determine the level of satisfaction based on their testimonials
- Related activities – the amount of processes this approach exploits, as well as of the participants in them
- “Immediate” results – the number of implemented projects based on design thinking sessions
- Traditional KPIs – units such as financial performance, market success, and revenue outcome of design thinking projects
- Reflective Measurements – questionnaires and surveys completed internally and externally by participants in design thinking processes including the practitioners, employees, and consumers
- Working culture – the impact of the design thinking inside the organization measured by factors such as motivation, team collaboration, and engagement

Common Market Applications

- Business
- Education
- Information technology

Project Considerations

The flexible and non-linear approach of design thinking can be considerably helpful in integrating novel or experimental ideas into existing body of knowledge or process. In the context of the DGI Tourism project, this means incorporating sustainability in intourism education and training.

This means that the process in developing educational content, materials, and approached would be centered in creating a needs-based, user-centered approach to learning. This approach is less common in education, especially in the standard approaches in vocational education and training.

¹⁸ Schmiedgen, J., Spille, L., Köppen, E., Rhinow, H., Meinel, C. (2016). Measuring the Impact of Design Thinking. In: Plattner, H., Meinel, C., Leifer, L. (eds) Design Thinking Research. Understanding Innovation. Springer, Cham. https://doi.org/10.1007/978-3-319-19641-1_11

7 Total Quality Management



Total Quality Management (TQM) is a systematic management approach to long-term success through customer satisfaction. It is accomplished as a result of the commitment of all organization members to participate in the continuous improvement of processes, products, services and the culture as a whole.¹⁹

Key Characteristics



Continuous improvement of processes, products, services



Commitment to a culture of quality process and service



Long-term success through customer satisfaction

Framework

Effective Communications

Mechanisms are employed in times of organizational change, as well as during day-to-day activities

Continuous Improvement

Each organization needs to be committed to continuous improvement to handle altering stakeholder needs and ensuring a competitive advantage



Process Thinking

Monitoring inputs, outputs and KPIs of a process, consisting of a series of well-defined steps is important in order to detect unexpected results



Fact-based decisions
Data-driven decision making for continuous performance monitoring and analysis is followed to achieve consensus and improvements



Customer Satisfaction

The customer's level of satisfaction that ensures the efficiency of the efforts



Integrated System
Although organization might be segmented into many departments, it is the horizontal integration of these departments that matters



Total employee commitment

All employees are committed to the same vision and organizational goals



Strategic thinking

Quality management is ensured by employing a strategic and systematic approach to achieving an organization's vision, mission, and goals



¹⁹ Deming, W.E. (1986) Out of the Crisis, MIT Centre for Advanced Engineering Study, Cambridge, MA

Relevance to education

TQM is defined in the educational sector as a management approach which keeps in the spotlight quality aspects. TQM has been introduced in primary, secondary ^{20 21}, and higher education ²². It involves achieving high quality but also influencing all segments of the educational process: organization, management, interpersonal relations, material and human resources, etc. Applying the approach described above, quality becomes total (integral). The introduction of TQM in educational organizations calls for a series of alterations. Starting with the management's and educators' perspective and actions and moving to the coordination and close observation of the educational process, to the assessment of its outcomes, to the general atmosphere of the organization and the social relations.

Measuring Results

TQM utilizes the following Quality Improvement (QI) tools such as cause and effect diagrams (Fishbone diagrams) , pareto charts, data collection through Check Sheets (Process Maps, Data gathering tools), Stratification of data, graphical tools such as Histograms, frequency diagrams and Pie charts, Statistical Quality Control(SQC) and Statistical Process Control (SPC), Scatter Diagrams and Plots and Correlation Analysis, Operation and Process Flow Charts.

Common Market Applications

- Manufacturing

Project considerations

TQM is a well-elaborated and proven effective approach in standardized production processes such as manufacturing. However, this would entail significant cultural changes to be observed for the development and systematic testing of the performance of the method.

²⁰ Sfakianaki, E. (2019) 'A measurement instrument for implementing total quality management in Greek primary and secondary education', *International Journal of Educational Management*, Vol. 33, No. 5, pp.1065–1081.

²¹ Kaiseroglou, Nikolaos, and Eleni Sfakianaki. "A review of total quality management applications in schools." *International Journal of Management in Education* 14.2 (2020): 121-134.

²² Bayraktar, E., Tatoglu, E. and Zaim, S. (2008) 'An instrument for measuring the critical factors of TQM in Turkish higher education', *Total Quality Management and Business Excellence*, Vol. 19, No. 6, pp.551–574.

8

Digital Competence Framework



Digital

The Digital Competence Framework (DigiComp) is a tool that can be customized so that digital skills developed and acquired can be applied in any different context. DigComp can be used by a very wide target, i.e. both by companies and institutions and by trainers and educators involved in processes of development of digital skills for their users.

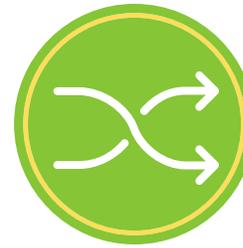
Key Characteristics



Acquisition of digital skills process as a progressive and transversal learning



Becoming competent in the digital work not a constraint but an opportunity



Interdisciplinary and allows for diverse training and career paths

Framework



DigComp is a framework that describes what it means to be digitally competent with a scale of 21 target skills, which refer to learning outcomes.²³ 'Competence' refers to not only what a student knows and understands, but also what he is able to do. The learning levels correspond with 8 progressive outcomes, from beginner level to highly specialized.²⁴

²³ 2020-09-D-51-en-2.pdf (eursc.eu)

²⁴ Digital Competences Framework (DigComp 2.2) update published - Occupazione, affari sociali e inclusione - Commissione europea (europa.eu)

Measuring Results

DigiComp maps the proficiency levels of Digcomp to the cycles in the European Schools. The DCF proposes, therefore, six proficiency levels.²⁵ Each proficiency level represents a step up in pupils and students' acquisition of the competence according to its cognitive challenge, the complexity of the tasks they can handle and their autonomy in completing the task. Each level of mastery considers several factors simultaneously:

- the student's level of familiarity with the proposed situation (simple, current, new),
- the complexity of practices with digital tools (elementary, complex),
- the degree of autonomy (with help, alone, shared with others),
- the complexity of procedures (application, development) and goals to be achieved,
- the knowledge necessary for their implementation.

Common Market Applications

- Education

Project Considerations

All educational staff can mobilize digital tools and resources that assist to the acquisition of digital competence in order to adapt the activities to the project's demands. At the micro level, the European Framework for the Digital Competence of Educators (DigCompEdu) can support and direct teachers' practice and ongoing professional development, while at the macro level, it can support the growth of school institutions as learning organizations by giving professional communities of practice a common platform for discussion, partnership, and ability to reflect. The DigCompOrg framework offers a thorough and general conceptual framework that captures all facets of the methodical integration of digital learning in educational organizations across all educational sectors and it can be modified to fit the various environments.

The methodology lacks green approaches to teaching- there is no area encompassing sustainability. Moreover, the methodology is used for students going to primary and upper high school, not the adults in VET education. Finally, it has to be adapted to the VET sector in the tourism industry.

²⁵ 2020-09-D-51-en-2.pdf (eursc.eu)

9 Educational Data Mining



Digital

Data Mining is the discipline of discovering valuable information, patterns and relationships through the analysis of large amounts of data. Data mining frameworks allow organizations to take data-driven decisions (business intelligence). Data mining can be a powerful tool in business dimensions that require strategic planning, like marketing, advertising, sales, finance, etc.

Key Characteristics



Predicting students' future learning behavior



Discovering or improving domain models



Studying the effects of educational support



Advancing scientific knowledge about learning and learners

Framework

"Educational Data Mining is an emerging discipline, regarding the developing methods that have a look into the unique and increasingly large-scale data deriving from educational settings and the use of these methods in order to understand more students and the settings which they learn in.

Whether educational data is collected from the students' use of interactive learning environments, computer-supported collaborative learning, or administrative data deriving from schools and universities, it has various levels of meaningful hierarchy. The study of these educational data is also determined by issues of time, sequence, and context."²⁶

Educational data mining has only recently been in the centre of attention from the research communities as an independent research area. In 2008 the annual International Conference on Educational Data Mining and the Journal of Educational Data Mining were established.

²⁶ <https://educationaldatamining.org/>

Measuring Results

Different methods are employed to derive results and findings from data mining methods. The most popular data mining methods are:

- Prediction
- Clustering
- Relationship mining
- Model-based discovery
- Distillation of data for human judgement

Common Market Applications

- Computer Science
- Bioinformatics
- Retail sales
- Security

Project Considerations

Educational data mining is characterized by several strong points. It outperforms traditional educational approaches & research paradigms, such as laboratory & in-vivo experiments as well as design research. However, data abundance is necessary in order to get quality results. Sofisticated computing software and advanced digital, statistical, and computing skills are also required.

10 Learning Analytics



Digital

The Education and Learning Analytics can collect user-generated data from learning activities and offer trends in learning engagement. Analyzing those trends can reveal learning behavior and identify their learning styles. The real-time, effective insights offered by learning analytics systems empower users to make thoughtful choices for their own benefit. Additionally, users have a variety of opportunities to generate creative company strategies thanks to the integration of current technology and analytics. By implementing learning analytics solutions, the education sector is utilizing data to make decisions that will increase productivity.

Key Characteristics



Assisting students' acquisition of techniques and skills for lifelong learning



Giving students personalized feedback about their learning in a timely manner



Supporting the growth of critical skills



Offering empirical evidence to support high-quality learning and teaching

Framework



E-learning platforms and modernized learning tools become more widely used, institutions are being influenced to embrace learning analytics to effectively manage, store, analyze, and report insights resulting from data created. The majority of institutions are neglecting the potential of big data produced by e-learning tools, which is impeding the market's growth, which is why the learning analytics market is still in its early stages of development.

Measuring Results

Measurement, or the straightforward process of tracking things and documenting values to let us know what happened, is where analytics begin. Simple math and statistics are not necessary for measurement, but you must first collect data.

Project Considerations

Similar to educational data mining, learning analytics, especially when dealing with big data require an abundance and constant flow of data in order to get quality results. Sophisticated computing software and advanced digital, statistical, and computing skills are also required.

It may be key to effectively measure key indicators of student performance, ease the support of student development, and better understand and improve the effectiveness of teaching practices.

Common Market Applications

Educational institutions worldwide, especially for higher educations and MOOCs providers

11 Six Sigma



Six Sigma is a methodology that improves organizational processes by streamlining operations, improving quality, and reducing defects in order to increase profitability. Originating from statistics, six sigma stands for the six standards of deviation that seeks to promote efficiency in the organisation. By promoting efficiency and reducing defects, companies can improve quality and save time. They can deliver better products, which can contribute to increased engagement and confidence among employees. When that happens, the company's bottom line is strengthened so as to better help drive it toward the top.

Key Characteristics



Reduce process variation



Enhance process control



Promotes work
standardisation and flow

Framework



The DMAIC (define, measure, analyse, improve, control) mode of action in Six Sigma searches for ways to incrementally enhance procedures that may already be in place but are performing below expectations.

In education, Six Sigma is often used in administrative processes. By reducing administrative and enrollment procedures and enhancing student experience, the Six Sigma continuous improvement technique enhances higher education institutions.

Measuring Results

Once CTQs (critical to quality characteristics) have been identified, a combination of interviews and surveys is used to quantify their effect on the student pass rate. In this phase, the process is analyzed to find out its present state and to help map out the desired future state.

Project Considerations

The use of Six Sigma can help the educational system better monitor pupils' growth over time. The educational system can examine a few elements that directly affect educational quality, such as teachers, curriculum, GPA, or the number of pupils in each class.

Schools and universities can use Six Sigma procedures to analyze student performances over a certain time period to determine each student's strengths and shortcomings.

Common Market Applications

- Education
- Healthcare
- Software

12 Project-Based Learning



Project-Based Learning (PBL) is one of the innovative approach models that allows students to get more involved in the learning process.²⁷ Project-based learning is a teaching model built from learning activities and stimulates students from various points of view by presenting them with a task to solve. Students are divided into groups and must achieve goals shared by the group itself.²⁸ PBL is an innovative approach where, starting from a concrete problem, instead of the traditional theoretical and abstract model, sees notable improvements in students' ability to retain knowledge as well as the opportunity to develop complex competencies such as critical thinking, communication, collaboration or problem solving.

Key Characteristics



Based on real-world challenges

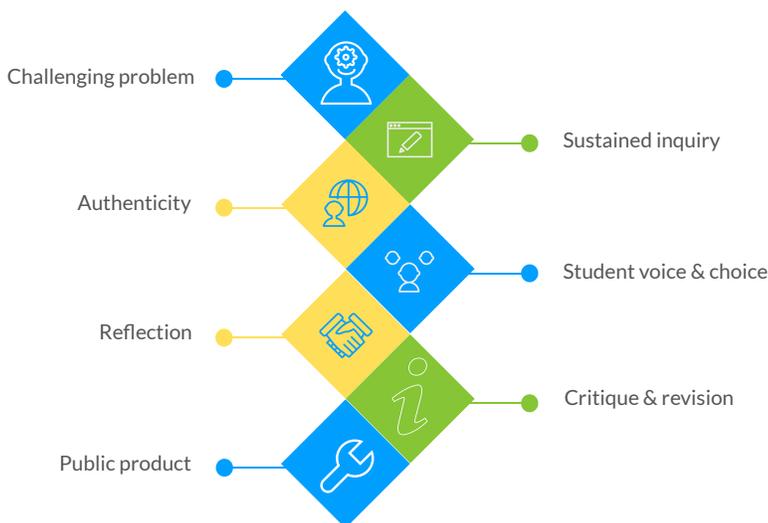


Real learning occurs through the project



Learner-directed

Framework



PBL encourages learners to play a key role in all stages of the project, which increases their motivation to learn by providing direct learning experiences that increase their interest, activeness, and interaction to improve their critical thinking.

²⁷ Bell S 2010 Project-Based Learning for the 21st Century: Skills for the Future The Clearing House: A Journal of Educational Strategies, Issues and Ideas 83(2), 39-43

²⁸ Stivers 2010 Project-Based Learning Why Use It? 1-8

Measuring Results

Teachers should give small, but clear and detailed tasks (projects) describing real life problems that are closely related to the VET sector in the tourism industry with special attention given to digital, green and innovative approaches to teaching. Afterwards, teachers must ensure that the set up objectives were actually met by students (through a simple checklist or report or similar).

Common Market Applications

- Education

Project Considerations

The methodology is a great fit for the project as it can make a positive impact on: student motivation; communication ability; critical thinking skills; students' creativity; problem solving ability; cooperation and collaboration ability. This is especially important when implementing something new such as innovative approaches to VET offerings in respect to sustainable tourism which is also a new paradigm. By teaching based on real-life projects and integrated tasks, PBL enables students to understand abstract theory and to bridge the gap between theory and practice which is a key to successful project implementation.

13 Mooc Cuisine

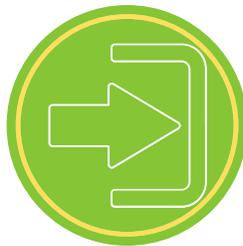


Mooc Cuisine are distance courses that are sometimes completely free (depending on the chosen course) and encompass all the professions of catering. It is a digital learning environment with a massive community of learners that focuses on personalised learning to train learners at their own pace, according to their objectives, level, and available time.

Key Characteristics



Loosely structured learning



Making education more accessible



Turning higher education into a public good

Framework

Mooc Cuisine is an online training platform and as such has high educational characteristics. It serves as a digital environment that allows education and training of both students and adults wishing to learn about something specific. There are already similar platforms in education, although they are not developed to that extent.

Measuring Results

The results achieved are measured by the exam and/or final project according to predetermined criteria set up in the course syllabus. At the end of the course, if the learner passes all the learning outcomes, he or she receives a certificate.

Common Market Applications

- Education

Project Considerations

Mooc Cuisine is a great example of a personalized path for adults who wish to learn more about VET offerings in the tourism industry. It is highly flexible hence it fits into the modern work-life balance approach.

Moreover, Mooc Cuisine results in a community of learners building networks around the same topic of interest and engaging in the same activities. Thereby, because DGI Tourism is an innovative project in its nutshell and deals with new problems caused by covid19 and climate change, Mooc Cuisine could be in similar vein beneficial when replicated in the VET sector by creating VET community with shared interested in sustainable tourism and post-covid environment regeneration.

This is an example of the online training courses designed in a digital environment (collaborative platform), however, there are still no examples of the VET courses in the tourism industry especially in relation to digital, green or innovative approaches to VET offerings.

14 Student Response System



Online service that provides a just-in-time training, learning and evaluation methodology, supported by the most recent mobile technology.

The SRS contributes to the establishment of new pedagogical methods that lead to the intensification and reinforcement of the teaching models by upgrading communication and instructional feedback.

Key Characteristics



Collecting real-time responses from students



Can be used for class discussions and peer instruction



Immediate visual feedback to create a more encouraging and engaging learning environment

Measuring Results

Clicker activity, test performance, and class absence

Common Market Applications

- Education

Project Considerations

The SRS can provide an insight in creating engaging tools for learning in the digital component of the project. It is well tested in standardized classroom learning. While there are various multidisciplinary studies looking at its efficiency in many fields, hardly any studies link SRS with sustainability education. Standardization is also contrasting too much sustainability pedagogical approaches (see Burns Model of Sustainability Pedagogy).

15

Demand-Driven VET delivery



Demand-Driven VET delivery concentrates on the study of what is needed for the VET systems to reinforce the connection of delivery to the needs of the targeted labor market.

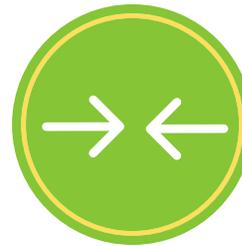
Key Characteristics



Short-term requests for skilled labor



Address regional labour market issues within a country



Matching labor supply and demand

Measuring Results

Reverse Tracer Study

Common Market Applications

- National-Level Planning for VET Delivery

Project Considerations

Demand-driven VET delivery is a well-laid-out method for analyzing the market demand for labor. However, this does not necessarily account for the project's goals.

²⁹ Godfrey, M. New approaches to employment planning. Employment paper N 5. ILO. Geneva. 1996

16

Methods of Playful Learning



Innovative

Playful learning stimulates intrinsic motivations since it is active, creative and experimental with a focus on gaining skills and knowledge in a joyful and fun way. Wondering, taking risk, constructing and failing as well as reflecting critically are supporting students on their way. During the last years, games and gamification have been applied to learning and teaching in almost any type of school. This trend of using game principles in learning is also used in higher education as universities are developing escape rooms, serious games, and other gamified teaching methods.

Game mechanics are less important than dynamics and spontaneous acting. Different and flexible settings (classroom, outdoors, virtual environment, et cetera) open a variety of opportunities.

Key Characteristics



Learning through games
and gamification



Spontaneous and flexible

Measuring Results

- Direct (e.g. quizzes, homework)
- Indirect (e.g. course evaluations)

Common Market Applications

- Education

Project Considerations

Learning through discovery rather than being told facts enables deeper, contextualized learning. This method can enhance motivation, engagement, and cognitive and social learning. Resistance from learners and/or other educators may occur, particularly for older learners.

17

Qualitative Analytics Methods



Innovative

Qualitative data analysis delves into examining available data to identify general themes and recurring patterns on a specific research topic.

“Qualitative Research in Education gathers the outcomes from the educational researches carried out in different fields, disciplines and qualitative methodological approaches. These investigations have as a final purpose to improve the educational processes or contexts.”³⁰

Key Characteristics



Gaining insights, reasoning, and motivations



Non-numerical approach



Understand people's beliefs, experiences, attitudes, behavior, and interactions

Measuring Results

Interviews, focus groups, observations, teacher reflections, or case studies. Secondary sources such as reports, student records, are also helpful.

Common Market Applications

- Education

Project Considerations

Since qualitative research addresses 'why' and 'how' questions and enables deeper understanding of context and experiences it is important in educational research in general and for the project. However, Identification, examination, and interpretation of some patterns and themes like social competences can sometimes be challenging.

18 GreenComp



Green

GreenComp is the European sustainability competence framework. It advances a shared understanding of what sustainability as a competence entails and offers guidance to educators while giving learners a common ground. It meets the expanding demand for individuals to enhance and develop the knowledge, abilities, and attitudes necessary to live, work, and act in a sustainable manner. It is intended to promote training and learning activities for lifelong learning. It is written for all students, irrespective of age, educational level, and learning environment (formal, non-formal, informal). It offers a generic reference model that all lifelong learners may use to provide learning opportunities for acquiring sustainability competencies and to evaluate the success of supporting education and training for sustainability.

Key Characteristics



Designed to support education and training programmes for lifelong learning



Can be adapted for formal, non-formal and informal learning



Forms a knowledge basis for everyone who cares about our planet's present and future state



Competences are closely interrelated and interconnected

Framework



Image source: [Greencomp Conceptual Reference Model](#)

Measuring Results	Project Considerations
Questionnaires and surveys	By assisting users in gaining the information, abilities, and attitudes necessary to think, plan, and act with empathy, responsibility, and care for our world, GreenComp aims to promote a sustainable mindset. The development of GreenComp required a comprehensive study process that included a large, diverse group of specialists and stakeholders in order to forge consensus on a planned proposal.
Common Market Applications	
Education	

19

Green Methodology for Learning Assessment



Green

Green methodology exploits a peer learning approach so as to facilitate trainees in learning from peers and make reflections in vocational education. This is done using mobile devices and using a green learning arena that eliminates the need for printed material typically used in learning assessment.

Key Characteristics



Integrated with digitalisation



Activity-based training



Interactive peer-assessment

Measuring Results

With digital tools & services. Questionnaires for measuring results are completed with a smart phone or a computer.

Common Market Applications

- Education

Project Considerations

Assessment framework that completely eliminates printed paper requirements and scanning. Improvements in the trainees' learning motivation and learning achievement. Requires digital skills to fine-tune the questionnaires.

» Innovation Management

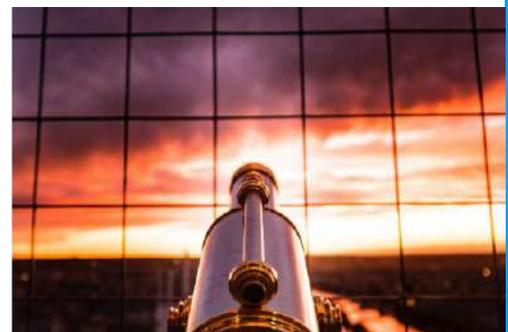
Innovation management involves the use of tools that allow managers, employees and clients/users to collaborate under a common understanding of processes and goals. In this way, innovation management allows the organizations to cope with newly introduced internal or external environmental changes and bring into the spotlight fresh solutions, products or processes. Innovation management is the subject of ISO 56000³¹ and contributes to the Sustainable Development Goals of the United Nations: 4,8,9,16.

As already mentioned, changes in organizations may come up either due to external conditions (market-driven requirements) or internal adaptations. The implementation of changes can follow either the “top-down” or the “bottom-up” approach.

Educational change is defined as “Change intended to alter the goals of education and/or to improve what students are expected to learn, how students are instructed and assesses how educational functions are organized, regulated, governed and financed.”³²

Educational innovations are becoming more and more important over the years, as it is evident that in order to adapt to labour market needs, secure a competitive advantage and offer high-quality education & training, education institutions need to constantly focus on strategic leadership in terms of:

- Curriculum (use of new or revised curriculum materials, including the use of technologies),
- Pedagogy (new teaching approaches or planning) and
- Scholarship (change of beliefs or vision)³³



³¹ <https://www.iso.org/standard/69315.html>

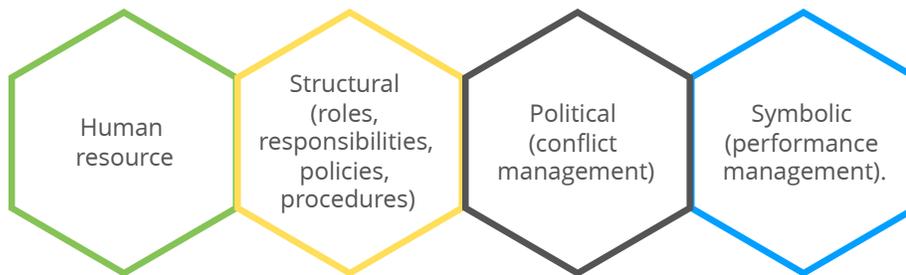
³² Duke, D. (2004), *The Challenges of Educational Change*, Pearson, Boston, MA.

³³ Fullan, M. (2007), *The New Meaning of Educational Change*, Teachers College Press, New York, NY.

Several innovation management models can be found in the literature, among them Kotter's theory³⁴ introduces 8 distinct steps that need to be followed to facilitate quick, continuous and effective changes:

- | | |
|---|--|
| <p>1 Create a sense of urgency</p> <p>2 Form a powerful guiding coalition</p> <p>3 Create a vision</p> <p>4 Communicated the vision</p> | <p>5 Empower others to act on the vision</p> <p>6 Plan for and create short-term wins</p> <p>7 Consolidate improvements and produce more change</p> <p>8 Institutionalise the new approaches</p> |
|---|--|

Another model, that is very popular in the educational sector, is the Bolman and Deal model³⁵. It proposes that organisations should constantly refer four perspectives or frames:



Each frame has its own scope. When all of them are considered as a whole, it offers a deeper understanding of the organisation.

In overall, it is considered important for managers to encourage creativity and be able to introduce this into the organisation's culture effectively. This also applies to the educational sector that needs to be prepared to adapt fast to change, encouraging a creative culture. Moreover, the use of innovation management methodologies & tools (i.e. brainstorming, prototyping, product lifecycle management, idea management, design thinking, portfolio management³⁶, etc.) can lead to enhanced capacity within the employees and subsequently to the continuous development of the organisation.³⁷

³⁴ Kotter, J.P. (2007), *Leading Change: Why Transformation Efforts Fail*, Harvard Business Press, Boston.

³⁵ Bolman, L.G. and Deal, T.E. (1999), "4 steps to keeping change efforts heading in the right direction", *The Journal for Quality and Participation*, Vol. 22 No. 3, p. 6

³⁶ Innovation management. Korona plus d.o.o. Institute for Innovation and Technology, Slovenia, 1st edition, 2013. ISBN 978-961-90592-9-6 (pdf)

³⁷ Clark, Charles H. (1980). *Idea Management: How to Motivate Creativity and Innovation*. New York: AMACOM

» Stakeholder Mapping & Early Analysis Activities

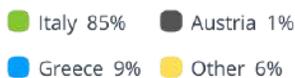
For Project Result 1, a second dedicated spreadsheet has been created. With the contribution of all the Consortium partners, the spreadsheet will allow mapping relevant stakeholders within the partners' network. These stakeholders, at a later stage, will be reached in order to help the Consortium in a twofold way:

- The collection of feedback that would provide an additional layer of validation for the project results,
- The promotion of the DGI Tourism results in relevant organizations that hold the potential of maximizing the project's impact and its societal and industrial value adoption

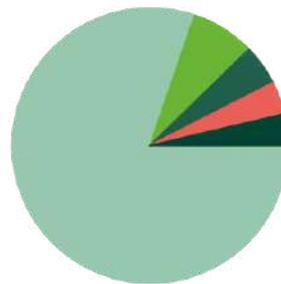
The choice of stakeholders is closely related to their impact on different target groups including VET centres/providers, trainers, and trainees but also policy and decision-makers. The project will try to benefit from all these various stakeholders in order to gain knowledge on the current needs and different social, economical and environmental aspects..

In that spirit, Consortium partners have identified 450 stakeholders in total, which are further categorized as in the following figures based on HQ country and Organization Type.

By Country



By Organization Type



It should be noted that:

- Tourism bodies include hotels, hostels, chain of hotels, travel agencies & online travel agencies.
- E&T bodies include VET centers, Universities & Schools.
- Associations include chambers & cooperatives of the tourism industry and beyond.
- At certain cases, umbrella organizations have been reported - which is also evident in the statistics. For example, in Austria, the travel association, reported that it has more than 160 members from all fields of tourism, which could be of great value for feedback provisioning.

Consortium partners will reach stakeholders in order to get in contact with them and confirm their willingness to join the project and contribute by providing feedback as an additional validation layer at the project results. Furthermore, those who continue with cooperation will receive newsletters which will be created along with project duration. Hence, the project's identified target groups, indirect stakeholders, and the general public at large, will receive a series of electronic newsletters (a planned number of 4), comprising information on the project, project results, and orientation. The document will be available electronically on the project website and will be sent by e-mail to the identified stakeholders, relevant contacts of the Consortium members and interested parties, respecting GDPR rules. The document will be drafted in English and then translated into all national languages of partners. The DGI Tourism newsletters will help attract the attention of all stakeholders and build a loyal connection with them.

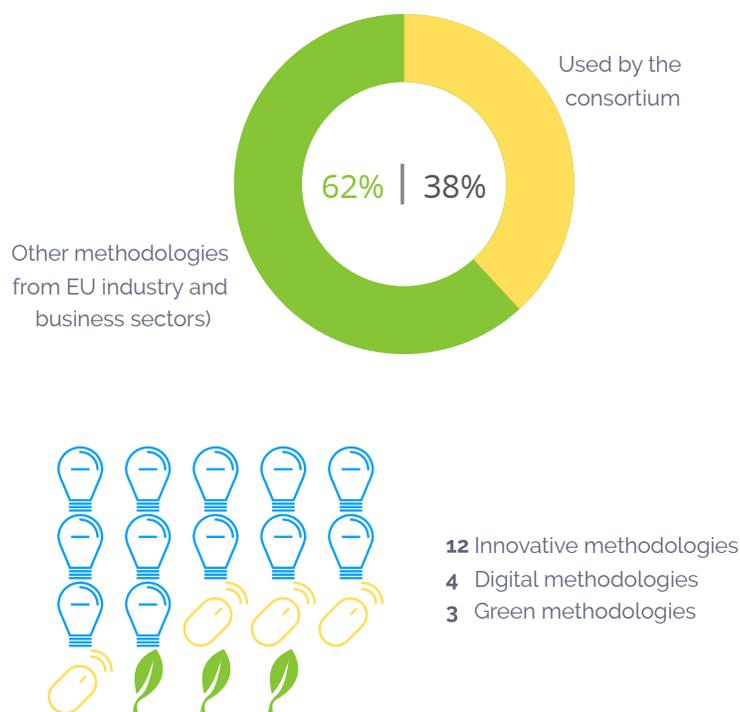


» Conclusion

The tourism sector was under transformation even before the Covid-19 pandemic. Sectorial behavioural and digital swifts require new skills uptake from tourism professionals in order better adapt to labour market needs. The DGI Tourism project aspires to address these needs, by proposing an innovative VET offering that is expected to help VET students & travel professionals to adapt and align to the market needs and economic challenges, proposing an intelligent skills mix (including green and digital).

Based on the outcomes of PR1/Task 1, a selection of methodologies and quality assurance models in industrial and business sectors was delivered. Innovation management was also analysed in the field of education and in general. In total 19 methodological frameworks were identified and elaborated based on their applicability to address the project's needs.

Finally, here is a summary of methodologies identified in this project task:



Finally, the consortium partners contributed in mapping an ecosystem of 450 external stakeholders consisting of lead organizations on an international, national and regional basis that will facilitate knowledge sharing and further increase the visibility of the project results.



The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors. The Commission cannot be held responsible for any use which may be made of the information contained therein.

Project Consortium Partners



Co-funded by the European Union