

Self-assessment of competencies of students and graduates participating in didactic projects - Case study

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Abstract

Aim/purpose

the aim of this article is to examine the opinions of students and graduates of the faculty of economics of a technical university as regards their selfassessment of their preparation for entering the modern labour market. All the respondents participated during their studies in didactic projects aimed at improving their competencies taking into account the expectations of potential employers.

Design/methodology/approach

the study was quantitative in nature and was carried out using the CAWI method. In the analysis of the study results, elements of descriptive statistics were used, such as: mean measures, structure indicators, structure similarity indicators and tests for the significance of mean values. A comparative analysis was conducted between two groups of respondents – students and graduates.

Findings

the conducted study shows that by organising additional training for students, the university contributes to supplementing their theoretical and practical knowledge in the area of competencies required by the labour market today, in particular within the scope of specialist and technical competencies which are becoming indispensable in the Economy 4.0.

Research implications/limitations

due to the small size of the test sample, the results should be treated with caution, are not representative and constitute only a case study.

Originality/value/contribution

the results of the research confirm the importance of lifelong learning as regards reducing the competence gap among university graduates. The tools used in the above-mentioned process include additional training activities, such as the presented didactic projects addressed to students, complementary to the curriculum of studies. They enabled the students to extend their competencies even before they left the walls of the university and, as a result, facilitated their entry into the labour market.

Keywords: Competencies; Didactic projects; Labour market; Universities

1 Introduction

Nowadays, in a meritocratic society, people take up gainful employment within chosen professions as a result of their educational achievements, as well as their skills and personal qualities (Mulder~~2014~~, 2014; Ionescu, Cuza, 2012), but today domain-specific occupational expertise is insufficient to guarantee positive work outcomes during the course of one's career (Van Der Heijde ~~and~~ Van Der Heijden, 2006). The demand for new competencies depends on changes in the labour market, which result primarily from the impact of new technologies (Rakowska, Sitko-Lutek, 2016). The digitisation of society and the economy is one of the most significant changes that we are witnessing nowadays (Pieriegud, 2016). Digital transformation also changes the face of business (Bauer et al., 2015). In this context, we are not only talking about Economy 4.0 (Furmanek, 2018; Paprocki, 2016; Gebhardt et al., 2015), but also about Work 4.0, based on progressive computerisation, automation and algorithmisation of professional activities (Wojtczuk-Turek, 2019).

Organisations are changing, and consequently the work environment is also changing. New professions, as well as new ways of working, tools and work organisation are emerging, with flexibility and virtuality becoming

increasingly important (Alvesson 2016, 2016; Lauda et al., 2015). In many cases work can be performed remotely workers are physically dispersed and at the same time connected by technology. They communicate and obtain data with its help and make decisions based on it (Malone, 2004), also using their competencies. An increasing proportion of the workforce can be described as “digital natives” (Prensky, 2001). These people have already grown up in the digital reality and are thus able to navigate the world of multimedia effectively using digital technologies (Strużyna, 2018). At the same time, the structure of existing professions is also evolving. In the future, there is likely to be a reduction in the number of jobs due to robotisation — especially in the area of industrial production — and, consequently, human labour will be substituted by machinery and equipment. According to estimates, about 60% of professions can already be automated in one-third, and the only barrier is the cost of robots and software (Manyika et al., 2017). However, bearing in mind that the prices of robots fall by about 10% a year (Frey, Osborne, 2017), it can be estimated that this trend is likely to intensify. This could affect up to 15–30% of employees globally by 2030 (Manyika et al., 2017), with two-thirds of employees in the United States (Frey, Osborne, 2017). Apart from the “physical” reduction of jobs as a result of technological development, there is also a risk of eliminating people who will not be able to acquire or update professional competencies necessary for the modern labour market, i.e. to “learn” new technologies, from the labour market. Within certain occupational categories, the problem of ensuring that workers with appropriate specialist qualifications are available will be aggravated (World Economic Forum, 2016). Research also confirms the discrepancies between employee’s knowledge and skills and employer’s requirements (Gawrycka et al., 2019). The gap is particularly visible in the area of digital competencies (Śledziwska et al., 2015), and the difference between supply of and demand for employee digital skills is a serious problem for many companies (Cardenas-Navia, Fitzgerald, 2019).

As the education level is one of the crucial determinants of a worker’s professional situation (Tomczak, 2018), universities play a key role in the process of shaping the competence profile of employees (Sołtysik et al., 2020; Quintana et al., 2016; Martinez, 2008), eliminating the competence gap (Gawrycka et al., 2019), and nowadays also placing emphasis on developing digital literacy (Fernandez-Villavicencio, 2010). Competencies constitute a main pillar in the professional world; therefore, they have become a key element of any educational model (Parrado-Martínez, Sánchez-Andújar, 2020). In the European Higher Education Area (EHEA), a model was introduced, which is based on the development of competencies allowing students to learn new knowledge strategies and acquire abilities to solve problems by themselves (De los Ríos-Carmenado et al., 2015). Therefore, it is essential that they provide students with the opportunity to acquire current knowledge and necessary skills (Schmidt, Gibbs, 2009; Garcés-Ozanne and Esplin, 2010) needed for the transition from higher education to the labour market (Grosemans et al., 2017) and then create an opportunity for graduates to constantly update their knowledge in accordance with the needs of the labour market. The level of competence achieved in the course of study at the university is a function of the resources that the university has engaged in the teaching process and the personal resources of students, including their involvement in learning, skills acquired before the beginning of studies and individual talents (Hartog, 2001). The university’s task is to help students to understand and master theories and methods from various areas of knowledge, as well as to prepare them for tasks in the area of future professional work. Contemporary higher education institutions (HEI) are, however, forced to carry out their mission in a situation of dynamic changes in society as a whole, in the economy and in the workplace (Quintana et al., 2016). In order to meet these challenges, it is necessary to update the curricula on an ongoing basis in response to the labour market demand in order to enhance graduates’ employability (Ornellas et al., 2019), which constitutes the primary aim and purpose of degree completion (Kinash et al., 2016). Graduate employability means that graduates of HEIs have developed the capacity to obtain work or to create it (Kinash, Crane, 2015). But learning is more than the acquisition of routine knowledge and technical skills, and a previous study found that high-achieving economics students may possess advanced technical skills, but many of them fail to develop an integrative understanding of the discipline and to apply economic threshold concepts to complex real world situations (Tang, 2019). There is also a necessity to complement the offer of studies also through additional activities and training undertakings, such as sectoral didactic projects addressed to specific groups of students. It has been proved that engaging students and motivating them to learn is one of the persistent challenges in higher education (Rajasulochana, Ganesh, 2019). The findings of previous research (Mangelaja, Hirvonen, 2007) reveal that extracurricular activities are one of the most important influences on students’ levels of satisfaction, along with such factors as social relationships, resources and the educational environment, personal goal achieving, and above all they promote skills and qualities of individuals (Clark et al., 2015).

It is no surprise then that various aspects of a lifelong learning system have been discussed within academic literature, with lifelong learning having been established as an important element of policy agendas in many countries (Schuetze, 2007) and recognised as a key to national economic competitiveness and social cohesion (Green, 2006). Four different basic models of lifelong learning can be distinguished (Schuetze, Casey, 2006). Firstly, a social justice or emancipatory model - *‘Lifelong Learning for all’*, pushing the notion of equality of opportunity and life chances through education in a democratic society. Secondly, a cultural model - *‘Lifelong Learning for self-fulfillment’*, perceiving lifelong learning as a process of each individual’s life itself, targeting at the fulfilment of life and self-realisation. Thirdly, an ‘open society’ model - *‘Lifelong Learning for all who want, and are able, to participate’*, understanding lifelong learning as an adequate learning system for developed, multicultural and democratic countries. Finally, a human capital model - *‘Lifelong Learning for employment’*, connoting continuous work-related training and skill development to meet the needs of the economy and employers for a qualified, flexible and adaptable workforce. As it appears to be the most prominently advocated recently, the human capital model (Schuetze, Casey, 2006) was selected as the main assumption of our examinations, the results of which are presented below. We believe that the main responsibility for acquiring and updating skills and qualifications to enhance career chances and employability rests primarily with individuals, but at the same time, the role of the university is to provide opportunities to expand these skills and abilities by providing a high-quality tailored lifelong learning educational offer for both students and graduates.

The aim of this paper is to examine the opinions of students and graduates of the faculty of economics of a technical university as regards their self-assessment of their own competencies. All respondents participated in didactic projects aimed at improving their competencies, taking into account the expectations of potential employers.¹

This study is based on elements of descriptive statistics such as mean measures, structure indicators, structural similarity indicators and tests used to determine the significance of mean values. Their application is reflected in individual parts of this paper. Moreover, a comparative analysis was conducted between two groups of respondents: students and graduates.

2 Research methods and procedure

Based on the literature review, the following research questions were set:

- 1) What is the self-assessment of the competencies of students and graduates after completing certified training?
- 2) Does participation in certified training give students and graduates a competitive advantage in the area of competencies?

In search of answers to the above-mentioned research questions, the following research hypotheses were also formulated:

H1. Students and graduates participating in additional certified training highly assess their competencies

H2. There is no significant difference in the level of self-assessment of the competencies between students and graduates

The study was of a quantitative nature and was conducted using the survey method and a surveying technique, namely Computer Assisted Web Interview (CAWI). The choice of the research technique was dictated by factors such as the possibility of reaching respondents who were no longer students, the speed of the survey and lower costs in relation to traditional surveys.

The research sample consisted of students and graduates of the Faculty who took part in didactic projects aimed at improving their competencies, taking into account the expectations of potential employers. The projects were open to students of the last 4 semesters of first-degree studies and students of each semester of second-degree studies, both full-time and part-time ones. Students were able to improve their competencies by participating in certified training courses, workshops, activities carried out together with employers, practical projects and study visits to employers. Due to the small size of the surveyed population resulting from a limited number of participants in both projects, a decision was made to replace random selection with purposive one: all project participants were asked to take part in the survey. The total number of individuals who could participate in the study was 305, which means that they constituted almost 30% of all students of the Faculty of Management and Economics. Eventually, 87 people took part in the online survey (66 women and 21 men; 52 students and 35 graduates; 78 working and 9 not working), i.e. 28.5% of those participating in both projects. The prepared and pre-verified questionnaire was distributed to the respondents via e-mail.

The survey consisted of 26 questions, most of which were closed. In case of 5 questions the respondent could choose more than 1 answer. Due to the fact that some of the didactic project participants were in the last semester of the first- or second-degree studies, they could already have graduate status at the time of conducting the research. The survey was attended by 59.8% of students and 40.2% of graduates. Finally, the results of the research were prepared separately for students and graduates in order to make a comparative analysis between both groups of respondents. 76.7% of women and 23.3% of women and 23.3% of men participated in the study. The structure of the respondents does not differ from the structure of the Faculty's students, who are mostly female. In addition, in several cases the results achieved were compared taking into account the level of education, i.e. first- and second-degree students. The aim of deepening the analysis was to indicate similarities and differences in the self-assessment of the study participants.

The chi-square test of independence was used to compare the sample of students and graduates or those working and not working in the field of the examined characteristics. The chi-square test of independence is used to test the independence of immeasurable (qualitative) features. To verify the hypotheses of independence H0 or dependence H1 of the examined features, the χ^2 statistic is used, the value of which is expressed by the formula:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(n_{ij} - \hat{n}_{ij})^2}{\hat{n}_{ij}}$$

where: n_{ij} - number of sample elements, \hat{n}_{ij} - theoretical numbers, k - number of columns of the independence table, r - number of rows of the independence table.

Theoretical numbers are calculated according to the formula:

$$\hat{n}_{ij} = \frac{\sum_{j=1}^k n_{ij} * \sum_{i=1}^r n_{ij}}{n}$$

The significance level of the test was 5%, with $(r-1)(k-1)$ being the number of degrees of freedom.

3 Research findings

The study began with a self-assessment of the respondents in the area of their level of theoretical knowledge and practical skills acquired during the education process. The importance of these issues was related to the nature of studies, which have a general academic profile and as a result are focused on theoretical education. However, taking into account the direction of education (management, economic analytics), it was important to examine the possibilities of acquiring managerial and analytical skills. Therefore, the aspect of practical training seems to be fully justified. In response to the questions formulated this way (Q4 and Q5), 69.6% of respondents rated their preparation very well and well in terms of theoretical knowledge, while only 2.2% rated the level of theoretical knowledge poorly. In the case of the respondents' self-assessment of their practical skills, less than 40% of the respondents assessed them as very good or good. 10.9% of the respondents rated them as poor or average.

More and more often students take up professional work during the education process (Q16). Among the surveyed population, the majority of graduates, i.e. 85.8%, declared that they took up a job during their studies — many of them are still professionally active. Only 14.2% of the respondents in this group did not work during their studies. In the case of students participating in the survey, only 7.7% did not work. The remaining respondents were already economically active, which means that the vast majority of them enter the labour market increasingly earlier (over 90%).

Bearing in mind that a significant percentage of the surveyed graduates and students declared to work during their studies, the researchers considered it important to know the respondents' self-assessment of their competencies (Q12–15). The results of the self-assessment are presented in Table 1 below.

Table 1 Self-assessment of the level of competencies in the group of students and graduates (in %).

alt-text: Table 1

Source: Authors' own elaboration based on research results.

Self-assessment of competencies	Specialist and technical	Social	Managerial	Digital
Students				
Very good	11.54	30.77	23.08	17.31
Good	48.08	46.15	59.62	65.38
Average	40.38	19.23	13.46	11.54
Bad	–	3.85	3.85	5.77
Very bad	–	–	–	–
Graduates				
Very good	14.29	17.14	20.00	31.43
Good	57.14	71.43	45.71	51.43
Average	28.57	8.57	31.43	17.14
Bad	–	2.86	2.86	–
Very bad	–	–	–	–

71.4% of the surveyed graduates assessed their level of specialist and technical competencies as very good or good. 58.6% of the students were of the same opinion. The respondents could also assess their social competencies. In this case, almost 90% of the graduates and 77% of students assessed the aforementioned competencies as very good or good. Due to the direction of education, the assessment of managerial competencies was important. 65.7% of graduates and 82.7% of students rated these competencies as very good or good. This may be due to the completion of first-degree studies in management. The graduates and students were also able to assess their digital competencies, which are essential in the modern working environment. They were assessed as very good or good by 82.9% of the graduates and 82.7% of students participating in the survey. Using the Chi-square independence test, the level of self-assessment of specialist and technical, social, managerial and digital competencies was examined among students and graduates. The Chi-square test with Fisher's³ correction for a small sample size showed that there is no difference in the level of self-assessment of the competencies tested between students and graduates (results in Table 2)

Table 2 Results of the Chi-square independence test with Fisher's correction.

alt-text: Table 2

Source: Authors' own elaboration based on research results.	
Competencies	The p-value of the chi-square test with Fisher's correction
Specialist and technical	0.5342
Social	0.1276
Managerial	0.2401
Digital	0.1966

The next step involved the examination of whether there are differences in the level of self-assessment of competencies in the group of students, or whether, for example, the students rate the level of social competencies much higher than specialist and technical ones. The study showed that the students rate the level of specialist and technical competencies the lowest, while the level of social, managerial and digital competencies higher (Table 3).

Table 3 Results of the independence test for the examination of the level of self-assessment in the group of students.

alt-text: Table 3

Source: Authors' own elaboration based on research results.				
	Specialist and technical	Social	Managerial	Digital
Specialist and technical	-	-0.01111	0.005205	0.0024446
Social		-	-0.5393	0.1875
Managerial			-	-0.8682
Digital				-

The same examination was conducted for the group of graduates. The graduates assessed social competencies much higher than the other assessed competencies (Table 4).

Table 4 Results of the independence test for the examination of the level of self-assessment of competencies in the group of graduates.

alt-text: Table 4

Source: Authors' own elaboration based on research results.				
	Specialist and technical	Social	Managerial	Digital
Specialist and technical	-	-0.1232	0.6872	0.1976
Social		-	-0.0849	0.1802
Managerial			-	-0.3284
Digital				-

On the other hand, it was important to examine what additional training courses aimed at improving competencies or acquiring skills confirmed by certificates were attended by students or graduates declaring employment during studies at the university (Q16, Q20). The research shows that a large group of students meeting this criterion participated in additional training courses. More than 70% of the respondents indicated that they participated in training courses such as Prince 2, Certified Associate in Project Management (CAPM) and "The creative mind in data analysis". Only 10.4% of the respondents indicated language training. Little interest was shown in the "Business Model Canvas – a business building tool" training (6.25%). An even lower percentage of students participated in the "Business data analysis using Excel" training (4.1%).

A similar survey was conducted among the graduates. Among the surveyed group, the most popular training was Certified Associate in Project Management (CAPM), attended by over 80% of the respondents, followed by "Creative mind in data analysis", attended by 60%. The lowest percentage of graduates declared participation in the "Business data analysis using Excel" (6.7%) and "Business Model Canvas" (10%) training courses.

The research conducted so far reveals that the majority of graduates and students who are still professionally active have assessed their managerial, digital and specialist competencies as very good or good. Nevertheless, it seemed interesting to investigate whether these respondents ever had to give up their jobs due to the lack of a certificate or specialist qualifications. The research shows that 17.1% of the surveyed graduates had not taken work several times because of this reason. 28.85% of the surveyed students found themselves in a similar situation. On the other hand, 28.6% of the surveyed graduates and 17.3% of students had not taken up a job due to the lack of specialist qualifications or certificates at least once.

It should be remembered that rapid changes taking place in production processes, IT architecture or organisation management require continuous improvement of skills or acquiring new ones in order to maintain employment. Therefore, the respondents were asked about their interest in the possibility of improving their qualifications. 77% of the surveyed students and graduates responded positively to the question formulated this way. In order to deepen the analysis, the respondents were asked to indicate their needs/areas of further education. In this case, the respondents could choose more than one answer. The research shows that 65.7% of the respondents are interested in participating in training and specialist courses. More than 50% of the respondents are interested in upper tertiary education and more than 40% of the respondents indicated the need to learn a foreign language. In order to expand the research, a statistical test was used to examine the relationship between the need for education and the respondent's status. The statistical test did not confirm (p-value = 0.7524) the differences among the studied group of graduates and students (the share of people who want to develop competencies in the studied groups is similar).

The research shows that 28.6% of the graduates and 40.4% of the students assessed the level of their specialist and technical competencies as average or poor. It was therefore important to demonstrate whether they were interested in improving these competencies in the future. The survey showed that 66.7% of the respondents are interested in education in this area, as it will enable them to acquire specific tools necessary for their professional work.

Among the respondents, 11.5% of the graduates and 23% of the students assessed their social competencies as average or poor. In this case, over 50% of the respondents were interested in education related to communication and foreign language learning.

As far as managerial competencies are concerned, 34.3% of the graduates and 17.3% of the students assessed them as average or poor. Here, it was important to investigate what competencies these individuals would like to acquire in the future. The survey showed that 26.3% of the respondents are interested in education related to managerial competencies, whereas 48% of them would like to improve their specialist competencies, including analytical ones.

Furthermore, the group that assessed their digital competencies as average or poor constituted 17% of the graduates and 17.3% of the students. Of this group, 80% would like to improve their language competencies and 30% would like to improve their IT competencies.

In the course of the conducted research, attention was drawn to the specificity of education of graduate students at the faculty and the fact that a significant proportion of the respondents indicated that they had already worked during their studies. It was therefore important to examine the opinions of the first- and second-degree graduates as regards improving their competencies in the future. Over 50% of the surveyed first- and second-degree students pointed to the need to improve their specialist and technical competencies. In addition, there were no major discrepancies in the opinions of the surveyed groups of students as to the need to increase their IT and analytical competencies (approx. 40%). The greatest difference between the groups of first- and second-degree students was observed in the area of ~~%. Only 30~~ managerial competencies. The percentage of the surveyed second-degree students declaring the need to improve the indicated competencies was over 12 percentage points higher than that of the first-degree students. This is most likely to result from the specificity of the group of students undertaking second-degree education, i.e. they are often graduates of technical faculties. The conducted research demonstrates that more than 70 % of the graduates of first-degree studies indicated the need for further education in the area of communication competencies. On the other hand, the proportion of the respondents in this group declaring willingness to receive specialist and technical education or education in the area of managerial competencies exceeded 50 %. Only 30 % of the surveyed graduates of first-degree studies indicated their need for education in the area of IT competencies. What is more, over 55 % of the surveyed graduates of second-degree studies indicated their need for education related to communication, analytical, managerial and specialist/technical competencies. Approx. 30 % of the respondents from the surveyed group indicated their need for further development of their language competencies in the future. Only 11 % of the respondents from the surveyed group indicated their intent to supplement their IT competencies. When comparing the responses between groups of students (both first- and second-degree ones) and graduates, no major differences arose. A statistical test was carried out, which revealed no differences in the group of people willing to improve their competencies in the future.

4 Discussion

The research shows that the labour market situation determines the behaviour and attitudes of employers and employees to a significant extent. The increase in demand for employees, low unemployment rate (about 5%, as confirmed by Statistics Poland) and numerous shortages of employees on the Polish labour market⁴ serve as confirmation that employers are trying to compensate for the emerging shortages by employing people who do not have full qualifications, e.g. students who took up employment already during their studies (as shown by the research, their proportion reaches as much as 85%). This also confirms the fears presented in the World Economic Forum's 2016 report, indicating that the problem of providing employees with appropriate specialist qualifications will be aggravated. It can be assumed that hiring students fills a gap in the labour market.

According to the survey, more than 90% of the graduates and 77% of the students assessed their competencies as high — especially the managerial ones, which most probably help them to find employment in a situation of shortages on the Polish labour market. Taking into account the research conducted by Mulder (2014), the thesis that people take up gainful employment as a result of their educational achievements, skills and personal qualities may be said to be confirmed.

It is necessary to remember about the rapid changes taking place in the economy and, at the same time, the need for continuing education that provides access to the latest knowledge and enables the acquisition of new qualifications. The studies by Alvesson (2016) and Lauda et al. (2015) reveal that methods and organisation of work keep changing, which requires the constant adaptation of qualifications and skills to the needs of the labour market. This also requires changes in employees' attitudes towards education. The research shows that graduates and students of first- and second-degree studies are aware of the changes taking place in the labour market and the need for further education and acquisition of skills necessary in Economy 4.0. More than 50% of the surveyed graduates of first-degree studies demonstrated their willingness to receive specialist and technical education. 30% of them suggested that they would like to receive education in the area of IT competencies. On the other hand, over 50% of the graduates of second-degree studies indicated their need for education in the area of analytical and specialist/technical competencies. 11% of the surveyed group pointed out the need to supplement their IT competencies. It can be said that this is also consistent with the results of the study conducted by Rakowska and Sitko-Lutek (2016). The demand for new competencies depends on the changes taking place in the labour market including, for example, the prevalence of new technologies.

The increase in the society's awareness of the changes resulting from the structure of Economy 4.0 shows the need for continuous education. This is also supported by our research, according to which over 65% of the respondents are interested in education, especially in the area of specialist and technical competencies. This is consistent with the studies carried out by Śledziewska, Gabryelczyk, Włoch (2015) and Pieriegud (2016).

The summary of the considerations is a matrix, showing the participation in training courses both among the working and non-working graduates and students (Table 5).

Table 5 Matrix of participation in training courses among working and non-working graduates and students.

alt-text: Table 5

Source: Authors' own elaboration based on research results		
Graduates (40.2%)	Number of training courses completed:	Number of training courses completed:
	Prince2 – 12	BEC - 2
	Business data analysis using Excel - 10	CAPM - 1
	Training of managerial skills - 10	Effective communication in the project team - 1
	BEC - 8	Training of managerial skills - 1
	Bussiness Model Canvas - a business building tool - 5	VBA - 1
	International Project Management Association (IPMA) - 5	
	CAPM - 4	
	Effective communication in the project team - 4	
	Team building - 4	
	The creative mind - 4	
	VBA - 3	
	Financial analyst - 1	
	Business simulations - 1	
Students (59.8%)	Number of training courses completed:	Number of training courses completed:
	Business data analysis using Excel - 22	IPMA - 2
	Training of managerial skills - 14	Prince2 – 2
	International Project Management Association (IPMA) - 9	Training of managerial skills – 2

Business simulations - 8	Business data analysis using Excel - 1
Team building – 8	Bussiness Model Canvas - a business building tool - 1
Prince2 – 7	CAPM - 1
BEC - 5	Business simulations - 1
The creative mind - 4	Team building - 1
Bussiness Model Canvas - a business building tool - 3	
CAPM - 2	
VBA - 2	
Financial analyst - 1	
Working since studies	Non-working
89.7%10.3%89.7 %	10.3 %

The matrix shows that the individuals who assessed their competencies in the above-mentioned groups as very good and good also reported their willingness to participate in training courses in a given field. The fewest respondents who assessed their digital competencies as high wanted to participate in IT training (40%), social communication courses (24%) and language courses (42%). In the remaining cases, about half of the participants wanted to improve their competencies despite high self-assessment. Perhaps the intention of these respondents was to develop competencies on the basis of specialisation within a given area of knowledge.

In total, 40 respondents had been forced to give up their jobs once or more times because of the lack of confirmation of their competencies with appropriate certificates, and at the same time participated in training courses, with 35% of this group having taken one course, 30% two, 25% three, 5% four and 5% five courses. The average number of certified training courses was calculated for the group of respondents who had had to give up job offers several times due to the lack of confirmation of their qualifications and for the group of respondents who had been forced to give up a job offer once or did not have to reject job offers at all. There is no significant difference in the average number of training courses completed between the groups of respondents who had had to give up their jobs several times because of missing certification, the ones who had suffered from such an issue at least once, or those whose competencies were sufficient. On average, the participants from each of the examined groups attended slightly more than two training courses (about 2.1). These averages are not statistically different from each other in terms of significance (the values of statistics related to the averages compared in each case were less than 0.5 and amounted to -0.24, 0.34 and -0.08 respectively). The respondents who had to give up their jobs due to the lack of certification did not receive significantly more training than those who did not have to face such an issue.

Among those who assessed their competencies (specialist/technical, social/personal, managerial and related to digital technologies) as good and very good, slightly less than half of the respondents had to give up their jobs due to the lack of appropriate formal qualifications in each of the groups studied. This sparks interest in view of the above-mentioned high demand for employees. Although the labour market is characterised by shortages in the area of labour force, at the same time almost half of the respondents were forced to resign from taking up employment due to their failure to meet formal recruitment requirements. Solutions to this situation may include lowering the above-mentioned requirements set by employers or reorganising the recruitment process in such a way as to enable the verification of practical skills of its participants, even if they do not meet all formal requirements yet.

5 Conclusion

The research confirmed both hypotheses, that is students and graduates participating in additional certified training highly assess their competencies (H1) and also there is no significant difference in the level of self-assessment of the competencies between students and graduates (H2). Importantly, both groups are eager to take part in additional training.

The results of the research presented above seem to support the importance of lifelong learning in terms of reducing the competence gap among university graduates and other employees and maintaining employment in the face of labour market changes. They fit into the assumptions of the human capital model characterising lifelong learning as a continuing training system appropriate for a knowledge-based economy within which a well educated, adaptable and flexible workforce is seen as a necessary condition for industrial innovativeness, international competitiveness (Preston, Dyer, 2003) and is a key to social cohesion (Green, 2006). They also stand in contrast to the traditional view of lifelong learning, which assumes that the main responsibility for initial and continuing vocational and professional training lies with the industry (Schuetze, Casey, 2006). Higher awareness among young people serves as confirmation of the importance of developing professional competencies throughout one's life. The research results proved that participation in the development of skills can be a conscious decision of students and graduates, motivated by a desire of personal development and improvement of one's own situation on the labour market, using the extracurricular educational offer of the university, which exceeds the study programme. One of the tools used in

the above-mentioned process includes additional training activities such as the presented didactic projects for students. They made it possible to extend students' competencies in a way complementary to the curriculum — it is important to note that this took place even before they left the university walls and entered the labour market. However, there is no doubt that given the occurrence of rapid changes within the economy, continuous improvement of competencies is an indispensable element of professional activity.

The study presented above is not free from limitations such as, above all, limited representativeness as a result of non-random sampling. In the future, it is certainly worth to undertake further research efforts aimed at analysing the discussed topic – also with the use of qualitative methods such as in-depth interviews – in order to increase the cognitive value of research. Nevertheless, the most important practical implications of the research presented above include the need to expand the educational offer of the university by continually developing and implementing similar extracurricular didactic projects complementary to study programmes, which will help students to supplement and acquire new competencies, taking into account the needs of the contemporary labour market.

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~~Hope (1968), ZZZZZ (2020), ZZZZZ (2020), 2020a,b, ZZZZZ, 2020a,b~~ (uncited reference can be removed)

CRedit authorship contribution statement

Małgorzata Gawrycka: Conceptualization, Writing - original draft, Writing - review & editing. **Justyna Kujawska:** Conceptualization, Writing - original draft, Writing - review & editing. **Michał Tomczak:** Conceptualization, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

None.

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Footnotes

¹The main objective of the first project was “Improving the competencies of those participating in higher education according to the needs of the economy, the labour market and society”. It was implemented in the period from April 2016 to July 2018, had 240 participants and was co-financed from ~~(anonymised for the purpose of blind review)~~The National Centre for Research and Development funds. As a result of the implementation of the second project, measures for 160 students have been planned in order to improve the competencies of the participants, which will contribute to the implementation of the specific Knowledge Education Development Operational Programme (PO WER) objective, i.e. “Improving the competencies of those participating in higher education according to the needs of the economy, the labour market and society”. The implementation period ~~is wa~~ ~~10-October~~ 2017-~~09-September~~ 2020. The project was co-financed from ~~(please replace bold text with plain text)~~ ~~(anonymised for the purpose of blind review)~~ The National Centre for Research and Development funds.

²The research was conducted in October 2019 among students and graduates of the Faculty ~~of Managament and Economics, Gdańsk University of Technology~~~~(anonymised for the purpose of blind review)~~

³The calculations were made in the R-CRAN software using the `chisq.test` and `fisher.test` functions

⁴According to the Statistics Poland data ~~(2020a,b)~~, the unemployment rate at the end of 2019 was about 5% http://swaid.stat.gov.pl/RynekPracy_dashboards/Raporty_predefiniowane/RAP_DBD_RPRA_17.aspx and the shortages reached over 100,000 people <https://stat.gov.pl/obszary-tematyczne/rynek-pracy/popyt-na-prace/popyt-na-prace-w-czwartym-kwartale-2019-roku,2,36.html> (accessed on 23.03.2020).

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