



HARMONIZING ACADEMY WITH THE INDUSTRY: PERSPECTIVES ON THE ROMANIAN TEXTILE ENGINEERING CURRICULUM

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Abstract: *Changes in the business world as a result of economic instability, innovations in technology, the increasing diversity on the labor market, may be altering the kinds of competencies and general skills that universities are being called to deliver [1]. It is the goal and responsibility of textile programs and faculties to producing graduates with the skills, competencies, and attributes to find employment and to be viable in their career. The purpose of this study was to identify the content of apparel and textiles curricula in textile programs at the bachelor level and then to establish which elements of that content were perceived as important to job performance in the occupational field of textile engineering, with emphasis on knitwear, garments engineer. It has been described the main textile programmes offered from Romanian universities and examined and compared similarities and differences between “Knitting and clothing technology” programme, the only common programme in all three universities that provides textile studies. This paper provides an overview of the careers in textile and textile product development, the universities offer, and the differences between, so that changes can be made to align important competencies.*

Key words: *careers in textile, textile supply chain, knitting and clothing technology*

1. INTRODUCTION

The garment industry is an important part of the textile industry, which is located at its downstream in the supply chain. The upstream of the textile industry include raw material suppliers of garments, midstream has raw material processors and garment manufacturers, while downstream have trade agents and brand owners.

Before 1989, the Romanian textile industry covered the entire supply chain, the complete production system that includes fiber manufacturing, spinning, weaving, dyeing, designing, cutting, sewing, and garment finishing. In the last decades, the offshoring process has led to an increase in the weight of clothing manufacture and the decline of other links in the value chain. Studies show that the Romanian clothing industry should focus on restoring the added value chain, on higher value-added, niche segments, developing brands and the image of products and processes, on developing new concepts and marketing strategies in order to survive in the competitive global market [2,3]. While the job market suffers changes, textile education programs are striving to adapt to the ongoing changes and external threats in the academic environment.

In response to the constant changes in the textile industry (modify of the value chain, technologization and digitalization of the industry, eco-trend, and customer demands, etc) textile



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faculties or textile departments have been researching how to update their programs to respond at the social, technological, and economic requests. [4, 5]

2. CAREERS IN TEXTILE

Different career classification models are offered to cover this highly complex industry. The clothing industry includes design, production, marketing, and distribution of clothing, home, and technical textile [6, 7]. Table 1 presents a summary of careers in design, textiles, textile engineering according to the Romanian Occupation Classification (COR) in accordance with the International Standard Classification of Occupations 2008 (ISCO-08) and the Romanian universities that provide the required qualification.

Table 1: Careers in textile and textile product development

Careers in textile and textile product development		University
2163 Product and garment designers	210607 Fashion designer	Fashion- fashion design/National Art University of Bucharest Fashion- fashion design/University of Art and Design ClujNapoca. Faculty of Arts and Design/West University of Timisoara Faculty of Arts/ University of Oradea Faculty of Design / "Aurel Vlaicu" University of Arad "George Enescu" University of Arts in Iasi
	216306 Product Development Pattern Maker	Faculty of Textiles, Leather and Industrial Management/ Gheorghe Asachi Technical University of Iasi (TUI) Textile Products Design and Technology/ Faculty of Engineering/"Aurel Vlaicu" University of Arad
Careers in Raw Materials and Manufacturing Manufacturing		
2141 Industrial and production engineers	214101 Leather and substitute engineer	Chemical technology of leather products and substitutes /(TUI) Technology and design of leather clothing and substitutes/(TUI)
	214102 Knitwear, garments engineer	Knitting and clothing technology (TUI), Faculty of Energy Engineering and Industrial Management / University of Oradea Faculty of Engineering/"Aurel Vlaicu" University of Arad Faculty of Engineering/"Lucian Blaga" University of Sibiu
	214103 Textile, leather engineer	Faculty of Textiles, Leather and Industrial Management/ (TUI)
	214105 Textile, leather technical designer	Technology and design of textile products (TUI)
	214106 Textile, leather consultant engineer	Technology and design of leather clothing and substitutes/ (TUI) Faculty of Energy Engineering and Industrial Management / University of Oradea
	214107 Textile-leather expert engineer	Technology and design of leather clothing and substitutes
	214108 Textile-leather inspector engineer	Technology and design of leather clothing and substitutes/(TUI)



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	214109 Textile-leather referent engineer	
	214136 Manufacturing programmer / manufacturing launcher	Knitting and clothing technology (TUI), Faculty of Energy Engineering and Industrial Management / University of Oradea (UO) Faculty of Engineering/"Aurel Vlaicu" University of Arad(UAVA) Faculty of Engineering/"Lucian Blaga" University of Sibiu(ULBS)
Careers in Sales for the Fashion Retailer – are not specified separately		

3. KNITTING AND CLOTHING TECHNOLOGY PROGRAM IN ROMANIAN UNIVERSITIES

The question of determining the specific education needed by university licentiate of textile programs for successful entry into the working market has been approached from a variety of angles. The common point of several research studies is the accent on surveying the opinions of practitioners in the industry on the competencies and qualities needed by students entering the textile industry [8,9]. Apparel construction and patternmaking are the competencies identified as essential by the participants. Ather recommendable competencies include understanding people, product development, organization and management, technology and communication, marketing and international trade, human resources, and environmental issues and sustainability.

Regarding the textile studies curriculum, there is differentiated between an industry orientation and a professional orientation [10]. A curriculum with an industry orientation involves examination of the apparel industry structure and responsibilities and focusing on business efficiency and profitability. A curriculum with a professional orientation is concentrated on the importance of applying integrated, broad-based clothing and textiles knowledge to professional decisions based on specific social, psychological, and cultural aspects of clothing, customer orientation, merchandise operations, and sustainable value chain.

A professional orientation integrates technical training with cognitive competence to train students to make future decisions that concern consumer satisfaction and business profitability[10].

Agency for Quality Assurance in Higher Education (ARACIS) is a body with legal prerogatives to issue and to propose to the Ministry of National Education advises and a recommendation based on its own evaluations, and provides the conceptual framework and describes the main activities and strategies provided by the processes of periodic authorization, respectively of external quality assurance. According of the Romanian Agency for Quality Assurance in Higher Education[11], the curricula of a study programme must be compatible with the national qualifications framework and with similar plans and study programmes from the member states of the European Union and from other countries. It has to include a set of fundamental disciplines, a set of specialized disciplines in the field and the complementary disciplines organized in compulsory disciplines and optional disciplines. In order to maintain accreditation, the Romanian textile study programmes must take inventory and develop their curricula regularly. The evaluation of quality in an institution is made within the three areas provided under the law: institutional capacity (institutional, administrative and managerial structures, material resources), educational effectiveness (the content of study programmes, learning outcomes, scientific research activities, financial activity), and quality management. The article will focus only on the content of study programmes.



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In order to obtain accreditation, as a quality assurance modality that certifies the observance of standards by education, in the curricula, the ratio between the teaching hours and the other applied educational activities (seminars, laboratory activities, projects, traineeships, etc;) must be of 1/1, with no more than +/-20 % admitted deviation. Analyzing the link between industry and academia in terms of the textile industry is important for textile programs to give students a solid foundation of skills and knowledge sought by employers. Therefore, in the bachelor (Licence) study programme a 2-3-week traineeship per year beginning with the second year of study must be included, as well as a period for the elaboration of a diploma paper, during the final year of study. For traineeship periods, the university has to establish collaboration agreements with the practical units, which must specify the place and period of training and the organization mode and guiding principles.

Table2: Comparison of the Curriculum for Knitting and Clothing Technology Programme

Course name	No of hours			
	UO	TUI	ULBS	UAVA
Mathematics	84	56	112	112
Physic	42	56	56	42
Chemistry	42	112	84	70
Mechanics and Resistance of Materials, Machines Parts and Mechanism	56	x	210	140
Electrotechnics	84	x	x	70
Technical Drawing and Infographics	112	x	x	28
Computing Programming and Programming Languages	42	56	56	42
Probability theory and mathematical statistics	84	126	126	28
Graphics Computer-Aided Applied informatics	70	112	154	x
The basics of computer-aided design technology	56	42	x	x
Textile Fibers	56	140	84	98
Textile Structures -knitting	56	56	56	42
Textile Structures (yarn)	56	56	98	56
Textile Structures (fabrics)	56	56	70	56
Comfort and functions of textile and leather products	56	56	42	42
Fundamentals processes in garments	112	140	168	168
Metrology in Textile-leather	56	56	70	42
Basis of processes in textile garments	84	112	112	56
Structure and design of garments	126	56	126	112
Structure and design of knitting	70	84	70	126
Clothing construction and shaping	56	84	x	x
Design of technological processes in garments	56	56	x	x
Practical Activity	180	180	180	180
Practical Activity for Diploma Project	60	60	60	60
Elaboration of theDiploma Project	56	56	56	70



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Textile Finishing	56	42	112	70
Processes and Machines in Clothing	154	182	168	140
Processes and Knitting Machines	154	168	168	140
Computer Aided Design in Clothing	70	84	70	84
Computer Aided Design in Knitting	56	84	56	x
Time study	42	42	56	x
Basics of computer-aided ecological design/Ecological design	x	42	x	28
Fashion Design	56	70	98	140
Artistic Creation /drawing - optional	56	56	56	x
Basics of computer-aided ecological design/Ecological design	x	42	x	28
Economy	56	x	28	28
Management	56	84	42	42
Manufacturing management in the textile industry	x	x	56	42
General Engineering in Textiles&Leather	56	112	56	42
Analysis and Production-Cost Control Systems	56	x	56	28
Production Systems Engineering	56	x	56	x
Textile Quality Control	84	56	56	70
Marketing	x	28	56	x
Foreign Language: English	56	56	70	70
Second foreign language	28	14	14	14
Communication	28	28	x	14
Ethics and academic integrity	28	x	x	14

Textile engineering students today must be prepared for jobs that involve diverse skill sets, knowledge sets and experience to be successful. This goal is achieved through a set of disciplines included in the following categories: fundamental disciplines (cca 17%, hours: 560), required disciplines (max 90%, hours: 2800), mandatory optional courses (min 10%, hours 320), disciplines in the field (min 38%, hours: 1250), specialty disciplines (min 25%, hours: 1000), complementary disciplines (max 8%), optional courses (min 10 %).

From the analysis of the four curricula, we found the similarity of 75% of the programs, but ARACIS's requirement also allows the distinction of universities for the proposed programs. For example, the curriculum Knitting and Clothing Technology Programme Gheorghe Asachi Technical University of Iasi (TUI) contains specific disciplines such as Technologies knitwear on different types of vehicles (plus 168 hours compared to the other programs), product lifecycle management, prototyping diploma project. The Knitting and Clothing Technology Programme/University of Oradea (UO) focuses on IT disciplines: computer programming and programming languages, information systems for management, automation in garment manufacturing, the "Aurel Vlaicu" University of Arad (UAVA) offers a broader range of disciplines in the field of weaving, and the "Lucian Blaga" University of Sibiu (ULBS) proposes a larger number of disciplines in the mechanical field.

4. CONCLUSIONS

Academic requirements for graduates of textiles and clothing programs should continue to form around the particular intellectual processes needed for well-prepared engineers. Students must develop the underlying intellectual, scientific, and technical principles to function in life and in professional roles without neglecting communication, ethical and managerial skills.

It's important to recognize that fashion and textiles industry is changing and alignment of curriculum to all implicated stakeholders needs is important to the mission of academic institutions. As more companies are seeking the university graduates as an employee, the curriculum must be



developed with professional competencies, allowed textile engineering programs to assess, redirect, or modify curriculum for better response to the market demand. Therefore is highly necessary that professors update their curricular by developing new courses, updating course objectives, adopting newer techniques, and integrating the subject matters within and between the disciplines in textile programs.

The curriculum and discipline-content competencies are established by departments in concordance with a set of rules settled by the accrediting agency. A more modern and flexible approach is expected in this institution too.

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