

Tokarčíková, Emese; Malichová, Eva; Kucharčíková, Alžbeta; Durišová, Mária

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IMPORTANCE OF TECHNICAL AND BUSINESS SKILLS FOR FUTURE IT PROFESSIONALS

Emese Tokarčíková^{1*}, Eva Malichová², Alžbeta Kucharčíková³
and Mária Durišová⁴

¹⁾²⁾³⁾⁴⁾ University of Zilina, Slovak Republic

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Abstract

Everyday usage of new information and communication technologies and recent changes in the economy increased the importance of educated IT employees with the right combination of technical and business skills. The purpose of this paper is to contribute to the management literature and practice by answering the question of what abilities today's IT students should have to fulfil the requirements of their future workplace. Our surveys via the questionnaires and semi-structured interviews among IT employers and IT students identify the importance of hybrid skills and the increasing managers' awareness of this topic. The findings indicated that not only the employers but also the students call for the increase of education efforts to improve these skills. The skills and knowledge recognized in our surveys should be mastered by the university educators to prepare graduates by providing innovative learning and teaching methods. For IT students, it is essential to acquire and develop technical skills as the core ones, but they also need the business skills to become desired professionals who can play a significant role in the future workplaces and the economy as a whole.

Keywords: technical and business skills, hybrid skills, management, learning and teaching methods

JEL Classification: L26, M13, P46

* Corresponding author, **Emese Tokarčíková**– Emese.Tokarcikova@fri.uniza.sk

Introduction

We live in the world where the information and communication technologies (IT or ICT) and their numerous applications are an integral part of not only our work but also of our personal everyday lives. In this information society, almost no one can imagine a day without using computers, mobile phones or other smart technologies. Businesses are embracing IT to streamline their operations and to improve their productivity. Marketers and managers use databases to make right decisions. These can store a staggering amount of data and report them. The digital transformation of businesses sets the pace in the market competition within the achievement of the business goals. The launch of new types of IT in the electronic world is accelerating, which creates new products and services in vertical markets. Business processes can take advantage of intelligent automation, machine learning, etc., so that the managers can improve operational efficiency, boost productivity, reduce costs, and increase the investment activity (Malichova, 2015, 2016). Due to this, the demand for IT employees is growing more than ever before. According to experts, European labour market faces a shortage of more than 500,000 (in Slovakia more than 10,000) skilled IT specialists. This can fundamentally and negatively affect e.g. the competitiveness of our country as the IT industry is one of the key sectors of the Slovak economy. No, we are not talking only about experts in new technologies such as machine learning, cloud computing, big data, artificial intelligence, block chains etc., but also about the shortage of people for all kinds of IT roles. IT job gaps cause that various projects and research activities cannot be performed, tenders cannot be submitted, and innovations cannot be implemented. Our surveys performed on a sample of IT employers and students of IT oriented study programmes, via a questionnaire and semi-structured interviews, were focussed on the identification of the skills that are essential and that should be taught to future IT employees according to the labour market requirements. The team of researchers Stanciu et al. stated that only the higher education system with good quality of education and with international mobility programmes will increase the number of qualified and skilled employees (Stanciu, et al., 2018).

1. Review of the scientific literature

Skills and technical knowledge are necessary for the success in the workplace. All managers do not use the same concept or theory, but depending on the workforce, they are trying to find out which approaches are fitting for motivating the employees and improving their productivity. This is a topic of the theory of human capital. The skills management is about managing the abilities of employees and also the abilities required for the job positions. According to the Business Dictionary, a skill is an ability and capacity acquired through deliberate, systematic and sustained effort to smoothly and adaptively carry out activities or job functions involving ideas, things, and/or people. A skill, as an ability or proficiency in a specific area, is important at any level an employee works at in an enterprise. Certainly, *technical skills* are the core ones for every IT employee and contain the individual's affinity or ability to complete tasks related to the widespread IT knowledge. Their concrete forms are the main indicators of the employee's expertise. They contain the knowledge of programming and database creation, web development or general IT support, or the specific skills needed for the newest IT networks and application services. Technical skills are usually very concrete and tangible, it is easy to teach and learn them and even to test them. *Business skills* mean that an IT employee is able to effectively

manage the project's budget and finances, and to present and promote concrete IT product/service with providing good customer services. This requires a high level of economic literacy, containing basic knowledge about the costs, revenues, taxes, cash flow, etc. Other skills include the ability to manage and plan the projects focused on the problem-solving, which means being able to make the right decision even under pressure, the ability of being a leader and delegating tasks/responsibilities and having good time management. They also include the ability of networking, the ability to communicate and negotiate with customers, team members, suppliers, and the ability of effective written and verbal communication. *Hybrid skills* include a combination of technical and non-technical (e.g. business) skills. Earl and Skyrme (1992, pp.169-187) defined the hybrid managers as the people "with strong technical and adequate business knowledge or vice versa...hybrids are people with technical skills able to work in user areas doing a line job, but adept at developing and implementing IT application ideas". According to this, the report of Burning Glass (burning-glass, online) and Business-Higher Education Forum (BHEF, online) described valuable identified skills in three areas (human, business and digital) via the analyses of more than 150 million U.S. job positions posted since 2007 as well as 56 million CVs.

The employees' skillsets can be expanded by the managers via motivating them to learn and increase the value of their human capital. Most human resource managers say that technical skills are the hardest ones to find but it is easier to teach and improve them. They are essential. The increasing of the business and management skills depends on the employee's personality (individuality) and it can be affected by the corporate culture and motivational factors as it was more specifically examined by teams of authors such as Lorincova et al., (2016, 2016a and 2018), Hitka et al. (2018, 2016) or Kucharčíková et al. (2018a, 2018b). There is a necessity to create the content of the motivation programs for groups supplemented by employee –specific factors (Hitka, et al. 2017).

2. Research methodology

The questions included in our international questionnaire survey (conducted from February to May 2019) were related to the assumption that a mix of technical and business skills is essential for all IT employees. This assumption was derived from the analysis of different IT job offer descriptions where we realized that many job positions are being redefined and the business skills' value is increasing. We compared the responses of two target groups: the managers of the IT enterprises and the students of IT related study programmes, asking them which skills they perceive as the most relevant for the IT job positions. Even though the job demand is created by IT employers, we surveyed and analysed the students' answers because they represent their current point of view about their expectations of the job market. The results gained from the questionnaires were the starting point for further semi-structured (face-to-face) interviews performed to understand some of the findings more deeply. The survey involved 45 European (Slovakia, Romania, Czech Republic, Croatia, Hungary, France and Germany) IT enterprises, particularly focusing on software development, where 51% of them have more than 250 employees and 29% of them employ 50 to 249 employees. The parallel survey involved 459 students (at the age of 19-25 years) who are already studying at faculties focused on IT in the same EU countries as the surveyed representatives of IT enterprises were from. In accordance with the results of the survey, we propose appropriate ways how to educate future IT professionals.

3. Results and discussion

According to Eurostat, across all 28 states of the EU “the number of persons employed as ICT specialists grew by 36.1% during the period from 2007 to 2017, which was more than 10 times higher as the corresponding increase (3.2%) of total employment”. (figure no. 1.)

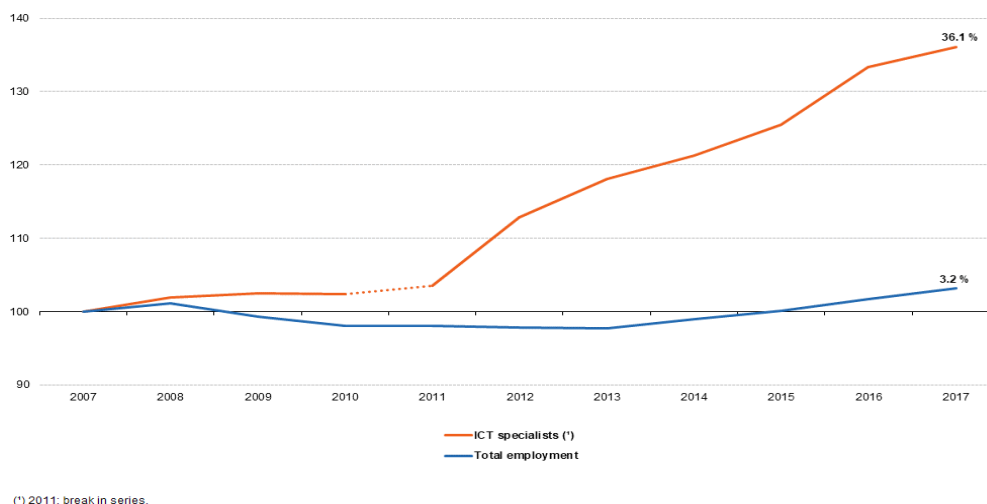


Figure no. 1: Index of the number of persons employed as ICT specialists and total employment, EU-28, 2007-2017 (2007=100)

Source: Eurostat

3.1 Results of the survey conducted

From the recent history we know that numerous IT enterprises (dot coms, IT start-ups) failed because their founders and employees (in many cases really capable IT visionaries) knew almost nothing about how to run a business. Also, other employers at different IT positions have no idea about the budgets of their projects or about how to manage them. According to the latest IT job offers' descriptions, there is demand for IT employees who are capable of doing more than just coding (working on a PC, devices and infrastructures, having IT certification, etc.) but also have a portfolio of non-tech skills at their disposal (figure no. 2).

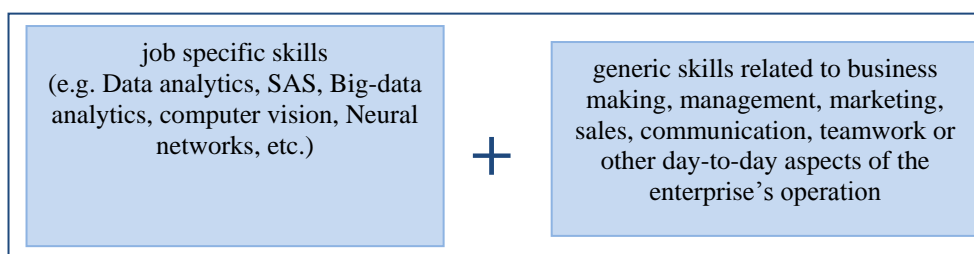


Figure no. 2: The skills required in IT job offers

Answers to our question: “Do you think that besides the technical skills, an IT employee should also have business skills at his/her disposal?” validate our assumption that business skills are perceived as an added value for IT professionals among the employers and the students focusing on their future professional career as well (figure no. 3). Confirmation of this assumption was prior for following specified questions.

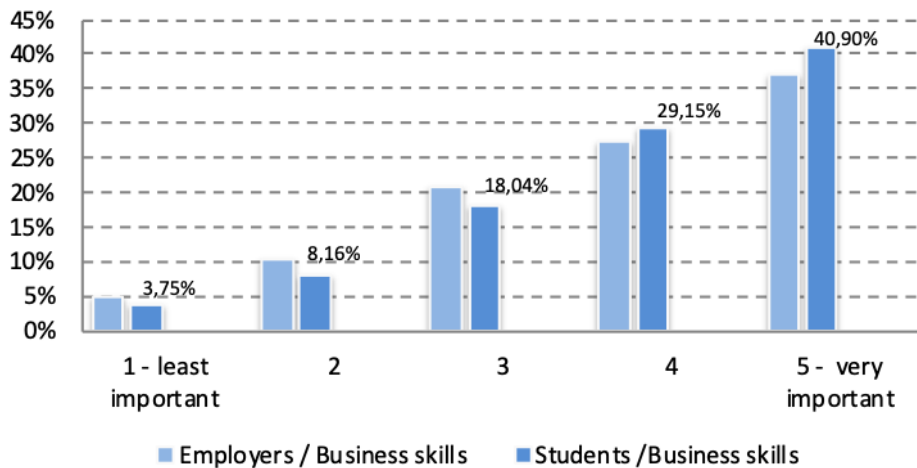
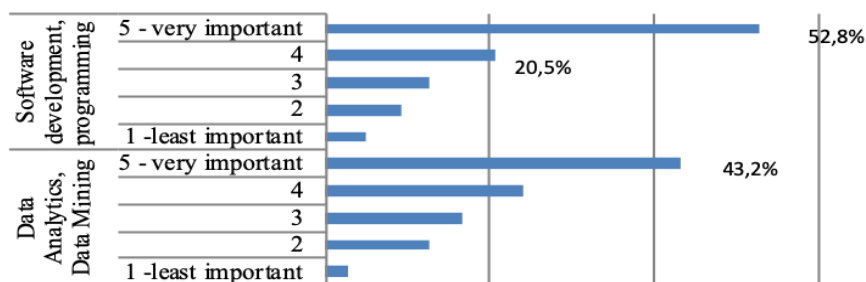


Figure no. 3: The importance of business skills for an IT employee
(perception of employers and students from 1 – least important to 5 – very important)

Even though both questioned groups assigned high importance to business skills, students emphasised them more than employers. Our further quantitative research via the face-to-face interviews explained that the knowledge of new IT technologies/applications encourages many IT students to establish their own businesses during their studies. Both those who already have some experience with start-ups and those who want to start their own businesses evaluated the business skills as highly important.

According to the question “What are your preferred areas within the technical skills of IT professionals?”, the employers’ answers are shown in figure no. 4 and the students’ opinions in figure no. 5.



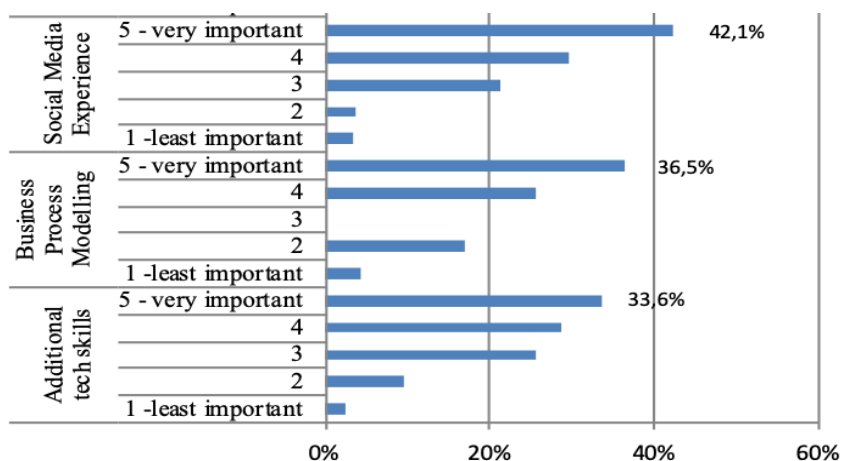


Figure no. 4: Preferred technical skills from the perspective of employers (from 1 – least important to 5 – very important)

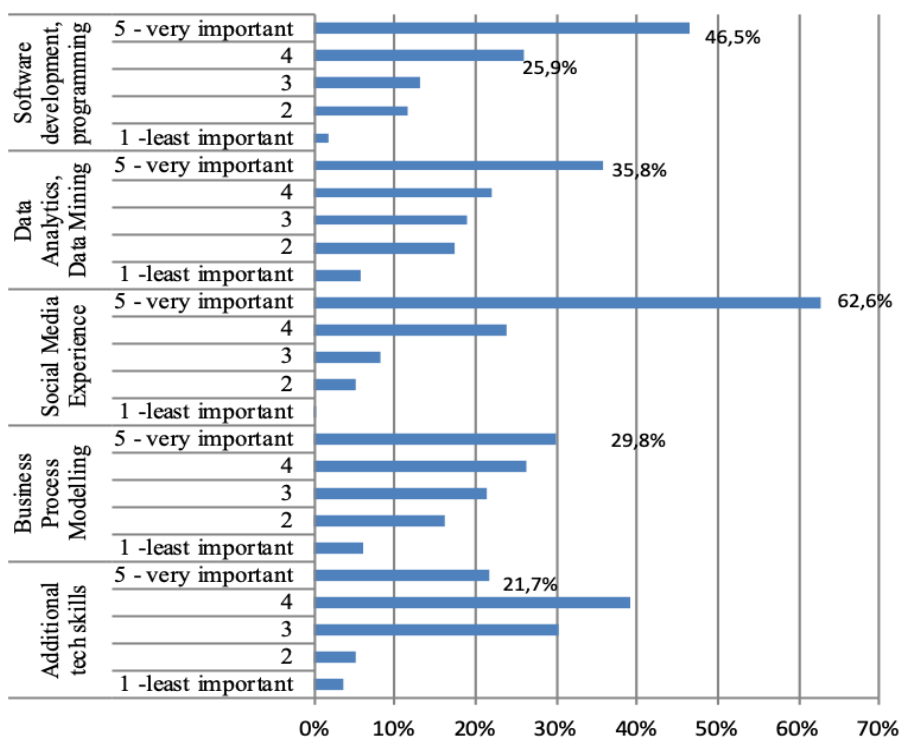


Figure no. 5: Preferred technical skills from the perspective of students (from 1 – least important to 5 – very important)

In relation to the additional skills, the survey participants among the IT employers stated that they sometimes offer extra compensation for the in-demand IT skills within the areas such as information security, cloud computing, Business intelligence, Internet of Things, Artificial Intelligence, and Advanced Machine Learning. The difference between the employers' and students' point of view was mainly present in the case of the skills related to social media experience, where the employers valued this ability less (42.6% of these respondents saw them as very important) than the students did (62.6% of these respondents saw them as very important). In other tech skills areas, the students' and the IT employers' expectations were relatively similar, with only small differences.

The pie chart (figure no. 6) shows the answers of employers to the question: "In the case when you have to choose between the candidates with the same tech professional experience and skills, what other factors help you separate the adequate candidates from the perfect ones?". It can be seen that over three quarters of the respondents make this decision by taking the business skills of job seekers into account.

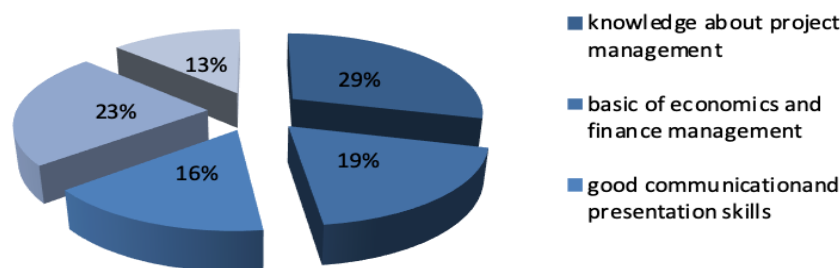


Figure no. 6: Knowledge of business skills giving an advantage to the job seekers (employers' point of view)

According to LinkedIn, 57% of leaders say that soft skills (business and personal skills) are more important than hard skills (LinkedIn, online). Table no. 1 shows the list of business skills of IT professionals offered in our survey and the percentage of high evaluations of their importance by the employers and students. These skills were selected based on the content of IT job adverts, combined with the recommendations of Cedefop's European skills and jobs surveys.

Table no. 1: Preferred business skills from the perspective of employers and students

BUSINESS SKILLS	IT Employers' perspective			IT Students' perspective		
	(5) very important	(4) important	P	(5) very important	(4) important	P
Project management and process skills	26.9%	53.5%	1.	23.5%	47.5%	4.
Financial management skills	29.3%	44.9%	3.	23.5%	40.2%	6.
Teamwork skills	19.4%	42.1%	6.	21.6%	46.6%	5.
Communication and negotiation	16.5%	41.2%	9.	18.0%	26.6%	9.
Critical thinking	34.8%	32.5%	4.	32.5%	48.6%	8.
Problem-solving	34.6%	40.3%	2.	29.6%	32.5%	7.

BUSINESS SKILLS	IT Employers' perspective			IT Students' perspective		
	(5) very important	(4) important	P	(5) very important	(4) important	P
Decisiveness /Leadership	12.8%	32.6%	11	16.2%	25.6%	11
Time management / Flexibility	29.6%	36.5%	5.	25.6%	52.3%	2.
Open-mindedness	27.6%	32.8%	7.	39.6%	55.0%	1.
Customer services	27.8%	30.6%	8.	29.6%	46.2%	3.
Networking skills	14.4%	30.1%	10	18.5%	23.6%	10
Other	5.6%	12.8%	12	6.9%	18.7%	12

The majority of the survey's participants (table no. 1) strongly agreed that business skills are very important/important. There were some differences only in the priority assigned to them where the IT employers emphasized the project management skills more, and the IT students put more emphasis on the open-mindedness. In the semi-structured interviews, we uncovered that young IT students actively search for opportunities to increase their business skills. These facts are opposite to the widespread stereotypical image of a programmer as an introvert who focuses only on the coding and is not interested in any other topic related to the business practice or social contacts.

On the contrary, students have added some additional skills to the list of business skills, in areas such as social responsibility, volunteering and the environment protection. They also added the presentation skills and argumentation of decisions (why they made decisions they did and the ability of defending these decisions in front of a panel of experts or customers). These skills were appreciated by the employers too, especially in the cases when the technology or an application can be translated into a business opportunity or they are articulated as the value propositions for the business.

We also asked the IT students this question: "Did you have a chance to attend any lessons, courses or seminars where you could gain knowledge related to business skills?" (table no. 2). The most frequent answers were the economics subjects (72%) attended at the secondary schools or universities. As other sources of the business skills improvement, the students listed the experience gained from enterprise internships, trainee programmes for the students, and the self-education.

Table no. 2: Sources of business skills improvement for IT students

Type of education possibility	N %
Economics subjects at the secondary school/university	72.0%
BaŃa Achievement programme	0.3%
E-learning possibilities, e.g. MIT, Coursera, etc.	21.9%
Subjects as Sociology or Psychology at the secondary school/university	46.8%
Workshops focused on the skills improvement	16.5%
Other	16.5%

3.2 Suggestion for the improvement of business skills of IT professionals

During the current period of globalization, the education as a form of investment in human capital represents an ideal platform for the improvement of everybody in the labour market in the long term as well (Chodasová, et al., 2015). Currently IT enterprises apply unified courses mostly based on improving language or communication skills of their employees. But improperly designed and applied courses as a part of motivational programs may have a negative impact and do not motivate them to maximize their performance (Hitka, et al. 2017). Enterprises are successful in today's market by hiring and retaining the best employees with the niche skills. Basic technical (IT, Math, Science) and business skills (economic literacy, basics of corporate finance, problem-solving, critical thinking, collaborative working in teams) are essential for all employees because they give them a solid foundation to succeed in various work and business situations. With cooperation from IT enterprises, it is important to build the students' mindsets so that they become continuous learners. After identifying the gaps in the current knowledge, IT enterprises can update and improve the business skills of their professionals via the forms internal training or in external learning camps. But the first step should be made by the educational authorities. Many students miss the opportunities early in their careers because they do not have adequate practice from the integration of business principles and soft skills (Baldwin, Pierce, Joines, & Farouk, 2011). It means that the education of future IT professionals cannot overlook any opportunity to promote innovative pedagogy and methods for teaching, learning and assessment. Responsible supervisors/ guarantors of study programmes can provide the overarching curricular goals for the study programmes. In response to job requirements, universities with IT study programmes should rethink and strengthen these to help students acquire skills needed in the labour market prior to their graduation.

The basic ways include:

- New education methods and teaching innovations that increase the speed of the students' understanding of real working problems and increase their motivation and interest. Implementation of methods for the increase of critical thinking such as the Socratic method, Method of questioning, Scenario creation, Strategy of thinking and learning, Writing essays, etc. To develop creative thinking, a teacher can use methods such as the DITOR, TRIZ, Strategy of stimulating questions, Checklist learning, Brainstorming, Brainwritting, Method Philips 66, IDEALS, Morphological analysis, etc.
- Teaching and learning based on the use of case studies, experimental games or constructivist education, which is a "form of collaborative and cooperative learning, underpinned by the following principles: learning should take place in authentic and real-world environments; students should be encouraged to become self-regulatory, self-mediated, and self-aware." (Blašková, Blaško and Kucharčíková, 2014).
- Intensive workshops, e.g. about how to create effective business plans, basics of business negotiations, or how to run a successful start-up company.
- International and intercultural collaboration via blended mobility and the project-based learning.
- Creation of digital learning materials and tools with the support of digital technology utilisation, establishment of a collaborative e-learning platform (Moodle) or educational game form that attracts attention and influences the students' spirit of competition (Smeureanu and Isaila, 2017).

- Application of social networks to educate students about how they can promote their skills, widely defined by authors Batagan and Boja (2015).
- Promotion of the idea and principles of social entrepreneurship, sustainability and corporate social responsibility among young people.
- Improvement of the students' interest in international educational exchange programmes because, as demonstrated by the results from our survey presented in table no. 3, we are still facing huge disinterest (46%) in this field. A supporting fact is that the knowledge of foreign languages, especially the communication skills in English and German language of our students are increasing every year.

Table no. 3: Students' interest in international education exchange programmes

Type of mobility	N %
Erasmus + Student Mobility (studying at a partner higher education institution for a certain period of time)	40.0%
Erasmus + Student Mobility (traineeship (work placement) abroad in an enterprise or any other relevant workplace)	25.0%
AISEC Exchange programmes	12.9%
IAESTE Exchange programmes	6.8%
Fulbright Programmes	4.5%
I am not interested in any such possibility	46.0%

Conclusions

Finding qualified and suitable employees is one of the most challenging tasks for every enterprise. IT employers in highly competitive and constantly changing business environment expect their job candidates to have not only the IT skills as their core qualities but also the economic and social knowledge, as they will participate in the digitization and smart solutions for economic and social life. A lack of business skills leads to a loss of hours of working time and it generates additional costs. This is most evident across the sectors that rely on technology during their operation (e.g. automotive, logistics, engineering) but also in the public sector (education, research, health services). No one is likely to need all the skills including the technical, business and managerial skills, but students (future employees) can mix and match them to become the hybrid professionals required by the IT labour market and the whole economy. This article briefly presents the main skills required in the labour market, and the ways how to improve their level by more attractive education forms. However, regardless of the professional orientation, these skills give advantage to all the students/employees in the dealing with their individual current situations within their personal lives.

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