Result No 1

Fostering Digital and Green Transformation in SMEs
2021-1-PL01-KA220-HED-000027531

Green aspects of the digital transformation in SMEs Curriculum

The authors of this Project Result:

1. Uniwersytet Ekonomiczny w Poznaniu, Poland
2. Universita Degli Studi di Macerata, Italy
3. Universitat Rovira I Virgili, Spain
4. Kauno Technologijos Universitetas, Lithuania
5. EFMD AISBL, Belgium
6. Conform-Consulenza Formazione e Management Societa Consortile a Responsabilita Limitata, Italy
7. Fundacja "Partnerzy dla Samorządu", Poland

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1 General information

GENERAL CHARACTERISTICS OF THE STUDIES CONDUCTED

1) Name of the field of study: **Green aspects of the digital transformation in SMEs**

2) Level of education: **master, postgraduate**

3) Education profile: **general academic**

4) Form of studies (full-time / part-time): **full-time/part-time**

5) Professional title awarded to the graduate: **Specialist in green digital transformation**

The curriculum is designed for academic specialists and experts, as well as postgraduate.

It is possible to take it as part of a full master's degree program, where it serves as an introduction (during the first two semesters) to the specialized knowledge that can be given in a variety of fields of study, most notably in the fields of economics and management, but also in the fields of natural science, engineering, and technology, and even the humanities.

A graduate who wishes to become a Specialist in green digital transformation will need to acquire the information outlined in this curriculum to make effective use of the results of green digital technology.

6) Total number of hours of lectures and classes: **375**

7) Number of ECTS points necessary to complete studies at a given level: **15**

8) Number of semesters: **1**

9) An indication of the discipline or disciplines (with an indication of the main discipline) to which the learning outcomes relate, and for each of these disciplines, the percentage of the number of ECTS points in the number of ECTS points necessary to complete studies at a given level:

- economics and finance: 50% leading discipline
- management and quality studies: 25%
- computer and information sciences: 25%

10) Modules:

Module 1: Introduction and institutional aspects of SMEs transformation

    Unit 1.1. Circular and digital economy: from the current economic model to sustainable development

    Unit 1.2. Transforming business models toward a sustainable business

    Unit 1.3. Alternative financial models for green evolution of SMEs

Module 2: Digitalization: new techs and the impact on SMEs

    Unit 2.1. Deployment of digital workforce in SMEs

    Unit 2.2. Practice to use robotics in SMEs operations

    Unit 2.3. Implementation of information and data security in SMEs operations

Module 3: Circular economy

    Unit 3.1. Circular resource management

    Unit 3.2. More rational use of energy by SMEs

    Unit 3.3. Logistic transformation Data security, digital privacy

Module 4: Green marketing

    Unit 4.1. Green marketing as a differentiation strategy

    Unit 4.2. Practice of SMEs to add value for the consumer through green marketing

    Unit 4.3. Measuring the impact of green marketing

11) Description of the field of study, in particular the goals of education and employment opportunities (typical jobs) and continuation of education by graduates

Students pursue a curriculum that is geared to a world in constant turmoil. The relevance of factors that have an impact on the natural world is growing in the context of today's digital transformation. Sustainable digitization is becoming more fundamental to our understanding of IT growth recently as a result of the fast improvements in technology. In today's linked world of computers, smartphones, and the internet, it's more challenging than ever to find effective solutions to environmental concerns. Our carbon footprints may be minimized with digital technologies. The rationalization of the use of natural resources is one of the many benefits of digitization, and IT solutions are also becoming progressively less harmful to the environment.

We can make numerous changes to our digital lives to reduce our environmental footprint in this area. To achieve this goal, it is essential to raise this type of consciousness within the next generation of business leaders and among representatives of SMEs. If you're looking to undertake green digital transformation, you'll need a firm grasp on how to apply emerging technologies like green marketing, circular resource management, AI, blockchain, and robots.

The program is directed not only to students of economic or political faculties, especially not only to technical faculties. It is a program that can complement studies with various specializations, from economics, politics, and sociology through pedagogical, agroeconomic, medical or typically humanistic studies. Humanists' digital skills are highly valued by employers.

PROFESSIONAL CAREER DEVELOPMENT

This field of study primarily allows you to expand or deepen your economic and business knowledge and continue your master's or postgraduate studies.

The program develops the skills necessary to start a career as:

- highly qualified specialists in various types of organizations (various enterprises, non-profit organizations, public administration units, local, regional or national government),

- heads of operational, financial, and analytical departments in international corporations or small and medium-sized enterprises (SMEs) operating on a national and international scale,
- entrepreneurs running their companies on the domestic and international market.

12) The manner of considering the results of the analysis of compliance of the assumed learning outcomes with the needs of the labour market

The needs of the labour market were considered thanks to the implementation of focus groups, which consisted of almost 140 people of various origins. Those needs were also confirmed thanks to the desk research of the Consortium Partners. Business orientation has been checked also by business Partners of the Consortium.

2. Methodological framework

Curriculum, as we comprehend it today, has developed through the years, from precarious and muddled to a range of systematically planned and unplanned relevant learning experiences that occur in the educational process. Beginning in the 1980s, Harden et al. (1984) proposed a model for educational strategies in curriculum planning with the mnemonic SPICES, used mostly in medical schools but possibly applicable also at other universities. It covered the following elements:

S- Student-centred – the student is responsible for their own education. It means that he/she must set their own learning objectives, decide about the pace of learning and evaluate their own education according to their own criteria. The emphasis is put not on what the teacher teaches, but what students learn.

P – Problem-based – the main purpose of this is to use the method as a vehicle to develop a usable body of integrated knowledge and to develop problem-solving skills.

I – Integrated teaching – in this approach, the university organizes a teaching structure to interrelate or unify subjects usually taught in separate academic course or department. This curriculum has been created as a perfect example of an integrated teaching method.

C – Community-oriented – a teaching process must be community-based; this means that it must be consistent with the expectations of the local community and its strategy.

S -Systemic approach – the education process must be treated as a system of joined and interrelated elements, so all courses are set to the same goals and learning outcomes.

In 1998, David Kern (2009; 2015; 2016) proposed another teaching model, based on 6 steps (the methodology of this curriculum has been based on this approach):

1) Problem identification and general needs assessments – this is a basic step, where educators must find out what the purpose is of developing a new curriculum: a new kind of knowledge, or perhaps tools which need to be reconsidered,

2) Targeted need assessment – the first step must be operationalised in terms of the needs of the targeted learners,

3) Goals and objectives – the fundamental part of the curriculum, where goals are defined as a broad concept to be achieved and objectives are the targeted results of the curriculum development,

4) Educational strategies – defines how the outcomes should be achieved,

5) Implementation – a strategic plan for how to achieve the desired outcomes,

6) Evaluation and feedback – ways educators can discover whether the curriculum has been developed properly and whether it needs refinement.

Another model – PRISM, proposed by Bligh (2001) - can be broken into the following components:

P – Product-focused –a more practical approach focused on the application of methods rather that theoretical knowledge,

R- Relevance – this is like the community-based approach (from Harden, 1984): the curriculum should address problems raised by the community and local stakeholders,

I – Interprofessional – students must work in teams to jointly solve problems,

S – Smaller – classes should be small, and lectures should cover smaller units, as concentration is higher when a unit does not last as long,

M – Multisite - further emphasizing the product-focused goal of the curricula while at the same time achieving social aims,

S – Symbiotic – the outcome must be consistent and interrelated.

It is important to indicate skills that are crucial from the student's perspective. In the conditions of digital transformation, knowledge becomes a key resource, while the key competence of people and organizations – is the way to quickly adapt and use this knowledge. The labour market shaped by the processes of automation and phantomization appreciates employees who, based on advanced cognitive, social, and technical (including digital) competencies, can adapt the profile of their skills to the rapidly changing expectations of employers. The competences that distinguish human work from the work of IT systems, robots or artificial intelligence are of key importance. Since people will still be difficult to replace in these areas, they have been called the competences of the future. These include (Włoch & Śledziewska, 2019):

COGNITIVE COMPETENCES - commonly referred to as thinking competencies. It is a very broad concept, covering both creativity and logical reasoning and solving complex problems.

SOCIAL COMPETENCES - they are necessary in a work environment that requires contact with other people, teamwork, or people management. These include effective teamwork, leadership and entrepreneurship, and emotional intelligence.

DIGITAL AND TECHNICAL COMPETENCES - these are the skills of the so-called hard. Particularly important are digital competences, which are becoming of fundamental importance. They are not limited only to programming or data analysis but cover a wide range of skills from digital problem solving to knowledge in the field of privacy or cyber security.

We need to include all those competencies in the framework of green revolution, which takes the whole thing to another level.

To deliver those skills, a new approach towards teaching is required. We can observe different trends in teaching paradigm, where the most important are constructivist, humanistic, or even critical-emancipation paradigms. In each of them, teaching and learning are understood and defined in a different way, different roles are attributed to students and teachers, and different strategies and teaching forms are used. Hence, depending on the adopted paradigm, teachers use different models of designing and teaching classes in their academic practice. Among several cognitive and social learning theories widely spread in recent years, it is constructivism

which seems to be the best known. Constructivists believe that learning consists of the learner's giving meaning to the process of the construction of individual cognitive structures, which takes place thanks to his or her involvement and multilateral activity. In accordance with the assumptions of constructivism, learning occurs when (Pritchard, 2009: 32–33):

• the construction of knowledge, rather than the reproduction of knowledge, is paramount,
• new information is built into and added onto an individual's current structure of knowledge, understanding and skills,
• students construct their own knowledge in an active way (active learning strategies) rather than take an information,
• students use their previous knowledge in building new knowledge,
• training involves the use of a variety of resources,
• authentic tasks in a meaningful context are encouraged,
• reflection on prior knowledge is encouraged,
• collaborative work is encouraged,
• autonomy is encouraged.

Examples of constructivist classroom activities are:

• Role playing,
• Problem-based learning,
• Inquiry-based learning,
• Reciprocal teaching/learning,
• Cooperative learning,
• Competence-based learning.

Another important teaching trend is edutainment, which is combination of education and entertainment. The main purpose of edutainment is to promote student learning through exploration, interactivity, community experience, teamwork, trial and error, and repetition in such a way that students get so lost in the fun that they do not realise they are learning at the same time. Aksakal (2015) points out the following characteristics of edutainment:

• entertainment and interaction, which is thought to be missing in education, attracting learners' attention due to being gamified,
• combining education and entertainment and increasing learners' excitement and enthusiasm to teach them subjects and information that is hard to learn,
• acquiring learning more easily by making the subjects and information that will be taught more enjoyable,
• attracting learners' attention and gaining the permanence of learning by the rousing of learners' feelings,
• making the internalisation of difficult subjects easy using methods of simulation or graphs and visual methods, like in real life,

- teaching how to use resources and methods regarding the value of life by combining educational aims and measurement,
- teaching how individuals in learning environments apply their own knowledge,
- demonstrating how individuals understand or internalise what they learn,
- used to teach to learners combining what they perceive or evaluating what they learn,
- finally, it provides learners with a good time in the process of creating and experiencing.

Edutainment is an attractive method of teaching, since it encourages personalised learning, enhances creativity and visualisation, transforms a conventional classroom into a smart classroom, improves interactive and collaborative teaching and learning methods, promotes a digital culture and provides technological tools for educators.

One more trend worth attention, while it corresponds closely with constructivist approach – is Competence Based Education. In basic terms, competency-based education means that, instead of focusing on grades and yearly curriculum schedules, the focus is placed on how competent each student is in the subject. In competency-based learning, the focus is placed on deep understanding that is demonstrated through application of the gained knowledge. This means that learning outcomes are proven by action and focus on building the skills students need to become better learners into adulthood.

The process of developing the curriculum must consider modern approaches and try to follow trends shaping the education market today and responding to the challenges of contemporary world.

2.1. Problem identification and general needs assessment

Climate change and environmental degradation present an existential threat to Europe and the world. Smart use of clean digital technologies can serve as a key enabler for climate action and environmental sustainability. The digital transition and a smarter and greener use of technologies will help make Europe the first climate-neutral continent by 2050, a key goal of the European Green Deal. Technology can improve energy and resource efficiency, facilitate the circular economy, lead to a better allocation of resources; reduce emissions, pollution, biodiversity loss and environmental degradation. At the same time, the ICT sector must ensure the environmentally sound design and deployment of digital technologies. On December 2020, 26 Member States and Norway and Iceland have signed a declaration to accelerate the use of green digital technologies for the benefit of the environment. They will deploy and invest more green digital technologies to achieve climate neutrality and accelerate the green and digital transitions in priority sectors in Europe, for example by using the NextGenerationEU and Invest EU funds. The joint goal is to accelerate and take the global lead on the green digital transformation, building on the Council Conclusions of 17 December 2020 on "Digitalisation for the Benefit of the Environment", as well as on the Digital Strategy (COM/2020/67 final). The higher education system has to work together with the Politicians and to establish the European Green Digital Coalition that will accelerate the ICT sector's transition towards a sustainable, climate neutral, circular and zero pollution economy while at the same time contributing to innovative, sustainable, inclusive and resilient society and economy. This project is a big step forward this initiative. There are many courses and programmes in higher education that are oriented on the digital transformation, but it is impossible to find a curriculum that directly covers green aspects of the digital transformation. One fact that is worth to mention is also that SMEs not often invest in green digital technologies. They usually perceive green investments as a cost that never is given back. The project concentrates on the Course oriented on managing green digital transformation in SMEs. Small and Medium-sized Enterprises (SMEs), including micro-enterprises, are important engines of innovation, growth, job creation and social cohesion in high-income/emerging economies, as well as low-income developing countries. In the former, SMEs undertake the majority of private economic activity, and account for more than 60 percent of employment and 50 percent of GDP. In the latter, SMEs contribute on average to more than 50 percent of employment and 40 percent of GDP; furthermore, they contribute significantly to broadening employment opportunities, social inclusion, and poverty reduction (G20/OECD 2014). To put this in perspective, in the EU27 the overwhelming majority (some 20.9 million, or 99.8 percent) of enterprises active within non-financial business economy in 2008 were SMEs.

These accounted for two out of every three jobs (66.7 percent) and for 58.6 percent of value added within the nonfinancial business economy (EUROSTAT 2011). SMEs, therefore, are core economic engines for all members of the G20 (2021, G20 insights). Higher educational system must follow the changes that are being pursuit in the real economy. We need to educate Students aware of the importance of green and digital revolution, aware of the importance of every small eco-innovation in every sector. We need to adjust academic curricula to the requirements of processes that are running around. As our students are future entrepreneurs and employees, the knowledge that we will transfer them now will benefit in next years. We are all responsible for our planate.

According to the document "Towards a green, competitive and resilient EU economy: How can digitalisation help?" (Hedberg and Šipka, 2020), The European Commission's Green Deal proposal already recognises that the two transitions (digital and green) are closely linked. For too long, the green transition and digital transformation have been promoted separately, even though their alignment would bring many benefits. Better management of data and the deployment of digitally-enabled solutions can provide the means to make our economy – including our food, mobility, and energy systems – more competitive while also contributing to climate action and environmental protection. Connecting governments, people, companies, and things will enable the sharing of valuable information and co-creation of needed solutions. Digital solutions are already behind many novel business models, and they could be utilised even more for greening our economy. They can help improve the design of products and support people's 'right to repair'. They can help us consume fewer materials and less energy, reduce emissions, minimise waste and even support dematerialisation. Moreover, they can enhance governance, including the implementation and enforcement of relevant rules needed to protect our natural capital like biodiversity; enhance the circular economy; and achieve climate neutrality. As the world around us becomes more and more digital, tools and methods must consider the technological aspect. The global processes especially affect SMEs, which are not so properly prepared to finance all required changes. We need to consider first the following processes:

1) The shift of trade to the web - the rapid growth of e-commerce - the coronavirus epidemic accelerated the global trend that was taking place anyway as part of the technological revolution known as Industry 4.0 - companies that have not yet moved their activities online are losing their competitiveness faster and faster and they will soon be unable to cope with the competition.

2) Automating customer service by introducing chatbots. With resource constraints, the smart way to get things done is through automation.

3) Generation Z has become the greatest market force, understanding the market completely differently and displaying consumer behaviour in a completely different way than previous generations. This creates a demand for new marketing strategies, new tools, and

new skills, as well as for new content that must be more visual and saturated with deeper content than before - refer not only to the substantive content of the message, but also for an attractive and visual message.

4) Moving business processes to the cloud - companies implementing the cloud have many benefits from improving processes, and at the same time cloud solutions are advanced, inexpensive, and easy to use.

5) Green shift – considering aspects of protection of the environment in every aspect of business operation.

2.2. Goals and objectives

The main concern of this project is how to increase of Students awareness on importance of green impact from usage of digital technologies. General objective is to **develop and transfer innovative and good practices to improve quality of higher business education, enabling preparation Students to use green digital technologies.**

The following specific goals have been set for this curriculum:

G1: Increase knowledge, skills, and competencies of Students.

G2: Transforming future entrepreneurs' thinking to act in the era of green digital transformation.

G3: Transforming Students minds towards thinking about green economy as a source for gains, not costs.

G4: Promote the skills and operational tools necessary to manage green innovation and the implementation of new digital technologies in SMEs.

G5: Improving and fostering a deep understanding of green and digital transformation at HE and it impact on business reality, as well as business and social relationships.

G6: Prepare Students to act as a "green and digital transformation agent".

G7: Increase competencies of Academics.

Measurable objectives that can be used with regards to the curriculum:

a) Number of visitors of the platform,

b) Number of students registered on the platform,

c) Number of students taking the course,

d) Number of check-ups as a way of practical validation of the acquired knowledge,

e) Number of movies recorded by students,

f) Number of case studies prepared by the Consortium.

2.3. Educational strategies

COVID-19 has forced a change in existing teaching patterns. Distance learning has ceased to play a supplementary role in the teaching process and has become a basic role. This generated several new challenges in the field of teaching. In many cases, the solutions were created based on the current way of conducting classes and the change consisted only in switching to online teaching. In retrospect, such a solution seems inappropriate.

Within the IDEA[1] project there were some recommendations developed, especially in the school-based subsystem. There are the following (IDEA, 2022):

- Inclusiveness and engagement strategies in digital education must be tailored for different students' groups based on their backgrounds, profiles and behaviours,
- Training and upgrading staff, and to some extent students', skills is a necessity. This refers not only to digital skills but also to cultural and interpersonal ones,
- Face to face education remains essential to humanize the learning experience and implement practical activities,
- Digital technologies should be applied to transform educational pedagogies and support learning journeys, but not relied upon as the core proposition,
- Content and methods need to be designed specifically for online environments,
- A shared understanding and coordination of inclusive strategies in digital education is needed among the different schools, departments, admission, and students support offices in HEIs.

Then it is crucial to combine those elements and implement them into educational strategies that includes more constructivist approach. The following pedagogical approach are suggested to be used while executing education process according to that curriculum (Pietrzykowski, 2019, 32-34):

- progressive education: emphasis put on learning by doing, integrated curriculum focused on thematic units (here green, sustainable and digital economy); strong emphasis on literacy, engineering, digital skills, problem solving, critical thinking; team work, development of social skills; collaborative learning projects; personalized learning; blended learning; emphasis on lifelong learning and social skills; tutor works not in the position of authoritarian, but rather as facilitator of the discussion or a group leader; movement for physical and mental health is recommended to create a sound body and mind,
- experiential learning: refers to the experience of the student; the student has to be actively involved in the experience and must be able to reflect on that experience, then use analytical skills to conceptualise the experience and finally make decision how to use new

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ideas gained from the experience – these four stages are the key elements of the Kolb learning cycle; people by their nature prefer a certain autonomous learning style affected by different factors and go through three stages of personal development, which are: acquisition (birth to adolescence) – acquiring basic abilities and cognitive structures; specialisation (schooling, early work and personal experiences of adulthood) – development of a particular specialised learning style affected and influenced by their own background; and finally, integration (from mid-career on) – expressing a non-dominant learning style in all life domains,

- situated learning: a model of learning in a community or practice – in this sense, the classroom is not determined, and it can be a very random place; students become a part of the community through the learning process; they understand and experience the world, as well as knowledge, through the constant interactions by which they reconstruct their identity and evolve the forms of their membership in the community as their relationships change. In situated learning, no importance is given to the retention of the content; learning begins with people trying to solve problems; when learning is problem-based, people explore real-life situations to find answers, or to solve the problems,

- service learning: community oriented – combines learning objectives with community service in order to provide a pragmatic, progressive learning experience while meeting societal needs; it covers the following hands-on learning methods: volunteerism, community service and internship; students get tasks combined with delivering value for society, which enables them to practically use the theoretical knowledge acquired during formal education; the lessons learned from these situations are discussed during the lesson, creating a closed circle of school (theory) -practice (experience) -school (combining experience with theory),

- problem-based learning: students learn about a subject through the experience of solving an open-ended problem, usually in small groups with a tutor to facilitate discussion; students set their own goals and conduct their own research before coming to the group by individually searching for materials related to the topic; every person in the group has a role to play; fosters active learning, and also retention and development of lifelong learning skills; it encourages self-directed learning by confronting students with problems and stimulates the development of deep learning; it encourages students to activate prior knowledge and build on existing conceptual knowledge frameworks,

- adult learning: allows the use of prior, accumulated knowledge as well as work experience and adds to the learning experience; orientation to learning is problem-centred rather than subject-centred; motivation to learn is internal; it improves the social atmosphere and order,

- cognitive apprenticeship: the learner, while using cognitive tools and led by the teacher, can observe, enact, and practice implicit knowledge, thus achieving a successive

approximation of mature practice; enculturates learners into authentic practices through activity and social interaction; the model consists of 6 stages: modelling (after observation of the teacher learners can model the desired performance); coaching (hints, feedback, modelling, reminders are provided); conceptual scaffolding (teachers support the learner in accomplishing tasks); articulation (covers any method of getting students to articulate their knowledge, reasoning, or problem-solving processes); reflection (the learner reflects on the problem solving task while comparing their own way with the expert one); and finally exploration (students are encouraged to explore new ways in which knowledge or skill can be used),

- constructivist learning: learners are encouraged to use knowledge derived from their own background in the educational process; emphasizes the importance of the learner being actively involved in the learning process; learners should learn to discover principles, concepts and facts for themselves, hence the importance of encouraging guesswork and intuitive thinking in learners; learners gain meanings through the interactions with each other and with the environment they live in; they gain additional experience due to interactions with the group and community,

- competency - based learning: the focus is placed on deep understanding that is demonstrated through application. This means that learning outcomes are proven by action and focus on building the skills students need to become better learners into adulthood.

The Consortium prepares special forms of educational materials – interactive video training pills. It should cover:

- Introduction: a maximum duration of 1 minute, created using Motion Graphics, with a series of images which summarise the topic,
- Creation in the Studio: Use of the "Chroma Key" with the application of computer graphic and motion graphic solutions,
- Use of Interactivity - Possibility of accessing the in-depth information recalled by the teacher/presenter in the video to cover the other aspects not included in the OER and which constitute the knowledge baggage that the target Curriculum defined by the partnership. This will allow the viewer to temporarily interrupt the episode and, through the hotspots inserted on the timeline of the video, noted by specific "Key Words", access the different training contents provided, thanks to which students can:
  - download an in-depth pdf or ppt,
  - access a thematic website and/or a portal of the institution and/or reference body,
  - watch a further video and/or slideshow of photographs,
  - listen to an interview and/or other multimedia content.

The interactive video materials together with further investigation materials (FIM) will be followed by gamified interactive training videos, summarizing all content delivered in form of the OERs with "narrative crossroads", then check-ups (used for practical validation of the knowledge in the company), movies recorded in the classroom according to the delivered methodology (MovieLabs) and finally digital case studies.

2.4. Implementation

To implement the curriculum and ensure its lasting and continuous execution four elements are important:

a)   Proper support from all stakeholders (university staff, authorities, local community, government and its bodies, various NGO councils),

b)   A set implementation plan, covering staff, funds, and facilities,

c)   Operationalization of the plan while dividing it into pilot phase, transition period and full operation period,

d)   Sustainability of the curriculum.

With regards to this curriculum, the following elements are of particular importance:

1)   Dissemination of the curriculum while making it public and delivering the content to all who are interested. Persuading the university authorities/training Agencies, as well as staff, to use all developed materials and outcomes as supportive materials into the classroom/training session. Tight contact with all stakeholders and gathering continuous feedback from the target group,

2)   All materials developed in the Consortium will be uploaded to the PUEB's server (educational platform of one of the consortium members) and kept there for years. All materials will be ready for anyone to use, at any time. Because of the online content, it does not require special funds to be kept there. The educational platform is a place, where many educational materials and results of different projects have been gathered which enriches the value of the materials The only cost that can be associated with the curriculum is the administration of resources and server maintenance costs, which are kept anyway as part of the Partner's infrastructure,

3)   The curriculum will be tested by the target group representatives just after launch – this will be the pilot phase. After gathering feedback, proper improvements will be implemented and the final version of the educational platform will be launched, which will begin the platform exploitation phase,

4)   The sustainability of the outcome must be guaranteed by the quality of the tools. The maintenance costs of the infrastructure are low, so the sustainability depends mostly on the quality of courses, materials and other tools gathered on the platform. Since the quality

will be good, students will be eager to use the materials for their own education, at which point the Consortium must put special attention towards evaluation and the pilot phase.

2.5. Evaluation and feedback

Curriculum evaluation is the process of measuring and judging the extent to which the planned courses, programmes, learning activities and opportunities as expressed in the formal document produce the expected results. This process can enable decisions to be made about improvements and future progress, if delivered and run effectively. Evaluation is a decisive and integral part of both the formal and informal planning cycles. The tasks of the program evaluation are:

- determining whether the program is to be continued or interrupted,
- improving its structure or its implementation,
- providing critical information for strategic changes and policy decisions,
- adding or removing certain working techniques,
- determining which of the competing programs are worthwhile for allocating funds,
- providing indicators for monitoring,
- endorsing or opposing the philosophy of a given program.

The most important element of the process is finding the right people to evaluate the program. The target group in the case are Students, Academics, Educators, SMEs representatives.

Curriculum will be assessed by one of the external academics. Then there will be also other ways of evaluation. Student will be invited to evaluate elements of the curriculum. The call for participation will be opened to:

- any European University student who can prove citizenship in any European country,
- students of the 2nd Bologna cycle (Master programmes),
- students enrolled in Management, International Business and Management, International Management, Economics, Informatics or Business and Administration programs at any European University.

Also, teachers will be asked for their assessment of the prepared materials. From all gathered feedback, the report will be prepared. The evaluation will be run once a year to get the curriculum updated and adjusted to changing the circumstances of the environment.

3. Division of hours

The division of hours, as prepared by the Consortium, consists of min 375 hours, from this 345 is an individual work of the students (Table 1). Very important feature if this curriculum is practical validation of the gained knowledge, therefore students will have to check whether knowledge that they gained is being applicable or has been applied already in companies (75 hours and 3 ECTS points have been assigned for check-ups within the company). An innovative

feature of this approach has been also applied in form of short educational movies, where students after participation in MovieLabs will have to record own movies about green and digital technology.

Table 1: Division of hours (materials developed within the FoDiGreT project)

Higher education/postgraduate	ECTS	No of hours	Lecture	Other contact hours	Individual Students'	Exam /other
12 units of the curriculum	6	150	12	0	135	3
Scenarios – gamified interactive training videos with "narrative crossroads".	2	50	3	0	45	2
Movies – student's presentations	4	100	10	0	87	3
Practical validation – check ups	3	75	5	0	68	2
Total ECTS/semester	15	375	30	0	335	10
Total hours in the Semester	375					

4. Modules description

4.1. Introduction and institutional aspects of SMEs transformation

Module 1		
	Expectancy	Clarification
1	Title of the module	Introduction and institutional aspects of SMEs transformation
2	Short description of the content	Description Digitalisation drives many sectors. Circular economy optimizes industry resource utilisation. These two movements are linked, and more cooperation is required to hasten the shift to a sustainable circular economy. Digitalization may assist develop circular business in several ways. "Greening the financial system" refers to the spread of new tools, methods, and laws to incorporate climatic and environmental factors into financial risk management and investment decisions. Climate and environmental hazards are increasingly seen as financial, not simply reputational, threats. This module consists of the following units: **Unit 1 - Circular and digital economy: from the current economic model to sustainable development** **Unit 2 - Transforming business models toward a sustainable business** **Unit 3 - Alternative financial models for green evolution of SMEs**
3	Expected learning outcomes	The following learning outcomes are expected in the module: 1. Knowledge: • Student knows the essence of circular and digital economy • Student recognizes differences between economic growth and sustainable development • Student is familiar with the manner of transforming business models towards sustainability • Student classifies alternative financial models for green evolutions

		2. Skills: • Student applies circular aspects into management of SMEs • Student evaluates the level of digitalisation implementation in SMEs • Student analyses the extent to which SMEs can transform their businesses toward sustainability • Student examines the financial models for green transformation of SMEs 3. Competencies: • Student is capable to compare SMEs functioning in traditional manner with their digital and green transformation • Student is oriented towards digital and green transformation of SMEs • Student solves issues of green and digital transformation of SMEs • Student easily reflects on different financial models of green transformation of SMEs	
4	Length of the module	3 ECTS points, 75 hours of students' workflow	
5	Learning topics	• Regulatory aspects • Understanding the concept of Green Economy • Production and Operations Management • Real time production • Industry 4.0 impact • Green economy–production aspect • Financial aspects of green transformation • Financial models • Green economy–financial aspect	
6	Learning materials	• Video • PowerPoint presentations • Articles • Books	
7	Learning methods	• Class, e-learning, film	
8	Evaluation	• Self-evaluation test	

4.2. Digitalization: new techs and the impact on SMEs

Module 2		
	Expectancy	Clarification
1	Title of the module	Digitalization: new techs and the impact on SMEs
2	Short description of the content	Description Digital technologies encourage ecological innovations that help to sustainable development by minimizing environmental consequences and maximizing resource use. As these technologies grow and combine with the deployment of a digital workforce, the usage of robots, and the application of information and data security, they may provide exponential advances that contribute to a sustainable future. Digitalization has both beneficial and bad environmental implications. On the one hand, it may dematerialize the economy by enabling the delivery of digital products and services, which account for an ever-increasing share of the economy and exports; a growth in the significance of digitally provided services decreases mobility and, therefore, emissions. This module consists of the following units: **Unit 1 - Deployment of digital workforce in SMEs** **Unit 2 - Practice to use robotics in SMEs operations** **Unit 3 - Implementation of information and data security in SMEs operations**
3	Expected learning outcomes	The following learning outcomes are expected in the module: 1. Knowledge: • Student recognizes the digital technology which support green transformation • Student is familiar with technology for digital workforce, the usage of robots and data security • Student classifies practices to use robotics in SMEs operations • Student explains how digital technologies can be used for data security in SMEs operations

		2. Skills: • Student applies artificial intelligence to SMEs operations toward green transformation • Student evaluates possibilities of digitalization of workforce for green transformation of SMEs • Student examines possibilities of information and data security in SMEs operations towards green transformation 3. Competencies: • Student is capable to recognize the digital technologies supporting green transformation of SMEs • Student solves issues of workforce organization with the support of digital technologies • Student is oriented towards implementation of robotics in SMEs operations targeting to green transformation • Students easily reflect on information and data security in SMEs
4	Length of the module	3 ECTS points, 75 hours of students' workflow
5	Learning topics	• Automation of knowledge work • Digital workforces • Artificial Intelligence • Blockchain technology • Robotics • Big data, cloud, virtualisation • Information and data security
6	Learning materials	• Video • PowerPoint presentations • Articles • Books
7	Learning methods	• Class, e-learning, film
8	Evaluation	• Self-evaluation test

4.3. Circular economy

Module 3		
	Expectancy	Clarification
1	Title of the module	Circular economy
2	Short description of the content	Description Sharing, leasing, reusing, repairing, refurbishing, and recycling of existing materials and goods are all part of the circular economy model of production and consumption. This model aims to keep resources and products in circulation for as long as feasible. The product's life cycle is extended as a result of this action. It suggests that there should be as little waste as possible. When a product approaches the end of its useful life, its components are recycled so that as many of them as possible remain in use within the economy. These may be used fruitfully on several occasions, resulting in the creation of additional value. This is a radical divergence from the conventional, linear economic model, which is based on the pattern of taking, making, consuming, and discarding goods and resources. This model requires a substantial quantity of inexpensive and readily available forms of energy and materials. This module consists of the following units: **Unit 1 - Circular resource management** **Unit 2 - More rational use of energy by SMEs** **Unit 3 - Logistic transformation**
3	Expected learning outcomes	The following learning outcomes are expected in the module: 1. Knowledge: • Student recognizes all features of circular economy • Student explains the rationales standing behind circular resource management of SMEs • Student presents the benefits resulting from more rational use of energy by SMEs • Student is familiar with energy sources and pollution control

		• Student demonstrates the advantages of automated and connected transport 2. Skills: • Student applies the idea of sharing, leasing, reusing, repairing, refurbishing, and recycling of existing materials and goods to operations of SMEs • Student evaluates the degree to which SMEs operations are oriented towards circular resource management • Student evaluates the use of energy by SMEs • Student analyses the relationship between energy sources and energy efficiency • Student applies the automated and connected transport into the operations of SMEs towards green transformation 3. Competencies: • Student is oriented towards circular solutions possible to be implemented by SMEs in green transformation • Student easily reflects on energy efficiency and energy sources used in SMEs operations • Students is capable to explain the role of SMEs operations in pollution control • Student solves issues related to automated and connected transport of SMEs
4	Length of the module	3 ECTS points, 75 hours of students' workflow
5	Learning topics	• Circular electronics initiative • Circular economy-product passports • Waste re-usage • Energy efficiency • Energy sources • Pollution control • Automated and connected transport • Green economy–logistic aspect
6	Learning materials	• Video • PowerPoint presentations • Articles • Books

7	Learning methods	• Class, e-learning, film
8	Evaluation	• Self-evaluation test

4.4. Green marketing

Module 4		
	Expectancy	Clarification
1	Title of the module	Green marketing
2	Short description of the content	Description Green marketing is a marketing strategy that encourages the manufacture and sale of pure (eco-friendly) goods while protecting ecological balance. Green marketing also seeks to reduce the impact of business on the environment. There are many different things that go into green marketing. Green marketing encourages the production of pure products through the use of pure technology, the conservation of energy, the preservation of the environment, the use of a minimum amount of natural resources, and the increased consumption of naturally occurring foods rather than foods that have been processed. It is possible to refer to the actions taken by individuals, social organizations, businesses, and governments as "green marketing initiatives" in this context. This module consists of the following units: **Unit 1 - Green marketing as a differentiation strategy** **Unit 2 - Practice of SMEs to add value for the consumer through green marketing** **Unit 3 - Measuring the impact of green marketing**
3	Expected learning outcomes	The following learning outcomes are expected in the module: 1. Knowledge: • Student presents the feature of green marketing and recognises it as a differentiation strategy of SMEs operations • Student recognizes the problem of niche market and market accessibility in SMEs green transformation • Student explains the customer experience in green transformation of SMEs • Student is familiar with measures of green marketing

		2. Skills: • Student analyses the marketing aspects and identifies them as green • Student applies the green marketing to the accessibility to market by SMEs • Student evaluates the customer experience during green transformation of SMEs • Student examines measures of green marketing impact on SMEs operations 3. Competencies: • Student easily reflects on green marketing in SMEs green transformation • Student is oriented towards consumer experience in SMEs green transformation • Student is capable to measure the impact of green marketing on SMEs operations
4	Length of the module	3 ECTS points, 75 hours of students' workflow
5	Learning topics	• Green marketing–strategy positioning • Accessibility to market • Niche market • Green marketing–consumer experience • Green marketing-measurement and impact
6	Learning materials	• Video • PowerPoint presentations • Articles • Books
7	Learning methods	• Class, e-learning, film
8	Evaluation	• Self-evaluation test

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II. Research results – focus group

1 Introduction (research)

The research was carried out as part of the Fostering Digital and Green Transformation in SMEs, project number 2021-1-PL01-KA220-HED-000027531, led by the Poznan University of Economics and Business. Members of the Consortium are:

1. Uniwersytet Ekonomiczny w Poznaniu, Poland
2. Universita Degli Studi di Macerata, Italy
3. Universitat Rovira I Virgili, Spain
4. Kauno Technologijos Universitetas, Lithuania
5. EFMD AISBL, Belgium
6. Conform-Consulenza Formazione e Management Societa Consortile a Responsabilita Limitata, Italy
7. Fundacja "Partnerzy dla Samorządu", Poland

The findings of the research are included in Project Result No. 1.

The researchers first created a questionnaire (which may be found in the Attachment), and then carried out the study. The survey was available from March 24 all the way through April 22. A total of 137 respondents took the time to reply to the call. The vast majority of those who participated in the survey were from Poland, while the other participants were representative of their respective countries. (Figure 1).
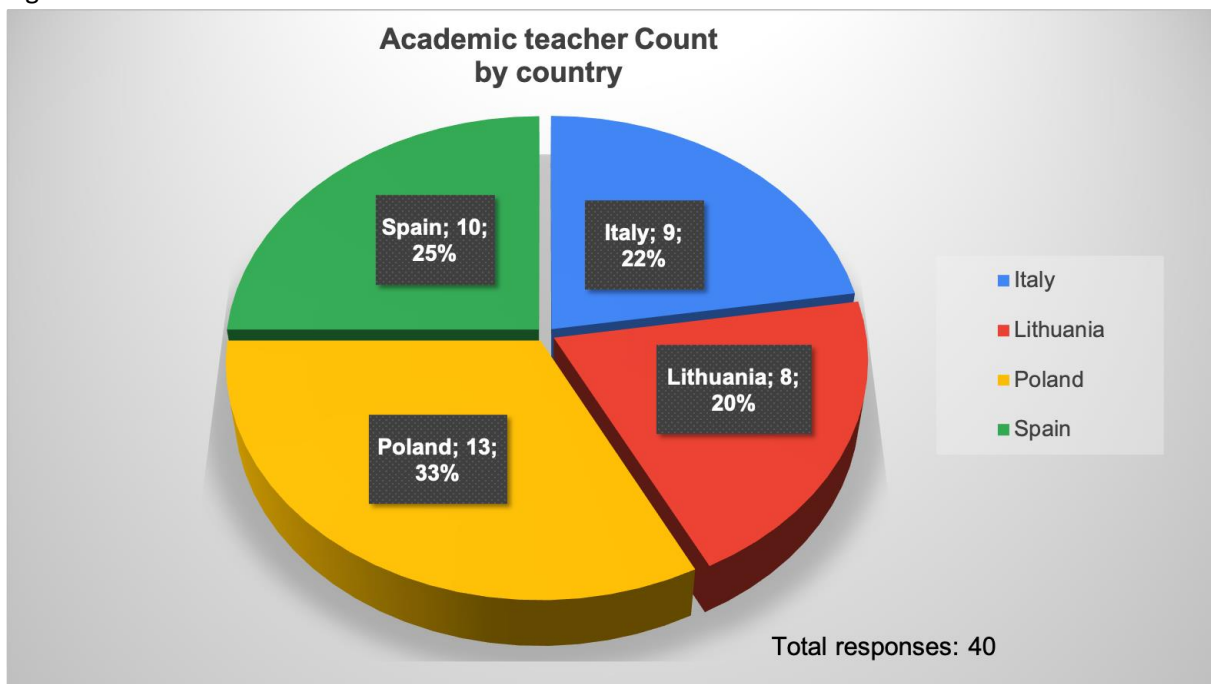
Figure 1. Category of Respondents
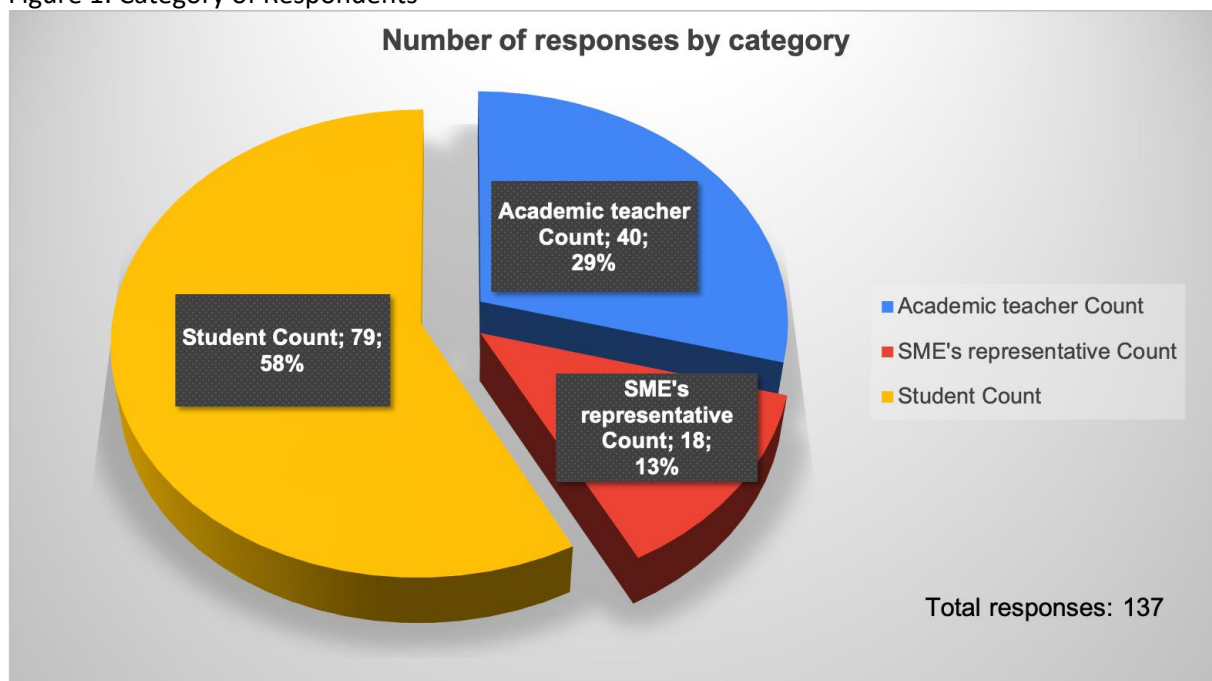
Authors' own research based on survey data.

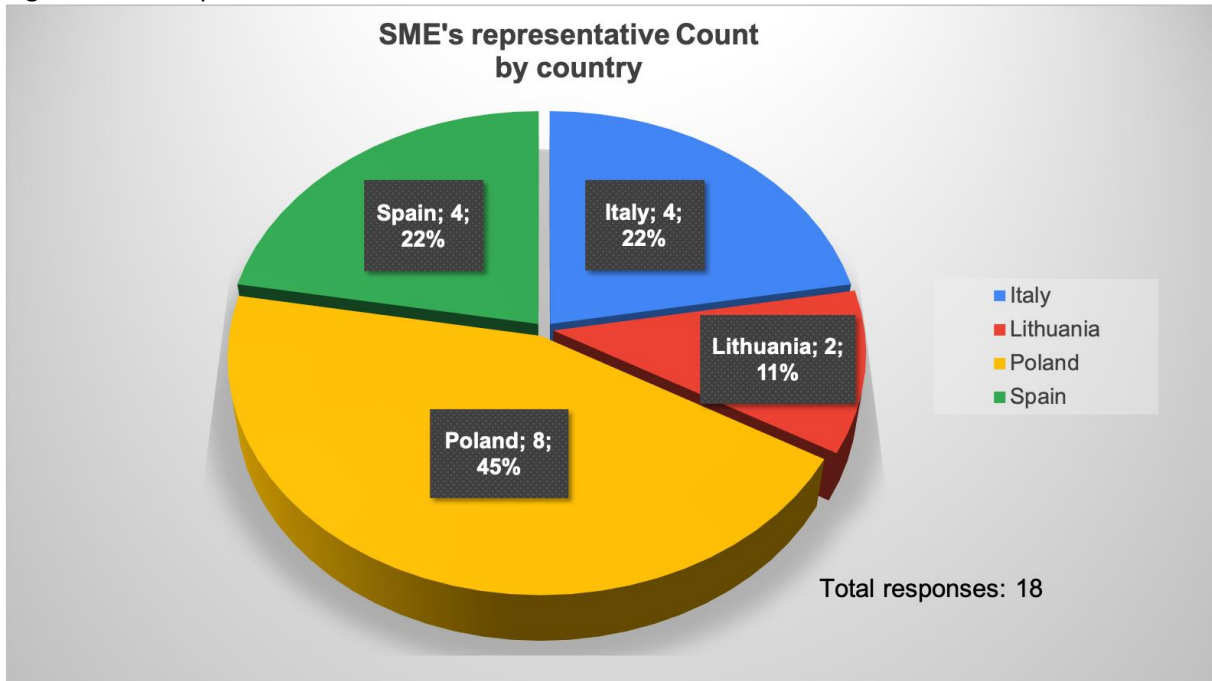Figure 2. Students' Countries
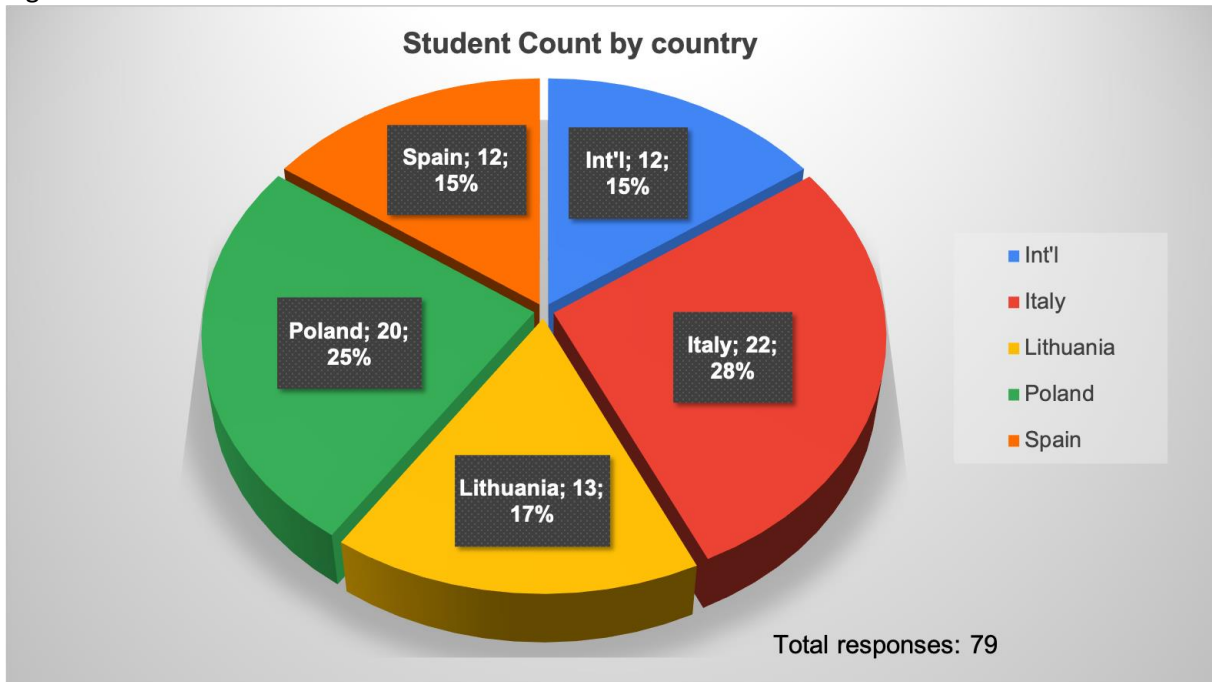
Authors' own research based on survey data.

Figure 3. Academic teachers' Countries

Authors' own research based on survey data.

Figure 4. SME representatives' Countries

Authors' own research based on survey data.