Development of Communicative Competence as a Precondition of Competitive Software Engineer Formation

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1 Introduction

The European vector of Ukrainian education requires modifying priorities in the educational process, not only from the side of educational institutions and their direct representatives, lecturers, but also from the side of future graduates themselves as they are the prospective showpiece of higher educational institutions and a precondition for a certain university prominent reputation. Changing the worldview towards European society integration, joining the European education system and employing in the European labour market are rather confusing milestones for young man careers. Students do not know how to reach their most desired aim, namely, prosperity. Today students understand the importance of employee correspondence to international qualification frameworks. A potential employee should demonstrate a series of competences in the course of a job interview to be hired.

2 The Basic Part of the Study

The engineering profession is one of the most difficult ones, since it depends upon a successful combination of creative thinking with the manufacturing perfection. It is based on a thousand-year experience and requires a significant knowledge update at least every 10 years. The speed of the methodology updates, the constant addition of new aspects, the emergence of innovative technologies based on the profound knowledge of natural and technical disciplines forming the engineering speciality fundamentals.

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In Ukraine, because of the low level of social protection, the greatest stimulus from the side of an employer is the financial reward, and from the side of the worker it is effective knowledge application in the workplace for career prospects. Gradually, a manager or a team leader may face the communication problems between professionals who lack an ability to work in a team or build permanent relationships with clients.

European employers and HR experts foresee communication problems within the company and do their best to prevent them by means of thorough selection of employment procedures. According to the survey conducted by Joblift GmbH online job resource [1], the communicative competence belongs to the top 5 demands from employers. In 2017, Joblift meta job search engine analyzed more than 31 million vacancy advertisements on the European job market looking for employers' demands for one or more of 78 personality traits. Interpersonal behaviour as team spirit and communication skills (place 1 and place 4) is mentioned in the top five of more than 9 million vacancies in Germany. In the UK, communication skills rate second, and in France, social skills and team spirit rank high places, too—positions 3 and 5.

On closer examination of requirements to software engineers employing in Germany, the communicative competence should be emphasized, too: it ranks first in the top 11 soft skill list from computerwoche.de [2] as the ability to establish consensus and comprehension of how to realize one's goals through effective communicating with other people.

The situation is not going to change by 2020 according to the data from forbes.com [3]: leadership, communication and collaboration tend to rate first in the traditional soft skill list globally. More than 100 top HR managers, CEOs and recruiters (including the ones from Adobe, Prezi and SchooLinks) are willing to hire entry-level job seekers with no exact experience in the area they are being interviewed provided that they have a solid foundation of soft skills.

In Ukraine, an ability of presenting oneself and perceiving other people's perspective is considered by managers and generalists as teamwork essentials and preconditions for quick promotion obtaining. According to 21 senior managers opinion from the survey on the dou.ua [4], communicative skills imply Ukrainian soft developers' ability to produce and present the idea orally and in writing, to hold the team meetings, to report to product owners and to mentor newcomers both in Ukrainian and in English. The given examples prove the necessity of the presence and development of communicative skills for engineers.

The situation with forming communicative abilities and competences in the world and in Europe differs dramatically. The Framework for Qualifications of the European Higher Education Area (QF-EHEA), based on the Bologna Declaration (1999) and Dublin Descriptors (2005), was effectively adapted and taken into account for developing national qualification frameworks. The National Qualifications Framework of Ukraine was developed 12 years later and is still being introduced to educational institutions, governmental bodies and stakeholders.

Inherent-level descriptors of the National Qualifications Framework of Ukraine [5] include both a generalized ten-level description (integral competence) and the

basic competence system (knowledge, skills, communication, autonomy and responsibility), reflecting the personal progress of learning achievements. They are:

– integral competence (ability to perform tasks, solve tasks and problems);
– knowledge (depth, character, range);
– skills (performing tasks of different types, problem-solving, activity evaluating, analysing, etc.);
– communication (interacting with people, working in a team, reporting information);
– autonomy and responsibility (task performance control, independence, responsibility for work).

The international experience of implementation of National Qualifications Frameworks worldwide and the long-term development of the National Qualifications Framework of Ukraine resulted in unique profound qualification gradation. The Cabinet of Ministries of Ukraine introduced level descriptors for integral competences that evolve from level to level: for example, level 0 includes an ability to act adequately in familiar simple situations under direct control and readiness for systematic training; level 9 provides an ability to identify and resolve socially significant systematic problems in a particular activity area that are crucial to sustainable development and tasks requiring new systemically important knowledge creation and development of transmission technologies. Similar descriptors are not available in the national frameworks of European countries except Germany and the UK of Great Britain and Northern Ireland, which nevertheless contain similar general competences for all levels.

The study shows that another distinct feature of the National Qualifications Framework of Ukraine is the inclusion of communicative competence descriptors, which are absent in the most qualifications frameworks of European countries with the exception of Bulgaria and Scotland, and is included in qualifications frameworks of Germany and Poland as components of other competences and skills. A special attention should be paid to communicative competence descriptors referring to higher education (levels 5 to 7) in the National Qualifications Framework of Ukraine. It can be seen that these three-level descriptors emphasize the necessity of communicative competence both in academic and professional environment:

– Level 5 necessitates interaction, collaboration with a wide social circle (colleagues, managers, customers) for professional or educational activity fulfilment.
– Level 6 outlines presenting information, ideas, problems, decisions and own experience in a professional activity field to specialists and non-specialists; ability to form a communicative strategy effectively.
– Level 7 foresees comprehensive and univocal reporting own conclusions, knowledge and definitions to specialists and non-specialists, particularly to learners; foreign language application in professional activity.

The higher education standard of Ukraine for IT-specialists and software engineers provides a series of competences necessary for successful career building. The most crucial ones are an ability to communicate in a foreign language both verbally and in

writing, an ability to conduct the theoretical and applied research at the appropriate level, an ability to motivate people and move towards a common goal, to work in a team and an ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge or types of economic activities).

The concept of communicative competence is being the object of particular attention of scholars, teachers, employers, etc. There are hundreds of definitions of communicative competence, from the simple ones as the ability to interact well with others (Spitzberg 1988) to rather complicated such as personal mastering the communicative qualities associated with the need to interact with other people, with the objects of the surrounding world and its information flows, the ability to find, transform and transmit information, to perform various social roles in groups and teams [6].

To understand the necessity of communicative competence for software engineers is essential to elucidate the concept of communication. The term communication has more than two hundred definitions nowadays. Scholars commonly give definitions of communication which are related to their fields (pedagogical science, psychology, political science, etc.). Having analyzed numerous definitions, T. Goban-Klas outlines seven common definition types [7]: (1) communication as a transmission of information, ideas, emotions and skills; (2) communication as understanding of other people; (3) communication as an influence on people with the help of signs and symbols; (4) communication as an association using a language or symbols; (5) communication as an interaction with the help of symbols; (6) communication as an exchange of meanings between people; (7) communication as a component of a social process which expresses the group norms, provides public control, distributes roles, achieves coordination of efforts and so on. A Guide to the Project Management Body of Knowledge (PMBOK[R] Guide) [8] by Project Management Institute, Inc. gives the definition of communication as processes required to ensure the planning, creation, distribution, control and monitoring of project information.

Various definitions of the concept are not contrary to each other; they supplement each other, giving more details to the communication comprehension.

In the course of our research, it is reasonable to focus on different functions of communication. According to Moseeva, communication performs the following functions within combined teams [9]: (a) an informative function (information transfer, provision of information that facilitates decision-making); (b) a motivational function (encouraging employees to perform their duties better by persuasion, suggestion, orders, instructions through communication; (c) a control function (monitoring based on hierarchy and subordination behaviour of employees by various means of communication); (d) an expressive function (promoting the emotional expression of feelings, experiences, attitudes to what is happening, allowing people to meet social needs); (e) an integrative function means that communication helps to consolidate the organization, to join forces to achieve goals.

Moseeva considers communication both a phenomenon and a process. The researcher insists that as a phenomenon, communication includes interaction between structural units and participants on the basis of established regulations and rules. As

a process, communication is the direct interaction of project participants, employees and concerned individuals. It is evident that incorrectly built communication poses the greatest risk to any project and its successful completion; sometimes uninterrupted communication can result in unstable social relations in the team, which can negatively affect its further work.

3 Results and Discussion

All the information mentioned above let us assume that communication has to be taught and improved constantly, especially at any level of teenage and adult education, in order to educate highly qualified in-demand employees overseas. It should be explained to potential specialists that in Europe, the communicative competence level is determined orally and in writing in the course of interviews and at assessment centres with the same complexity degree as a professional competence. A stubborn stereotype of an engineer at a drawing board or at a computer has become outdated. An engineer spends most of their time examining requirements, collecting data, exchanging ideas with colleagues, collaborating with customers and reporting to them, managing subordinates and controlling each project development. A software engineer has a wider range of responsibilities which include co-working with both experts and nonprofessionals, converting data from conventional for software developers form into user-friendly information and visualizing own ideas in graphical form and in writing. Hence, communicative competence is an important component of work routine, particularly for professional and business communication of a software engineer.

At Tavria State Agrotechnological University, software engineers start learning English the same way all the other students do: the course outcomes are set. The freshmen are explained that not vocabulary use or translation skills are to be proved at the end of the course. The goal of a Bachelor of Science in Software Engineering in the context of command of English is to establish effective communication and to fulfil their communication needs.

The experience shows that foreign language teachers are able to exert considerable influence on students' motivation to improve their communication competence as well as to master English.

In order to adjust the communicative competence development in software engineering education to a changeable and expansible list of communicative skills demanded from graduates by potential employers, a series of arrangements have been made at Tavria University:

– During panel discussions with manufacturers, entrepreneurs and stakeholders, the list of both professional and personal skills important for successful employment and career building has been drawn up.
– Communicative competence descriptors referring to higher education (levels 5 to 7) from the National Qualifications Framework of Ukraine have been taken into
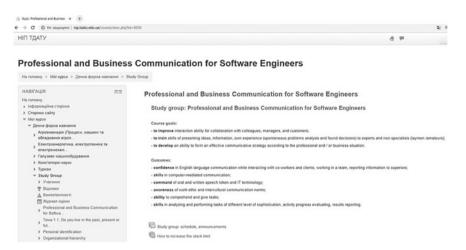
Fig. 1 Study group "professional and business communication for software engineers" on the official Tavria State Agrotechnological University portal

account by the university teaching staff and corresponding activities have been included into educational programs in English.

– A study group for software engineering students has been formed in order to help young people to advance in communicative competence (Fig. 1).
– The survey among the most perspective employers, instructors and students has been conducted and output data has been analysed.

The mentioned above survey (Fig. 2) included the list of 10 prevalent communicative competence components which should have been ranked corresponding to their importance from the responders' point of view: work ethic, communication, positive attitude, self-motivation, team spirit, negotiation, ability to network, emotional intelligence, presentation skills and active listening skills. The responders have been also asked to add some items of their choice to complement the profile of workers of promise.

The first group of responders consisted of 31 proprietors and directors of regional enterprises. According to the survey results, experienced managers mostly assess candidates according to their behaviour towards the company and interpersonal relationship. Communication ranks first in their list. Approximately a quarter of employers put team spirit and work ethic high on a list, and almost 10% of responders mentioned active listening skills and negotiation (8%) in the top five (places 4 and 5). Among responders' own demands, loyalty, time management, initiative and critical thinking have been added.

The survey results indicate that teachers are more individual-oriented with regard to communicative competence development: most of 43 instructors believed that personal mode of operation and emotional sensitivity are more valuable to an employee than, for example, a team spirit: 18% of responders put emotional intelligence first on

Fig. 2 Survey forms for students and potential employers

a list, 16% ranked communication second and 13% placed presentation skills third. Teachers also would like holders of a bachelor's degree to demonstrate creativity, time management and initiative; therefore, these components were named them in the additional list.

Students mainly rely on the interdependence between the behaviour demonstrated by all the communication participants. Most of 129 responders expect the same attitude from their potential managers and co-workers they express themselves; hence, they try to reflect in their top-list interpersonal relationship aspects of communicative competence components which they would like to develop. Communication ranks first in the students' list (32%), 24% ranked team spirit second and 11% placed positive attitude third. The extra-list of software engineering students included flexibility, time management, intercultural understanding and leadership.

In general, the importance of communication is indicated by these data (Table 1).

4 Conclusion

On the basis of the data analysis, it is reasonable to take certain actions in order to accelerate and strengthen communicative competence development in the university study:

– to inform students about the necessity of being a competent communicator to become competitive software engineers;
– to support extracurricular study groups and students' clubs for communicative competence development;

Table 1 Survey results

Employers		Teachers		Students	
Communicative competence components	%	Communicative competence components	%	Communicative competence components	%
Communication	25	Emotional intelligence	18	Communication	32
Team spirit	15	Communication	16	Team spirit	24
Work ethic	14	Presentation skills	13	Positive attitude	11
Active listening skills	9	Team spirit	11	Work ethic	9
Negotiation	8	Positive attitude	9	Self-motivation	6
Positive attitude	7	Work ethic	8	Emotional intelligence	6
Self-motivation	7	Active listening skills	8	Ability to network	5
Emotional intelligence	6	Self-motivation	7	Presentation skills	3
Presentation skills	5	Negotiation	6	Active listening skills	2
Ability to network	4	Ability to network	4	Negotiation	2
Additional list composed by responders					
Loyalty	17	Creativity	21	Leadership	23
Time management	10	Time management	7	Flexibility	12
Initiative	8	Initiative	5	Time management	8
Critical thinking	5			Intercultural understanding	6

– to extend available courses through communication-oriented tasks, activities and projects;
– to introduce courses for professional and business communication into educational programs;
– to provide mutual assistance of university instructors, employers and stakeholders with regard to providing practical application of communicative competence in the working place;
– to popularize the experience of Tavria State Agrotechnological University through workshops, seminars, webinars and panel discussions with leading institutions of higher education.

To conclude, it is necessary to emphasize that Ukrainian software engineers and developers are in great demand both in Ukraine and abroad among employers of different levels and statuses due to their working efficiency and learning capability. To function effectively in the working environment regardless of the company type and size, country, it is crucially important to have a high level of communicative competence.

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