

INTEGRATION OF SOFT SKILLS OF GRADUATES OF THE TECHNICAL UNIVERSITY IN ZVOLEN AND THEIR APPLICABILITY IN SLOVAK BUSINESS ENVIRONMENT – THE CASE STUDY

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Abstract

Higher education institutions annually produce hundreds to thousands of graduates with the same or similar education. The new graduates only with academic background compete with the graduates from previous years who have acquired some practical experience. The individual will only assert themselves through the complex of superstructure competencies and the ability to apply them effectively and practically for the benefit of the employer. The paper aims to present research focused on the analysis of soft skills and summarising the requirements for the soft skills competencies of the graduates from the Technical University in Zvolen in terms of employers' expectations in the Slovak republic. The research was carried out in the form of a questionnaire survey, and the results of the questionnaire survey were evaluated by the method of mathematical-statistical analysis by non-parametric testing of significance. On the basis of the testing of significance, the hypothesis for specific areas of soft skills competencies was confirmed, suggesting that students' competencies in these areas do not reach the level demanded by enterprises, and therefore, it is necessary to improve the quality of education in that area to match students' real knowledge with business requirements.

Implications for Central European audience: The global labour market requires the introduction of new competencies so that university graduates can work in a domestic or transnational context. An advantage is the added value showed by various interpersonal skills represented by soft skills. In the research, we focused on the analysis and summarising the

requirements for the soft skills. Based on the testing of significance, the hypothesis of the statistical significance of the difference for specific areas of soft skills competencies was confirmed, suggesting that students' competencies in these areas do not reach the level demanded by enterprises. Soft skills and emotional behaviours deficits could affect business outcomes.

Keywords: soft skills; higher education; business environment; competencies

JEL Classification: I23, J24

Introduction

Research and the facts in the area show that soft skills have an important role in determining a person's success in work. Robles (2012) and Levasseur (2013) state that hard skills focus on traditional technical expertise such as computational skills and technical problem-solving, while soft skills are a combination of social and interpersonal skills, personal qualities and career attributes. A hard skill is a minimum requirement for a person to enter certain occupations, while a soft skill will determine development in the job. It is, therefore, the education, including a vocational challenge to integrate both kinds of components in an integrated manner and not a biased one, that is able to prepare complete human resources can work and grow in the future (Sharma, 2009). Engineering education is critical for sustainability, given the key role that engineers have in shaping the development of society (Vehmaa et al., 2018). Soft skills as non-technical skills that are intangible but extremely demanded (O'Brien, 2001). According to Murti (2014), soft skills are communication, conflict resolution, interpersonal relationships, presentation, negotiation, team building and other characteristics defined in terms of expected results and not methods or techniques. Weiner (2000) classified soft skills into two: intrapersonal skills and interpersonal skills. Intrapersonal skills refer to an individual's ability in managing themselves for optimally developing works, for example, time management, stress management and creative thinking. Meanwhile, interpersonal skills are defined as skills of an individual in managing their relationship with others for optimal professional development, i.e. ability to motivate, to lead and to negotiate. The labour market needs more specific technical skills ever, but it is also increasingly becoming in need of other types of skills, such as teamwork, assertiveness, and the ability to work under pressure (De Villiers, 2010). We have stated only a few definitions of soft skills that can be summarised as non-technical, interpersonal and socially important behavioural competencies that relate to social or emotional intelligence (EQ) and overlap with each other and have a significant impact on recruitment. Educational institutions are often criticised because their graduates do not have sufficient soft skills, whether it is creative thinking, teamwork, stress resilience, organisational skills or the ability to resolve conflicts. The priority of educational activities in the field of technical education should be, in addition to vocational education, also equipping students with competencies on how to solve technical problems with creative methods. Wu and Wu (2020) add that modern technical education should also address the design of creativity courses that support students' creativity, critical thinking and the transfer of learning skills. Baer and Kaufman (2019) state that education in the field of creativity tends to adopt different interpretations and perspectives to define students' creative competence and their dependence on the relevant field or discipline and the opinions of

experts. Some authors argue that creativity primarily means thinking competencies, others argue that creativity requires different thinking, and some even considered creativity to be an exercise in the imagination. Definitions of creativity are different, but most of them follow the standard bipartite definition given by Runco and Jaeger (2012), stating that creativity includes originality (novelty, uniqueness, newness) and efficiency (value, appropriateness) by Eteläpelto and Lahti (2008), Gajda et al. (2017), Walsh et al. (2017). Originality in itself may result in unnecessary products or ideas and, conversely, effective products or ideas may not in themselves contribute to new understanding or knowledge. Globally, Sullivan (2017) identified three main approaches of theories of creativity since the mid-20th century: the cognitive-psychological approach, the socio-psychological and the socio-cultural approach. Park et al. (2017) report that diversity of knowledge creates synergies between different types of knowledge by strengthening the link that ultimately leads to improved innovation and performance. Based on the vast diversity of theoretical perspectives, there is no generally accepted definition of creativity. However, there is general agreement that creativity is better understood as a holistic, multidimensional concept (Sarsani, 2005). Within the psychological tradition, the standard definition of creativity includes two components: originality and usefulness (Runco & Jaeger, 2012). In addition to these components, scientists such as Kaufman and Sternberg (2007) and Simonton (2012) have proposed quality as the third component of creativity. The findings of Andiliou and Murphy (2010), Bereczki and Kárpáti (2018) and Mullet et al. (2016) suggest that teachers value creativity and believe that everyone can be creative to some extent and that creativity can be developed in schools. Bereczki and Kárpáti (2018) also identified factors limiting creativity in the learning environment, including factors at the context level (e.g. overloaded curricula, standardised tests), teacher level (e.g. lack of freedom, traditional approaches to teaching), student level (e.g. individual differences between students, lack of involvement) and level of parents (e.g. negative attitude and insufficient support).

Understanding the impact of *teamwork* on performance is important because teamwork is viewed by some researchers as one of the key driving force for improving a firm's performance. Team members enhance their skills, knowledge and abilities while working in a team (Froebel & Marchington, 2005). Researchers and experts indicate that effective behaviours and concepts related to teamwork can increase the level of improvement of employees' performance and their productivity as well as enhancing the ability to solve conflicts and facing urgent and sudden challenges at work. According to Mulika (2010), teamwork can be accurately defined as a group of individuals who work cooperatively to achieve a specific task or goal. This skill has become appreciated that so much that large organisations have designed special tests to determine the abilities of their employees to work on teams. Therefore, teamwork ability became an essential skill that every worker must have to be accepted in the job. Teamwork is a precise organisational measure that shows many different features in all types of organisations, including non-profit. Conti and Kleiner (2003) reported that teams offer greater participation, challenges and feelings of accomplishment. Tarricone and Luca (2002), in their case study on successful teamwork, defined successful teamwork as synergism existing between all team members creating an environment where they are all willing to contribute and participate in promoting and nurturing a positive, effective team environment. *Organisational skills* are a set of techniques used by an individual to facilitate the efficiency of future-oriented learning, problem-solving, and task completion. The organisation requires the integration of several elements to reach a planned

goal. Dawson and Guare (2010) define organisation skills as the ability to design and maintain systems for keeping track of information or materials. The broader domain of executive functioning plays a large role in the development and execution of organisational skills. The fact is that organisational skills are a prerequisite for success and that those skills must be taught to children (Fry, 2005; Gambill et al., 2008). It is these skills that help students become successful in school and continue to be successful in the working world (Fry, 2005). Another important soft skill refers to *problem-solving*, which is dealing with a questionable, unresolved or difficult question or task. The following steps lead to solving such situations: problem definition, problem analysis, production of different problem alternatives, evaluation and selection of the most suitable alternative, implementation of decisions and monitoring and evaluation. Therefore, it is necessary to see the problems in the context, identify their causes, identify solutions and verify that the solution was correct. Collaboration within different departments of a single company tends to be full of situations where there is a conflict of views and interests, and there are often different conflicts that need to be resolved as effectively as possible for the good of the company. However, conflicts can also be seen as a dialogue where new ideas, perspectives and solutions arise. Positive conflict resolution implies the ability to concentrate on the problem, propose alternative solutions and, above all, a willingness to compromise (Holečková, 2010; Peters-Kühlinger, 2007).

1 Methodology of research

The methodology used to investigate the employment of students of the Technical University in Zvolen was thoroughly described and published in the article "Application of Soft-Skills Competence in Practice (Practice vs Students)" authored by Čierna et al. (2020). The mentioned methodology was divided into a questionnaire survey as a tool to obtain the data from students and enterprises. The data collected from the questionnaires were analysed and evaluated according to Likert's scale and tested by the Shapiro –Wilk (SW) test and the Mann-Whitney U-test.

The following sequence of steps was chosen to carry out the research:

1. Defining the soft skill areas (04 – 06/2018).
2. Defining the relevant knowledge areas of information-communication technologies (07 – 09/2018).
3. Questionnaire design. (10/2018).
4. Random choice of respondents and their demographic characteristics specification. (11 – 12/2018).
5. Evaluation of the results of the questionnaire research (01 – 03/2019).

The concept of the questionnaire was based on the definition of relevant areas of soft skills assessment. Respondents evaluated the individual areas through the Likert scale of evaluation, which is shown in Table 1.

Table 1 | Likert scale of evaluation

Statement	Excellent developed	Developed very well	Developed well	Developed sufficiently	Not developed
Point value	1	2	3	4	5

Source: own elaboration

The questionnaire for enterprises was sent to 200 employees of enterprises operating in the Slovak Republic. A total of 155 respondents responded to the questionnaire, which corresponds to a 77.5% return on the questionnaire. An analysis of the respondents found that 35% of the participating respondents were from large enterprises, 27% were from medium enterprises, and 38% of the questionnaires were represented by respondents from small enterprises with less than 50 employees.

A total of 132 questionnaires was distributed among students, of which return was 100%. Regarding the total number of students, the proportion of students studying for a bachelor's degree (Bc.) was 55%, and the proportion of students studying for a master's degree (Ing.) was 45%.

A questionnaire research method was used to analyse the competencies of graduates of technical university studies in which responses were evaluated using the Likert scale. The data obtained from the questionnaires were first tested for normal distribution to select a suitable method of mathematical induction. The Shapiro-Wilk test was chosen from many tests that statistical software currently provides. The assumption that our research outputs are non-parametric variables that do not exhibit a normal distribution was verified. Based on the results of the testing, subsequently, non-parametric testing using statistical induction methods, namely Mann-Whitney's U test, was used to investigate the significance of the difference between the expected and actual state of competencies. One of the most commonly used tests of normality is the Shapiro-Wilk (SW) test. The test is based on determining whether the points of the constructed quantile-quantile graph (Q-Q plot) differ significantly from the regression line outlined by these points. At the level of significance α selected beforehand, the null hypothesis H_0 was tested: $F(x) = F_0(x)$ against the alternative hypothesis H_1 : $F(x) \neq F_0(x)$, where F is the empirical distribution function of the sample of the range at F_0 distribution function of normal distribution norms (μ , σ) with parameters μ and σ unspecified. SW test is mainly used for samples of smaller ranges $n \leq 50$. The ordered values $x_{(1)}, x_{(2)} \dots x_{(n)}$ of randomly selected sample $x_{(1)}, x_{(2)} \dots x_{(n)}$ were considered.

The results were presented in tables, radar charts, and box plots.

2 Results and discussion

Creative thinking competence evaluation

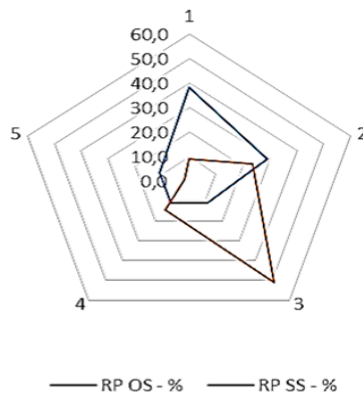
Table 2 shows the results from questionnaires using descriptive characteristics – absolute frequency (AP) and relative frequency (RP) for creative thinking (CT) area. Individual assessments are characterised by the Likert scale (LS) for expected states (OS) and actual states (SS). As we can see, the expected state and the actual state are significantly different.

Table 2 | Descriptive statistics parameters for the area of creative thinking

Creative thinking LS	OS		SS	
	AP	RP %	AP	RP %
1	59	38.2	14	9.2
2	45	29.1	37	23.6
3	17	10.9	79	50.9
4	17	10.9	22	14.5
5	17	10.9	3	1.8

Source: own elaboration

Figure 1 shows the RP of individual ranks of the LS for the area of creative thinking.

Figure 1 | Radar chart of RP for LS ranks for the area of creative thinking by OS and SS

Source: own elaboration

By comparing the graphs OS and SS, it can be concluded that there are considerable differences between ratings. To confirm the hypothesis about the significance of the difference, the Mann-Whitney U test shall be used to test the results. The test results for the creative thinking area are shown in Table 3.

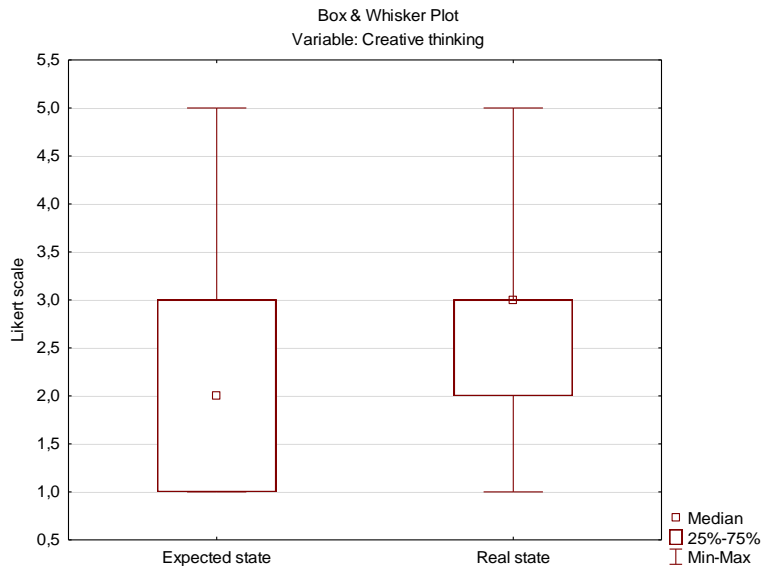
Table 3 | The Mann-Whitney U – test results for the area of creative thinking

Variable	$p < 0.05$ Sum of ranks CT_OS	Sum of ranks CT_SS	Test criterion U – value	Test criterion Z– modified value	p- value	N valid CT_OS	N valid CT_SS
Creative thinking	2595.50	3509.50	1055.50	-2.812	0.005	155	155

Source: own elaboration

Based on the test results and the p-value ($p = 0.005$), the null hypothesis is rejected and incline to the alternative hypothesis that there is a statistically significant difference between OS and SS. The box plot shows the results of the respondents' evaluation (Figure 2).

Figure 2 | Box plot for the variable of creative thinking



Source: own elaboration

Figure 2 shows:

- 25 to 75% of all respondents' assessments in the area of creative thinking for the expected state are within 1-3 of Likert scale corresponding to the 2nd and 3rd quartiles;
- the median, i.e. the middle value, for the expected state of creative thinking is 2.0, which corresponds to a very well developed area of soft skills;
- 25 to 75% of all respondents' assessments in the area of creative thinking for the actual state are within 2-3 of Likert scale corresponding to the 2nd and 3rd quartiles;
- the median, i.e. the middle value, for the actual state of creative thinking is 3.0, which is a well-developed soft skills competence.

Assessment of competencies in the area of teamwork

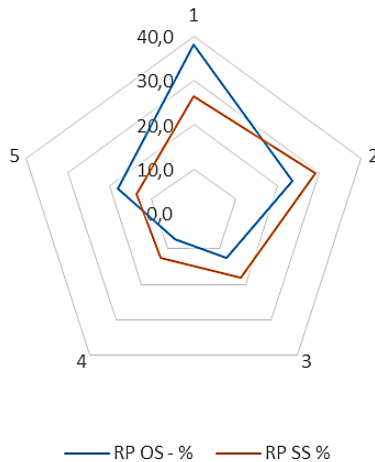
Table 4 shows the results from questionnaires AP and RP for the teamwork (TW) area. Individual assessments are characterised by the Likert scale (LS) for expected states (OS) and actual states (SS). As we can see, the expected state and the actual state are not significantly different.

Table 4 | Descriptive statistics parameters for the area of team work

Team work		OS		SS	
LS	AP		RP %	AP	RP %
1	59		38.2	41	26.4
2	37		23.6	45	29.1
3	20		12.7	28	18.2
4	11		7.3	20	12.7
5	28		18.2	21	13.6
Total	155		100	155	100

Source: own elaboration

Figure 3 shows the RP of individual ranks of the LS for the area of teamwork.

Figure 3 | Radar chart of RP for LS ranks for the area of teamwork by OS and SS

Source: own elaboration

By comparing the graphs OS and SS, it can be concluded that there are no significant differences between the ratings. To confirm the hypothesis about the significance of the difference, the Mann-Whitney U test shall be used to test the results. The results of the test for the teamwork evaluation are shown in Table 5.

Table 5 | Results of Mann-Whitney U-test for the area of teamwork

Variable	p < 0.05 Sum of ranks TW_OS	Sum of ranks TW_SS	Test criterion U – value	Test criterion Z– modified value	p- value	N valid TW_OS	N valid TW_SS
Team work	2842.00	3263.00	1302.00	-1.293	0.196	155	155

Source: own elaboration

The results of the Mann-Whitney U-test for team collaboration did not confirm a significant statistical difference between OS and SS. Based on the results of testing and the corresponding p-value ($p = 0.196$), the null hypothesis was confirmed; there is no statistically

significant difference between the expected and actual states of soft team assessment; i.e. reality and expectations are the same. This result points out that graduates predominantly meet the practice requirements for the skills in that area, and there is no need to improve teaching in that area. As the significant statistical difference between the expected and the actual situation was not confirmed, a box plot showing the distribution of respondent ratings is not provided. Median, i.e. the typical value, for the expected teamwork is 2.0, which means that practice requires highly developed teamwork skills from graduates.

Assessment of competencies in the area of organisational skills

Table 6 shows the results from questionnaires AP and RP for the organisational skills (OSk) area. Individual assessments are characterised by the Likert scale (LS) for expected states (OS) and actual states (SS). As we can see, the expected state and the actual state are slightly different.

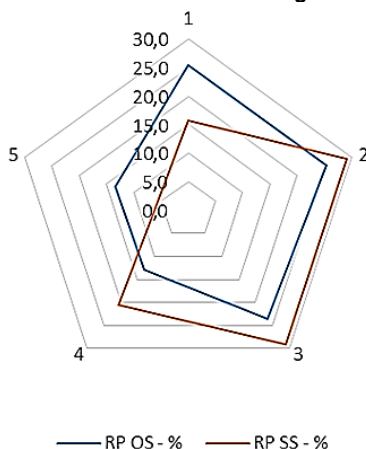
Table 6 | Descriptive statistics parameters for the area of organisational skills

Organisation skills	OS		SS	
	LS	RP %	AP	RP %
1				
2				
3				
4				
5				
Total				

Source: own elaboration

Figure 4 shows RP of individual ranks of the LS for the area of organisational skills.

Figure 4 | Radar chart of RP for LS ranks for the area of organisational skills by OS and SS



Source: own elaboration

By comparing the graphs OS and SS, it can be concluded that there are no significant differences between the ratings. To confirm the hypothesis about the significance of the

difference, the Mann-Whitney U test shall be used to test the results. The results of the test for the organisational skills evaluation are shown in Table 7.

Table 7 Results of Mann-Whitney U-test for the area of organisational skills

Variable	p < 0.05 Sum of ranks OSk_OS	Sum of ranks OSk_SS	Test criterion U – value	Test criterion Z – modified value	p- value	N valid OSk_OS	N valid OSk_SS
Organisational skills	2903.00	3202.00	1363.00	-0.915	0.360	155	155

Source: own elaboration

Based on the results of testing and the corresponding p-value ($p = 0.360$), the null hypothesis was confirmed; there is no statistically significant difference between OS and SS of organisational skills assessment; i.e. reality and expectations are the same. This result points out that graduates predominantly meet the practice requirements for the skills in that area, and there is no need to improve teaching in that area. As the significant statistical difference between the expected and the actual situation was not confirmed, a box plot showing the distribution of respondent ratings is not provided. Median, i.e. the typical value, for the expected organisational skills is 3.0, which means that practice requires well-developed organisational skills from graduates.

Assessment of competencies in the area of dealing with conflicts

Table 8 shows the results from questionnaires AP and RP for dealing with conflicts (DC) area. Individual assessments are characterised by the Likert scale (LS) for expected states (OS) and actual states (SS). As we can see, the expected state and the actual state are slightly different.

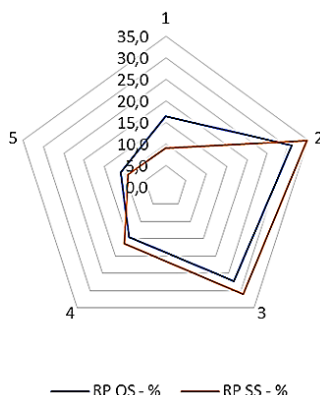
Table 8 Descriptive statistics parameters for the area of dealing with conflicts

Dealing with conflicts	OS			SS	
	LS	AP	RP %	AP	RP %
1		26	16.4	14	9.1
2		48	30.9	53	34.5
3		42	27.3	48	30.9
4		22	14.5	26	16.4
5		17	10.9	14	9.1
Total		155	100	155	100

Source: own elaboration

Figure 5 shows the RP of individual ranks of the LS for the area of dealing with conflicts.

Figure 5 | Radar chart of RP for LS ranks for the area of dealing with conflicts by OS and SS



Source: own elaboration

By comparing the graphs for OS and SS, it can be concluded that there are no significant differences between the ratings. This was consequently tested by the Mann-Whitney U-test. The results of the test for the area of dealing with conflicts evaluation are shown in Table 9.

Table 9 | Results of the Mann-Whitney U-test for the area of dealing with conflicts

Variable	p < 0.05 Sum of ranks DC_OS	Sum of ranks DC_SS	Test criterion U – value	Test criterion Z– modified value	p- value	N valid DC_OS	N valid DC_SS
Dealing with conflicts	2975.50	3129.50	1435.50	-0.474	0.636	155	155

Source: own elaboration

Based on the results of testing and the corresponding p-value ($p = 0.636$), the null hypothesis was confirmed; there is no statistically significant difference between OS and SS of dealing with conflicts assessment; i.e. reality and expectations are the same. This result points out that graduates predominantly meet the practice requirements for the skills in that area, and there is no need to improve teaching in that area. As the significant statistical difference between the expected and the actual situation was not confirmed, a box plot showing the distribution of respondent ratings is not provided. Median, i.e. the typical value, for the expected dealing with conflicts is 3.0, which means that practice requires well-developed skills from graduates.

Mathematical statistics comparing student versus enterprise

To test the significance of the difference between students' self-assessment (ST_S) and the enterprises' assessment of graduates from technical universities (COM_E), non-parametric testing by Mann-Whitney U-test was chosen. The results for the areas of soft - skills assessment are shown in Table 10.

Table 10 | The results of the Mann-Whitney U test for the individual areas of soft skills.

Variable	p < 0.05		Test criterion U – value	Test criterion Z – modified value	p- value	N valid ST_S	N valid COM_E
	Sum of ranks ST_S	Sum of ranks COM_E					
Creative thinking	11587.00	5991.00	2809.00	-2.561	0.0104	132	155
Teamwork	11400.50	6177.50	2622.50	-3.130	0.0017	132	155
Organisational skills	11617.50	5960.50	2839.50	-2.445	0.0145	132	155
Dealing with conflicts	12632.00	4946.00	3406.00	0.696	0.4866	132	155

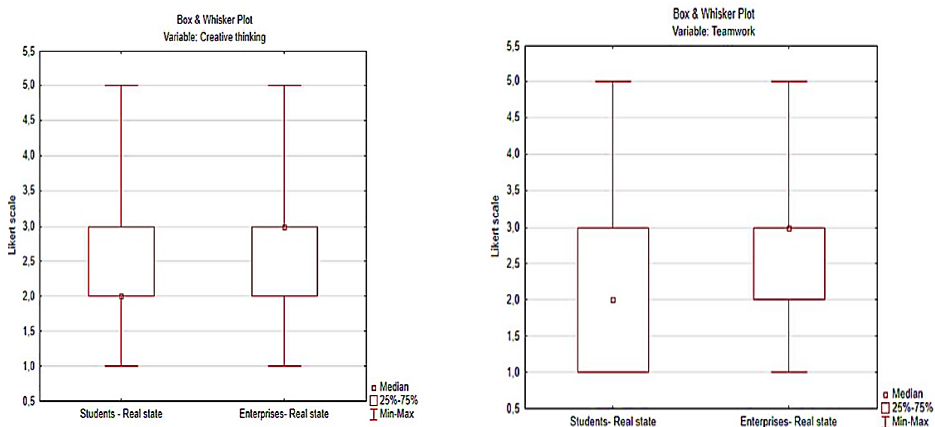
Source: own elaboration

Based on the test results and the corresponding p-value ($p = 0.005$), we reject the null hypothesis and incline towards the alternative hypothesis that there is a statistically significant difference between the assessment of soft skills by students and companies in the following areas of evaluation:

- Creative thinking,
- Teamwork,
- Organisational skills.

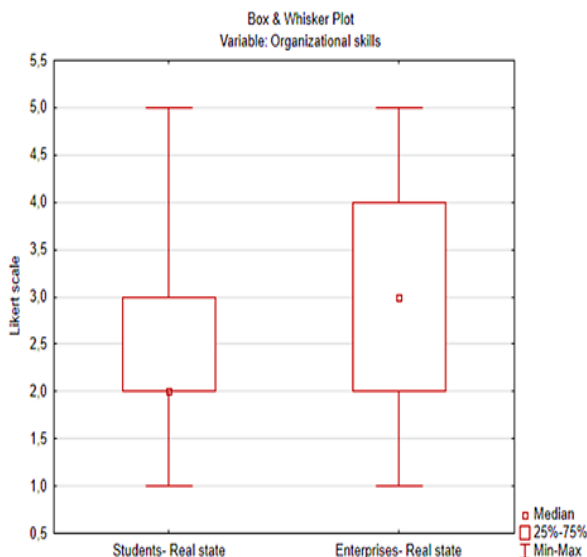
For the other assessed areas (stress resistance and dealing with conflict), testing confirmed the null hypothesis that there is no statistically significant difference between the expected and actual state of soft skills assessment.

Based on the results of testing the significance of the difference by the Mann-Whitney U-test shown in Table 9 were specified areas where testing confirmed a significant statistical difference between students 'versus enterprises' assessment. The following part brings the graphical illustration of the test of significance using box quartile plots for areas with a confirmed, statistically significant difference.

Figure 6 | Box plot for Creative thinking and Teamwork– students vs enterprises

Source: own elaboration

Figure 7 | Box plot for Organisational skills – students vs enterprises



Source: own elaboration

Based on the results presented in Figure 6 and Figure 7, it can be generally summarised that self-assessment of competencies by students is better than the assessment of graduates by enterprises. This means that students assess themselves more positively than the real state assessed by employers in enterprises when assessing the skills of newly hired graduates.

Conclusion

Increasing demands on the efficiency and effectiveness of business entities are inevitably generating efforts to introduce improved management systems that take into account several rules and documents, thus changing labour market requirements. Employers' demands on candidates' expertise change, with the individual personality of each candidate, are coming to the forefront. These are features that are not usually included in qualification training (Čierna et al., 2020). Today's labour market is characterised by its global nature. This challenge requires the introduction of new competencies for university graduates to work in a domestic or multinational context. What gives one candidate an advantage over others is the added value showed by various professional certificates presenting hard skills or one's interpersonal skills represented by soft skills. In the research, we focused on the analysis of soft skills and summarising the requirements for the soft skills competencies. The results of the questionnaire survey were evaluated by non-parametric testing of significance of the mean value difference by Mann - Whitney U - test. Based on the testing of significance, the hypothesis of the statistical significance of the difference for specific areas of soft skills competencies was confirmed, suggesting that students' competencies in these areas do not reach the level demanded by enterprises. Therefore, it is necessary to improve these skills. Altindag and Kosedagi (2015) indicated the desired soft skill outcomes might be achieved by training emotional intelligence. The soft skills deficit affects business outcomes, including workers' behaviour, safety, engagement, and productivity. Companies are competing based

on workers' knowledge, which has enhanced the importance of workers' hard and soft skills (Borghans et al., 2014). It is imperative that businesses develop and implement strategies for developing successful soft skills training programs to address the soft skills deficit. Failure to do so has far-reaching implications in terms of negative business outcomes in this highly competitive global work environment. We recommend that a larger study be performed to examine the relationship between the types of strategies for developing and improving emotional skills and the size or type of the organisation. Individuals with soft skills deficits and emotional behaviours could affect business outcomes. As global business competition increases (Bailly and Lene, 2013), it is of paramount importance for businesses to employ individuals who master soft skills and emotionally intelligent managers.

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