The professional and language training integration of IT specialties students in the context of multilingual education

Yelena A. Spirina, Irina A. Samoilova, Dinara A. Kazimova & Nadezhda A. Gorbunova

E.A. Buketov Karaganda University
Karaganda, Kazakhstan

ABSTRACT: Currently, in Kazakhstan, the relevance of language training of students is increasing due to the implementation of trilingual education according to the state programme. Moreover, knowledge of professional English for IT specialists is a key requirement for employment. Therefore, the teaching of specialised IT disciplines is carried out in English in the process of training IT specialties students at *E.A. Buketov* Karaganda University. The objectives of the study were to identify the problems faced by 1st-year students in parallel study of IT disciplines in English and the English language, and to find out how much IT specialties students understand the importance and significance of English language proficiency for future professional activity. The results of a survey of 112 IT specialties students showed that they positively assess the importance of learning English (86%), while not realising the importance of professional communication in English for professional training and development. Also, they do not know about the possibilities of English-language on-line professional services.

INTRODUCTION

The language policy in the Republic of Kazakhstan has recently been determined by the National Cultural Project *Trinity of Languages* [1], according to which multilingual (trilingual) education is desirable and already developing. The purpose of trilingual education is to create conditions for simultaneous mastery of three languages by citizens of Kazakhstan: Kazakh, Russian and English [2]. English is a means of international cultural and professional communication.

In the process of preparing IT students, the main difficulty is the dynamism of the development of information and communication technologies and the IT industry, changing requirements for the competencies of graduates from employers and the global labour market. Due to the specifics of the IT industry, the requirement of proficiency in English at a professional level is one of the key requirements of an IT specialty graduate.

The ability to communicate in English is one of the requirements for employment [3]. Proficiency in English is necessary to compete with representatives of other countries in national and international labour markets [4]. This is explained by the fact that in the IT industry, the main language for work and communication is English, professional IT terms used and documentation are in English, and IT specialists work as part of multilingual teams of IT companies, therefore, there is an objective need for the formation of foreign-language communicative competencies for effective professional work.

RESEARCH METHOD

It is recognised that foreign language training in the system of higher professional technical education contributes to the formation of graduates of such abilities that will give them the opportunity to use a foreign language as a communication tool in the dialogue of cultures, as well as the means of scientific and technical communication [5].

Willingness to apply knowledge of English in professional activity is an important indicator of the professionalism of a specialist in the IT field, which determines the foreign language professional competence. This is justified by the fact of expanding contacts with foreign partners, by the bulk of the material, both news and educational, in all IT industries being published in English, by English-based user interfaces of IT software products and development tools, by the availability of technical documentation and user manuals also in English.

IT specialists need the English language to understand IT terminology, work with English-language resources and understand the nuances of the profession, compile technical documentation, attend IT conferences, meetings, watch top webinars, work abroad. Therefore, teaching English as a professionally oriented language to students of information specialties is an important part of the professional training of a future IT specialist.

As part of the training of technical students, language competence is considered not a goal, but a means, part of the socio-cultural formation of the personality of a future professional. Learning a foreign language in a non–linguistic university is not the main, but an auxiliary means of forming a future specialist, since it is in the sphere of forming his/her general cultural readiness. Foreign language training for students is an additional tool for acquiring and generating knowledge; it expands access to information and forms a professional culture of a specialist who can integrate into the world community [6].

The importance of English proficiency by technical and information specialists is reflected in the criteria of international certification and accreditation organisations for engineering training, professional consortia and associations. Thus, in the criteria of the European Federation of National Engineering Associations (FEANI), the requirement for the level of language training of a professional engineer is clearly highlighted: *(... Fluency in European languages, sufficient to facilitate communication when working throughout Europe ...)* [7].

The tendency to teach in a language other than the official one in the country began to acquire particular relevance more than twenty years ago [8], when an increase in the number of foreign students became a priority for many higher educational institutions. The general problems of integrated content and foreign language in higher education are considered in several works [9-12]. The issues related to the improvement of language competencies in a foreign language of students of non-linguistic specialties are also discussed [13-15].

Further, Bernavskaya et al emphasise the importance of foreign language communicative competence in the training of IT specialists, which directly affects the level of assimilation of knowledge in a foreign language and, accordingly, the formation of professional communicative competence of IT students and the development of positive motivation for professional activity [16]. One of the essential criteria of programmers' skills, according to the German psychologist Sonnentag, is appropriately formed communicative competence [17]. This allows IT specialists to work effectively together on projects, to be part of an IT team consisting of specialists who can be located in different countries and work remotely.

Thus, the foreign-language professional competence of IT students is a combination of motivation to learn a foreign language, key competencies in the field of IT and computer science, foreign-language professionally significant speech skills, reflexive skills aimed at self-assessment of the level of proficiency in a foreign language, and the experience of solving professional tasks in a foreign language that are close to the real conditions of professional activities.

In the conditions of multilingual education in the Republic of Kazakhstan, specifically at Karaganda University named after Academician E.A. Buketov, the training of IT specialties students is carried out in three languages: 30% of disciplines are in English, 50% - in their native language (Russian/Kazakh) and 20% in the second language (Kazakh/Russian). At the University, disciplines in English and Russian (Kazakh) languages (after the secondary school course) are studied from the 1st year.

The main emphasis is placed on the study of specialised IT disciplines in English, therefore, in the learning process, an important task is to form students' foreign-language professional communicative competence as future IT specialists throughout the entire period of university study. Teaching IT specialised disciplines in English is focused on several areas: understanding the subject content; development of presentation skills and discussions on professional topics; development of language skills; formation of co-operation between students in group work mode; and formation of skills for working with ICT, digital and on-line resources.

In the digitalisation of education, teachers actively use innovative technologies, ICT tools and on-line resources in teaching to solve various pedagogical tasks [18][19]. It has been confirmed by many researchers that teachers' confident knowledge of ICT technologies has a positive effect on the quality of students' professional training [20-22].

The purpose of the study outlined in this article was to identify the problems faced by 1st-year students of IT specialties, while studying IT specialised disciplines in English and the English language in parallel, and to find out how much these students understand the importance and significance of English language proficiency for future professional activity.

For this purpose, an on-line survey was conducted, in which students of the specialties computer science, information systems and mathematical and computer modelling took part. One hundred and twelve students responded to the survey.

In this study, the following methods were used: data collection, analysis and interpretation, as well as statistical methods, generalisation, on the basis of which conclusions were then drawn. The survey was conducted on-line on the Google Forms platform. The questionnaire included open-ended (or questions requiring a detailed answer) and closed-ended questions.

The survey was conducted in the second semester, i.e. students at the University had already studied English in the first semester. In addition, students have had a certain level of knowledge of terms of school computer science.

Table 1: Questionnaire regarding the preferences of 1st-year IT students, while studying specialised disciplines in English.

No.	Questions
1	*Evaluate your level of interest and self-organisation when performing educational tasks in IT disciplines in English* (on a 5-point scale)
2	*Do you like learning English? (explain the answers):* 1. Yes 2. No
3	*Does your level of English language proficiency allow you to successfully master the required amount of educational material?* (yes, no, additional efforts are required to master the material)
4	*Do you use the knowledge of the school computer science course to study IT disciplines in English?* (yes, no, additional efforts are required to master the material, other)
5	*What difficulties do you experience when doing exercises and tasks in IT disciplines in English?* (the volume of tasks is large, I do not know IT terms, complex professional texts, I do not understand videos, other)
6	What types of work with language material do you use when studying IT disciplines? (I keep a dictionary and glossary, translate texts, try to read more authentic sources, other)
7	*I study English in order to* (multiple answers allowed): 1. Improve the level of grammar of the language 2. Increase your general vocabulary 3. Improve conversational skills on general topics 4. Understand entertainment audio and video sources 5. Take additional on-line training courses on the profile of training 6. Increase the vocabulary of professional IT terms 7. Communicate with colleagues on professional topics about IT 8. Read professional sources on IT 9. Watch video courses on professional topics 10. Attend IT conferences, watch top webinars 11. Work abroad 12. Continue studying abroad 13. Other _____
8	*The specialty and the study of English should be interconnected, because:* 1. English is important for professional communication (on a 5-point scale) 2. English is needed to study professional materials and resources in IT industries (news/ training) (on a 5-point scale) 3. Professional terminology is used in English (on a 5-point scale)
9	*Specify which English-language Web services in the field of IT technologies you use:* 1. On-line educational platforms (MOOCs): _____ 2. Podcasts for programmers: _____ 3. Educational sites and IT portals: _____ 4. IT blogs: _____ 5. YouTube channels about IT: _____

RESULTS AND DISCUSSION

Based on the processing of the survey results, the following conclusions can be drawn. Only 16% of the students confirm a high level of interest in learning English for professional growth and self-organisation, when performing educational tasks in specialised IT disciplines in English.

Eighty-six percent of the 1st-year students positively assess the importance of learning English at the University, with the following explanation of their answers. Firstly, 79% of the students believe that knowledge of English is necessary for traveling around the world, language skills help to feel at home abroad. Secondly, the opportunity to expand personal contacts with native speakers, including on-line communication - 34%. Thirdly, English is needed for vocational training - 5%.

Twenty-three percent of the respondents believe that the level of English language proficiency currently allows them to master the necessary amount of educational material in specialised IT disciplines; 77% of the students need additional efforts to study the material.

The survey revealed that 34% of the respondents did not study the subject of Computer Science in school to the required extent according to the standard. The following reasons are given:

1) lack of computers and poor quality of Internet connection at school due to the remoteness of the settlement from regional centres;
2) lack or insufficient number of computer science teachers;
3) computer science lessons were conducted by non-core teachers;
4) in high school, computer science lessons were used to prepare students for final examinations.

In Kazakhstan, much attention is paid to the digitalisation of education, especially school education. A number of state programmes on digitalisation, telecommunications and Internet development in schools are being implemented. However, currently the problem remains in remote regions of the republic. Therefore, freshmen who commence university study in IT specialties experience serious difficulties in studying these disciplines. They lack knowledge on several basic topics of school computer science and have a low level of understanding of the principles of algorithmisation and programming. And, as a result, 1st-year students do not know enough IT terms, including in English. As clearly demonstrated, first of all, these students have difficulties in studying IT disciplines in English.

Seventy-seven point four percent of the respondents noted the problem of ignorance of IT terms in English, 93% noted the difficulty in reading professional authentic texts, 99% noted the difficulty in perceiving authentic audio clips, 98% noted the difficulty in discussing profile issues, debates and presentations.

The analysis of the answers showed that, in general, 1st-year IT specialties students have low professional motivation in learning English. The main goals of these students in learning English are socio-cultural goals; namely, improving general speech and writing skills: *To improve the level of grammar of the language* - 91% of the respondents; *to increase the general vocabulary* - 92%; *to improve conversational communication skills on general topics* - 88%; and *to understand entertaining audio and video sources* -100%.

On average, 18% of the surveyed 1st-year IT specialties students associate the study of English with a professional orientation, as shown by their responses: *To take additional on-line training courses on the profile of training* - 18%; *to increase the vocabulary of professional IT terms* - 39%; *to communicate with colleagues on professional topics about IT* - 2%; *to read authentic professional sources on IT* - 21%; *to watch video courses on professional topics* - 19%; and *to attend IT conferences, watch top webinars* - 9% of the students. Seventeen percent of the respondents consider learning English in the context of professional growth and the opportunity to get a job and/or continue studying abroad (Figure 1).
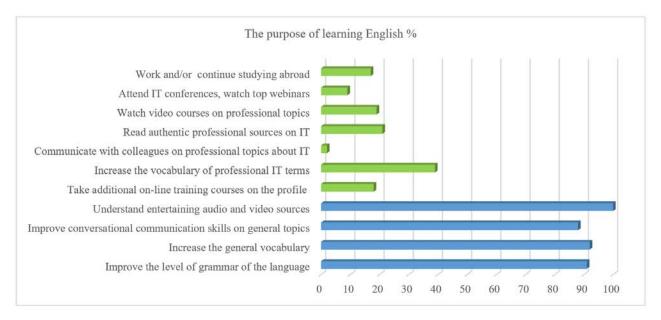

Figure 1: IT students' answers to the question: *The purpose of learning English.*

To prepare for classes in IT disciplines, 92.9% of the students make up only a dictionary and glossary of terms, and only 7.1% use English-language professional IT podcasts and Web portals.

When choosing several answers, the spheres of students' use of English language on-line profile services represent the following perspective in terms of significance. Eighty-seven percent of the respondents do not know the purpose of Web services for on-line IT training, for example: Coursera, ITVDN, GeekBrains, Sololearn, Udemy, SkillFactory, etc; they do not know about the possibilities of English-language podcasts for programmers: CodeNewbie, Software Engineering Daily, Coding Blocks, etc; they do not know about English-language educational portals in the field of IT technologies; for example, GCFGlobal.org.

In addition, students noted that the specialty (field of study) and the study of English should be professionally related, however, 98% of the respondents indicated that knowledge of only IT-sphere terms in English is sufficient, and only 9% of the respondents realise the importance of professional communication in English.

Summing up, the authors noted that the process of teaching specialised IT disciplines in English also places increased demands on the language competencies of the teacher, as well as on his/her skills and creativity to use Web services and on-line tools in the training sessions of specialised IT disciplines.

CONCLUSIONS

The analysis of the survey data of the 1st-year IT specialties students from *E.A. Buketov* Karaganda University in Kazakhstan allows the authors to conclude that, despite the obvious interest in new IT technologies and the English language, most of the surveyed students do not realise the importance of fluency in English for future professional activity in the IT industry, including communication between IT specialists, they do not know enough key IT terms and their auditory recognition of authentic speech is poorly developed. Professionally-oriented goals of the 1st-year students (work and study abroad) are characterised by remoteness from the present moment.

Nevertheless, some students demonstrate awareness about the demand for their future professions abroad. The above points to the need to carry out information work on the opportunities that knowledge of English opens up in the process of studying at the University; for example, participation in foreign conferences, international grants, student exchange programmes, etc.

The data obtained are of pedagogical importance for teachers of specialised IT disciplines and other interested parties, since the effective integration of the English language into the process of teaching specialised IT disciplines should be ensured through adequate pedagogical support. It is necessary to adjust pedagogical strategies and methods, and to develop contextual and linguistic materials in order to optimise the technology of teaching IT disciplines. Namely, the teacher should strive to create situations in the classroom that are close to the environment of professional communication; for example, role-playing games, debates and professionally significant presentations; to select material that has cognitive and communicative value from the point of view of the student's IT specialty, stimulating the exchange of opinions and creative access to speech activity; to encourage the use of English for extraction of up-to-date IT information from magazines, books and the Internet, so that the English language could become a tool for solving various tasks.

To implement an effective educational process, teachers of IT disciplines must have sufficient professional, pedagogical and language training for the effective use of technologies that allow teaching both the subject and the English language, since pedagogical changes, effective subject teaching and the use of technologies require appropriate additional training.

REFERENCES

1. State Program for the Implementation of the Language Policy in the Republic of Kazakhstan (2019). 10 January 2023, http://adilet.zan.kz/rus/docs/P1900001045 [in Russian].
2. Syrymbetova, L.S., Zhumashev, R.M., Nugmetuly, D., Shunkeyeva, S.A. and Zhetpisbayeva, B.A., Methodological approaches and strategies for teaching three languages in the Republic of Kazakhstan. *Novosibirsk State Pedag. Univ. Bulletin*, 7, **4**, 72-92 (2017).
3. Clement, A., Murugavel, T., English for employability: a case study of the English language training needs analysis for engineering students in India. *English Language Teaching*, 8, **2**, 116-125 (2015).
4. Kanoksilapatham, B., Preparing Thai mechanical engineers for the job market: the students' and employers' needs. *Inter. J. of Manage. and Applied Science*, 3, **10**, 83-88 (2017).
5. Ruiz-Madrid, N. and Fortanet-Gómez, I., Teacher professional development for the integration of content and language in higher education. *Innovation in Language Learning and Teaching*, 16, **4-5**, 277-280 (2022).
6. Khasanova, V., Shoniyozova, S., Tolipova, D. and Atamkhamedova, G. Formation and improvement of word usage skills in the technical field. *J. of Positive School Psychology*, 6, **10**, 4318-4322 (2022).
7. European Federation of National Engineering Associations, 14 December 2022, https://www.engineerseurope.com/what-engineers-europe-eeed
8. Wilkinson, R., *Integrating Content and Language. Meeting the Challenge of Multilingual*. Higher Education. Universitaire Pers Maastricht (2004).
9. Doiz, A. and Lasagabaster, D., Dealing with language issues in English-medium instruction at university: a comprehensive approach. *Inter. J. of Bilingual Educ. and Bilingualism,* 23, **3**, 257-262 (2020).
10. Fortanet-Gómez, I., CLIL in higher education. Towards a multilingual language policy. *Bristol: Multilingual Matters* (2013).
11. Cimermanová, I., A review of European research on content and language integrated learning. *Integratsiya Obrazovaniya*, 25, **2**, 192-213 (2021).
12. Han, Y., Zhao, S. and Nair, A.B., Effects of content and language integrated learning instruction model on learning outcomes in Chinese STEM program: a quasi-experimental comparative study. *Inter. TESOL & Technol. J.,* 70, **2**, 6-30 (2022).
13. Kuimova, M., Burleigh, D., Maldague, X. and Startseva, D., Academic exchange programmes to enhance foreign language skills and academic excellence. *World Trans. on Engng. and Technol. Educ.* 15, **2**, 184-188 (2017).
14. Kopzhasarova, U.I., Beisenbaeva, B.A. and Alken, S.H., Improvement of technical specialty students' foreign language professional skills. *Bulletin of Karaganda University*, 2 (102), 157-263 (2021).

15. Abramova, V.S., Foreign-language professional competence development applying the CLIL technology in teaching non-linguistic university students. *Russian Linguistic Bulletin,* 8 (**36**) (2022).
16. Bernavskaya, M.V, Ivanova, V.A. and Mikhailova, O.Y., Methodology for formation of professional communicative competence of future IT specialists. *IOP Conf. Series: Materials Science and Engng.,* 940, **1**, 012133 (2020).
17. Sonnentag, S., Brodbeck, F.C., Heinbokel, T. and Stolte, W., Stressor-burnout relationship in software development teams. *J. of Occupational and Organizational Psychology*, 67, **4**, 327-341 (1994).
18. Bernabeo, R.A. and Michaelides-Mateou, S., The use of interactive whiteboards as a pedagogical tool in teaching aviation courses. *World Trans. on Engng. and Technol. Educ.,* 15, **1**, 78-81 (2017).
19. Zykrina, S., Gabdullin, R. and Kozhabaev, K., Effective teacher feedback: adapting Internet technologies for criteria-based assessment. *World Trans. on Engng. and Technol. Educ.,* 20, **3**, 196-202 (2022).
20. Yessengabylov, I., Nurgozhayev, S., Aldabergenova, A., Smagulov, Y. and Krivankova, L., Factors in the productive use of information and communication technologies by mathematics teachers. *World Trans. on Engng. and Technol. Educ.,* 19, **4**, 392-397 (2021).
21. Bedelov, K., Bidaibekov, Y., Grinshkun, V., Bostanov, B. and Koneva, S., The effective use of telecommunication cloud services for the training of future computer science teachers. *World Trans. on Engng. and Technol. Educ.,* 19, **4**, 398-403 (2021).
22. Pusca, D. and Northwood, D.O., Teaching and learning engineering design: creative methods for remote education. *World Trans. on Engng. and Technol. Educ.,* 19, **3**, 306-312 (2021).