

Map of Employer Needs and Young IT Professionals

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DOI: <https://doi.org/10.30880/jtet.2024.16.01.018>

Article Info

Received: 5th February 2024
Accepted: 21st April 2024
Available online: 30th May 2024

Keywords

Digitalization; innovative technologies; digital skills; labour market; unemployment

Abstract

This research aims to identify the specific needs of young people in the Mangistau and West Kazakhstan regions during their job search in the IT field and determine the IT professions in high demand according to employers. The research employs online surveys and economic-statistical analysis as the primary methods. The findings indicate that the negative labour market trends in Kazakhstan and neighboring countries are projected to worsen by 2030. While the information and communication technology sector represent a highly promising area for new job creation, employers' expectations often do not align with the skill sets possessed by young professionals. Employers also anticipate a future surge in demand for cybersecurity specialists. The practical significance of this research lies in enabling young applicants to make informed decisions regarding their IT career paths, allowing employers to gain insight into the expectations of potential employees, and aiding public authorities in developing education and IT programs to combat youth unemployment.

1. Introduction

A low level of unemployment is a fundamental criterion for social stability (Ivanenko & Nesen, 2023). Prolonged job searches contribute to social tension and decrease the motivation of individuals unable to secure employment, leading to social apathy. Persistently high youth unemployment rates stimulate an increase in regional crime. These factors underscore the relevance of this research and highlight the need for increased attention from state authorities to address the issue of adequate employment levels for the population (Lukashevych, 2022).

One of the primary causes of unemployment in the Mangistau and West Kazakhstan regions is the reluctance of citizens to work in available areas offered by the Employment Center. Instead, they seek employment in the oil industry due to high salaries. The projected decline in oil production will further exacerbate unemployment levels, necessitating the development of expertise in alternative fields, with the digital sphere emerging as one of the most promising (Madakam et al., 2019). The digital sphere is the activities, services and industries that rely mainly on digital technologies, such as information and communication technologies, computer applications and Internet platforms.

The impact of digitalization on the economy and labour market in Kazakhstan has been studied by various Kazakh researchers. Karmys (2020) explored the impact of digitalization on the labour market through three theories: technological unemployment, minimal impact of digitalization, and temporary technological unemployment. The study concluded that the theory of minimal impact of digitalization is the most likely scenario

for Kazakhstan in the near future. Rakhmetulina et al. (2022) determined that the market exhibits rapid skill obsolescence, emphasizing the need for the development of soft skills, and a strengthened practical component in the education of future specialists. Gizzatova and Amangeldieva (2019) highlighted that creating new jobs in the context of digitalization not only addresses unemployment but also contributes to sustainable social development.

Jahan & Zhou (2023) investigated the relationship between digital accessibility and employment shock during the COVID-19 pandemic in 93 countries. Results show that greater digital accessibility is positively correlated with employment growth, especially in high-income countries, indicating its importance in stabilizing employment during a pandemic and providing a basis for future theoretical work on this issue.

Researchers worldwide have extensively examined the impact of digitalization on the labour market. Attaran et al. (2019) examined the challenges of increasing labour productivity in the era of information technology. Bănescu et al. (2022) researched the impact of e-commerce development on the labour market, focusing on the impact of human capital with advanced technological skills. The study found that the growth of e-commerce and the increase in the number of people specializing in technology contribute significantly to the increase in labour market activity, indicating the need to restructure education to keep up with technological advances.

Some studies have focused on assessing the impact of digitalization on employers as well (Fernández, 2023). Yin et al. (2023) studied the impact of digitalization on the gender gap in labour force participation in G20 countries between 2006 and 2021. The results show that digitalization tends to reduce the gender gap, especially in high-income countries, and although the interaction between digitalization and globalization has mixed effects, digitalization generally increases female employment and reduces female unemployment, especially in the service sector.

This study seeks to identify the unique requirements and preferences of young people in Mangistau and West Kazakhstan Oblasts when seeking IT jobs, as well as to identify employers' perspectives and criteria when hiring IT professionals in these regions. Therefore, this research aims to determine the needs of young individuals, focusing on the Mangistau and West Kazakhstan regions, during their job search in the IT field. The ultimate goal is to establish the "ITeachMe" Competence Development Centre, which will provide innovative opportunities for the development and integration of young people into the labour market. In order to achieve the main objective, a number of research objectives were defined. Firstly, an in-depth examination of the key labour market indicators in the Mangistau and West Kazakhstan regions was conducted. Secondly, the study delved into the specific requirements and preferences of young individuals in these regions seeking employment within the IT sector, employing an online questionnaire.

2. Materials and Methods

The field and desk study were conducted using an online survey method through social networks such as Instagram, Meta, and WhatsApp. A sociological study titled "Analysis of Youth Needs with a Focus on the Regions of Mangistau and West Kazakhstan in Finding Jobs for Young People in the Digital Sphere and Identifying the Demand Among Employers for Digital Professions" was carried out by sole proprietor Zholdasbekova upon the request of the Public Foundation ITeachMe. The study received financial support from OrleTECH and was conducted in partnership with the "Shell Kazakhstan" company. The project took place from September 7, 2022, to August 7, 2022. During the field stage of the sociological research, an online survey method was employed using questionnaires distributed to respondents through social networks.

In the process of collecting and processing secondary information, an economic-statistical analysis method was applied. This involved analysing indicators of the current state of the labour market in the West Kazakhstan and Mangistau regions, including the number of unemployed individuals categorised by the duration of unemployment and by regions in Kazakhstan, unemployment rates in the West Kazakhstan and Mangistau regions, employers in these regions, population migration data for the first quarter of 2022, and the increase in new businesses during the same period. Data was collected from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023).

The online survey was conducted according to the following schedule: on July 9, 2022, questionnaire forms were posted on social networks such as Facebook, Instagram, and WhatsApp. Targeted advertising attracted respondents from the West Kazakhstan and Mangistau regions. Interim results were monitored daily, ensuring the quality of the survey by assessing the number and activity of respondents, as well as the completeness of the questionnaire and the presence of contradictions. The online survey concluded on August 1, 2022, after running for less than 4 weeks. A total of 183 individuals and 43 companies participated in the online survey. The study employed techniques to obtain the most representative data to ensure the sample represented the general population of unemployed citizens in the labour market. The sample consisted of 226 respondents, of whom 183 were young people aged 18 to 40, and 43 were businessmen. The sample represented individuals from West Kazakhstan, Mangistau, Astana, and Almaty. The respondents met the following criteria simultaneously:

1. They were unemployed (without a profitable hobby).
2. They were actively seeking employment.
3. They were ready to start working within one month.

The respondents in the survey belonged to Generation Y, also known as millennials, who were born between 1982 and 2004. As they have grown up with the Internet, they are more involved in digital technology compared to previous generations. The questionnaire survey of respondents was constructed using simple random sampling. Fig. 1 illustrates the composition of the survey participants (unemployed citizens) based on gender and age.

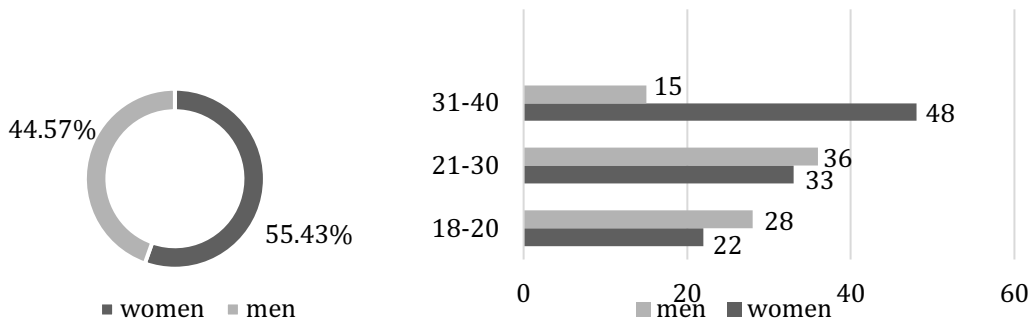


Fig. 1 Sample structure by gender and age

The structure of the sample by the level of education and age is shown in Fig. 2.

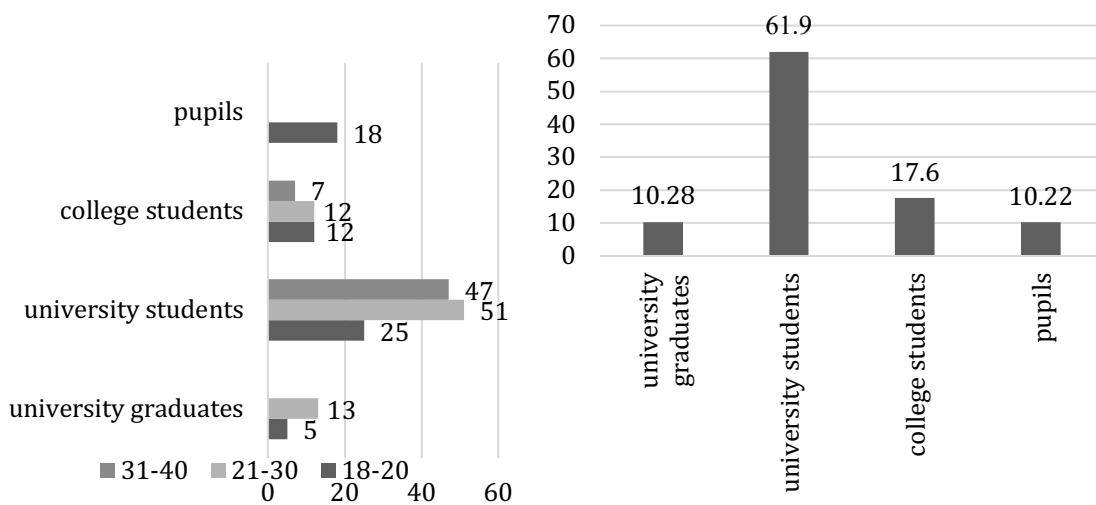


Fig. 2 Sample structure by education and age

Fig. 3 shows Respondents from socially vulnerable segments of the population (SVSP).

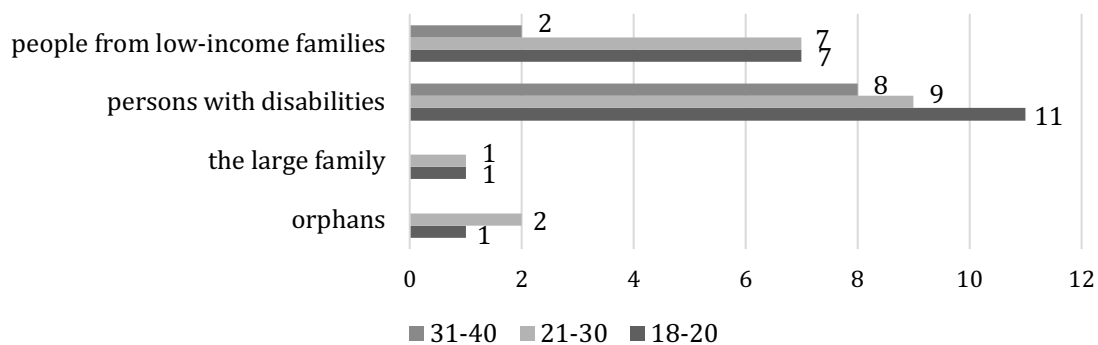


Fig. 3 SVSP by the age

Fig. 4 and 5 provide an overview of the composition of respondents who represent businesses.

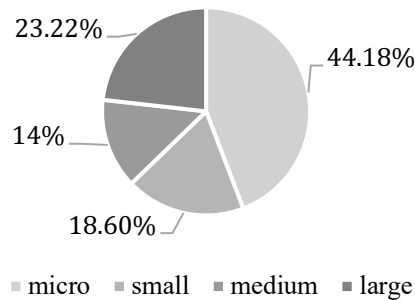


Fig. 4 Respondents-representatives of businesses by category of entrepreneurship

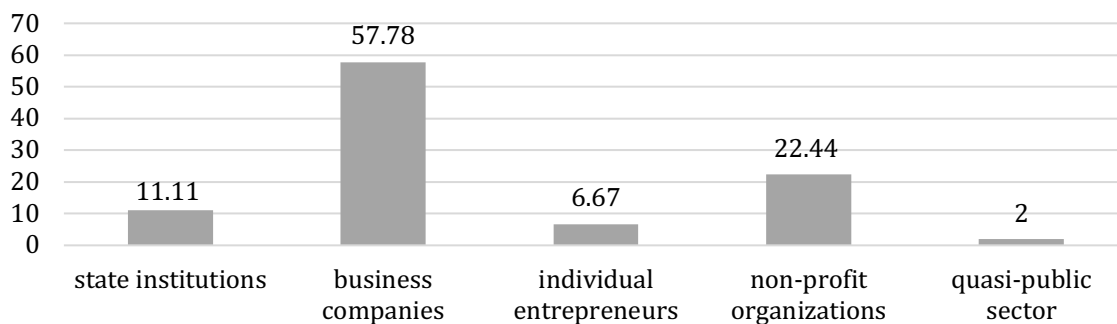


Fig. 5 Respondents-representatives of businesses by category of ownership

The study was conducted in a specific regional context and the findings may not be directly applicable to other regions or countries without further validation. Future studies may expand the geographical coverage and sample size to increase the reliability and transferability of the findings.

3. Results

3.1 Key Labour Market Indicators of Some Countries of the Commonwealth of Independent States (CIS)

Building on the broader economic context presented in the previous sections, this subsection examines specific labour market indicators in the CIS countries. The objective is to compare labour trends in Kazakhstan with those in the region's neighbouring countries and conduct a comparative analysis that identifies characteristic challenges and opportunities. Analysing the labour market in specific CIS countries provides valuable insights into current unemployment trends and the population's age structure. This analysis also helps determine Kazakhstan's position among regional countries in terms of labour relations and market development prospects. The following indicators are proposed for consideration: the demographic load factor (the ratio of the number of children and elderly dependents to the working-age population between 15 and 64 years old) and the labour load factor (the ratio of the inactive population to the working-age population between 15 and 64 years old). Egger and Ronnas (2021), in their study of labour market concepts and indicators in the CIS countries, including Kazakhstan, discussed the labour burden ratio, noting that it can provide insight into the level of labour force participation and potential economic dependency within a particular population. A high labour burden ratio implies a lower labour force participation rate, which can contribute to various socioeconomic problems (Egger and Ronnas, 2021). Fig. 6 presents the results of calculating these coefficients.

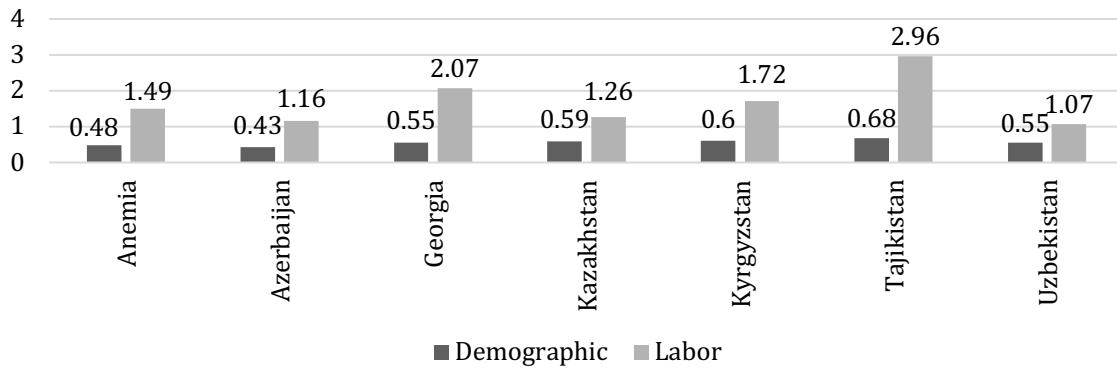


Fig. 6 Demographic and labour load coefficients

Source: Egger and Ronnas (2021)

It is important to note that the level of population participation in the labour force varies significantly from country to country (Fig. 7).

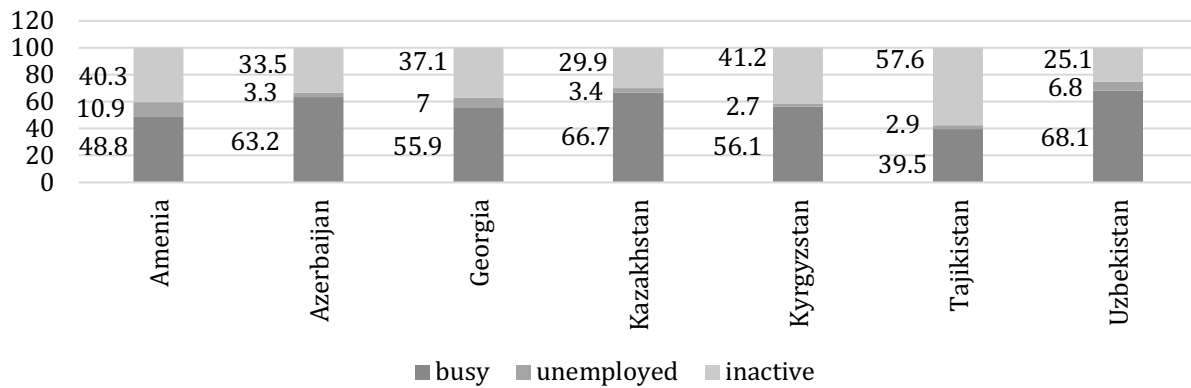


Fig. 7 Participation in the workforce, %

Source: Egger and Ronnas (2021)

Fig. 7 illustrates that Kazakhstan holds a relatively high position in terms of employment compared to other countries in the region, ranking second only to Uzbekistan. This result can be attributed, among other factors, to the age structure of the population as depicted in Fig. 8.

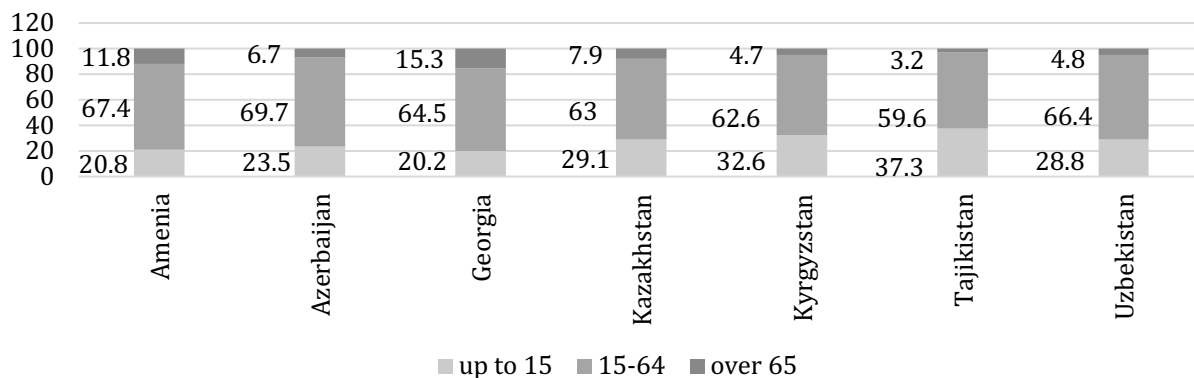


Fig. 8 Age structure 2020

Source: Egger and Ronnas (2021)

The structure depicted in Fig. 8 is expected to undergo significant changes by 2030, as indicated by the projections presented in Fig. 9.

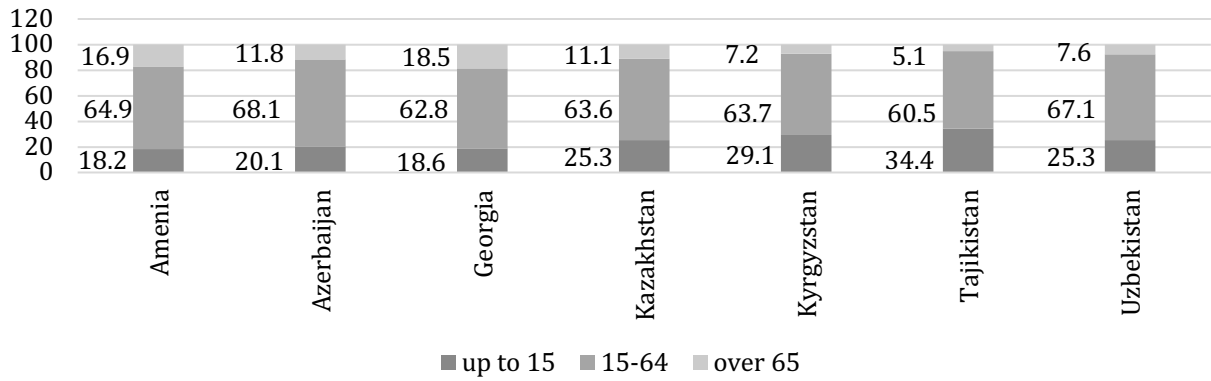


Fig. 9 Age structure 2030
 Source: Egger and Ronnas (2021)

These trends indicate a growing burden on the working-age population.

3.2. Main Indicators of the Labour Market in Mangistau and West Kazakhstan Region

Considering the dynamics of the labour force in the region, it is necessary to look in detail at labour market indicators, including employment rates and industry contributions, to gain a deeper understanding of local economic conditions and their impact on employment strategies. In 2022, the Republic of Kazakhstan reported a total of 458,300 unemployed individuals. The employment rate exceeded 65%, with trade (16.7%), agriculture (12.4%), education (12.7%), and industry (12.5%) being the dominant sectors of employment. Approximately 85% of the population held secondary vocational or higher education qualifications (Bureau of National Statistics..., 2023). As of April 2022, the unemployment rate in West Kazakhstan stood at 3.8%, which was 1.1% lower than in Mangistau Oblast. Mangistau Oblast experienced a higher incidence of poverty compared to other regions (Bureau of National Statistics..., 2023). Officially registered unemployed individuals numbered over 16,000 in West Kazakhstan and over 17,000 in Mangistau Oblast. Figure 10 presents data on the number of unemployed individuals categorized by the duration of unemployment in the Mangistau region, West Kazakhstan, and other regions of Kazakhstan for comparison.

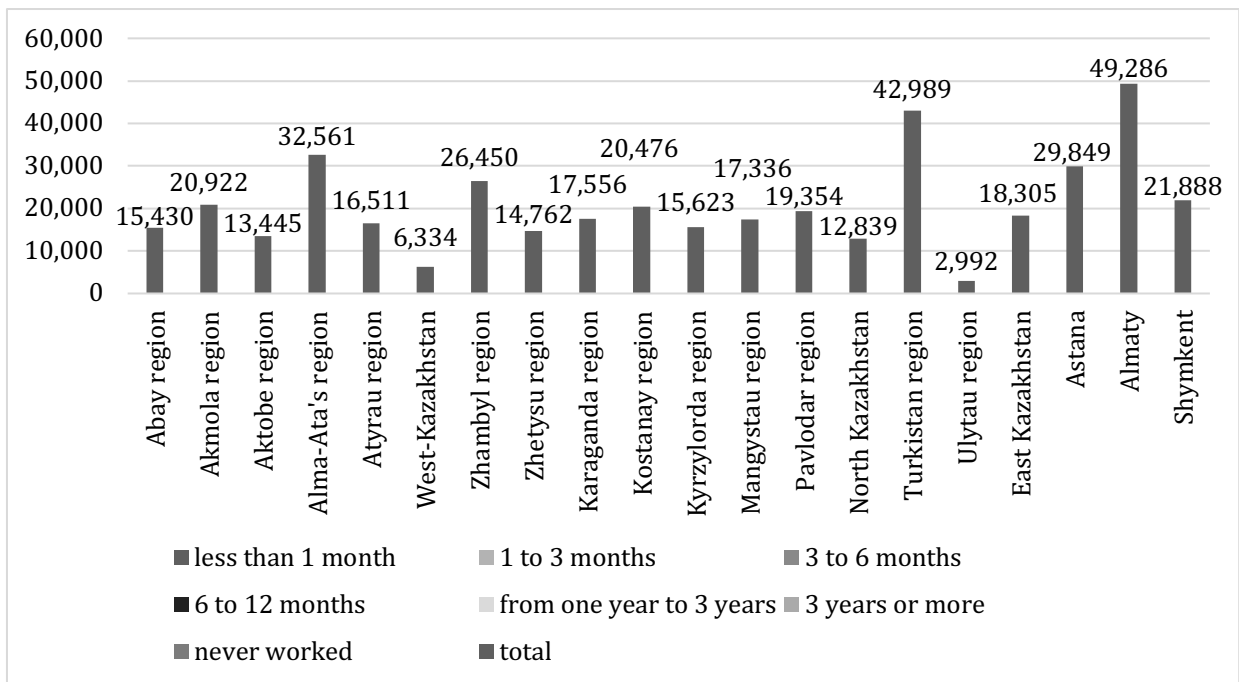


Fig. 10 Unemployed population by the duration of unemployment and by region of Kazakhstan

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023)

Comprehensive information regarding unemployment in West Kazakhstan and Mangistau is provided in Table 1, while Table 2 presents data on employers in these regions.

Table 1 Unemployment in West Kazakhstan and Mangistau

Region	Population	Number of unemployed (people)	Share of registered unemployed in the labour force (economically active population), %	Quota, people (75% of the population)	The actual number of people who took the survey, people	Fact in % of quota
West Kazakhstan	666,972	12,963	3.8	9.722	183	0.81
Mangistau	748,471	17,000	4.9	12.750		

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023)

Table 2 Employers in West Kazakhstan and Mangistau

Region	Number of legal entities	Active	Temporarily suspended	Quota, units (75% of the number of active companies)	The actual number of people who took the survey, people	Fact in % of quota
West Kazakhstan	11,842	5,543	2,614	4.157	43	0.17
Mangistau	56,500	28,250	28,250	21.187		

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023)

The primary macroeconomic issues in Mangistau and West Kazakhstan that impact the unemployment rate in these regions are shared and encompass the following (Temirova and Abdimomynova, 2016):

- i) Mono-raw economic orientation: Both regions heavily rely on a single raw material or industry, which poses risks and vulnerabilities to their economies.
- ii) Narrow market: Limited market opportunities and diversification restrict job creation and economic growth in the regions.
- iii) Remote location from economic centers: The geographical distance from the country's main economic hubs leads to increased transportation costs and limited access to markets and resources.
- iv) Lack of drinking water: Insufficient water resources for drinking purposes pose challenges to the well-being and living conditions of residents.
- v) Limited agricultural prospects: Restricted potential for agricultural development necessitates the expensive importation of foreign agricultural products.
- vi) Income inequality: Residents of the regions experience varying income levels, exacerbating socioeconomic disparities.

While cities like Astana, Almaty, and Shymkent experience a net inflow of migrants, other regions, including West Kazakhstan and Mangistau, witness a negative migration balance (Table 3).

Table 3 Population migration in the regions, for the first quarter of 2022

Region	Arrived	Left	Balance
West Kazakhstan	5,209	5,527	-318
Mangistau	6,782	6,812	-30

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023)

A notable indicator that reflects the potential for reducing unemployment and generating new employment opportunities is the growth of new enterprises, as shown in Table 4.

Table 4 Growth of new businesses, for the first quarter of 2022

No.	Regions	Total	New (+)	Closed (-)	Gain/loss
1	West Kazakhstan	12,476	147	52	95
2	Mangistau	16,520	128	43	85

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2023)

Therefore, the creation of targeted programs and the implementation of various mechanisms to stimulate entrepreneurship, facilitate retraining, provide psychological assistance, and raise awareness are essential to help unemployed individuals secure employment.

3.3. The Needs of Young People in Mangistau and West Kazakhstan When Looking for Work in the Digital Sphere

As mentioned earlier, digitalization is one of the most promising areas for professional development in the Republic of Kazakhstan. Information and communication technologies have become increasingly pervasive in various aspects of people’s lives, highlighting the significance of possessing high-level digital skills. To gather detailed information about the respondents’ level of digital skills, they were asked specific questions during the study. The results of their responses regarding their basic IT skills are presented in Fig. 11.

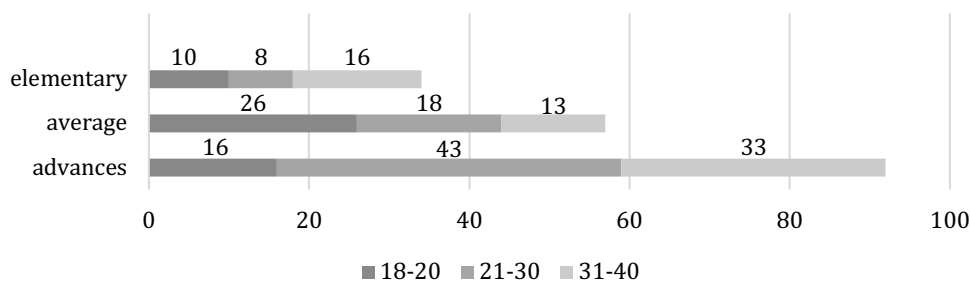


Fig. 11 Assessment of basic IT skills (units) (type/print a document)

To further explore the respondents’ skills as confident users, Fig. 12 illustrates the percentage of answers provided by respondents to the question regarding their proficiency in various confident user skills.

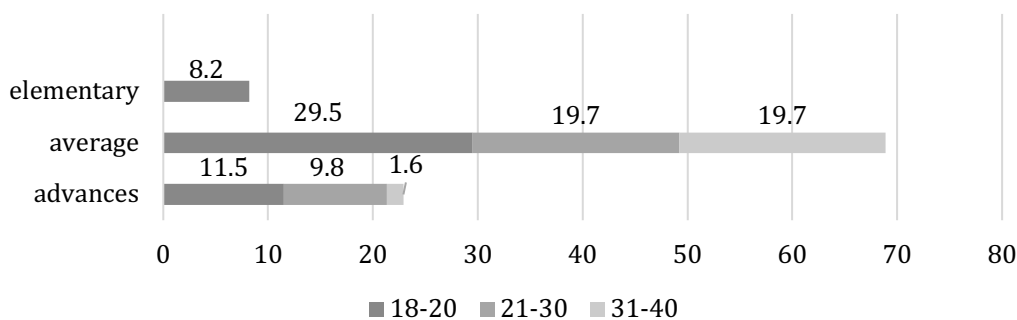


Fig. 12 Assessment of digital skills (%) (Microsoft Office, Internet)

To gauge the self-perceived professional IT skills of the respondents, Fig. 13 demonstrates how they rated their own proficiency levels.

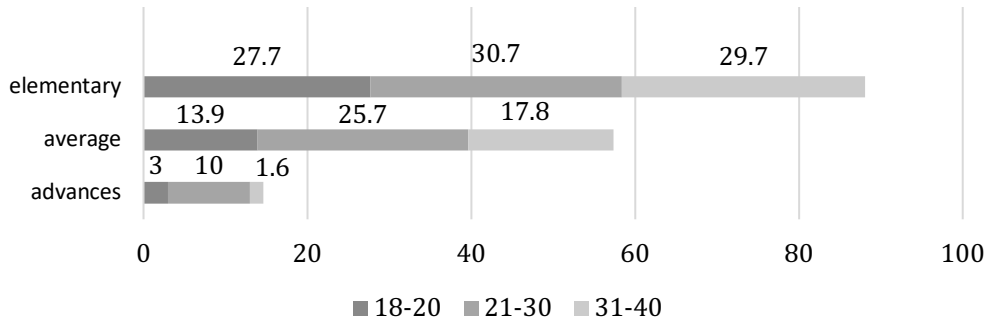


Fig. 13 Assessment of professional IT skills (graphic design, programming)

To assess the presence of social competencies among the respondents and identify the required ones, they were asked the question: “What social competencies do you possess?” The responses are presented in Fig. 14.

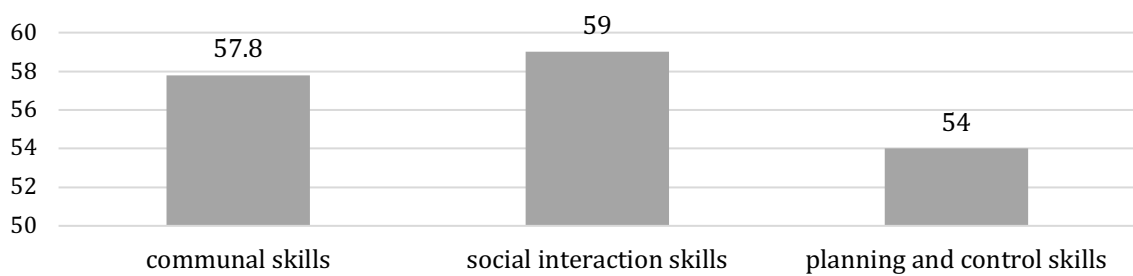


Fig. 14 Assessment of social and professional competencies of young people

To the question “What IT skills do you need for further employment?”, the following answers were received (Fig. 15).

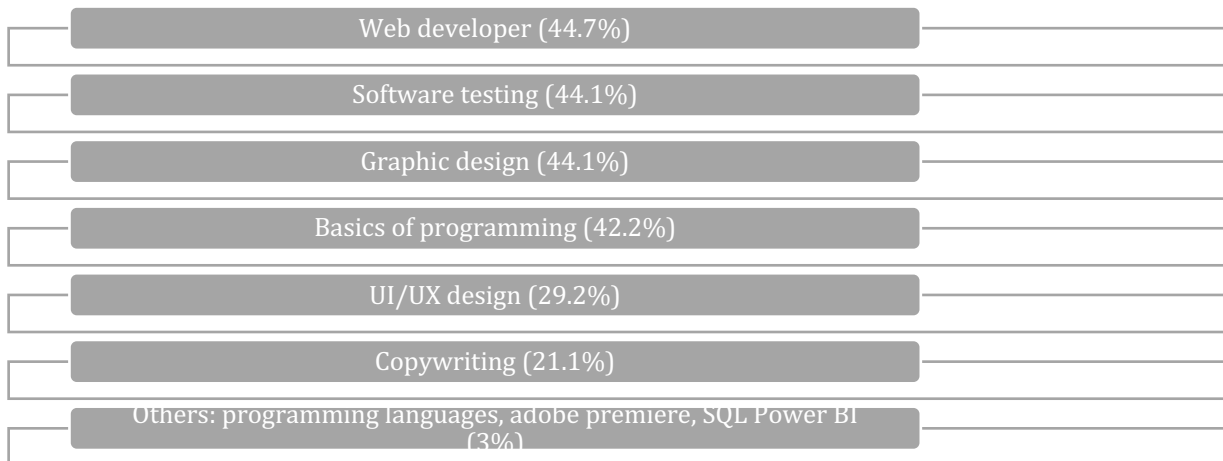


Fig. 15 Skills needed for employment

To the question “What IT profession would you choose for yourself?” young people chose the following professions (Fig. 16).

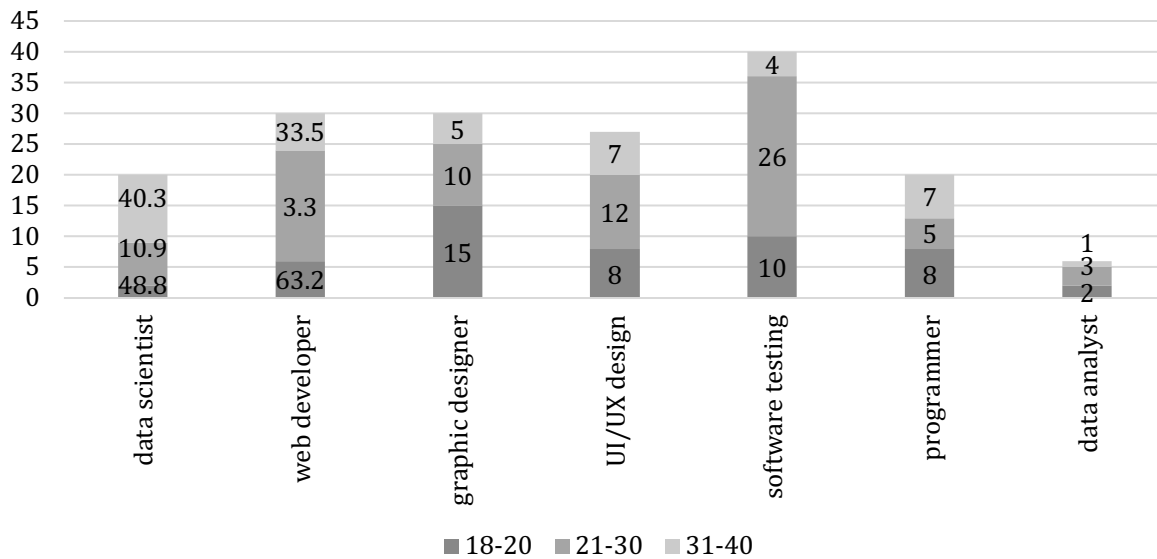


Fig. 16 Priority IT professions

Table 5 provides an overview of the prices and duration of courses offered by various commercial IT schools. These courses can serve as a means for individuals to acquire the necessary skills and knowledge in the IT field.

Table 5 Price analysis of commercial IT schools

No.	Company name	Speciality	Average price per month	Course length
1	Skillbox	Web-developer	60,676	12 months
2	Decode	Software testing UI-UX design	67,000	3 months
3	GeekBrains	SMM marketing Data Science	84,667	12 months
4	Almaty.Itstep	Programming languages	55,000	12 months

Table 6 presents the list of professions and corresponding vacancies available at that time.

Table 6 Analysis of demand for IT specialists on the HeadHunter website

Professions	Number of jobs	Average pay, tenge per month
Web-developer	235	250,000-300,000
Software testing	358	150,000-200,000
Graphic design	72	200,000-250,000
Programmer	1059	150,000-250,000
Ui_UX design	62	200,000-250,000
Copyright	171	100,000-150,000
Data analyst	102	250,000-300,000
Data scientist	23	Not stated

The analysis of salaries in the IT field revealed that they are directly influenced by factors such as experience, position level, and company size.

3.4. The Needs of Employers in Mangistau and West Kazakhstan When Looking for Workers in the Digital Sphere

The success of IT-services businesses is significantly influenced by various factors, including the availability of human resources, the effectiveness of specialists' work, efficient team management, and more. The selection process for personnel that meet specific requirements carries inherent risks. To gain insights into managers'

perspectives on this matter, they were asked whether they would consider employing young individuals. The results are depicted in Fig. 17, providing valuable information regarding the willingness of companies to hire young talent.

Table 7 Structure of answers to the question “Would you like to employ a youth representative employee?”

Forms of businesses ranging	Responses (%)		
	Yes	No	Maybe
Micro	48.15	-	40
Small	11.11	2.33	26.67
Medium	22.22	-	-
Large	18.52	-	33.33
Total	55.80	2.30	41.90

To identify overarching trends and the key attributes sought by most businesses, respondents from the corporate sector were asked about the characteristics and skills they expect from candidates applying for positions at their companies (Fig. 17).

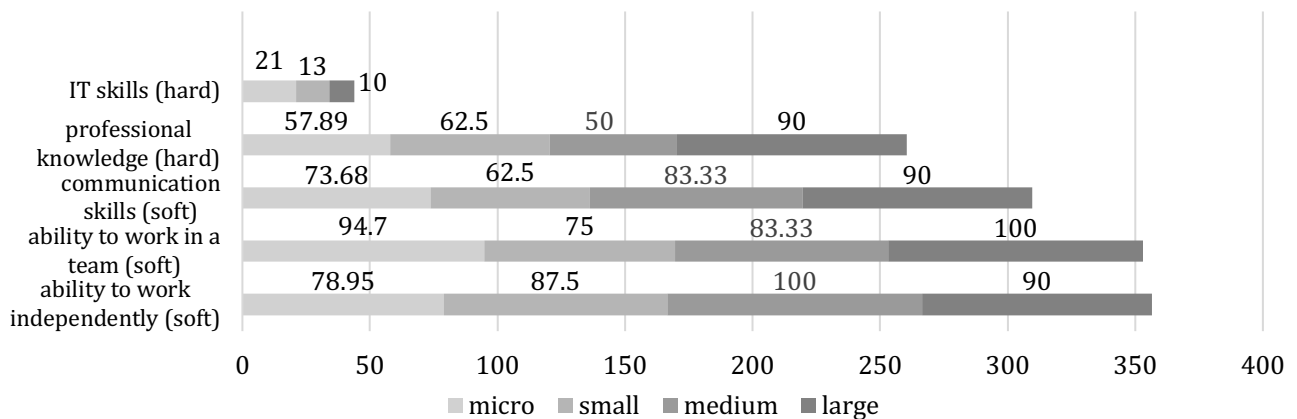


Fig. 17 Key characteristics that IT companies expect to see in their employees

The majority of well-trained IT professionals are educated by private commercial IT schools. In this context, it becomes evident that for company executives, ensuring team stability takes precedence over hard skills, as they endeavour to reduce staff turnover and mitigate the adverse effects of personnel risk. The subsequent question posed to the respondents was “What IT skills should your employees possess?” (Fig. 18).

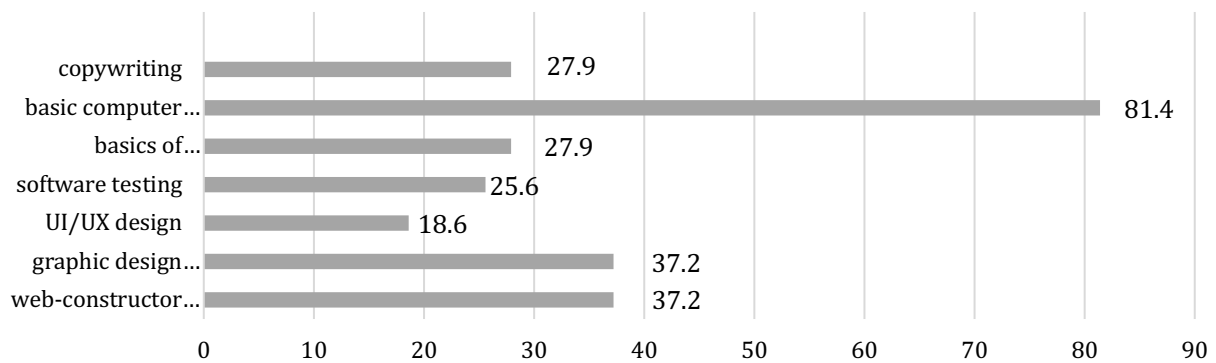


Fig. 18 Main IT skills that tech companies expect to see in their employees

According to Fig. 19, employers prioritize the possession of basic computer skills among their desired IT skills for employees, while the category of UI/UX design is considered to be of lesser importance. Furthermore, when asked about the types of specialists they require, the responses from employers were distributed as depicted in Fig. 19.

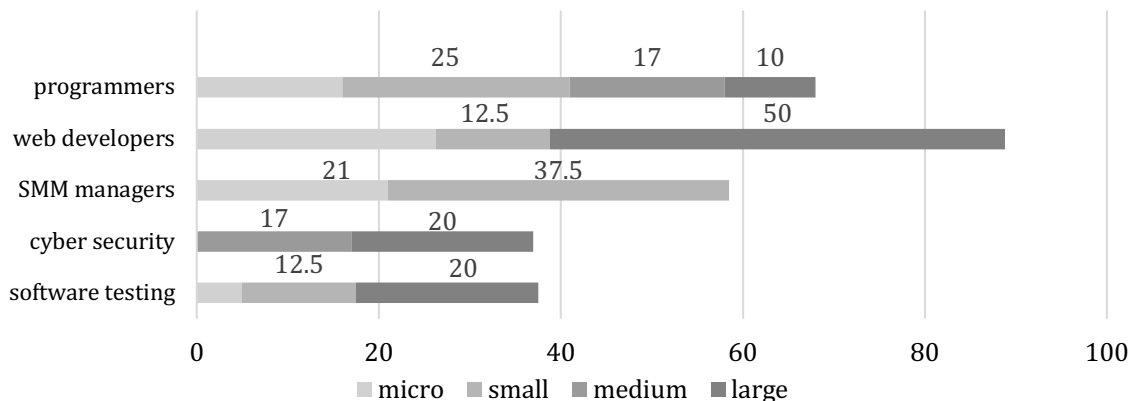


Fig. 19 Employers' needs for specialists in various specializations

The survey results reveal certain trends that are typical for the labour market in Kazakhstan's IT sector:

- i) Web developers (88.8%): Nearly 50% of large businesses have shown interest in hiring professionals in this field.
- ii) Programmers (68%): There is an equal level of interest in programmers across different business sizes, with micro-businesses at 16%, small businesses at 25%, medium businesses at 17%, and large businesses at 10%.
- iii) SMM managers (58.5%): There is a demand for social media managers in micro (21%) and small businesses (37.5%).
- iv) Cybersecurity specialists (37%): Medium-sized (17%) and large businesses (20%) have shown interest in hiring cybersecurity specialists.
- v) Software testing (27.5%): This specialty is primarily in demand by medium-sized (12.5%) and large businesses (10%).

Maps of employers and youth needs are shown in Fig. 20 and 21.

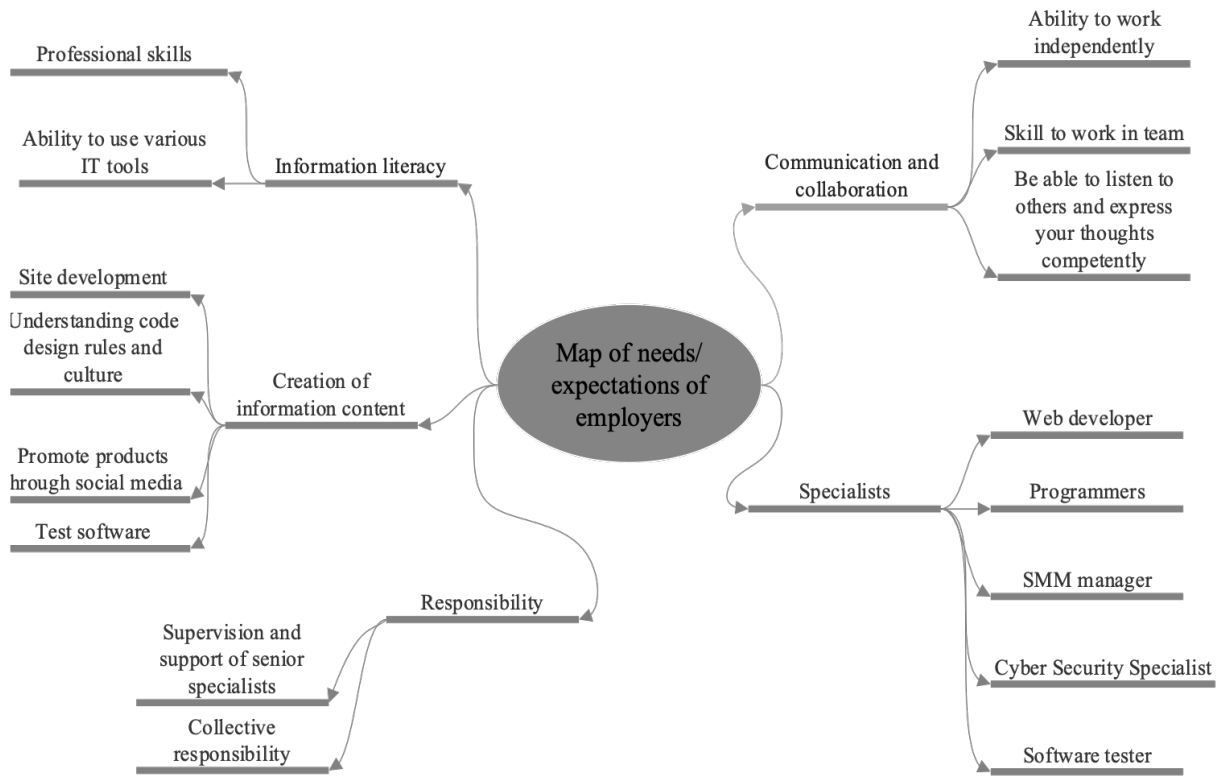


Fig. 20 A map of employer needs/expectations

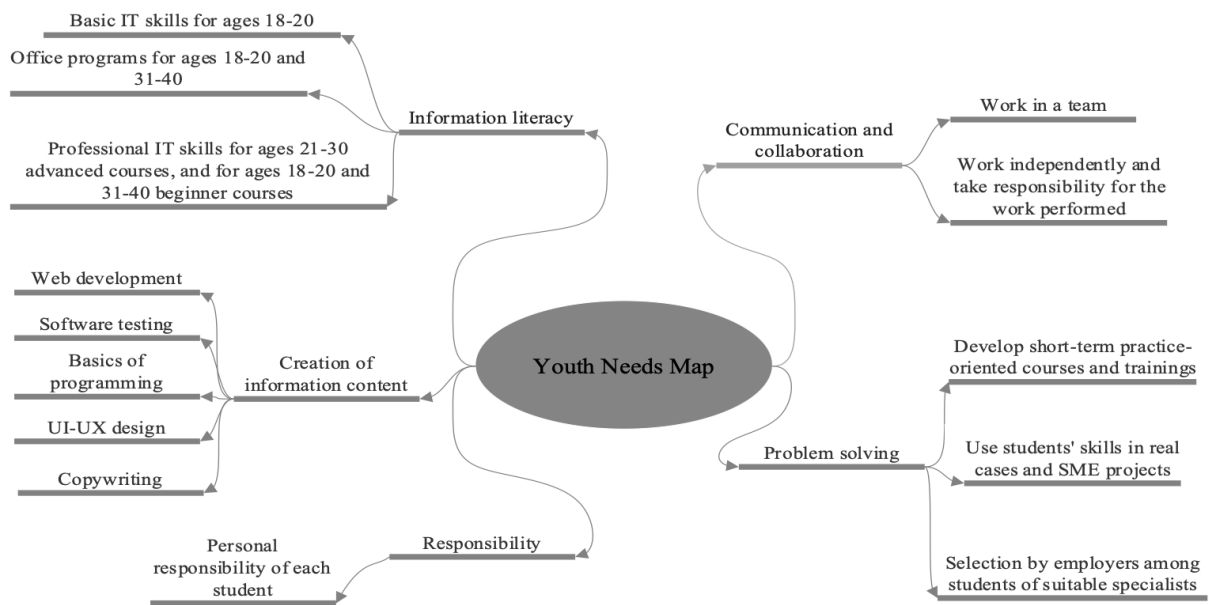


Fig. 21 A map of youth needs

These findings can help government agencies improve the effectiveness of government programs and support regional and national IT labour markets.

4. Discussion

The ability for IT specialists to work remotely has significantly reduced the importance of job location. As long as individuals have a reliable internet connection and appropriate technology, they can work from anywhere. In

regions where young people face employment challenges, it is beneficial to train them in IT (Lytvynko & Ryzhko, 2023). This provides opportunities for remote work both within their country and abroad. However, more than simply having a computer and internet access is required for successful employment and career growth in IT.

According to the study, essential skills for IT professionals include problem-solving, critical thinking, creativity, communication skills, teamwork, technological proficiency, as well as a sense of social responsibility and environmental awareness. Therefore, training programs at universities in Kazakhstan should focus not only on knowledge acquisition but also on developing these skills. However, Abdullina et al. (2018) highlighted the need for serious revision and adjustment of educational programs in Kazakhstan. The researcher identified issues such as outdated programs and the use of programming languages that are no longer relevant in the industry. The recommended literature for students also contains outdated sources, which is unacceptable in the dynamic field of IT. These problems, among others, contribute to the mismatch between employer expectations and the skills of young professionals, as revealed by the research conducted in this article.

A study by Jagannathan et al. (2019) focuses on Asian regions. It highlights the high level of digitalisation's impact on labour markets regarding workers' skills, learning processes, and implementation mechanisms. The study identifies a range of essential skills that future talent pools must possess, including digital skills, digital literacy, employability, green economy skills, adaptability to an Industry 4.0 environment, well-being-oriented skills, high-tech skills for relevant manufacturing sectors, interpersonal relationship building, and creativity. This study considers the skills that gain value in a sustainable development context, which your research did not address explicitly.

Colombo et al. (2019) also emphasise the significant impact of digitalisation on the labour market. They propose a methodology to determine soft and hard skills for each profession, taking into account the field, education, and region. The researchers highlight that digitalisation has not only led to the emergence of entirely new professions but also significantly changed the skill requirements for existing occupations, necessitating the review and improvement of specialists' skills. This research supports the conclusion made in the study you mentioned regarding the need to adapt and combine skill sets. The proposed methodology is particularly useful for identifying competencies in emerging fields such as IT medicine, where a new set of skills can be identified.

The research findings highlight the significance of tailoring the educational environment to the individual learning styles of the respondents, emphasizing the need for an individualized approach in the development of training programs. The study identified a disparity in IT proficiency among young people, with some being more advanced while others are at the initial stages of study. Respondents aged 21-30, in general, showed higher levels of advancement and had completed secondary and higher education. Therefore, it is recommended to offer advanced-level training to this age group. To support the professional growth of young IT professionals, it is crucial to develop individual program plans that foster the engagement of each trainee in their professional development, including addressing the needs of individuals with disabilities.

The study also confirmed the necessity of strengthening the interaction between the education system and the IT industry, as well as revising existing training programs. Currently, a significant portion of graduates from national universities in Kazakhstan do not meet the demands of the IT job market. Furthermore, there is an increasing need for multifunctional employees, while specialists with high expertise in a specific area are also highly valued. Employers expressed a desire for IT specialists to have a broad knowledge base and not remain narrowly specialised in programming, emphasising the importance of interdisciplinary communication, business process management skills, and knowledge in fields like marketing, sociology, and psychology. This demand for versatile IT professionals is particularly pronounced in micro and small businesses due to their limited budgets.

The research involved business representatives from various industries, leading to the identification of a growing demand not only for IT generalists but also for individuals who can combine two professions, such as IT medicine, IT-teacher, IT politician, and more. Integrated training programs should be developed to cater to this trend. Additionally, the study highlighted the increasing significance of personal data security. While medium and large businesses showed interest in cybersecurity specialists, the rise in cybercrime is expected to make micro and small businesses equally interested in professionals in this field in the future. Therefore, it is crucial to develop training programs on company data protection specifically tailored for professionals in micro and small businesses (Bystrova, 2017; 2018).

Educational institutions should focus on incorporating practical digital skills such as coding, software development, and important soft skills such as project management into their programs. Government agencies are encouraged to support digital literacy initiatives, offer incentives for training and set standards for certification of digital occupations. This will ensure that learning outcomes are aligned with labour market requirements, which is necessary to close the skills gap and build a robust digital economy.

5. Conclusions

The survey results reveal the essential requirements IT companies have for applicants in this field. These include basic digital literacy (over 80%), relevant professional skills (around 65%) and well-developed soft skills such as

communication and the ability to work independently and in teams (almost 75%). The results show that IT job seekers need to improve their proficiency in office digital technology, especially among 18-20-year-old respondents (8.2 %), and acquire professional IT skills (88.1 %). Short-term courses in web development (44.7%), graphic design and software testing (44.1%), and programming basics (42.2%) were identified as essential for IT job seekers. In terms of career expectations, respondents expressed a desire to become software testers (24.5%), web developers and graphic designers (18.4%), UI/UX design specialists (16.6%), programmers (12.3%), and big data specialists (12.8%).

The developed needs maps can provide valuable information to various stakeholders, including employers, young professionals and public authorities, to improve the effectiveness of government programs in IT development, education and youth unemployment. For employers, the maps can provide a deeper understanding of the expectations and skill levels of potential IT employees. This information can inform their hiring strategies, talent development programs and collaboration with educational institutions to ensure that graduates' skills are better aligned with the needs of the IT industry.

Future research should explore several avenues to gain a deeper understanding of the interaction of labour market and education in the IT sector. Longitudinal studies can trace the evolution of employment and skills development patterns over time in response to changes in education and policy. Comparative studies within Kazakhstan or between countries with similar economic characteristics will assess the effectiveness of different IT education and employment strategies.

Acknowledgement

The author would like to thank those involved in making this research successful.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **Study conception and design:** Aizhan Duisebayeva; Gulbakhyt Zholdasbekova; **Data collection:** Madina Karimova; Gulnar Abdulina; **Analysis and interpretation of results:** Madina Karimova, Gulbakhyt Zholdasbekova; Gulnar Abdulina; **Draft manuscript preparation:** Aizhan Duisebayeva, Gulbakhyt Zholdasbekova. All authors reviewed the results and approved the final version of the manuscript.

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