DEVELOPMENT AND INITIAL VALIDATION OF AN ASSESSMENT TOOL FOR STUDENT TRANSVERSAL COMPETENCES

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ABSTRACT

Transversal competences have been receiving an increasing attention in educational research and practice over the last decades. As a part of a wider project for assessment of students' competences in higher education, a group of experts developed a model of transversal competences for students, consisting of civic, digital, entrepreneurial, global, innovation, and research competences (each with corresponding sub-competences and facets), based on the analysis of theory and previous research. In this paper, we present an assessment tool that was developed and tested for measurement of the competences in this model. The final version of the assessment tool is a self-report survey with 292 behavioural indicators that are evaluated on a 7-point Likert-type scale estimating how characteristic each indicator is of the respondent's typical behaviour. The initial pool of behavioural indicators was created by the same group of experts based on the analysis of previous research and best practice examples in transversal competence assessment. From this pool, an initial version of the survey with 440 indicators was created and administered to 686 respondents from 8 study domains representing all study levels. Factor analysis of responses revealed a six-factor structure corresponding to the initial theoretical competence model. After further psychometric analysis, the final version of the assessment tool was formulated. Each of the six competences is further divided into 3–5 sub-competences, with each sub-competence consisting of 2–5 facets. Each facet is measured with multiple behavioural indicators describing basic, intermediate and advanced level of the respective competence. The results showed good construct validity of the tool, with the expected competence differences appearing between different study levels, and the expected relations emerging between the competence indicators and average grades. Practical applications and possibilities for further development of the assessment tool are discussed.

Keywords: Assessment, transversal competences, higher education, competence model, self-report scales

Introduction

The European Pillar of Social Rights (2017) states that fostering the development of competences is one of the objectives of the European Education Area, which can make full use of the potential of education and culture as a driver of employment, social justice, active citizenship and means of exploring European identity in all its diversity. People need the right set of competences to maintain their current standard of living, support a high level of employment, and promote social cohesion, considering the demands of a changing society and the labour market (European Commission, 2017).

This set of competences is referred to as transversal competences, which are the "cornerstone" of each individual's personal development and relevant to the application of any knowledge and skills, and many international organizations, national governments, and businesses are improving the transversal competences of workers, pupils, and students as one of society's priorities (ESCO, n. d.; Whittermore, 2018). Transversal competencies go beyond a particular field or study program because they are interdisciplinary in nature – they can be used in a variety of disciplines, situations and contexts to perform a variety of tasks (Economou, 2016; Florea, 2014; Pârvu et al., 2014).

The New Skills Agenda for Europe declares that university graduates have a better chance of finding a job and earning more than people with a secondary education qualification (OECD, 2019; European Union, 2016). This means that higher education institutions play an essential role in developing transversal competencies for university students. Higher education is an area that simultaneously ensures the training of highly qualified specialists in the critical sectors of the labour market, as well as the development and renewal of human research capital and the creation of a knowledge base, which is a prerequisite for creating new knowledge, technologies, and innovations.

The growing importance of transversal competencies in the learning outcomes of higher education programs and the demand for them in the labour market, and the need to assess them are emphasized by higher education expert Robert Waagenar from the University of Groningen in the Netherlands. The researcher underlines that the development of transversal competencies requires their precise definition, a clear understanding of what needs to be taught (integration with the field of study), well-defined learning outcomes, and indicators of competence development levels (Wagenaar, 2018).

Several initiatives have been launched internationally to develop tools for assessing competence development. In 2008, the OECD initiated the project for the Evaluation of Learning Outcomes in Higher Education

(hereinafter AHELO) With the support of the European Commission Tuning CALOHEE within the project Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe, competence matrices have been developed in 6 study programs (AHELO, 2015). Additionally, in 2016, the Council for Aid to Education (CAE), in collaboration with the OECD, initiated a new study to assess competencies and compare results between Member States (OECD, 2019; International Tuning Academy Groningen, 2018). These projects were initiated in various fields: physics, nursing, education, teacher education, history, and civil engineering, but no measurements have been made. In 2016, the Council for Aid to Education (CAE), in collaboration with the OECD, launched a new study to assess competencies and compare results among the Member States. However, this was not supported at the national level. Considering the above, it is more appropriate to take measurements at the national level during the study period for student competence development.

In turn the Recommendation of the European Parliament and the Council of the European Union entitled "The Key Competences for Lifelong Learning" (2016, 2018) identified eight key competencies: communication in the mother tongue, communication in foreign languages, mathematical, science, and technology, digital, learning to learn, social and civic, entrepreneurship and initiative, and cultural awareness and expression competence (European Commission, 2016, 2018). The above competencies are considered equally important and can be used in various contexts and combinations. Hence they were merged and structured to define the six transversal competencies, each with specific sub-competencies and facets (Rubene et al., 2021), analysed in this study.

Digital competence relates to human behaviour when using information and communication technologies and digital media to effectively communicate and manage information, collaborate, create and disseminate knowledge in professional (and/or learning) activities. This competence consists of such sub-competences as *information literacy and data literacy, communication and cooperation, digital content creation, security,* and *problem solving,* each with multiple facets (See Table 1 for a detailed list of all sub-competences and their facets).

Innovation competence is characterised by knowledge and skills required for long-term implementation of useful, effective improvements or innovations (new products or solutions, inventions (process outcomes), methods, devices, ideas) that are useful to people or organizations. This competence consists of *creativity, critical thinking, initiative, teamwork,* and *networking.*

Entrepreneurial competence is characterised by the ability to create, see or transform ideas and opportunities into action by mobilising and

effectively using necessary resources to achieve goals. This competence is determined by *problem-solving skills and creativity to create value – for oneself and/or society, identification, mobilisation, and effective use of internal and external resources,* and *initiative and action orientation.*

Civic competence is characterised by human participation in civil and social life which contributes to social and political well-being and sustainability at the level of community, nation, Europe, and globally. This competence includes *understanding and implementation of civil rights and obligations, knowledge and application of the principles of a democratic society,* and *community involvement.*

Global competence is characterised by the student's ability to assess local, global and intercultural issues, understand and appreciate different perspectives and worldviews, engage in open and effective interaction with people from different cultures, and work for collective well-being promoting sustainable development. This competence consists of *information management, awareness of diversity in local and global communities, intercultural communication and cooperation,* and *values and attitudes in an intercultural environment.*

Research competence is characterised by human behaviour in conducting research activities in one's professional (and/or learning) environment, the activities which result in solving an independent research problem. This competence consists of *attitude and ethics, conceptualisation of knowledge/research planning, conducting research,* and *collaboration and communication.*

As we know there are many different types and methods of competence assessment – observation in action, simulation, modelling, narrative methods, tests, quizzes, mind and/or conceptual maps, portfolios, interviews, discussions, focus group discussions, but self-assessment scales and questionnaires are quite common (Darling-Hammond et al., 2013; McConlogue, 2020). For example, the scoping review of measuring instruments for assessment of students' digital competence revealed that the majority of the studies report on a designed self-assessment questionnaire (Litiņa & Miltuze, 2021). Self-assessment questionnaires allow assessment in large groups (such as university students), saving time and resources.

Methodology

Model and item development

The model of students' transversal competences was developed by a group of experts, representing various study domains, based on the analysis of theory and previous research. The expert group suggested the structure of the model, as well as formulated the initial pool of behavioural indicators for measuring the competencies in the model. For each competence, sub-competence and

facet, multiple behavioural indicators were formulated, corresponding to a basic, intermediate, and advanced level of the competence. The item pool development was also based on the analysis of previous research and best practice examples in transversal competence assessment. From this item pool, an initial version of the survey was created and, after pilot testing on a sample of 19 students, administered in the study reported below.

Participants

The participants in the study were 686 students (47% female) from seven Latvian universities, representing 8 study domains and all study levels (bachelor, masters, and doctoral). The average age of the participants was 25 years (*SD* = 7.6 years). Most participants (89%) were full-time students, with 62.7% attending academic study programmes and 37.3% attending professional study programmes.

Measures

The participants completed an online survey (hosted on *QuestionPro* platform), responding to 440 behavioural indicators on a 7-point Likert-type scale estimating how characteristic each indicator was of the respondent's typical behaviour. In addition, the participants responded to 25 demographic questions about their gender, age, place of residence, work and study experience.

Results

The data analysis was organised in two stages. The first stage included a psychometric analysis of the results to optimise the assessment tool. The second stage included an initial validation of the tool.

As the first step, the empirical distribution of the frequency of answers to each survey question was examined (i. e., what percentage of the respondents had chosen each of the response options on the scale from 1 to 7, when evaluating each specific behavioural indicator). This analysis helped to identify (a) those items, where the participants had experienced difficulties in evaluating some behavioural indicator, for example, because of an incomprehensible formulation; (b) those items which poorly differentiated among respondents, for example, because the behavioural indicator is too common or too rare in the student sample; (c) those items, for which the distribution of results did not correspond to the intended complexity of the described behaviour (e. g., with very few respondents indicating a presumably easy behaviour, or many respondents indicating high levels of presumably difficult behaviour). The potentially problematic items were flagged for further analysis.

In the next step of the analysis, the items (behavioural indicators) corresponding to each competence were included in an exploratory factor analysis (using a parallel analysis method with oblique Promax rotation) in the Factor module of JASP 0.14.1 software. Thus, in total, six exploratory factor analyses were performed. Exploratory factor analysis allows identifying factors, or "latent variables", in the data, where the items/questions corresponding to the same factor correlate more closely than the items corresponding to different factors, or the items that do not correspond to any factor. These analyses allowed to test whether items, which were theoretically presumed to measure the same facet, or the same sub-competence, load on the same factor (latent variable), and whether the overall structure of inter-item correlations within each competence correspond to the theoretically presumed structure of the competence, i.e, the analysis reveals empirical factors (latent variables) corresponding to each of the theoretically presumed sub-competences and their facets. As a result of the factor analysis, it was possible to identify those items (behavioural indicators) that did not correspond to any of the factors, or that corresponded to more than one factor, as well as those items that did not correspond to the theoretically presumed factor (according to the competency structure suggested by the experts), but corresponded to another factor. Also at this stage of the data analysis, none of the statements were yet excluded from the survey, but potentially problematic items were flagged.

Next, the results of the empirical distribution analysis and exploratory factor analysis were compared to decide which items should be excluded from the assessment tool or reformulated. In total, 149 items were excluded and 30 items were reformulated, resulting in the final version of the assessment tool with 291 behavioural indicators covering 6 transversal competences with 25 sub-competences and 86 facets. Internal consistency reliability indicators (Cronbach's alpha) were calculated for each facet and sub-competence. The Cronbach's alpha coefficient reflects how closely the answers to several questions are correlated, thus showing whether it is justified to calculate a common index from these questions, for example by summing each respondent's answers or calculating the arithmetic mean of each respondent's answers to these questions. This step in the data analysis was necessary to make sure that the behavioural indicators within each sub-competence and each facet could be combined into a common index that could then be used to analyse the data and draw conclusions. The internal consistency indices for all facets and sub-competencies were sufficient to calculate the corresponding arithmetic means. The descriptive statistics for all facets and sub-competences are provided in Table 1.

Table 1. Descriptive Statistics, Internal Consistency Reliability Indicators (Cronbach's Alpha), and Factor Loadings for All Facets and Sub-Competences of the Six Transversal Competences

Competences, sub-competences, and facets	No of items	Alpha	M	SD	Factor No	Loading
1. Digital competence						
1.1. Information literacy and data literacy	*12*	*0.90*	*5.37*	*1.06*		
1.1.1.Browsing and searching for information and digital content. data filtering	4	0.77	5.18	1.30	F1	0.548
1.1.2.Evaluation of data. information and digital content	3	0.90	5.69	1.21	F1	0.491
1.1.3.Data. information and digital content management	5	0.82	5.25	1.16	F1	0.662
1.2. Communication and cooperation	*17*	*0.94*	*5.13*	*1.14*		
1.2.1.Interaction with digital technologies	4	0.85	5.51	1.25	F1	0.584
1.2.2.Sharing using digital technology	3	0.82	5.27	1.37	F1	0.685
1.2.3.Cooperation using digital technologies	4	0.87	4.65	1.52	F1	0.588
1.2.4.Netiquette	3	0.89	5.32	1.32	F1	0.497
1.2.5.Digital identity management	3	0.77	4.89	1.36	F1	0.648
1.3. Digital content creation	*10*	*0.88*	*4.78*	*1.21*		
1.3.1.Digital content development	3	0.82	4.58	1.52	F1	0.696
1.3.2.Integration and re-development of digital content	2	0.75	5.03	1.45	F1	0.688
1.3.3.Copyrights and licensing	2	0.86	5.02	1.52	F1	0.479
1.3.4.Programming	3	0.75	4.55	1.53	F1	0.724
1.4. Security	*13*	*0.91*	*4.77*	*1.14*		
1.4.1. Device protection	5	0.83	4.96	1.28	F1	0.780
1.4.2. Protection of personal data and privacy	3	0.79	4.74	1.37	F1	0.815
1.4.3. Protection of health and well-being	3	0.74	4.72	1.31	F1	0.737
1.4.4. Environmental protection	2	0.86	4.66	1.52	F1	0.523
1.5. Problem solving	*7*	*0.91*	*5.27*	*1.19*		
1.5.1. Solving technical problems	2	0.82	5.30	1.40	F1	0.727
1.5.2. Needs assessment and technological solutions	3	0.83	5.16	1.31	F1	0.854
1.5.3. Identifying digital skills gaps	2	0.87	5.35	1.34	F1	0.637

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Competences, sub-competences, and facets	No of items	Alpha	M	SD	Factor No	Loading
2. Global competence						
2.1. Information management	*7*	*0.90*	*4.68*	*1.25*		
2.1.1. Search for information	3	0.80	4.82	1.34	F2	0.579
2.1.2. Evaluation and management of information content	4	0.86	4.53	1.32	F2	0.617
2.2. Awareness of diversity in local and global communities	*12*	*0.88*	*4.19*	*1.12*		
2.2.1. Awareness and understanding of different worldviews	3	0.88	4.83	1.34	F2	0.715
2.2.2. Cooperation at the local and international level	4	0.89	3.09	1.59	F4	0.805
2.2.3. Management of diversity policies	2	0.84	5.04	1.51	F2	0.652
2.2.4. Recognising the signs of radicalisation (hatred. violence. threats to human rights and calls for division of society)	3	0.94	3.80	1.72	F2	0.484
2.3. Intercultural communication and cooperation	*8*	*0.90*	*3.96*	*1.30*		
2.3.1. Communication in a multicultural environment	3	0.81	4.27	1.45	F2	0.636
2.3.2. Action modelling in an intercultural context	2	0.90	4.22	1.49	F2	0.632
2.3.3. Engagement in international activities	3	0.80	3.40	1.53	F4	0.686
2.4. Values and attitudes in an intercultural environment	*11*	*0.92*	*4.04*	*1.25*		
2.4.1. Moral and ethical principles and actions.	5	0.86	4.25	1.39	F2	0.559
2.4.2. Communication skills in intercultural and interreligious situations	3	0.81	4.41	1.40	F2	0.654
2.4.3. Actions to promote an inclusive environment	3	0.83	3.47	1.47	F4	0.633
3. Innovation competence						
3.1. Creativity	*18*	*0.96*	*4.68*	*1.18*		
3.1.1. Generation of ideas	6	0.91	4.72	1.23	F3	0.721
3.1.2. Improvements	6	0.91	4.57	1.29	F3	0.755
3.1.3. Problem solving	3	0.88	4.76	1.31	F3	0.702
3.1.4. Creative attitude	3	0.84	4.66	1.32	F3	0.777

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Competences, sub-competences, and facets	No of items	Alpha	M	SD	Factor No	Loading
3.2. Critical thinking	*15*	*0.96*	*4.83*	*1.12*		
3.2.1. Alternative thinking	4	0.88	4.93	1.18	F3	0.669
3.2.2. Identifying and analysing	4	0.91	4.92	1.20	F3	0.589
3.2.3. Generalisation	3	0.87	4.71	1.24	F3	0.649
3.2.4. Evaluation	4	0.91	4.76	1.27	F3	0.624
3.3. Initiative	*16*	*0.94*	*4.61*	*1.14*		
3.3.1. Engaging others	3	0.88	4.99	1.38	F3	0.790
3.3.2. Mobilisation	3	0.90	4.31	1.52	F3	0.841
3.3.3. Organisation and implementation of work	3	0.80	4.65	1.24	F3	0.740
3.3.4. Risk-related initiative-taking	3	0.88	4.32	1.42	F3	0.687
3.3.5. Active engagement and independence	4	0.84	4.76	1.21	F3	0.780
3.4. Teamwork	*6*	*0.93*	*5.17*	*1.25*		
3.4.1. Cooperation skills	3	0.87	5.16	1.33	F3	0.621
3.4.2. Teamwork improvement	3	0.88	5.18	1.26	F3	0.693
3.5. Networking	*7*	*0.93*	*4.39*	*1.34*		
3.5.1. Internal (within-team) networking	4	0.89	4.62	1.33	F3	0.654
3.5.2. External networking (outside the organisation)	3	0.88	4.15	1.54	F3	0.603
4. Civic competence						
4.1. Understanding and implementation of civil rights and obligations	*8*	*0.82*	*4.01*	*1.13*		
4.1.1. Relatedness of rights and obligations	4	0.74	3.58	1.25	F4	0.645
4.1.2. Social justice management	4	0.77	4.44	1.32	F2	0.705
4.2. Knowledge and application of the principles of a democratic society	*10*	*0.91*	*3.22*	*1.30*		
4.2.1. Management of binding regulations	3	0.77	3.40	1.43	F4	0.643
4.2.2. Local and international cooperation	3	0.92	2.84	1.64	F4	0.802
4.2.3. Governance of the political system	4	0.70	3.41	1.31	F4	0.686
4.3. Community involvement	*10*	*0.92*	*2.70*	*1.29*		
4.3.1. Involvement at the local and national levels.	3	0.86	2.76	1.53	F4	0.885

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Competences, sub-competences, and facets	No of items	Alpha	M	SD	Factor No	Loading
4.3.2. Involvement at the level of the global community	3	0.86	2.70	1.49	F4	0.833
4.3.3. Management of social and political protests	4	0.79	2.63	1.25	F4	0.760
4.4. Civic capacity	*6*	*0.92*	*2.94*	*1.47*		
4.4.1. Civic engagement and capacity in the local community	3	0.80	3.15	1.48	F4	0.793
4.4.2. Civic engagement. and capacity in a global context	3	0.91	2.72	1.61	F4	0.833
5. Research competence						
5.1. Attitude and ethics	*8*	*0.95*	*4.59*	*1.37*		
5.1.1. Research interest	2	0.88	4.41	1.51	F5	0.594
5.1.2. Responsible research	2	0.86	4.75	1.53	F5	0.710
5.1.3. Research ethics	4	0.91	4.62	1.43	F5	0.758
5.2. Conceptualisation of knowledge/ research planning	*15*	*0.26*	*4.71*	*1.24*		
5.2.1. Understanding the research context	4	0.92	4.73	1.37	F5	0.768
5.2.2. Critical analysis of information sources	5	0.90	4.86	1.26	F5	0.663
5.2.3. Research conceptualisation/ design	6	0.94	4.54	1.35	F5	0.843
5.3. Conducting research	*13*	*0.96*	*4.41*	*1.30*		
5.3.1. Implementation of research methodology	2	0.91	4.57	1.50	F5	0.893
5.3.2. Data analysis	3	0.89	4.25	1.40	F5	0.880
5.3.3. Interpretation of data and formulation of conclusions	3	0.89	4.31	1.40	F5	0.866
5.3.4. Organisation of the research process	5	0.93	4.50	1.41	F5	0.881
5.4. Collaboration and communication	*16*	*0.95*	*4.17*	*1.34*		
5.4.1. Collaboration in the research process	4	0.78	4.35	1.32	F5	0.566
5.4.2. Communication and publicity	9	0.94	4.11	1.45	F5	0.747
5.4.3. Practical application of research results	3	0.90	4.05	1.57	F5	0.654
6. Entrepreneurial competence						
6.1. Problem-solving skills and creativity	*17*	*0.94*	*4.34*	*1.13*		
6.1.1. Noticing opportunities	4	0.86	4.04	1.33	F6	0.669

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Competences, sub-competences, and facets	No of items	Alpha	M	SD	Factor No	Loading
6.1.2. Creativity	4	0.81	4.25	1.28	F6	0.718
6.1.3. Vision	4	0.83	4.42	1.32	F6	0.799
6.1.4. Evaluation of ideas	3	0.84	4.75	1.31	F6	0.807
6.1.5. Ethical and sustainable thinking	2	0.81	4.26	1.48	F6	0.631
6.2. Identification. mobilisation. and effective use of internal and external resources	*14*	*0.92*	*4.73*	*1.03*		
6.2.1. Evaluation of own capacities	3	0.83	5.20	1.17	F6	0.638
6.2.2. Motivation and perseverance	2	0.74	5.06	1.28	F6	0.645
6.2.3. Mobilisation of resources	3	0.81	4.72	1.19	F6	0.682
6.2.4. Financial and economic competence	3	0.82	4.10	1.43	F6	0.626
6.2.5. Communication and mobilisation of human resources	3	0.89	4.56	1.42	F6	0.627
6.3. Initiative and action orientation	*15*	*0.93*	*4.88*	*1.04*		
6.3.1. Showing initiative	3	0.90	4.98	1.25	F6	0.696
6.3.2. Planning	3	0.86	4.97	1.23	F6	0.716
6.3.3. Action under uncertainty	3	0.75	4.85	1.21	F6	0.641
6.3.4. Teamwork	3	0.77	4.46	1.34	F6	0.585
6.3.5. Learning from experience	3	0.85	5.15	1.21	F6	0.615

All the calculated facet means were then included in a secondary factor analysis, again using the exploratory factor analysis method to form a six-factor solution (according to the number of transversal competences in the model). This step was necessary to make sure that the transversal competence structure observed in the data was broadly in line with the competence structure presumed by the experts. The results of the factor analysis are summarised in the last two columns of Table 1. The results of this factor analysis revealed that each of the six transversal competencies corresponded to its own factor (latent variable) with corresponding factor weights for the facets of the respective competence. It should be noted that for all but two competences all facets load on the same factor and do not load on any of the other factors, showing that each of these competencies forms its own latent variable that is clearly separable from the other factors (competences). For Civic and Global competences, a small number of facets are "switched" between the corresponding factors, indicating that, in the perception of the respondents, the content of these two competencies

was not as clearly separable as in the case of the other four transversal competencies. However, in general, the results of the factor analysis demonstrate a very good fit of the empirical data structure to the initial expert-defined competence structure, showing a good factorial validity of the transversal competences model.

Several additional analyses were performed to test-use the assessment tool for different types of analysis, as well as for the initial validation of the instrument. In order to check whether a higher level of studies corresponds to a higher level of development of transversal competences, the means of all sub-competences and their facets were compared between the three study levels included in the study (bachelor's, master's and doctoral) using a Kruskal–Wallis one-way ANOVA with Dunn's Multiple Comparison Test with Bonferroni correction for post-hoc comparisons. The detailed results are too voluminous to be presented here (they are available on request), but, out of the 111 comparisons made, 93 yielded the expected pattern, with the facet and/or sub-competence means increasing with the study level. In general, the comparison of study levels supports the validity of the assessment tool, because theoretically the study process should foster the development of transversal competences, and the obtained results are in line with this theoretical assumption.

As the development of transversal competences is organically related to the content of many study courses, theoretically the level of competence development should be related to the study results. To test this assumption, Spearman correlations were calculated between all sub-competencies (and their facets), and the weighted average grade for the previous semester indicated by the respondents. Again, the detailed results (available on request) are not presented here, but, out of 111 calculated correlations, 92 correlations revealed a significant positive correlation between a sub/competence and/or its facets on the one hand, and the weighted average grade of the respondents on the other, offering further support to the validity of the assessment tool.

Discussion

The analyses described above can serve as examples of potentially more detailed, focused analyses that allow data to be explored based on the specific interests and needs of the user of the competency assessment tool. For example, looking at the assessment of competencies within a group of students or specific subgroups, it is possible to identify those competencies, sub-competencies and facets that need more attention to be developed, allowing for appropriate adjustments to study plans and / or course content. The assessment tool can also be used at the individual level, providing feedback to individual students on the strengths and weaknesses of their

transversal competencies (after standardisation of the instrument in the later stages of the project it will be possible to compare the results of each individual with the population mean). The assessment tool can also be used for evaluating the transversal competencies of a particular student from different points of view (for example, the questionnaire can be filled in by the student himself/herself, the scientific supervisor, internship supervisor, or other people involved in the study process, allowing for a comparison among different assessments to get a more complete and objective view of the level of development and improvement needs of the student's transversal competencies).

Comparison of competencies, sub-competencies and facets is possible not only between study levels as in the example mentioned above, but also between study years within one study program (for example, at the beginning and end of studies). Also, using a similar methodology, different types of comparisons between study programs, study directions, study fields are possible, as well as comparison of competence assessment between groups of students according to different taylored criteria (for example, competencies can be compared depending on the previous training/ education, whether students work in parallel to their studies, various demographic factors, etc.).

The analysis of correlations between the assessment of competencies and study results is also possible in different aspects and approaches. In the example above we calculated correlations between sub-competence/ facet scores and the weighted average grade, but a similar methodology can be used to measure correlations between any competences, sub-competences, or facet scores on the one hand, and any indicators of the study results on the other, e. g. any course grades, final exam grades, high school central-ised exam scores, grade point average etc. Competence assessments can be included in regression analysis models both as independent variables (to find out how different competences and sub-competences predict specific learning outcomes), and as dependent variables to better understand how different course outcomes, intermediate assessments and other measure-ments of learning outcomes predict the level of development of specific transversal competences, sub-competences, and their facets.

Conclusions

The results of this study support the validity of the transversal compe-tence assessment tool for students, based on six transversal competences: civic, digital, entrepreneurial, global, innovation, and research competence. The analyses revealed that all six competences represent unique, distinct constructs, although there is some overlap between the civic and global competence. The tool has been shown to differentiate between the transver-sal competences of students from different study levels, and to demonstrate

the relationships between different components of transversal competences and study results (average weighted grade). The assessment tool has potential for a wide range of applications for assessment and development of transversal competences in the study process in higher education.

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