IMPLEMENTING INTERDISCIPLINARITY IN CAREER GUIDANCE FOR SECONDARY SCHOOL STUDENTS IN FORESTRY AND WOOD, METAL AND MACHINERY, AGRICULTURE AND FOOD SECTORS OF INDUSTRY

TARPDISCIPLIŠKUMO DIEGIMAS, KONSULTUOJANT VIDURINIŲ MOKYKĻŲ MOKSLEIVIUS DĖL KARJEROS MIŠKININKYSTĖS IR MEDIENOS APDIRBIMO, METALO APDIRBIMO, MAŠINŲ GAMYBOS, ŽEMĖS ŪKIO BEI MAISTO PRAMONĖS SEKTORIUOSE

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Santrauka. Straipsnyje pristatomi kompetencijų poreikio tyrimo, atlikto miškininkystės bei medienos apdirbimo, metalo apdirbimo, mašinų gamybos ir žemės ūkio bei maisto pramonės sektoriuose Lietuvoje, Latvijoje ir Estijoje, rezultatai. Šiuo tyrimu įgyvendintas Erasmus+ strateginių partnerysčių projektas „Tarpdiscipliniškumo diegimas karjeros konsultavimo srityje“. Atliekant kompetencijų poreikio tyrimą, buvo apklausyti įmonių atstovai. Taip buvo siekti nustatyti konsultuojant dėl karjeros reikšmingus darbo procesus bei kompetencijas dizaino, gamybos technologijų ir verslo ekonominos srityse.

Raktiniai žodžiai: karjeros konsultavimas, kompetencija, tarpdiscipliniškumas, dizainas, technologijos, verslo ekonomika.

Summary. The paper presents the findings of the competence needs analysis performed in order to determine the employers’ needs for their staff competencies in design, technology and economics in the sectors of forestry and wood, metal and machinery, agriculture and food industry in Lithuania, Latvia
and Estonia. This study was performed as a part of the implementation of the Erasmus+ Strategic Partnership Project “Implementing Interdisciplinarity in Career Counselling”. A survey of company representatives was carried out in order to identify the work processes and the competencies in product design, production technologies and economics that are the most relevant to career guidance.

Key words: career guidance, competence, interdisciplinarity, design, technologies, economics.

INTRODUCTION

This article presents the initial findings of the study carried out as part of the Erasmus+ Strategic Partnership Project “Implementing Interdisciplinarity in Career Counselling”, No. 016-1-LV01-KA201-022681 in partnership with Rezekne Academy of Technologies, Vytautas Magnus University and Tallinn University of Technology. The project aims to develop and implement innovative practices in career education at secondary school, to promote secondary school teachers’ career guidance competence based on interdisciplinarity in design, technology and economics, as well as to facilitate motivated and targeted career choices of learners in selected fields of industries.

The wider objective of the project is to optimize the situation in the region’s labor market by introducing more professionals into the businesses that are strategically significant in the region.

In order to attain these goals, the analysis will focus on the gap between the competence needs of the economic sectors in the regions and education response in the area of Career Guidance in secondary schools. Afterwards, the guidelines and information materials will be prepared for career counselors and students along with the development of inservice training course for secondary school teachers.

The aim of the competence needs analysis was to collect information of the employers’ needs for their staff’s competencies in design, technology and economics and to elaborate recommendations for the development of the inservice training program for career counselors. A quantitative survey questionnaire with standardised answer options was used for data collection.

For the purposes of the questionnaire development, the existing Latvian occupational standards and profiles were analyzed in the sectors of Forestry and wood, Metal and machinery, and Agriculture and food. Additionally, the design, technology and economics competences of bachelor level graduates were described. Descriptions of work processes were elaborated based on the competencies from occupational standards. The competences in the questionnaire were expressed in terms of the corresponding work processes (Tūtlys, Spöttl, 2017).

Data collection via online questionnaire was conducted from January 12, 2017 until March 15, 2017. The questionnaire was delivered in Latvian, Lithuanian and Estonian languages. 130 questionnaires from Forestry and wood, Metal and machinery, Agriculture and food sectors of the industry were collected. An administrative manager, sector manager and sector specialist from each company voluntarily answered the questions online. Each respondent was invited to evaluate the relevance of different work processes related to design, technologies and economics in relation to his/her company activities and their future development.
Fourteen work processes related to design, 31 work processes related to technologies and 21 work processes related to economics are included in the questionnaire. Each work process described in the questionnaire was evaluated on a 10 point-scale, where 10 is “Very, very necessary” and 0 “necessary”. Respondents answered to the questions from the perspective of his/her company or department.

The data analysis of the questionnaire and the elaboration of recommendations for the development of the inservice training program for career counselors were conducted from March 15, 2017 until May 15, 2017. The work processes in Design, Technology and Economics were ranked by the mean score in each selected Industry sector - Forestry and wood, Metal and machinery, Agriculture and food. See four high ranked work processes/competencies demanded by respondents in Table 1.

Results in Table 1 show that competences related to Design recur more frequently in all sectors of industries. 11 out of 12 competencies are indicated repeatedly and just one competence is not repeated in two other industry sectors. This leads to the conclusion that four high ranked competences related to design are perceived as more general.

Competences related to technologies are also indicated in all industries, but not as often as competences related to design. 7 out of 12 competences are indicated repeatedly and 5 competences are indicated once as specific for the industrial sector. As a result, it can be assumed that competences related to technologies are perceived very differently.

Competences related to economics were repeated very rarely – just 3 of 12 competencies were repeatedly indicated by respondents in all industry sectors. One may conclude that competences related to economics were perceived by the respondents as more specific to the industry sector. It is likely that the size of the companies varies in different industries, which results in the demand for specific competencies. The data shows only the preliminary demand of competences and further studies are required in order to conduct additional data collection and analysis.

These findings make it possible to connect the demand for competencies in design, technologies and economics with teaching and learning strategies for the three phases of critical thinking – evocation/anticipation, comprehension/knowledge-building, reflection/consolidation (Crawford, Saul, Mathews, Makinster 2005).

Evocation/anticipation phase is for the activation of imagination, for building an interest. In this phase the career counselor can base his/her activities during guidance on competences related to design as more general. Comprehension/knowledge-building phase is for asking questions and finding answers. In this phase the career counselor can lead the students to inquire and base his/her activities during guidance on competencies related to technologies. Reflection/consolidation phase is for reflection and personalization of findings and information. In this phase the career counselor can ask the students to give personal responses based on competencies related to economics.

All these stages can be implemented in different ways for each phase – problem-based learning, group research, projects, cooperative learning.
### Table 1

<table>
<thead>
<tr>
<th>Wood-Forestry</th>
<th>Design (D)</th>
<th>Technology (T)</th>
<th>Economics (E)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Four high ranked competences in Design, Technology and Economics in Forestry and wood, Metal and machinery, Agriculture and food Industry sectors</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>D: Creative and independent development of existing and new products</td>
<td>7,80</td>
<td>T: Creating a safe workplace by complying with fire safety regulations in the production facility.</td>
<td>8,96</td>
<td>E: Handling problem situations adequately and adopting timely and necessary decisions.</td>
</tr>
<tr>
<td>D: Navigating and managing used materials in order to analyse their improvement and development trends, and to be able to use them at work</td>
<td>7,73</td>
<td>T: Managing technological processes.</td>
<td>8,630</td>
<td>E: Dealing with the sector market.</td>
</tr>
<tr>
<td>D: Creating long-term product: innovative, functional, produced in a rational and cheaper way, convenient and easy to use, with aesthetically high-quality forms, colours, and textures.</td>
<td>7,40</td>
<td>T: Adjustment of production regimes by applying knowledge of production process.</td>
<td>8,630</td>
<td>E: Development of the most cost-effective technical solutions.</td>
</tr>
<tr>
<td>D: Development of projects using computer-assisted design and computer-aided manufacturing technologies.</td>
<td>7,30</td>
<td>T: Making strategic and operative decisions by summarizing and analysing production information.</td>
<td>8,56</td>
<td>E: Defining the tasks for achieving the set targets in order to make products with high added value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metal-Machinery</th>
<th>Design (D)</th>
<th>Technology (T)</th>
<th>Economics (E)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>D: Development of projects using computer-assisted design and computer-aided manufacturing technologies.</td>
<td>8,24</td>
<td>T: Choosing the most rational technique and technology.</td>
<td>8,92</td>
<td>E: Handling problem situations adequately and adopting timely and necessary decisions.</td>
</tr>
<tr>
<td>D: Navigating and managing used materials in order to analyse their improvement and development trends, and to be able to use them at work.</td>
<td>7,92</td>
<td>T: Developing proposals directed to more efficient and useful resource utilization.</td>
<td>8,84</td>
<td>E: Development and management of projects.</td>
</tr>
<tr>
<td>D: Creative and independent development of existing and new products</td>
<td>7,60</td>
<td>T: Adjustment of production regimes by applying knowledge of the production process.</td>
<td>8,600</td>
<td>E: Evaluating the calculations of the cost of services to be performed, the necessary investments and workforce consumption.</td>
</tr>
<tr>
<td>D: Creating long-term product: innovative, functional, produced in a rational and cheaper way, convenient and easy to use, with aesthetically high-quality forms, colours, and textures.</td>
<td>7,40</td>
<td>T: Managing the production technology of Products and Services.</td>
<td>8,600</td>
<td>E: Using the necessary technical and normative documentation for the work, finalizing applied and professional documents.</td>
</tr>
<tr>
<td>Agriculture-Food</td>
<td>D: Navigating and managing used materials in order to analyse their improvement and development trends, and to be able to use them at work</td>
<td>7,92</td>
<td>T: Adjustment of production regimes by applying knowledge of the production process.</td>
<td>7,92</td>
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<tr>
<td></td>
<td>D: Creating long-term product: innovative, functional, produced in a rational and cheaper way, convenient and easy to use, with aesthetically high-quality forms, colours, and textures.</td>
<td>7,64</td>
<td>T: Choosing the most rational technique and technology.</td>
<td>7,64</td>
</tr>
<tr>
<td></td>
<td>D: Setting products’ manufacturing restrictions and choosing a set of possible solutions (possible material usage and compatibility as well as possible constructive solution options);</td>
<td>7,57</td>
<td>T: Adjustment of production regimes by applying knowledge of the production process.</td>
<td>7,57</td>
</tr>
<tr>
<td></td>
<td>D: Creative and independent development of existing and new products</td>
<td>7,55</td>
<td>T: Choosing the most rational technique and technology.</td>
<td>7,55</td>
</tr>
<tr>
<td></td>
<td>E: Handling problem situations adequately and timely adopting necessary decisions.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>D: Navigating and managing used materials in order to analyse their improvement and development trends, and to be able to use them at work</td>
<td>7,35</td>
<td>T: Making strategic and operative decisions by summarizing and analysing production information.</td>
<td>7,35</td>
</tr>
</tbody>
</table>
THE CASE OF CAREER COUNSELING STRATEGY IN THE AGRICULTURE AND FOOD INDUSTRY

In this part of the article, methodological reflections are provided on how to design the career guidance processes by following the aforementioned learning phases in the context of agriculture food industry.

EVOCATION/ANTICIPATION PHASE

The sector of agriculture and especially the food industry is specific in terms of importance and everyday consumption of the products produced by this sector. This circumstance can be successfully exploited in the evocation and anticipation of career guidance. On one hand, everyday consumption of a product makes it a self-evident and routine object, which can reduce the interest of young people in the processes of its production. On the other hand, increasing society’s interest in healthy lifestyle and nutrition naturally draws the attention to the processes of production in this sector, enhancing interest in the applied materials or technologies and their implications to the safety and environmental characteristics of the products. These topics are widely discussed in the mass-media, which can also be effectively used in evoking the pupils’ interest in these issues. Therefore, the evocation of interest in the career in this sector can be successfully combined with the development of skills and attitudes of responsible consumption, healthy nutrition habits etc. The pupils can be encouraged to find information about the everyday food products, the raw materials used in their production, the applied technologies (e.g. what is the “bacto-catch” technology mentioned on a milk carton? What is the meaning of saturated, unsaturated, and trans fats and why are they used in the production of food?), implications of production and consumption of products to health and environment.

COMPREHENSION/KNOWLEDGE-BUILDING PHASE

The survey demonstrated the high importance that technological work processes and related skills have to the sector of agriculture and food industry. Therefore, the phase of comprehension and knowledge-building can be strongly related to the introduction and analysis of the technological processes of production. The introduction of the sector’s technological processes could start in school, by identifying specific products and the types of technologies used in their production. There is a wide availability of different information materials that can be used for this purpose (e.g. videos of the production processes). The second step could be the organization of visits to the workplaces, where students could see the actual performance of technological processes. Taking into consideration the specificity of the sector’s technological and work processes which limits access to the observation of work processes (e.g. safety issues in the agriculture, strict hygienic requirements for the technological production processes of many food products), in some cases it could be difficult to access these production processes directly, especially in the major modern industries. In this case, observation of a simulated or smaller-scale technological process can successfully replace observation of actual large-scale production. For example, visiting a small bakery which accepts visitors and even offers the possibility to have “hands on” participation in some production processes (to bake the bread for yourself) could be of much higher value for the understanding of technological principles
of baking than a visit of a big bakery and observation of the processes from the distance. The third step could be a visit to the training centre and/or R&D laboratory to discuss what kind of knowledge and skills are needed to handle different technologies and to develop them, or what the expected technological changes in the sector are and how it will change the work.

**REFLECTION/CONSOLIDATION PHASE**

This phase can consist of some practical task solving and analysis of the employment and career prospects. The practical tasks could be related to the economic and technological aspects of the production process. For example, estimation of the production costs of simple food products in a small-scale production (e.g. production costs of hand-made bread), or brainstorming on possible solutions to a specific technological problem (e.g. packaging and storage of berries and mushrooms, or product cost calculation of traditional Lithuanian cake šakotis).

Reflection on the prospects of employment and career in the sector could cover the following questions:

1. Why is this production process interesting and important for me?
2. What are the most attractive and motivating features of the production process?
3. What makes the work in this field less attractive?
4. What kind of job in this sector could be the most interesting? What kind of knowledge and skills are needed for this job position? Where could I acquire the qualification required to apply for this job?

**REFERENCES**


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