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ICT Use in VET: The Virtual Training Centre for Shoe Design as a Model

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1. Introduction

It is known that one of Leonardo da Vinci General Objectives is to support participants in training and further training activities in the acquisition and the use of knowledge, skills and qualifications to facilitate personal development, employability and participation in the European Labour Market. Another objective is to support improvements in quality and innovation in vocational education and training systems, institutions and practices. In addition, one of the Leonardo da Vinci Operational Objectives is to facilitate the development of innovative practices in the field of vocational education and training other than at tertiary level, and their transfer, including from one participating country to others. Another one is to support the development of innovative ICT-based content, services, pedagogies and practice for lifelong learning. All these objectives serve to improve the Quality of VET systems and practices, which is one of Leonardo da Vinci European Priorities (in the call for proposals 2007). All these factors contribute to "Learning to learn", which is one of Lisbon Key Competences.

It is also an accepted fact that the changing needs in training, in terms of both quantity and quality, calls for promoting competitiveness and employment on the European footwear industry (Com. SW Doc., 2001). In order to foster use of information and communication technologies in footwear industry, the Lifelong Learning Programme can be regarded as an opportunity to overcome the challenges in this field by focusing on the development of innovation and good practice (Decision No: 1720/2006/Ec). One of the major problems of the shoe industry at the moment is that the overall level of skills and qualifications needs to be raised and, therefore, it is also necessary for training modules to respond to the continuous evolution in the workplace so as to confront the problem of unemployment and increased competition. Although the industry is asking for shoe designers as professionals, the lack of training in this area, on various levels, has been detected in some countries. A research by Mihai A. and Şahin M. (2007) displays that, for example, according to the Romanian Occupational Standard, the "shoe designing" as a job or its equivalent doesn't exist as an occupation for vocational education and training (VET). The curriculum for "Pattern Making with Leather Products" for secondary level VET dates from 1998. The university level course "Footwear Design and Technology" in Romania is too general and

does not offer all required competences essential for a shoe designer in line with the expectations in EU.

The main and comprehensive source that displays the situation of the European footwear sector is the document titled "Commission Staff Working Document: on the promotion of competitiveness and employment on the European footwear industry" (CSWD, 2001). In this document, it is strongly emphasised that the objective for the next ten years is for "Europe to become the most competitive and dynamic knowledge-based economy in the world". To achieve this the Commission has drawn up an action plan known as eEurope, aimed at speeding Europe's transition to the information society and ensuring that all Europeans possess the skills required for using the new information technologies. Another report, titled "Economic and competitiveness analysis of the footwear sector in the EU 25", sets up that "training of human resources is also a way of investing in the sector by helping workers to adapt to technological changes and to better face crisis situations" (ECAFS, 2005). As stated by Brugia M. (2005), "SMEs in Europe account for 99% of all businesses, and they provide employment for 74 million people. Decisive factors of influence are: lack of a training culture within SMEs; lack of appropriate training materials" (Burgia M, 2005). It can be inferred from this fact that almost every country in EU has its own training materials, in some cases insufficient, and methods for shoe design training. This brings about problems regarding the unification of workforce.

2. Vocational Education and Training (VET), and ICT Use

During the 60's and 70's, teaching and learning tools were nothing but a piece of chalk and a blackboard eraser, teachers and students who met each other face to face inside the classroom during class. In the 80's, videotape programs were used as teaching aids. In the 90's, one-way teaching by computer arrived. And finally today's advanced computer and information network technology has revolutionized our teaching and learning methods. In accord with the development, learning environment has also changed. Students can listen to their teacher or trainers in distant classrooms through PC's and get a simultaneous view of their teachers and texts as well. They can ask questions and record the "class" for repeated viewing. Training organizations can conduct professional training directly via the computer network. These learning environments are not so different from a teacher-guided class with discussions and tests as well (Şahin M., et al, 2007).

The European Centre for the Development of Vocational Training (Cedefop) is the European Union's reference centre for vocational education and training. This centre provides information on and analyses of vocational education and training systems, policies, research and practice. According to Seyfried E., in the past two decades and in most Member States there has been a growing awareness of the importance of quality in vocational education and training (Seyfried E., 1998). Obviously, the changing demands of the knowledge-based society and the overall trend to increase the efficiency and effectiveness of VET systems constitute major driving forces behind these developments. Undeniably, through its funds and programmes, such as Leonardo da Vinci, the European Commission has contributed to improving education and VET systems by raising the level of the services they offer. For a qualitative approach to VET, the technical working group on quality in VET (TWG) was called to respond to during its mandate (2003 and 2004) in accordance with the priorities of the Council Resolution of 19 December 2002 and the Copenhagen declaration on "enhanced

cooperation in vocational education and training" (CR, 2002-2003, DGEAC, 2004). Finally, a further focus of the work consisted of translating the three European policy priorities- promoting employability of the workforce, access to training with particular emphasis on the most vulnerable groups, and the better matching of training demand and supply- into concrete and measurable objectives (Şahin M., et al, 2007).

One of the concrete future strategic objectives in the EU, according to Council of the European Union (2001), is improving the quality and effectiveness of education and training systems in the EU. This includes improving education and training for teachers and trainers, developing skills for the knowledge society, ensuring access to ICT for everyone, increasing recruitment to scientific and technical studies, and making the best use of resources. The second strategic objective is facilitating the access of all to education and training systems. This objective includes open learning environment, making learning more attractive, and supporting active citizenship, equal opportunities and social cohesion (COEU, 2001).

3. Virtual Training Centre for Shoe Design (VTC-Shoe) as a Model

The objective of this chapter is to introduce a Leonardo da Vinci project, titled "**Virtual Training Centre for Shoe Design**", which is a Development of Innovation project. The scope of the study is the introduction of the steps taken for the construction of a virtual environment for shoe design training as a model. The study consists of two main parts: a) the curriculum developed for the virtual environment, and (b) the virtual environment itself. The first part deals with the content of the curriculum designed for basic and intermediate level. The second part deals with the methodology and approach fitting to ICT use and some sample lessons constructed so far.

The rapidly changing technologies, as well as the innovative e-learning teaching methods require for adapted modules for lifelong training that keeps continuously up to date with the relevant developments of the European footwear industry. The Virtual Training Centre for Shoe Design is an interactive platform, a meeting point for policy-makers, social-partners, practitioners, researchers and all those with an interest in shoe design field of vocational education and training. Experts in the field can share and exchange knowledge and experience with associates within and outside the European Union.

The project's scientific and pedagogic objectives are in tune with the main priority in Lifelong Learning Programme. Through the various research and development projects, partners have developed training materials for shoe design. These materials have to be compared between involved partners in order to get common curricula to be share with future users at a European level. The innovative e-content, developed within the VTC-Shoe project, can easily be translated to various languages.

In terms of strategic impact and contribution to growth, the VTC-Shoe project is expected to have a very powerful impact in the European footwear industry. Similar to the other projects funded by European Community, it is to improve competitiveness helping footwear companies to have skilled and competent shoe designers. Thus, VTC-Shoe added value for the Community lies in the provision of a training tool that has the dynamics not only to provide valuable training and skills to the targeted beneficiaries but also to empower the processes of the EU footwear industry and thus, increase productivity and competitiveness. This, in its turn, is expected help the industry grow and, thus, increase the demand for more skilled employees.

This virtual training centre to be formed in this field and its application constitute the first and good example for virtual learning in national vocational training systems. It helps to improve and upgrade competences and skills of staff and exchange experiences over the virtual training centre. It also increases the work opportunity by helping young generation to use Information Technologies.

4. Development of Competence Based Curriculum

Recognizing competencies and skills needed in footwear industry and anticipating their development stand for a complex mission given several socio-economical factors, which must be taken into consideration. The stakeholders (VET schools, universities, employers, professional associations etc.) have to monitor this identification taking place at various levels: 1) deciding the overall competences development plan necessary for a successful business strategy, action that should be taken at the highest managerial level; 2) defining the new competence needs through involvement of employers and employees; 3) elaborating specific competences development plan; 4) developing learning environment.

Based on the rationale presented above, the VTC-Shoe project attempted to design the competency-curriculum for VET under the area of a Virtual Training Centre. The research was conducted in order to identify and explore the usefulness of the questionnaire tool in finding a suitable presentation form for a competence-based curriculum. The sampling method based on convenience and targeted colleagues, former students, business contacts from the footwear industry and their acquaintances, both from Romania and Turkey. The questionnaire was developed based on planned curricula structure and on preliminary interviews with some experts from footwear industry and potential trainers and trainees. After its development, it was applied on students (assimilated as possible trainees) and modified accordingly and discussed with the other partners in the project.

The resulting questionnaires have been set up from two parts: Part I - Key competences for ICT use (KC); and Part II - Professional (Knowledge) and Methodological (Skills) Competences for Shoe Design. Only two units have been selected due to the relevance with shoe designing as a job description, as follows: 1) Developing Designs (DD) for Shoe Production, 2) Making and Developing Patterns (DP) for Shoe Designs.

All respondents were selected from Shoe Design programs of two universities, partners within VTC shoe project. 24 students from "Gh Asachi" Technical University, Romania, and 17 students from Selcuk University, Turkey, filled questionnaires in concordance with their needs for training.

Five levels have been proposed: 1-To a very limited extent; 2-To a limited extent; 3-Neutral; 4-To some extent; 5-To a large extent. The results (answers) have been summarized for each sub-task and presented as bar charts.

Several statistical parameters have been calculated by using the SPSS - Systat 6 application: mean (M), standard deviation (SV), coefficient of variation (CV) and kurtosis value (KV). The kurtosis value has been calculated because it could indicate whether the distribution of the variables follows up a normal distribution or not. A value of kurtosis significantly greater than 0 indicates that the variable has longer tails than those for a normal distribution; a value less than 0 indicates that the distribution is flatter than a normal distribution.

The respondents have been asked to evaluate their level regarding the Key Competences for ICT use as it follows: KC1- To use Information Technology (IT) in workplace, free time and for communication purposes; KC2- To use computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet; KC3- To acknowledge personal learning needs; KC4- To develop and use creativity and innovation; KC5- To identify available opportunities for personal, professional and/or business activities; KC6- To pursue and persist in learning, to organize my own learning, including through effective management of time and information, both individually and in groups; KC7-Sense of initiative and entrepreneurship; KC8- To successfully finalize any action. The results are presented within table 1 and table 2.

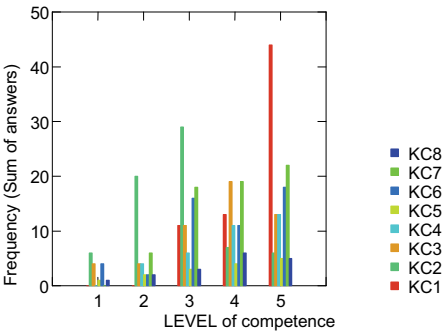
Statistical parameter	Bar Chart	Key Competences for ICT use							
		KC1	KC2	KC3	KC4	KC5	KC6	KC7	KC8
Mean, M		13.60	13.60	10.20	6.800	6.800	10.20	13.00	3.40
Standard deviation, SD		18.03	10.45	6.38	5.26	5.63	7.08	9.48	2.07
Coefficient of variation, CV		1.32	0.76	0.62	0.77	0.82	0.69	0.73	0.61
Kurtosis value		2.89	-1.04	-1.19	-1.50	-1.52	-2.62	-1.91	-1.96

Table 1. Key Competences for ICT findings (KC1-KC8) , Turkey

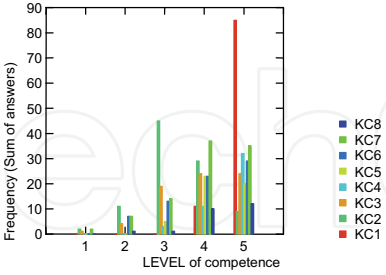
Statistical parameter	Bar Chart	Key Competences for ICT use							
		KC1	KC2	KC3	KC4	KC5	KC6	KC7	KC8
Mean, M		19.20	19.20	14.40	9.20	9.60	14.40	19.00	4.80
Standard deviation, SD		37.09	17.52	11.10	13.51	11.10	11.73	16.10	5.71
Coefficient of variation, CV		1.93	0.91	0.77	1.46	1.15	0.81	0.84	1.19
Kurtosis value		4.67	0.23	-1.55	3.01	0.04	-1.13	-0.49	-0.37

Table 2. Key Competencies for ICT findings (KC1-KC8, Romania

Positive values of kurtosis for KC1 indicate a higher probability than a normally distributed variable of values near the mean. The fact that the values are appropriate to 3 (2.897 for Turkey and 4.675 for Romania) concludes that the values are being spread in accord with the Laplace distribution. Negative value of kurtosis for competences KC2-KC8 points towards a lower probability than a normally distributed variable of values near the mean for

group from Turkey. The same situation appears at the group from Romania, for competences KC3, KC6, KC7, and KC8.

Regarding Developing Designs (DD) for shoe production, following competences have been enquired: DD1-An understanding of relevant research in shoe design; DD2- Determining shoe design requirements; DD3- Knowledge of relation among foot-last-shoe; DD4- An understanding of relation between shoe construction and materials used; DD5- A practical understanding of shoemaking technology.

For the unit Making and Developing Patterns (DP) for Shoe Designs the authors have investigated: DP1- Knowledge of shoe pattern making; DP2- High competence in development of shoe patterns; DP3- Preparing the shoe product portfolio.

Values of kurtosis appropriate to 0 indicate a normal distribution of variables. To increase the level of competences, the students from Turkey (table no.3) have to plan their professional development more carefully with a deeper understanding of relevant research in shoe design (kurtosis= 0.202), knowledge of shoe pattern making (kurtosis= 0.031). As for the students from Romania (table no.4), the same competences have to be developed, respectively, knowledge of shoe making pattern (kurtosis=0.273), as well as developing patterns (kurtosis= 0.155). A low value of kurtosis has been obtained for the competences in understanding of relation between shoe construction and materials used (kurtosis=-0.110), too.

Statistical parameter	Bar Chart	Competences (knowledge and skills)								
		Developing Designs (DD) for shoe production					Making and Developing Patterns (DP) for Shoe Designs			
		DD1	DD2	DD3	DD4	DD5	DP1	DP2	DP3	
Mean, M		13.60	10.40	13.40	10.20	13.60	10.20	23.20	6.800	
Standard deviation, SD		11.05	6.58	4.15	9.36	12.21	5.63	7.01	3.03	
Coefficient of variation, CV		0.813	0.63	0.31	0.91	0.89	0.55	0.30	0.44	
Kurtosis value		0.20	-0.97	1.48	1.35	-0.90	0.03	-0.65	-0.36	

Table 3. Developing Design for Shoe Production competences (DD1-DD5) and Making Developing Patterns for Shoe Design competences (DP1-DP3) , Turkey

Statistical parameter	Bar Chart	Competences (knowledge and skills)	
		Developing Designs (DD) for shoe production	Making and Developing Patterns (DP) for Shoe Designs

		DD1	DD2	DD3	DD4	DD5	DP1	DP2	DP3
Mean, M		19.20	14.40	19.20	14.40	18.40	14.40	32.6	10.20
Standard deviation, SD		21.13	16.27	9.96	13.16	12.97	10.96	19.06	8.78
Coefficient of variation, CV		1.10	1.13	0.51	0.91	0.70	0.76	0.58	0.86
Kurtosis value		-0.46	-0.48	-1.21	-0.11	-1.15	0.27	-0.15	0.32

Table 4. Developing Design for Shoe Production competences (DD1-DD5) and Making Developing Patterns for Shoe Design competences (DP1-DP3) , Romania

Considering how training can be interlinked in a better way with the needs for employment, the authors are targeting a new assessment instrument that could be used for recording the achievements of the students within the VTC shoe training tool. The research findings have been well thought-out on four basic factors: 1) tradition, competences and resources of the two above mentioned institutions, 2) trends in the European footwear industry, 3) needs to prepare students better for the challenges of working life in a rapidly developing European economy, 4) needs for incorporate key competences for ICT use into a knowledge/ skills based curriculum.

Based on the presented results, a new curriculum in shoe design could be created as an innovative tool for training in the framework of a virtual learning environment. A new shoe design training program calls for technical knowledge to smooth the progress of creative and analytical works on raw materials into new products, as well as on the production processes, costing and quality assurance. Based on the new economical context, the footwear industry requires design skills more than ever before; these are essential to new product development, competitiveness and business success in this field.

Considering the expectations of the target groups who are already engaged in IT use, the VTC-Shoe for footwear design will provide innovative technologies to enhance teaching and learning in shoe design field. With engaging content that increases students’ retention, VTC-Shoe courses can be accessed anywhere, anytime to develop individual skills in this field. The VTC-Shoe will train and develop successful designers by offering quality curricula and programs, technology support and optimal practices in footwear design field. The VTC-Shoe will provide footwear business with practical training under guidance and experience. The VTC-Shoe will establish networks of people who are engaged in footwear business and training. Thus, it will support the entrepreneurial community, including small and medium businesses, through collaboration and community support. The mission of the VTC-Shoe should be to support economic development by facilitating footwear design training that empowers socially and economically diverse people to strengthen and sustain growth opportunities in existing businesses or in the planning and marketing of a start-up business.

5. Content Developed Based on Expectations and Needs

The content of this course was developed based on the curriculum designed according to the expectations and needs determined as a result of the data collection process applied in the countries of the authors. For this, a country report displaying the present status and the needs and expectations was written by the teams of the authors of this chapter. The data obtained from the research carried out in this report is the foundation for the content developed based on the expectations and needs in Romania and Turkey. A data acquisition tool (a questionnaire) was developed to know about the expectations of those who are interested in shoe design training either as trainers or trainees. The questionnaire aimed to know better about the specific needs for such a virtual training.

According to the respondents' perceptions regarding gaining relevant theoretical knowledge on pattern making, theoretical knowledge on pattern making has a great importance for the course as it received nearly 90% of responses for "large" and "very large extent". Such values may be attributed to the importance of correct patterns that will be turned through assembly into footwear products. An even greater interest (nearly 90%) was expressed by respondents towards application of different techniques in shoe design (manual and CAD), where "to a very large extent" reached about 60% of responses. Whilst respondents reported great interest for determination of pattern-making restrictions in dependence with economic design and technological conditions (nearly 80%) there are about 15% that reported just in a small extent.

Over 80% of the respondents reported very high level of interest regarding current trends in shoe design, nearly 50% stating "to very large extent". The data obtained exhibits a very high interest for the analysis of different foot measurements, probably due to the fact that comfort is a key element affecting perception of quality in shoes. Interest for other technical aspects of the course is expressed as follows:

- 80% of them express interest in the use of design tools to develop new concepts of footwear,
- nearly 70% of them express interest in interpretation and clarification of design parameters,
- 80% of them have interest in preparation and presentation of new concepts in an attractive and professional manner,
- 80% of participants are interested in depth knowledge and understanding of measurement, foot anatomy, biomechanics (50% responding with "to a very large extent"). Such a high interest may also reside in the perception of relationship between shoe quality and comfort.
- Nearly 80% of the respondents also regarded as "very important" the management and collection of foot measurements through computer (foot scan, etc) and the transformation process of anthropometric data in parameters of the last/shoe.

The curriculum and the content developed based on this curriculum stand on four parts. The first part is about Foot. The second part is dedicated to Footwear. The third part deals with Measurements and Tools. The last part is about Design and Pattern Making. Tables 5-8 describe the logics of developing the content of VTC Shoe as a competence based course.

Module I- Foot. This part covers knowledge on Foot Anatomy and Biomechanics Applied to Footwear Design and Pattern Making. The aim is to identify and describe the main structure and functions of the foot in order to apply this knowledge to designing the footwear.	
Description of the Structure and Functions of the Foot;	The main foot structures: muscles, bones, ligaments, joints, nervous system. Types of foot. Foot problems related to footwear. Structural and functional disorders of the foot.
Foot and Footwear Biomechanics: Gait Analysis.	Functions of the foot during standing, balance, walking, running. Techniques for measuring plantar pressure distribution.

Table 5. Content of Module I , Foot

Module II-Footwear. This topic covers the identification and description of the entire range of materials used in shoe production both for upper and for bottom components (leather, textile, substitutes, rubber, synthetics, non-woven etc.).	
Footwear: Structure, Functions and Classification Criteria	This lesson presents various types of footwear models considering some classification criteria. The footwear components, both for upper and bottom, are presented in relations with their role for structuring and achieving the function of the entire footwear product.
Lasts for Footwear Industry	The conversion of size and general foot shape into definitive lasts includes variables such as nature and extent of functional demands, foot characteristics, styles and characteristics of the materials. This unit covers the theoretical knowledge regarding various types of lasts used in footwear industry, as well as the selection criteria of a shoe last accordingly with design requirements.
Footwear Technology	The technology used in the design of footwear is presented in the section. However, considering that technology is in advance each day, this content tends to be updated in parallel with the advancement.
Technological Allowances for Pattern Making	The are three main types of allowances for the sectional patterns: lasting allowance, seam allowance and edge allowance This section present basics information for establishing these allowance accordingly with the footwear manufacturing technology. It must be kept in mind that various design effects need special allowances and these can be estimated considering the treatments and materials involved.

Table 6. Content of Module II, Footwear

Module III- Measurements and Tools. On the designing and pattern making stages of the footwear, one of the basic tasks is to make precise measurements by using proper tools. To understand the details, the following lessons should be comprehended.	
Measuring the Foot (Foot Anthropometrics)	This section defines and presents anthropometrical parameters within the foot and leg. Foot measurements may include the use of basic measuring devices such as rulers and tape measures, 2 dimensional tracings, 3 dimensional techniques as well as computer techniques.
Measurement Systems	This section aims to present various measurement systems by connecting foot and last measurements with footwear sizing. It covers describing foot, last and footwear measurement sizing; scope and interpretation of design in brief; analyse and assessment of sizing for footwear design; adaptation of the measurements of foot to shoe design requirements; measurements of the foot transposed into measurements of the last; footwear sizing; measurement and comparison tables; the effect of poor-fitting or poorly made shoes; and Shoe Size Conversion tables.

Table 7. Content of Module III, Measurements and Tools

Module IV-Design and Pattern Making. These module covers presenting of principles and concepts of pattern making; drawing the outline for patterns; obtaining design standard for different models; making and modifying the working patterns; maintaining accurate records, documents, sketches, samples, drawings sheets, working progress files; preparatory stage for pattern making; producing the design standard (master pattern); sectional patterns within various models of shoe; and producing and modifying working patterns.	
Principles and Elements of Design Applied to Footwear	In order to create a good product, design knowledge about the theory of elements and principles of design is required. This section demonstrates how elements of design integrated into principles of designs could be used within the footwear product concept.
Developing and Presenting New Design Concepts	Developing and presenting footwear design concepts within specified guidelines is of importance. This section covers researching trends (materials, shapes, colours, components and accessories); developing or selecting concepts and storyboard themes; preparing preliminary design concepts using sketches, panels, boards, software tools, and samples of shoe; presenting design concepts; footwear concept and design briefing; researching fashion trends; generating and developing new footwear concepts.
Producing Standard Forme of the Last	The standard forme is the most important pattern in shoe design. If it is not accurate, all patterns will reproduce the errors within the original standard forme. The unit presents several accurate methods of producing standard forme. This lesson covers identifying the forme-making methods (paper slotted forme, fabric forme, vacuum-forme, paper tape forme); transposing the main anatomical points and

	lines on the last in accord with their position on foot; obtaining standard forme by flattening the internal and external surfaces of the last; transposing the anatomical points and lines of the foot into the last; measurements and calculations; control lines and points; methods for making standard forme; and flattening and making adjustments in order to get the basic standard forme.
Producing Design Standard (master pattern)	The design standard gives a pattern that represents the shape and the basics lines of the footwear model, which are transposed into a 2D drawing. It is very important that the basic standard has position points and basis lines clearly marked. These points and basis lines are linked with the anatomy and biomechanics of foot, and have to be in view during all the stages of designing and pattern making. This lesson covers how to produce design standard in reference to foot anatomy, last construction and characteristics and shoe style; the link between foot anatomy and basic construction lines; the link between basic construction lines and footwear patterns; and examples of design standards for different types of shoes
Pattern Making for Women's Court Shoe	The classic court shoe is the most common women's footwear model. In order to get an accurate pattern for this type of shoe that fit correctly on the last, basics principles of pattern making have to be known as well as the necessary adjustments. The lesson covers presenting of principles and concepts of pattern making for court shoe;
Pattern Making for Men's Casual Shoe (Oxford, Derby)	Designing and producing patterns for classical types of men's shoes, as Oxford and Derby models, are presented in this unit. The Oxford style is characterized by the fact that the vamp section is laid over the quarter sections. The Derby shoe is a lace-up style in which the quarters are laid on the vamp section. The lesson covers presentation of the principles and concepts of pattern making for Oxford/Derby shoe
Pattern Making for Children's Shoe	The children's shoe is not a small size of an adult shoe. Special features are required for this category of shoes due with different conditions and features the children's foot has to perform. This lesson covers presentation of the principles and concepts of pattern making for children's shoe.
Pattern Making for Slippers	Slippers are characterized by the fact that no laces or other systems for setting up on foot are used. Designing this type of shoe requires a special attention to superior line of quarter that has to be accordingly with the usability of the footwear. Elastic tape could be used and the patterns for vamp and for quarter have to be designed taking into consideration the presence of this functional element. The lesson covers presentation of the principles and concepts of pattern making

Pattern Making for Boots/High Boots	For designing boots or high boots more dimensions are required. The standard forme is completed with information about highs and girths measured on leg. The lesson covers presentation of the principles and concepts of pattern making for boots.
Pattern Making for Women's Sandals	The most common method for sandal's pattern making is by drawing the design lines and the sectional patterns directly on last. The 3D model is translated into the 2D standard forme and the working patterns are obtained. The lesson consists of the principles and concepts of pattern making for sandals.
Producing Lining Patterns	This unit presents the methods for getting patterns of lining for different types of footwear (court shoe, derby shoe, oxford shoe, slipper, boots, and sandal). The lesson consists of lining with fabrics (lining with synthetic materials) and lining with leather lining with natural materials).
Elements for Designing Bottom Footwear Components (Insole, Sole)	The basic construction of the bottom components is presented in this unit. Practical exercises demonstrate the principles for designing insole and sole as main components of the shoe bottom, which are belts, heels, heel covers.
Basics for Producing Footwear Patterns from 3D Design	This part is the presentation of the basics for footwear pattern making in accordance with design specification and manufacturing requirements. This method requires for 3D design to be created first directly on the last and then accurately transferred and transformed into a 2D standard design. The lesson includes defining design lines and features on 3D last; translating designs from 3D to 2D standard forme; drawing patterns to outfit required specifications of the footwear; modifying and adjusting patterns; materials and techniques needed to prepare footwear patterns; and basic steps in producing footwear patterns.
Grading 2D Footwear Patterns	The steps for grading flat (2D) footwear patterns by using manual techniques should be known. The lesson covers checking patterns for correct information; grading flat (2D) patterns; ensuring graded patterns to meet specifications; grading systems and methods; and pattern grading.

Nesting the Patterns and Material Efficiency Analysis	This unit focuses on nesting and some analysis for material efficiency. It covers proprieties of materials; spreading options; pieces restrictions; cutting planning strategies; fabric usage: used, wasted, and consumed.
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Table 8. Content of Module IV , Design and Pattern Making.

6. Features of Virtual Training Centre for Shoe Design

- a) **To contribute to the development of quality lifelong learning and to promote high performance, innovation and a European dimension** in system and practice in the field. VTC-Shoe project intends to improve vocational and educational training curricula on shoe design in Romania, Turkey and Greece by focusing on the development of innovation and good practice. The results of partners common developments will be transpose into a virtual centre, making it available on European level. By accessing the new created shoe design training course, trainers and teachers, shoe designers, adult learners, as well as trainees and apprentice will be keeping up to date with skills and knowledge necessary for high performance and innovation, both in training and shoe design. Based on availability into virtual common space of the innovative e-learning materials and training methodologies training materials, the project will make its contribution to development of single European information space (COM, 2005).
- b) **To help promote creativity, competitiveness, employability and the growth of an entrepreneurial spirit.** In a world increasingly based on knowledge and information, education and training are put at the core of the European footwear industry agenda (Com. SW Doc., 2001). The footwear companies need to make learning a lifelong endeavour deal with their employees of all ages continuously developing their skills. By creating a new e-learning content and functional web service the Virtual Training Centre for Shoe Design will help both workers and footwear companies transforming the way they learn, interact and work in order to meet the footwear sector needs for competitiveness, employability and the growth of an entrepreneurial spirit.
- c) **To support the development of innovative ICT-based content, services, pedagogies and practice for lifelong learning.** ICT-related skills in the shoe design are also vital for the competitiveness of the footwear sector from and for increased job opportunities and employment. The concrete aim of the project is to develop a modern virtual training centre in shoe design for: 1) training the trainers, trainees at the college and technicians and apprentices for shoe design; 2) preparing shoe design technicians as intermediates having common measurable qualities the industry is seeking. VTC-Shoe project will create a common ICT-based content and will help for upgrading competences and skills of teaching staff and exchange experiences over the virtual training centre.
- As for the operational and specific objectives, the project aims to support improvements in quality and innovation in vocational education and training system, institution and practices. This can be achieved through improving the qualifications and competences of the trainees in this field and it is directly related to the well-designed and programmed



Fig. 2. VTC-Shoe site content

“General” includes an introduction to Virtual Training centre mentioning the design of VTC mainly. It also gives information about the approach, methodology and techniques used in the formation of VTC. “Content Development” covers the dynamic and static materials like texts, animations, pictures, etc. used in the course step by step. It covers theoretical and practical knowledge about Foot, Footwear, Measurements and Tools, and Design and Pattern Making (fig.2).

7. Presentation of Content in the Virtual Environment

The lessons are presented in the virtual environment with the help of audio-visual aids. While the theoretical lessons are presented with the text accompanied by pictures for description, the practical ones has animations, videos and some other magnifying features in addition to the texts and pictures. The following are selected steps (from Lesson 4 of Part IV: How to Design a Standard) to demonstrate how a lesson is presented in the virtual environment (fig.3-16).

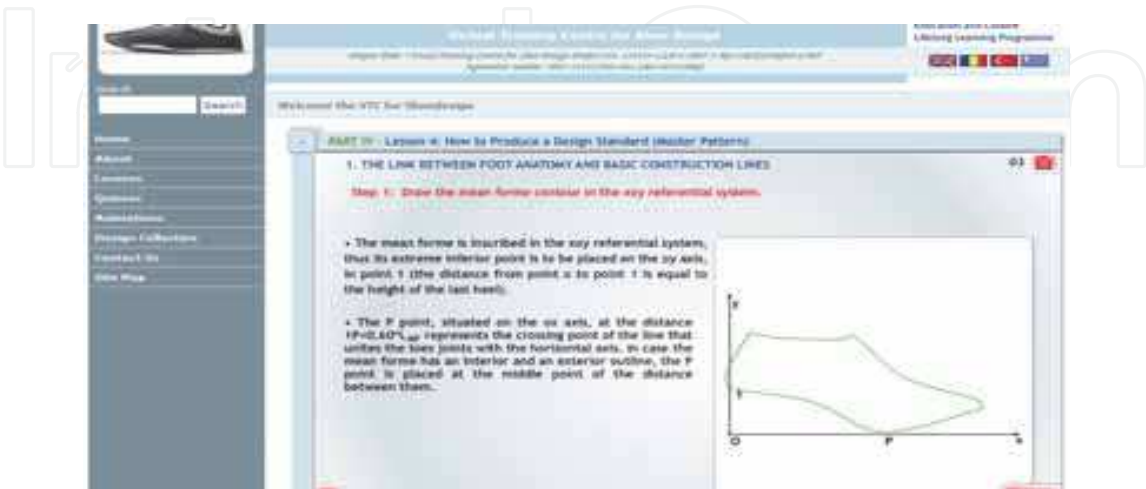


Fig. 3. Step 1: Draw the mean forme contour in the x0y referential system

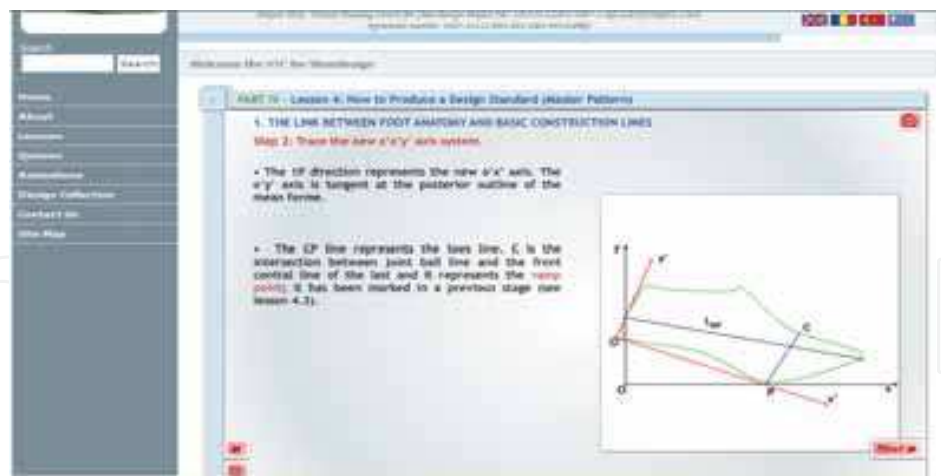


Fig. 4. Step 2: Trace the new $x'0'y'$ axis system

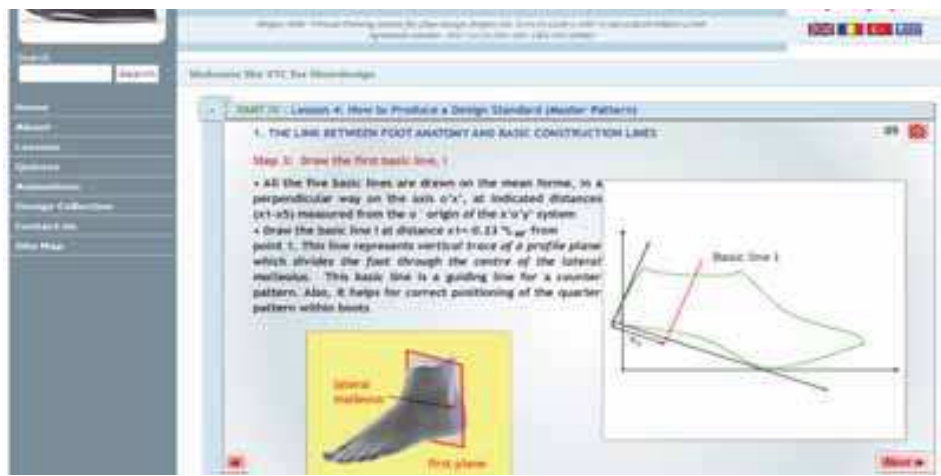


Fig. 5. Step 3: Draw the first basic line

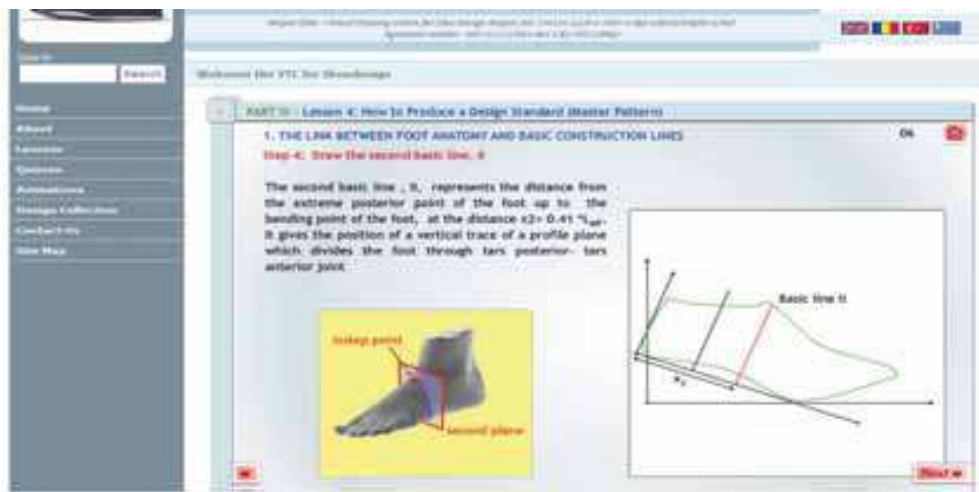
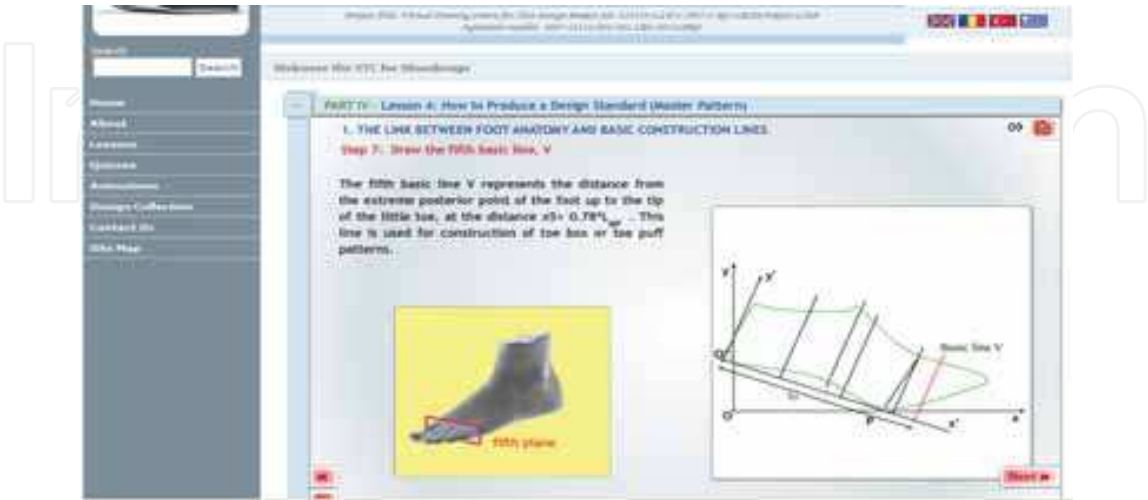
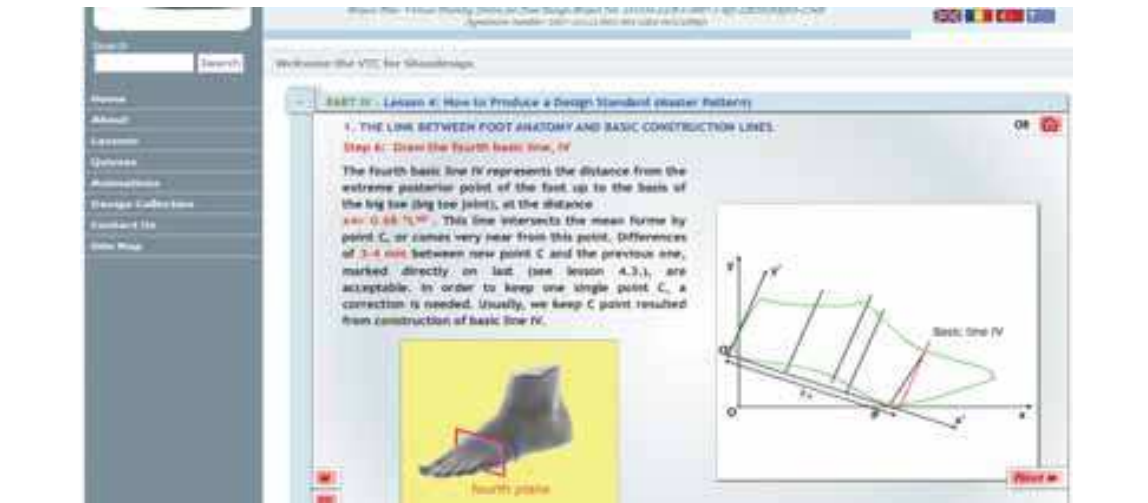
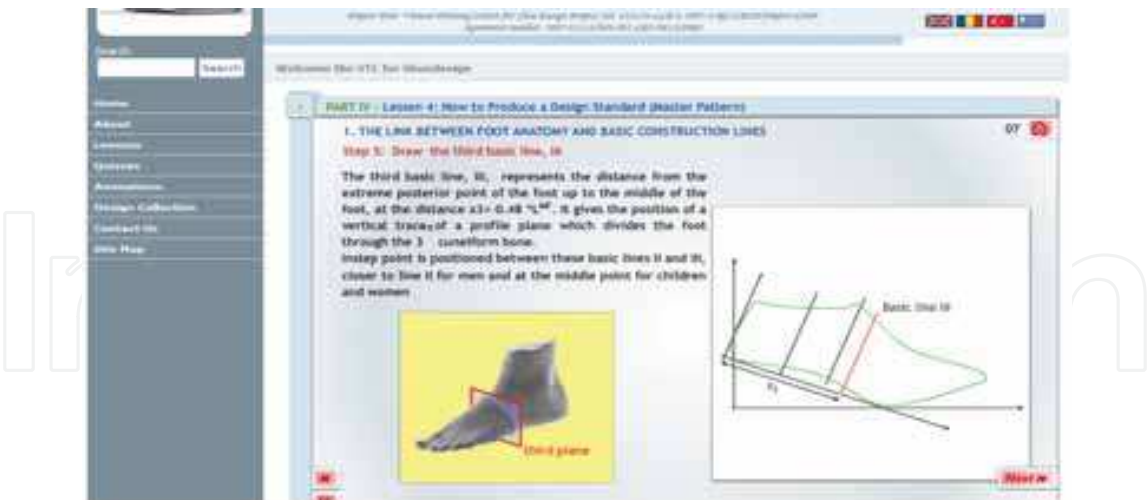


Fig. 6. Step 4: Draw the second basic line



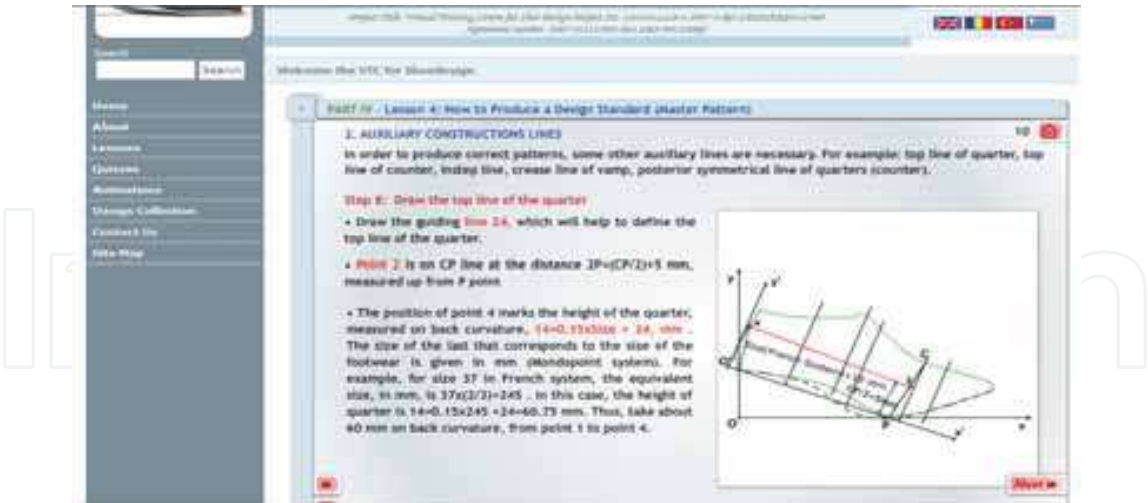


Fig. 10. Step 8: Draw the top line of quarter

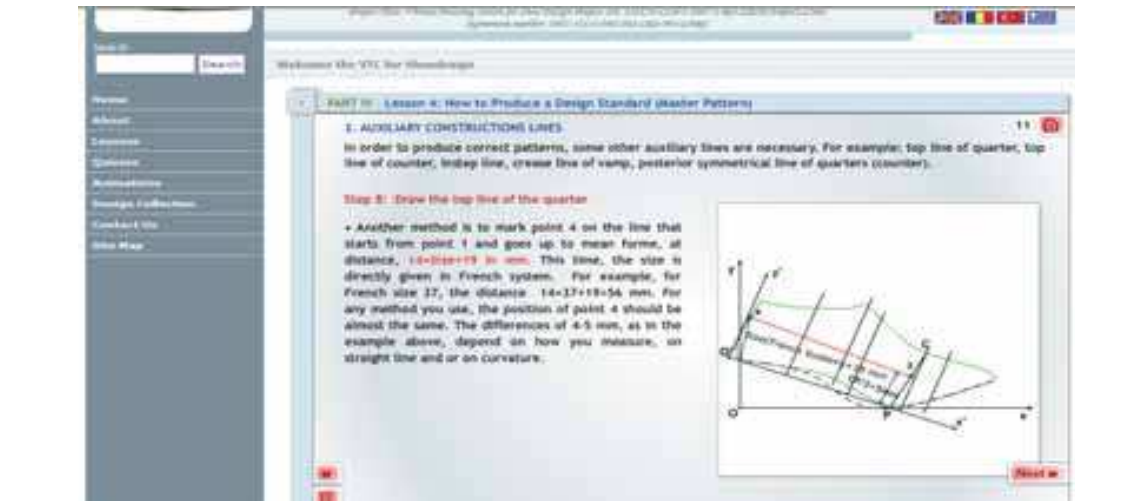


Fig. 11. Step 9: Draw the top line of the quarter

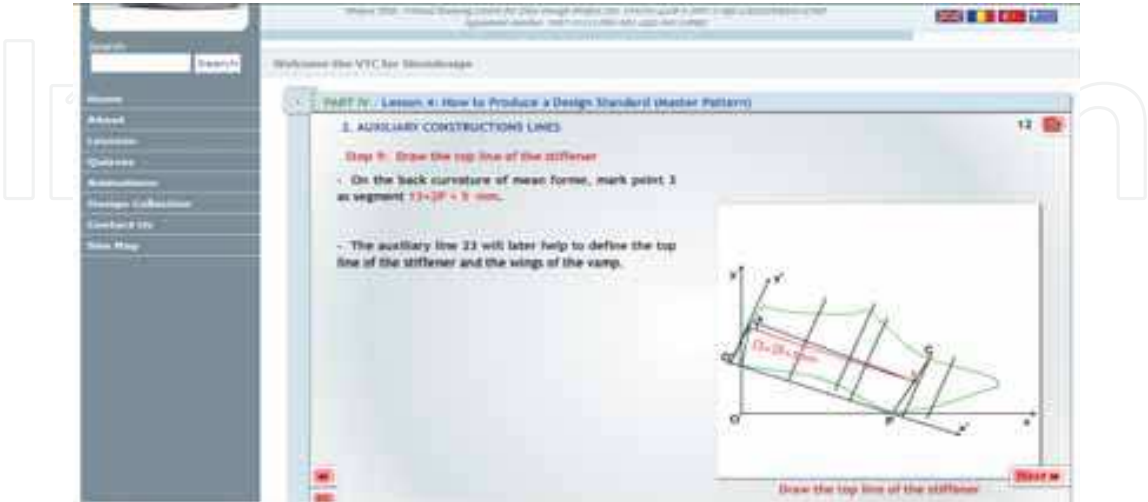


Fig. 12. Step 9: Draw the top line of the stiffener

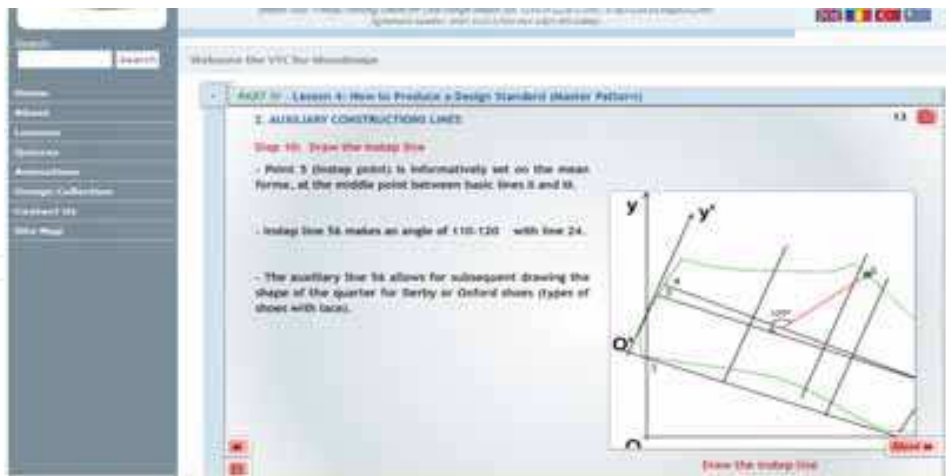


Fig. 13. Step 10: Draw the instep line

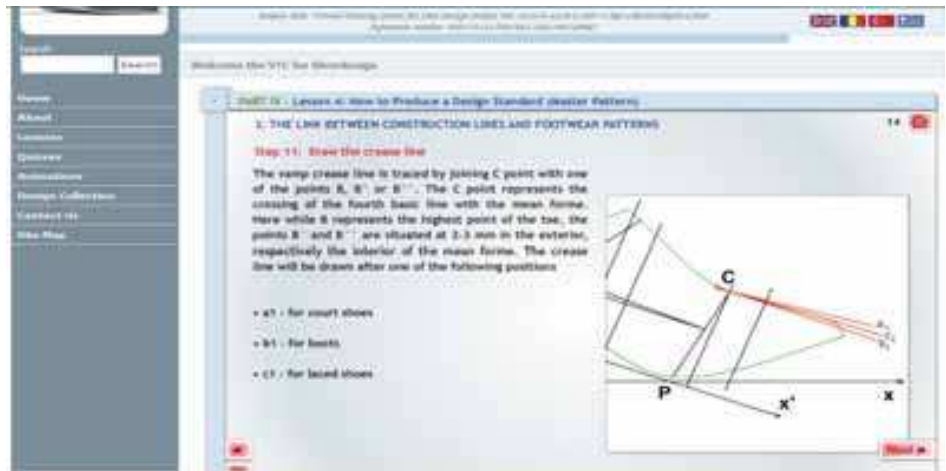


Fig. 14. Step 11: Draw the crease lines

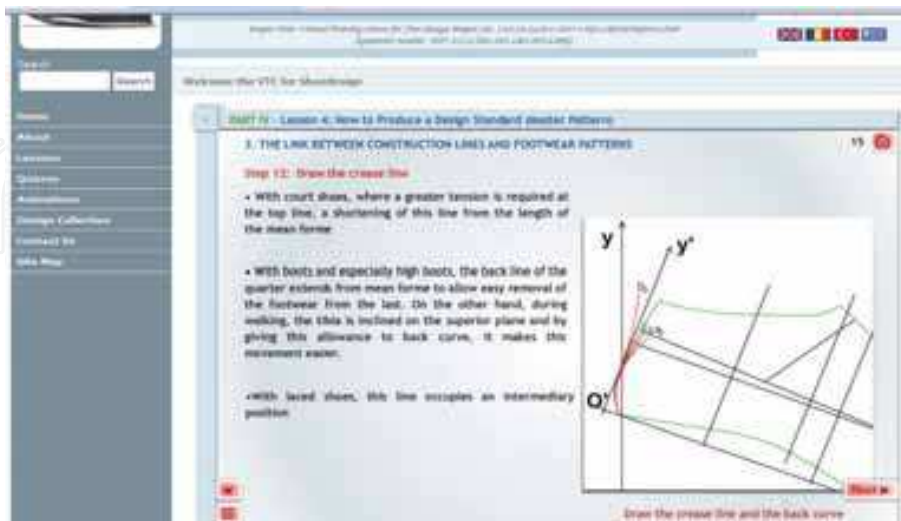


Fig. 15. Step 12: Draw the back curve lines

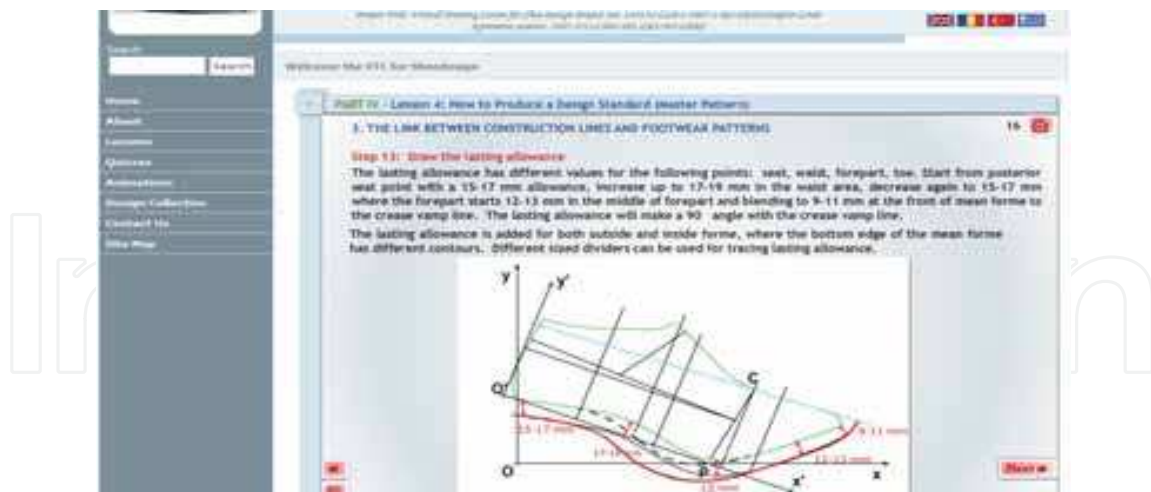


Fig. 16. Step 13: Draw the lasting allowance

8. Conclusion

This virtual learning environment for Shoe Design as an e-learning environment is important in the EU in terms of internationalisation and globalisation of education, student demand and interest in increasing the quality of education through ICT. At the national level, integration of ICT should become a key priority with national and regional institutions making a commitment to ITC and the development of networks. There must be increased national flexibility with a commitment to support common standards of quality and assessment and to develop national and international metadata standards. This centre addresses the priorities expressed here. Furthermore, this virtual training centre addresses the strategic objectives mentioned above: improving the quality and effectiveness of education and training systems in the EU by developing skills for the knowledge society, ensuring access to ICT for everyone, increasing recruitment to scientific and technical studies, and making the best use of resources. Facilitating the access of all to education and training systems by providing open learning environment, making learning more attractive, and supporting active citizenship, equal opportunities and social cohesion is the other strategic objective that can be achieved through this virtual training centre.

On a short term, the partners country will have trainers from colleges, vocational schools being up to date with the a new common curricula and having necessary skill for teaching on-line; trainees with more extensive knowledge in shoe design, more skilled design technicians, designers, who are actually responsible for designing shoes and apprentices prepared for a new job, who are newly recruited for shoe design.

As the research indicates here the Virtual Training Centre for Shoe Design is necessary for universities, footwear companies, colleges and training institutions all over Europe and elsewhere, because they are integrating in an organised and illustrative way all the steps required to acquire quickly, easily and in a technologically advanced manner the skills necessary for shoe design, and pattern construction and which will be more clearly and in a more effective educational approach than in an ordinary classroom. Through the network of collaborations of the partnership, the outputs of the training tools will be assimilated in the training systems of a wider spectrum of training organisations.

The project is to be considered successful if it can manage to stimulate interest and immediate results in the participating universities and vocational centres, by demonstrating to them the usefulness of the proposed technologies and by encouraging them in participating in new teaching and research activities. Also, another very important indicator is the number of companies that are interested in participating in the testing and evaluation stage of the project. The project runners also understand the dissemination and valorisation not merely as a duty but also as a possible resource for further activities. Thus, a special emphasis is given for perfect valorisation activities in order to assist the utilisation of the project outcomes. Valorisation is considered as an integral part of the whole project as a continuous activity. It starts within the partners and extended to national and European level.

In the long term, trainers will broaden their training ability by means of communication over virtual training centre; trainees and apprentices will have better employment opportunities in their countries and especially in other partnering countries; technicians will be a subject to lifelong learning and e-learning as a member of modern society; shoe designers will be more creative by contributing their creative feedbacks.

As target sectors, educational institutions will need to modify their existing training methods and techniques in the light of the new curriculum, and distance learning approach will provide them with a better, cost-effective training, which would have been impossible without high cost, numerous staff and workshops. Shoe manufacturers will be able to customise their training content according to their own training requirements, which may differ from one manufacturer to another.

As potential users, the training organisations, the SMEs, the universities, colleges, vocational schools, training centres will be able to increase easily the number of trainees and in this way they will contribute to the employment.

The results of the project can be transferred to similar fields such as furniture, textile, air conditioning etc. The experiences and knowledge gained during the process of this project can be used in developing and improving other training programmes in particular in the area of new information technology applications in related sectors.

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Technology Education and Development

Edited by Aleksandar Lazinica and Carlos Calafate

ISBN 978-953-307-007-0

Hard cover, 528 pages

Publisher InTech

Published online 01, October, 2009

Published in print edition October, 2009

The widespread deployment and use of Information Technologies (IT) has paved the way for change in many fields of our societies. The Internet, mobile computing, social networks and many other advances in human communications have become essential to promote and boost education, technology and industry. On the education side, the new challenges related with the integration of IT technologies into all aspects of learning require revising the traditional educational paradigms that have prevailed for the last centuries. Additionally, the globalization of education and student mobility requirements are favoring a fluid interchange of tools, methodologies and evaluation strategies, which promote innovation at an accelerated pace. Curricular revisions are also taking place to achieved a more specialized education that is able to responds to the society's requirements in terms of professional training. In this process, guaranteeing quality has also become a critical issue. On the industrial and technological side, the focus on ecological developments is essential to achieve a sustainable degree of prosperity, and all efforts to promote greener societies are welcome. In this book we gather knowledge and experiences of different authors on all these topics, hoping to offer the reader a wider view of the revolution taking place within and without our educational centers. In summary, we believe that this book makes an important contribution to the fields of education and technology in these times of great change, offering a mean for experts in the different areas to share valuable experiences and points of view that we hope are enriching to the reader. Enjoy the book!

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Aura Mihai and Mehmet Sahin (2009). ICT Use in VET: The Virtual Training Centre for Shoe Design as a Model, Technology Education and Development, Aleksandar Lazinica and Carlos Calafate (Ed.), ISBN: 978-953-307-007-0, InTech, Available from: <http://www.intechopen.com/books/technology-education-and-development/ict-use-in-vet-the-virtual-training-centre-for-shoe-design-as-a-model>

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