



Intellectual Output 6

Curricula, Syllabus and Framework of Instruction, Policy



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1. Curricula, Syllabus and Framework of Instruction, Policy

Vir2TEX project developed VR 360 new creative distance learning materials for schools educating textile. The developed modules will be helpful for both students and the new employers in the textile sector in order to decrease the orientation time of the new employers by combining immersive technologies and inspiring pedagogic content for the best learning results. The benefits of the new teaching materials will increase the motivation of students in learning and facilitating the effective aspect of learning.

From this perspective, Vir2TEX incorporate green practices of the ERASMUS+ Strategic Partnership Program due to the elimination of expensive cost of textile process machinery and the place required for the establishment of the machines needs for textile education schools. The developed training materials will create a direct positive impact to the environment by developing a new sustainability oriented innovative textile curriculum to better meet the future needs of prospective textile vocational students, trainers, academicians and new employees of private companies operating in the textile industry without any extra investment cost. A digital platform will be initialized for the individual and group consultation in road mapping capacity building and knowledge transfer for all stakeholders in partner regions and across the EU.

Recent graduates from VET programs (at the upper secondary and post-secondary levels) are often much more employable than recent graduates from general education programs across the EU. Additionally, with nearly half (48.4%) of all students enrolled in upper secondary school participating in VET programs, VET plays a significant role in the European upper secondary education landscape. However, there are still many misconceptions about VET in some countries, and it has a bad reputation. As a result, a mindset shifts among children, parents, businesses, and adult learners is required at the local level where VET is practiced, in close collaboration with networks of VET providers. Vir2TEX aimed to improve the attractiveness of Vocational Education and Training (VET) through partnerships and networks VET providers bring European VET policy, initiatives, programmes closer to practice. Additionally, raising awareness of the value of continuing VET would help workers' and employers' competitiveness.



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Vir2TEX created networking opportunities or events at the local, regional, national, or European levels to ensure a wide appeal to various target groups while utilizing a combination of cutting-edge online and conventional communication techniques. The project promoted communication between the academic community and society, including decision makers at the local, regional, state, and EU levels, as well as officials, members of the civil society, and media representatives. The developed e-learning materials ensure equal opportunities to local, regional, national, or European textile education. In doing so, the Vir2TEX will also encourage its participants, in particular young people to engage and learn to participate in civic society, raising awareness about European Union common values.

The goal is to establish long-term knowledge through innovative and adaptable teaching strategies and resources. Psychological studies show that adding audio-visual experiences to the learning process greatly improves learning effectiveness. The main concepts can be followed using interactive VR videos a very simple manner, and even the option to change one or more system parameters is provided. This allows users to quickly see the results of their changes without the need for further computations.

The e-learning technologies also have benefits. The e-learning curriculum is typically accessible through a high-speed internet connection, giving the student a great deal of freedom to choose the best time and location for their studies. Project aim to develop remote and inclusive learning pathways and opportunities by relying on digital technology and e-learning for students; reducing barriers faced by disadvantaged groups in accessing textile production process from fiber to garment learning opportunities. Developed modules enriched with the virtual reality (VR) will contribute creating inclusive environments that foster equity and equality education about textile. Vir2TEX project started by contacting stakeholders and identifying key points crucial in textile training via survey or observation in order to determine the content of digital learning and teaching tools.

According to results obtained, audience needs, skills and preferences so that learning materials can be tailored to their level and learning style were identified. Learning



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objectives, what the audience should learn after the course or training are determined. Defining these objectives helped to create a coherent and structured learning plan. Then, the project partnership developed new learning materials created by virtual reality (VR) digital technologies for delivering high quality education. Finally, the framework of the curricula, was tested and finalized with multiplier event. The identified key points crucial in textile training via survey or observation in order to determine the content of digital learning and teaching tools.

E-learning content is developed according to a set of learning objectives and is delivered using different media elements, such as text, graphics, audio and video. It must provide as much learning support as possible (through explanations, examples, interactivity, feedback, glossaries, etc.), in order to make learners self-sufficient. During analysis, the learning problem, the goals and objectives, the audience's needs, existing knowledge, and any other relevant characteristics were identified. In this stage, the learning environment, constraints, delivery options, and the timeline for the project were also considered.

Depending on the audience profile and the subject the ADDIE model approach is used. ADDIE is an acronym for Analysis, Design, Develop, Implement, and Evaluate. The model prescribes an audience and content analysis, then design the learning materials by deciding on the instructional, visual and auditory strategy, develop the materials with the appropriate authoring tools, implement the learning and finally evaluate it. Studies in many different disciplines require students to develop skills that relate to the three-dimensional (3D) nature of objects and systems, how they interact and function in the physical world. Using drawings and diagrams to aid these learning objectives is insufficient for most students, as they are required to extrapolate into a third dimension. 3D and virtual resources allow for a more nuanced and complex understanding, motivation and perceptions of reward, as well as more effective collaborative learning than 2D representations, opening up the potential for advanced teaching approaches in experiential learning.



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2. Vir2TEX Learning Content

The content for the Vir2TEX course is divided at first into main six modules and then divided sub modules. Each Module is presented in units. Students could access the content by clicking on the title of the module from the project web address “<https://vir2tex.yasar.edu.tr>”. In each module, student could find the Aim of the Module, its Learning Outcomes (i.e. what you should be able to do after engaging with the modules), and access the Module’s Content presented in units, where presentations and video lectures, together with definitions of concepts and links to recommended readings and videos are available. An optional self-assessment tool will also help students review the module and evaluate their knowledge.

The Project Modules:

1. Fibre Preparation
 - 1.1. Cotton Storage and Sampling Method from Cotton Bale
 - 1.2. Blow Room
 - 1.3. Tuft Feeding Unit and Carding Machine

2. Spinning Preparation
 - 2.1. Draw Frame
 - 2.2. Combing Preparation and The Combing Machine
 - 2.3. Roving Frame

3. Yarn Spinning
 - 3.1. Ring Spinning Machine
 - 3.2. Yarn Winding Machine and Yarn Conditioning

4. Fabric Production
 - 4.1. Knitting Technology
 - 4.1.1. Flat Knitting
 - 4.2.2. Circular Knitting



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4.2. Weaving Technology

4.2.1. Weaving Preparatory Process

4.2.2. Woven Fabric Production

5. Textile Finishing

5.1. Pre-treatment Processes

5.2. Dyeing

5.3. Finishing

6. Textile Clothing

6.1. Pattern Making

6.2. Cutting Process

6.3. Sewing Process

Many online students have common worries about time and effort. International students may have specific consequences from the online learning environment. Although it is assumed that online learning is flexible and simple, some students may not find it to be a desirable option.

There is no doubt that nothing will replace synchronous learning through face to face interaction but it is not always feasible for students to attend conventional classes. The project aims to develop remote and inclusive learning pathways and opportunities by relying VR360 technology and e-learning for students' curricula for textile education. Its main impact is expected to take place on the textile vocational, textile engineering, fashion design students, teachers, trainers, mentors, new employees of private companies operating in the textile industry, textile communities, universities, public authorities, chambers of commerce, chambers of industry.



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3. The Vir2TEX Project Output Course General Description

Objectives of the Course Outputs: The aim of the course is to introduce the machines and the production process from the fiber to the garment with the innovative e-learning methods prepared in the textile factory to the students studying in textile engineering, fashion design or the students studying in different departments who want to improve themselves in this field.

Content of the Course: The content of the course is starts with cotton fiber sampling from the cotton storage, processing fibers with the yarn production stages, knitted fabric production (flat and circular knitting machine), woven fabric production, processing the produced fabric in the textile finishing plant, and then the final stage of ready-made clothing production stages.

Education Language: English

Recommended Optional Programme Components: Virtual Glasses could be used for 3D videos in the course modules, but not compulsory.

Learning Outcomes

- Recognize the yarn production stages and basic principle
- Learn the working principle and the cross section view of the machines used in the yarn production
- Understand the production of fabric with flat knitting machines
- Have knowledge of the fabric production with circular knitting machines
- Be aware of the woven fabric preparatory machines
- Understand the production steps of the woven fabric
- Recognize the textile finishing steps applied to the fabrics
- Learn the machines used in textile finishing processes and their functions
- Outline the production steps in ready-made production
- Learn the working principle and the task of the machines used in the ready-made production



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Planned Learning Activities and Teaching Methods

The course is conducted using the project outputs developed within the scope of the European Union Project entitled Vir2TEX "Digital Learning Materials for Sustainable Textile Education". In the course planned to be opened in this context; VR enriched video training materials shot and voiced in the production of different textile companies, subject presentations, additional resources related to the subject, the measurement and evaluation methods after each module will be used.

Detailed Modules Outline

Module Name	The Aim of the Module	Learning Outcomes
1. Fibre Preparation	This learning module is focused on attaining a good understanding of the cotton storage, sampling method from bale, the task and the working principles of the blow room, tuft feeding unit and carding machine, the cross section of the machines, the name of the machine parts and the important settings for the quality control were explained.	<ul style="list-style-type: none"> ▪ Recognize the fibre preparation process from cotton storage to carding machine ▪ Understand the cotton storage and cotton sampling ▪ Learn the machines used in blow room line ▪ Understand the tasks and working principles of the tuft feeding and the carding machine
1.1. Cotton Storage and Sampling Method from Cotton Bale	This learning module is focused on attaining a good understanding of the cotton storage system and the sampling method from bale. The cotton quality test method and the preparation method of the blend formula according to test method will be explained.	<ul style="list-style-type: none"> ▪ Understand the storage system of cotton bales ▪ Learn the technique of cotton sampling from bales ▪ Recognize the cotton quality properties testing methods ▪ Be aware of the basic quality parameters of the fibers for the preparation of the blend receipt ▪ Calculate the number of different bales according to blend receipt



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<p>1.2. Blow Room</p>	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the machines in the blow room line. The training aims to guide the learners the cross section view of machines, the name of the machine parts and the important settings for the quality control.</p>	<ul style="list-style-type: none"> ▪ Learn the name of the machines and the machine order in the blow room line process ▪ Recognize the the tasks and working principles of the machines in the blow room line ▪ Learn the names of the blow room line machines' components ▪ Be aware of the working elements of each machine used in the process ▪ Understand the important settings made on the machine for the production of expected yarn quality
<p>1.3. Tuft Feeding Unit and Carding Machine</p>	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the tuft feeding and the carding machine. The training aims to guide the learners the cross section view of the machines, the name of the machine parts, the important settings and the quality control tests.</p>	<ul style="list-style-type: none"> ▪ Recognize the the tasks and working principles of the tuft feeding and the carding machine ▪ Learn the names of the tuft feeding and the carding machine components ▪ Be aware of the working elements of tuft feeding and the carding ▪ Understand the important settings made on the carding machine for the production of expected yarn quality ▪ Recognize the quality control of card sliver and the machine settings according to the quality test results
<p>2. Spinning Preparation</p>	<p>The spinning preparation is the step after the fiber preparation. The spinning preparation consist of draw-frame, combing preparation, the combing machine and roving frame respectively. In this module the task, the working principles, the cross section of the machines, the name of the machine parts and the important</p>	<ul style="list-style-type: none"> ▪ Recognize the spinning preparation process from draw frame to roving frame ▪ This learning module is focused on attaining a good understanding of the tasks and working principles of the draw frame, combing preparation, the combing machine and roving frame respectively

	settings for the quality control were explained.	
2.1. Draw Frame	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the draw frame, the auto-levelling system and the drafting principle. The training aims to guide the learners the cross section view of the machine, the name of the machine parts, the important settings and the quality control tests.</p>	<ul style="list-style-type: none"> ▪ Recognize the the tasks and working principles of draw frame ▪ Learn the names of the draw frame components ▪ Be aware of the draw frame classification according to the delivery unit and auto-levelling ▪ Understand the setting principle for the drafting distance ▪ Calculate the draft ratio for the production of expected sliver thickness ▪ Recognize the quality control of draw frame sliver and the machine settings according to the quality test results
2.2. Combing Preparation and the Combing Machine	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the combing preparation and the combing machine. The training aims to guide the learners the cross section view of the machine, the name of the machine parts, the important settings and the quality control tests.</p>	<ul style="list-style-type: none"> ▪ Recognize the tasks and working principles of combing preparation and the combing machine ▪ Learn the names of the combing preparation and the combing machine components ▪ Be aware of the carded and combed yarn classification according to the production process ▪ Understand the setting principle for the combing cleaning degree ▪ Learn the steps of combing process from beginning to the end ▪ Recognize the quality control of combed sliver and the machine settings according to the quality test results



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2.3. Roving Frame	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the roving frame. The training aims to guide the learners the cross section view of the machine, the name of the machine parts, the important settings and the quality control tests.</p>	<ul style="list-style-type: none"> ▪ Recognize the tasks and working principles of roving frame ▪ Understand the setting principle for drafting zone distance ▪ Learn the names of the roving frame components ▪ Recognize the quality control of roving and the machine settings according to the quality test results
3. Yarn Spinning	<p>The yarn spinning is the step after the spinning preparation. The yarn spinning consist of ring spinning machine, yarn winding machine and yarn conditioning respectively. In this module the task, the working principles, the name of the machine parts, the cross section of the machines and the important settings for the quality control were explained.</p>	<ul style="list-style-type: none"> ▪ Recognize the yarn production spinning process ▪ Understand the importance of the yarn winding and the yarn conditioning
3.1. Ring Spinning Machine	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the ring spinning machine. The training aims to guide the learners the cross section view of the machine, the name of the machine parts, the important settings and the quality control tests.</p>	<ul style="list-style-type: none"> ▪ Recognize the tasks and working principles of ring spinning machine ▪ Understand the setting principle for drafting zone distance ▪ Be aware of the yarn breaks and the piecing process manually ▪ Learn the names of the ring spinning machine components ▪ Recognize the quality control of ring spun yarn and the machine settings according to the quality test results
3.2. Yarn Winding Machine and Yarn Conditioning	<p>This learning module is focused on attaining a good understanding of the tasks and working principles of the yarn winding machine and yarn conditioning. The training aims to guide the learners the cross section view of the winding machine, the</p>	<ul style="list-style-type: none"> ▪ Recognize the tasks and working principles of winding machines ▪ Learn the names of the winding machines components ▪ Recognize the automatic splicing device working principle and the steps of piecing

	name of the machine parts and the aim of the yarn conditioning process.	<ul style="list-style-type: none"> ▪ Be aware of the importance of yarn conditioning
4. Fabric Production	<p>Fabric construction involves the conversion of yarns, and sometimes fibers, into a fabric having characteristics determined by the materials and methods employed. Textile surfaces can be produced directly from webs of fibers by bonding, fusing or interlocking to make non-woven textiles and felts. The weaving and knitting techniques were chosen as the subject of the fabric production training modules of the project.</p>	<ul style="list-style-type: none"> ▪ Recognize the different fabric production methods ▪ Understand the weaving preparation and the weaving process ▪ Learn the flat and circular knitting techniques
4.1 Knitting Technology	<p>Knitting is a process of manufacturing a fabric by interlooping of yarns via the use of needles. In knitting, the yarns are initially formed into loops, and then these loops are interconnected in order to produce a textile structure.</p>	<ul style="list-style-type: none"> ▪ Recognize the flat knitting and circular knitting ▪ Understand the knitting process with both flat knitting and circular knitting machine
4.1.1. Flat Knitting	<p>This learning module is focused on attaining a good understanding of the flat knitting technique, components of the flat knitting machines and their working principle. The training aims to guide the learners to understand the main characteristics of the flat knitting technique.</p>	<ul style="list-style-type: none"> ▪ Recognize the general definition of flat knitting technology ▪ Learn the basic components of flat knitting machines ▪ Outline the production steps and working principles of flat knitting machines ▪ Understand the setting principle of flat knitting production process. ▪ Be aware of flat knitted product range



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<p>4.2.2. Circular Knitting</p>	<p>This learning module is focused on attaining a good understanding of the circular knitting technique, components of the circular knitting machines and their working principle.</p> <p>The training aims to guide the learners to understand the main characteristics of the circular knitting technique.</p>	<ul style="list-style-type: none"> ▪ Recognize the general definition of circular knitting technology ▪ Learn the basic components of circular knitting machines ▪ Outline the production steps and working principles of circular knitting machines ▪ Understand the setting principle of circular knitting production process. ▪ Be aware of circular knitted product range
<p>4.2. Weaving Technology</p>	<p>Weaving is a method of textile production in which two distinct sets of yarns or threads are interlaced at right angles to form a fabric or cloth. The weaving process is preceded by yarn preparation processes namely winding, warping, sizing and drawing. In this module, weaving preparatory process and woven fabric production steps are explained.</p>	<ul style="list-style-type: none"> ▪ Recognize the woven fabric and weaving process ▪ Understand the weaving preparation processes; warping, sizing and drawing
<p>4.2.1. Weaving Preparatory Process</p>	<p>This learning module is focused on attaining a good understanding of the weaving preparatory process such as; warping, sizing and drawing. The training aims to guide the learners to understand the importance of the weaving preparatory process on weaving process.</p>	<ul style="list-style-type: none"> ▪ Understand the steps of weaving preparatory process ▪ Learn the sectional warping and beam warping procedures ▪ Outline the drawing-in process ▪ Be aware of yarn sizing requirement and how this is carried out
<p>4.2.2. Woven Fabric Production</p>	<p>This learning module is focused on attaining a good understanding the working principles of the weaving machine. The training aims to guide the learners the cross section view of the weaving machine, the name of the machine parts and the steps of the woven fabric production.</p>	<ul style="list-style-type: none"> ▪ Learn the basic steps of weaving process ▪ Recognize the requirements for warp yarns and weft yarns ▪ Recognize the the tasks and working principles of the weaving machines components



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		<ul style="list-style-type: none"> Outline the cross section view of the weaving machine
5.Textile Finishing	Textile finishing is the processes to improve woven, knitted cloth or yarn performance, handle and appearance. The finishing consist of three main process such as; pre-treatment, dyeing and finishing.	<ul style="list-style-type: none"> Learn the aim and importance of textile finishing Recognize the machines used in textile finishing
5.1. Pre-treatment Processes	This learning module is focused on attaining a good understanding of the pre-treatments of cotton fabrics such as; singeing, scouring, bleaching and mercerization.	<ul style="list-style-type: none"> Learn the pre-treatments of grey cotton fabric Recognize the raw control and singeing processes for cotton fabric. Understand the scouring, bleaching and mercerization processes for cotton fabric
5.2. Dyeing	This learning module is focused on attaining a good understanding of the dyeing of cotton fabrics.	<ul style="list-style-type: none"> Learn the dyeing methods of fabrics Recognize the properties of reactive dyes Learn the flow of the reactive dyeing process Understand the recipe contents of the reactive dyeing for cotton fabrics
5.3. Finishing	This learning module is focused on attaining a good understanding of the chemical and mechanical finishing processes of cotton fabrics. In addition to this, the main important quality control methods.	<ul style="list-style-type: none"> Learn the finishing processes of cotton fabric Recognize the chemical and mechanical finishing treatments Learn the softening, water, oil, stain repellency, anti-crease and antimicrobial processes Understand the calendering, sanforizing, raising, emerizing and shearing processes Learn the tests performed to the cotton fabrics



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<p>6. Textile Clothing</p>	<p>The last stage of the garment production is the textile clothing step. The aim of textile clothing module is to explain the steps of garment manufacturing from pattern making to sewing department.</p>	<ul style="list-style-type: none"> ▪ Learn the garment production steps in textile clothing factory ▪ Understand the pattern making process ▪ Recognize the fabric cutting machines ▪ Learn different sewing types and machines
<p>6.1. Pattern Making-CAD Department</p>	<p>This learning module has been prepared to introduce the processes performed in the pattern making department of a garment business. In this module, it is aimed to introduce the process steps that should be done in the pattern making department before proceeding to the mass production stage.</p>	<ul style="list-style-type: none"> ▪ Learning the procedures to be done in the pattern making department after the order is received. ▪ Understanding the pattern types and properties. ▪ Comprehending the grading of patterns for removing other size sets from the intermediate body. ▪ Learning the points to be considered in preparing the cutting plan
<p>6.2. Cutting Department</p>	<p>This module has been prepared to explain the process stages of the product to be produced from the fabric laying to the sewing room. It is aimed to explain the points that are considered in the perfect cutting, grouping and preparation of the parts that make up the garment to be sent to the sewing room.</p>	<ul style="list-style-type: none"> ▪ Explanation of the points considered in the spreading ▪ Information about the operations carried out in the cutting department ▪ Giving information about the machines used in the cutting department ▪ Explaining the considerations for cutting fabric layers properly ▪ Emphasize the importance of numbering fabric layers

<p>6.3. Sewing Department</p>	<p>In this learning module, it is aimed to give information about the sewing preparation, assembly processes, quality control processes and the machine used in each of these stages and its features in order to obtain the finished product. It is aimed to answer questions such as how and why the usage areas of these machines change depending on the fabric properties.</p>	<ul style="list-style-type: none"> ▪ Introducing the machines used in sewing knitted and woven fabrics ▪ Comprehending the sewing features made on the machines ▪ Defining the automat and explaining its feature ▪ Explanation of ironing and quality control processes after sewing
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