Received on: 22 August 2023 **Revised on: 16 November 2023** **Accepted: 03 January 2024**

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v68i1.334

Exploring the Management Perspective in the Formation of Digital Hub

Galiya Seitkan[1]* | **Kuralay O. Nurgaliyeva[2]** | **Aigul Akparova[3]**

[1] Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2] University of International Business named after K. Sagadiyev, Almaty, Kazakhstan.
[3] Kazakhstan University of International Relations and World Languages named after Abylai Khan, Almaty, Kazakhstan

Corresponding author:
*** Galiya Seitkan** – PhD student, Al-Farabi Kazakh National University, Faculty of Higher School of Economics and Business, Almaty, Kazakhstan. Email: galeka_07_96@mail.ru

For citation: Seitkan, G., Nurgaliyeva, K.O. & Akparova, A. (2024). Exploring the Management Perspective in the Formation of Digital Hub. Eurasian Journal of Economic and Business Studies, 68(1), 5-18.

Conflict of interest: author(s) declare that there is no conflict of interest.

Abstract

The rapid growth of the term digitalization was seen throughout the COVID-19 pandemic all over the world. Digitization and ICT have become a part of people's lives. Currently, the concept of digital or technological hubs is relevant. The purpose of forming those hubs was to interact with the stakeholders and provide them with the resources (technological services, competent ICT specialists, financial investments, qualitative training, accelerating start-ups, incubators) to come to the best solution as in the global questions arriving in the world by improving the network and ecosystem, also in business questions occurring in the society. The appropriate infrastructure is needed to form such hubs, including competent personnel, technologies, finances, markets, and other resources. The purpose of this article is to identify the level of ICT, management, business, economics, and students' familiarity and interest in the digital hub concept and examine the influence of the number of universities on the number of students, number of graduated students, and employed population of 15-28 years old by economic activities. The methods of systematic literature review of foreign literature, quantitative survey, and correlation analysis were used in the paper. The students from different universities in Kazakhstan took part in the survey. The survey's findings revealed that the vast majority of aspiring specialists are enthusiastic and confident about their plans to work in the ICT industry.

Keywords: Digitization, Digital Hub, Digital Technologies, ICT, Digital Skills, Digital Capacity

SCSTI: 06.54.01

JEL Code: I25, M10, M53

Financial support: This research has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant "Development Strategy of Kazakhstan Regional Potential: Assessment of Socio-Cultural and Economic Potentials, Roadmap, Models and Scenarios Planning" BR18574240).

1. INTRODUCTION

The increasing interest in digitalization has heightened the need for competent IT, management, business, and economic specialists to predict forming digital hubs in regions, as hubs represent spaces for testing and implementing innovations, boosting the region's economy. The development of digitalization as a global trend worldwide is affected by factors such as the development of national strategies and government programs, ICT, and digital technologies. These factors include the development of digital cities, the risks associated with cyber-security during the spread of COVID-19, and the development of innovation management. The sudden shift to online mode, the state of emergency, and other measures to prevent the spread of the virus have significantly boosted the adoption and use of modern technology in countries worldwide. As the COVID-19 situation demonstrated, countries placed a significant emphasis on developing their ICT infrastructure, which allowed for the quick conversion of physical worlds into digital ones. The digitalization process occurs in almost all countries, and each country has its priorities and directions for digital enhancement, depending on the country's potential. The implementation of digital National digitalization programs determines digital development in countries, currently more than 15 countries are implementing them. The leading countries in digitalizing national economies are China, Singapore, New Zealand, South Korea, Denmark, and others. China is integrating digital industries with traditional industries in its Internet Plus program, Canada is creating an ICT hub in Toronto, Singapore is building a Smart Economy driven by ICT, and South Korea is focusing on developing human capital, entrepreneurship, and dissemination of ICT achievements. In contrast, Denmark focuses on the digitalization of the public sector.

According to the Digital Kazakhstan program, the main goal is to accelerate the pace of economic development and improve the quality of life of the population through the use of digital technologies, as well as in the long term to create conditions for the transition of Kazakhstan's economy to a digital economy. One of the vectors for achieving this goal is "Creating the digital industry of the future", which means ensuring long-term sustainability, launching the country's digital transformation by increasing the level of human capital development, and progressive development of the digital ecosystem. Since one of the crucial human capital resources is young people, paying attention to their skills and knowledge in digitalization and developing digital hubs.

Recently, there has been growing interest in technology or digital hubs, which provide necessary services to organizations, medium and small enterprises, and businesses in testing business ideas and using digital technologies. In managing the formation of digital hubs, the first consideration is the available infrastructure and the human resource factor in the form of competent ICT professionals.

The problem of a shortage of IT professionals to form digital hubs has been highlighted at the national level. However, considering business, economics, and management professions is also essential. In their capacity, IT specialists cannot superintend the whole process of hub activities, from creation to sustainability. Since the purpose of forming digital hubs involves working towards creating and producing innovations, these specialisms are critical.

A digital hub has several functions, including technical, financing, training and testing, where the job of IT specialists is to implement technical operations. The management specialists' aim is the process of planning, organising, motivating, coordinating and controlling the activities of the digital hub. The task of the economic specialists is to fulfil the plans, strategies, cost accounting, income of the digital hubs, attracting specialists to the hub, therefore creating new workplaces. As a result, they raise living standards by providing services to local organisations, developing business ideas and start-ups that will benefit the local population with taxes, and develop the region's infrastructure. The role of business professionals is proposing creative ideas, brainstorming, supporting start-ups and finding investors.

Of particular interest are students from higher educational institutions at the bachelor's level, as not many continue studying master's and doctoral programs, graduating from university and entering the workforce, must have digital skills in the rise of digitization. Many recent studies have focused on analyzing ICT skills of students and separately ICT skills of teachers in various fields, but there are no studies in identifying digital skills for the formation of digital hubs. However, this study aims exploring self-evaluation of digital skills of students' of higher education institutions at bachelor's level as future professionals in forming the digital hub and real experience of academic staff facing challenges with students who lack the digital skills in educational process.

2. LITERATURE REVIEW

In the academic community, most scientists have noted in their research papers that the promotion of business development and innovation contributes to poverty alleviation and is accompanied by economic growth in the long run (Fagerberg, 2009; Hall et al., 2012; Abisuga-Oyekunle, 2020). Most prominently, the productivity of digital development is critical in rural areas. However, one major drawback of remote areas is that the population usually underestimates the significance of digital skills, the digitalization of the economy, and the development of digital hubs. This is usually because rural areas primarily focus on the possibility of having access to finances. However, the development of the financial sector is doomed without the digitalization of the area (Dyba et al., 2020). As a result of the formation of hubs, citizens are seen through the lens of market players as entrepreneurs and citizens improving their development.

Educational institutions stand out as prominent participants in developing a digital hub. In particular, higher educational institutions function as a bridge between private and public integration. Consequently, this increases the importance of the curriculum provided to students, such as access to various information systems, availability of necessary software, and development of digital skills, for example, in online computation (Kelly & Firestone, 2016). According to the study, students who have learned ICT skills clearly express thoughts and are better problem-solvers and self-directed than others (Somerville et al., 2008). The role of ICT while working with information, finding the needed one, evaluating and understanding it is essential for students' academic and personal needs (Perez & Torelló, 2012; Simona et al., 2017). ICT efficiency in the learning process, especially when working with information, using it for solving problems and making decisions, is also mentioned in the works of Horton (Horton, 2008). According to other research, digital literacy is more than just about owning technical skills; it also considers situative practices with communicative and functional competencies (Knutsson et al., 2012). The social and ethical challenges arising while participating in digital networks, management, and searching for information in the virtual area are highlighted in the work of Henriksen (Henriksen, 2011).

Moreover, incorporating digital skills by teaching staff increases the possibility for students to develop and practice their skills. The opportunity to practice digital skills improves the possibility for students to become part of the digital ecosystem and contribute to the development of private industry (Mahmood, 2009; Guzmán-Simón, 2017; Ghafar, 2020; Wang, 2021). According to the study, among the teachers of various fields, science teachers' attitudes to ICT showed the highest contribution (Har et al., 2022). The situation with COVID-19 showed significant changes in learning processes worldwide for teachers and students, highlighting the need to improve their digital skills (Yu, 2022). The results of another study ascertain that the capacity to adjust information technologies in blended, online, and offline contexts is concerned with digital literacy, which is essential in the learning process (Kara, 2021).

It must be mentioned that initially, educational institutions are regarded as a third space for innovation development and, consequently, the development of digital hubs. Moreover, at the stage of secondary education, such skills as using online applications and digital tools (such as mobile phones or tablets) are already highly valued. The application and usage of local technologies indicate students’ readiness for the development of a digital hub (McDougall et al., 2018). Digital skills, such as the ability to use digital tools (such as mobile phones or personal computers), digital artifacts, and social media, play a mediating role in information seeking among bachelor's degree students (Atoy et al., 2020). In their study, Radovanović et al. (2020) emphasized the importance of using digital skills in surfing digital artifacts. They divided the skill of using the Internet of Things into three groups: surfing social media and applying analytical skills using traditional formal skills in the Internet search engine (Radovanović et al., 2020). Digital literacy is using digital tools and artifacts to reduce barriers to obtaining knowledge and thus reduce the differences between students, including students with special needs. Therefore, digital literacy in various directions is becoming a critical skill (Hillier, 2017; Tohara et al., 2021).

The necessity of digital skills was vividly vital during the burst of COVID-19. Such stagnation of the economy in urban areas leads to massive destruction of the economic ecosystem, such as job loss, private business bankruptcy, etc. (Banai, 2020). The two sectors of the economy that have shifted massive functioning to online mode, especially in crises, are education and healthcare. The lockdown conditions pushed specialists in these fields to gain new knowledge in digital literacy (De et al., 2020; Lee & Trimi, 2021; Turnbull et al., 2021).

The human resource factor in forming digital hubs is crucial, as the human resources implement and make the most critical decisions and operations in the hub's activities. There is a need for more competent ICT professionals in Kazakhstan. According to this study, it was revealed that the level of proficiency in ICT skills also depends on age, so it was found that educated and adult people have a higher level of proficiency in ICT skills than the younger generation, who use the Internet and ICT more often than expected (Van Deursen, 2010). Another researcher also confirmed these results (Eshet-Alkalai, 2004). The digital skills of staff in enterprises and organizations in the industry, the public sector, and services are becoming overwhelmed by the growing demands. The provided literature review showed that existing literature on the development of hubs is not more focused on studying existing hubs and factors affecting their development. Few studies discuss developing digital skills in educational and social environments. However, it is still important to explore the view of bachelor's degree students about their digital skills, as they are the primary labor force and the engine for digital hub development.

Digitalization penetrates all spheres of society, and using digital technologies in various activities is increasingly frequent. Digital hubs help to determine the level of digitalization of organizations and improve the existing level. Digital hubs are based on the region's innovation infrastructure and human resources. Human resources in digital hubs play a significant role. Therefore, a survey was conducted among undergraduate students about their awareness of hubs and interest in future activities with digital technologies as a perspective of digital hub management. Significantly, future professionals' digital skills and competence will influence their work in digital activities.

To examine the role of universities in the labor market of economic activities following hypothesis were examined:

H1: Number of universities impact the number of students.

H2: Number of universities impact the number of graduated students.

H3: Number of universities impact the employed population 15-28 years old by economic activities.

The study aims to identify the level of familiarity with the concept of "digital hub" among students of leading universities at undergraduate level, the level of familiarity with the programme "Digital Kazakhstan", self-assessment of digital skills, identifying factors hindering the formation of digital hubs in Kazakhstan, identifying students' interest in working with digital technologies in the future and teachers' experience of working with students of various fields on implementing digital skills and digital instruments in the educational process.

Research questions are following: to what extent do undergraduate students have an understanding of the concept of digital hubs? How many of them see themselves in digital and ICT-related activities? How do teachers define students' digital skills?

3. METHODOLOGY

The methods of investigation are conducting survey among students at higher education institutions at bachelor's level and interviewing among academic personnel. The research design of the study is based on the provided literature review and uses qualitative research methods in order to establish the level of digital skills among the students at higher education institutions at undergraduate level and to identify teaching personnels' experience towards students' using digital skills at the educational process. A conducted literature review manifested that students lack the understanding of digital skills and enhancing practical application during learning process.

Data sampling was carried out as follows: 1) university lecturers are the main guiding and interest link in teaching undergraduate students the knowledge of profile and subject-specific specialties, as well as in today's realities the identifying link of students' digital skills through the use of digital attributes in teaching; 2) undergraduate students of IT, management, innovation management, economics, business specialties were selected for the survey, as the staff of these specialties directly affect the management of digital hubs. A total of 200 questionnaires were sent to undergraduate students, but 170 of them were answered.

Table 1 includes research questions of the interview.

TABLE 1. List of the interview questions

<table>
<tr><th>No.</th><th>Interview question blocks</th><th>Question</th></tr>
<tr><td>1</td><td rowspan="2">What is the level of digital skills of first year students?</td><td>How would you describe digital skills of your students? Do they need basic skills training?</td></tr>
<tr><td>2</td><td>How often do students need to use digital skills? Do they have to use them at particular subjects or topics?</td></tr>
<tr><td>3</td><td rowspan="2">How does digital skill impact on the students' educational process?</td><td>How does the level of digital skills impact on the progress of students? Does basic knowledge of ICT usage play a crucial role?</td></tr>
<tr><td>4</td><td>What is the usual reason of students appeal if they fail exams?</td></tr>
<tr><td colspan="3">Note: compiled by authors</td></tr>
</table>

Specifically, students of bachelor degrees at higher institutions are of great importance, as a minority of undergraduates continue studies at master's and doctoral levels, entering the labour market. Progression of digital skills in using various online platforms and devices such as mobile phones, tablets or personal computers contribute to the quality of education. Moreover, according to several studies the significance of applying digital skills in daily occurrence exhibited rectification of students' digital literacy levels. The designation of survey questions and inquiry for the provision of interview was based on the conducted literature review. Hence, the questionnaire consisted of three following blocks. The survey consisted of 30 questions.

The first part of the survey comprised next descriptive statistics: university title, type of specialty, and curriculum. Students' self-evaluation of digital skills at the undergraduate level was the second part of the questionnaire. Confidence in applying digital skills plays crucial role among students in gaining new knowledge. The awareness of students about the digitalization and the concept of digital hubs is analyzed in the third group of the questionnaire. There were distributed 200 surveys among students of higher education institutions at bachelor's level, but only 170 returned.

Secondly, five interviews among university academic staff were carried out, who run lectures and seminars for students of various specialties. The interviews were conducted on an individual basis. According to ethical issues, the interviewees were informed that the research would include the interview results.

The interview comprised two groups of questions, which included two questions each. During the interview process the questions were modified where necessary. Thus, the structure of the analysis was based on the three main questions. The first group of questions was focused on the analysis of students' digital skills knowledge after completing secondary education, as basic skills were taught at schools. In addition, questions were focused on the features of the educational process. The second group of questions was concentrated on the analysis of the impact of digital skills on the performance of the students. The goal was to identify the reasons students indicate appealing in cases of exam failure. The interviews were mainly directed at the real opinion of the academic staff as they deal with students and know current issues students face during education.

Correlation analysis is applied in the research, the formula of which is presented below (1):

$$r_{xy} = \frac{\Sigma(x_i - x_{medium})(y_i - y_{medium})}{\sqrt{\Sigma(x_i - x_{medium})^2 * \Sigma(y_i - y_{medium})^2}} \quad (1)$$

where r_{xy} –is Pearson correlation coefficient,

x_i –is the i-th element of the selection x,

y_i –is the i-th element of the selection y,

$x_{medium,}\ y_{medium}$ –are the i-ths elements of the selection x and y.

For the current research following variables were chosen: y – number of universities; x_1 – number of students; x_2- number of students graduated; x_3- employed population 15-28 years old by economic activity.

The data was collected from the official statistical yearbooks of the Bureau of National Statistics of Republic of Kazakhstan from 2010 to 2021 and were seen in Table 2 below.

Table 2. Description of study sample

Indicator	Variable	Unit of measurement	Period of time
Y	Number of Universities	Units	2010-2021
X1	Number of students	Units	2010-2021
X2	Number of students graduated	Units	2010-2021
Note: compiled by authors			

The aim of correlation analysis is to test number of universities affecting number of students, number of graduated students and employed population 15-28 years old by economic activity from 2010 to 2021.

4. FINDINGS AND DISCUSSION

The analysis of the survey showed that there were 170 participants of five universities in three fields of specialties. The data on descriptive information is presented in Figure 1.

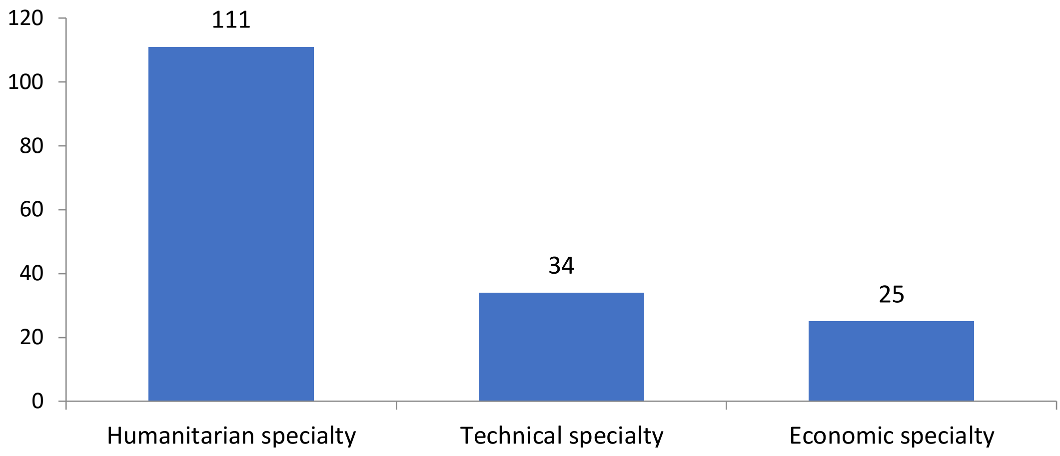

FIGURE 1. Distribution of survey participants according to specialties, in %

Note: compiled by authors

Humanitarian (65%), economic (15%) and technical specialties comprise about 20% respectively. According to the survey, 81% of respondents stated that they study subjects on digitalization, information and communication technology, IT. Interestingly, 9.4% of participators were not sure if their educational curriculum had subjects on digitalisation, information and communication technology, and IT.

Figure 2 shows data on respondents' self-evaluation the level of digital skills.

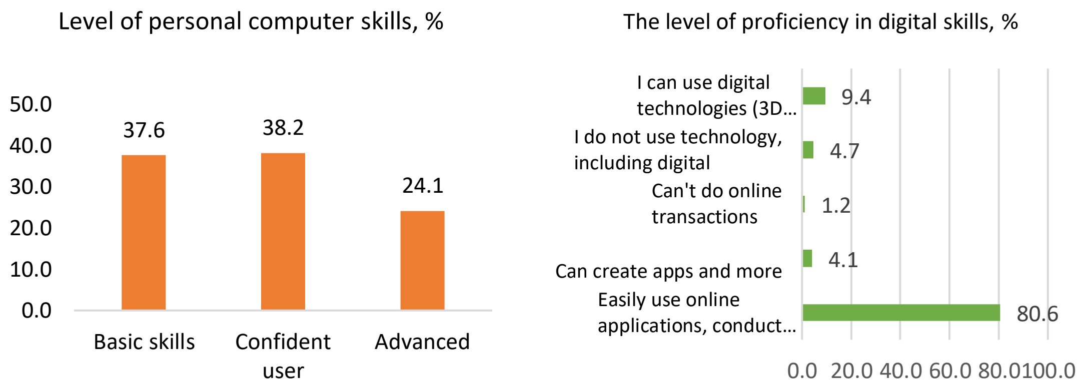

FIGURE 2. Self-evaluation of digital skills by respondents, in %

Note: compiled by authors

Of all respondents, only 24.1%, evaluate themselves as having advanced skills in using a personal computer. In comparison with advanced users, students with basic and confident skills of computer usage proved to be quite different comprising around 38% each, supporting the results for digital skills proficiency. A great number of attendees, 80.6% feel confident using online applications or conducting various online operations. This shows that, as a whole, students are confident users of personal computers or other gadgets and furthermore feel confident using digital artifacts. Slightly less than 10% of students used more advanced digital technologies or software such as Internet of things (39.4%), artificial intelligence (24.1%), robotics (17.1%), blockchain (11.2%), 3D printing (9.4%), big data (15.3%). 30% of the respondents answered they did not use any of those technologies, and 5.3% mentioned they used all of the listed digital technologies. The advantages and disadvantages of digitalization are presented in Figure 3.

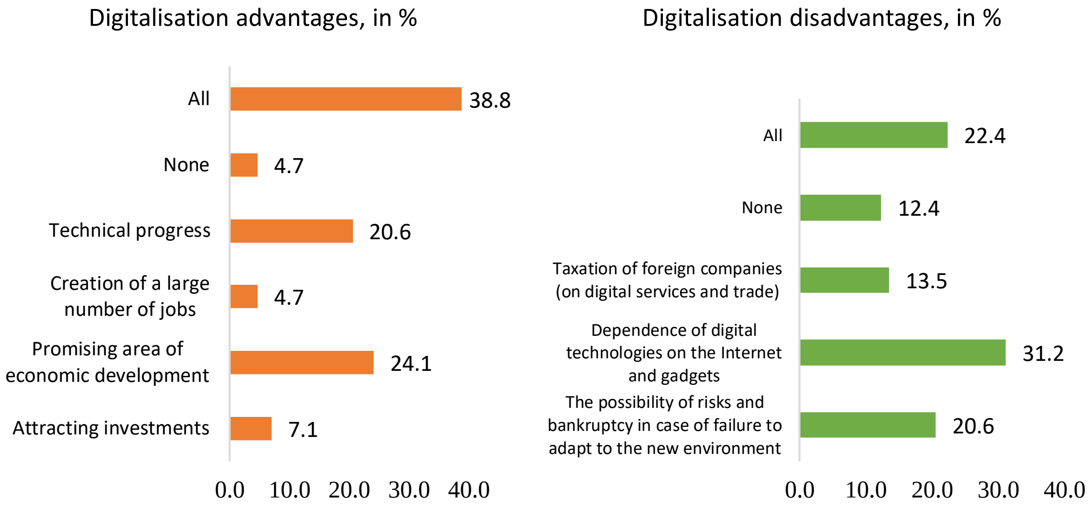

FIGURE 3. Digitalization advantages and disadvantages, in %

Note: compiled by authors

Among the advantages of digitalization, most students mark the development of the economy and technological innovation as the main contribution and comprise showing 24.1% and 20.6%, respectively. Few students concentrated to the decrease in unemployment. According to the results, 38.8% of students consider all fields as advantages in the economy's digitalization process. Nevertheless, it can further be regarded as necessity to gain more knowledge in digitalization impact and development of digital hubs.

Dependence of the technological innovations to access to the Internet (31.2%) was underlined as the main disadvantage. This additionally highlights the challenges of implementing of broadband internet, especially in remote areas. Next, the possibility of private business development failure made up 20.6%. Taxation of foreign companies is not regarded by the majority as a disadvantage, only 13.5%. This could be explained by the fact that students at the level of bachelor's degree might need more knowledge about global economic development and the impact of international agreements, etc.

71% of students are familiar with the Digital Kazakhstan program. 47.1% of students intend to work with digital technologies, in comparison with 32.9% who are not sure, but are interested. Respondents consider financial 42.4% and human resources 37.1% to be the main hindering factors in the formation of digital hubs in Kazakhstan.

The second part of the analysis includes the interviews conducted among the academic staff from five universities. The interview had two groups of questions. The interview analysis was built according to the main interview questions.

The first group of interview questions results ("What is the level of digital skills of first year students?"). The results of the interview indicated that first year students have poor basic digital skills. Interestingly, students can easily pass their assignments through mobile applications as they feel confident when using device. On the contrary, using computers was more challenging for them as among issues that students' experiences are starting a computer, creation of MS word document or Excel, usage of online platforms. Some students have trouble in learning the interface of an online platform at the beginning. Undergraduate students still need basic training of computer usage or usage in online platforms. Moreover, there are some subjects, which are conducted all the way on computers. Additionally, majority of the exams first year students pass on computers in test format, mid-terms exams are usually passed online as well. The results are different for academic staff from the rest universities. Mostly, because the rest of the academic staff conduct humanitarian subjects which are not highly dependent of digital tools. Students have the possibility to pass their assignments in a written form or orally.

The second group of interview questions results ("How does digital skill impact on the students' educational process?"). The first question was about the reasons why students appeal when they fail their exams. All of the respondents stated that most students, when they appeal to receive more points or have the opportunity to pass the examination for the second time, have two reasons. The first reason is related to health conditions, which explains that they could not cover all questions. The second reason is that during lectures or seminars, the information included in the exam needed to be presented on the slide, or the teacher gave no recommendations on the literature to study the material.

According to the academic staff, students sometimes need additional time to prepare for classes. The lack of familiarity with online platforms led to breaking the deadline of handing the materials. Even though students have good skills in using ICT, they have not developed the habit of working online. Unlike secondary education at universities, students are not reminded about their assignments or deadlines. The online platforms include all information needed. The tricky moment for students working online indicates the reason why they miss the deadline for assignments to pass. Another reason, especially among undergraduate students, is a necessity for digital skills in using a personal computer, particularly MS WORD, Excel, and PowerPoint.

Nevertheless, the reasons mentioned above for exams and assignments failure are present at all levels including the students of higher education at a bachelor's level. This puts conditions for academic staff to soften the requirements for developing the educational curriculum. That is, students need more knowledge related to the usage of various software or digital tools.

The results of correlation analysis of variables are presented below (Table 3).

TABLE 3. Descriptive Statistics

Ind.	**Mean**	**Median**	**Observed**		**Stnd. Dev.**	**Excess kurtosis**	**Skewn.**	**P value**
			min	**max**				
Y	129.833	126.000	122.000	149.000	8.971	0.484	1.386	0.001
X1	546481.333	571691.000	459369.000	629507.000	56412.666	-1.409	-0.118	0.403
X2	152974.917	153627.000	127084.000	177678.000	15897.648	-1.094	-0.061	0.888
X3	2156.355	2182.720	1985.773	2341.100	121.368	-1.690	-0.044	0.139
Note: compiled by authors								

Table 3 shows the descriptive statistics of the study data. The mean value representing the sum of observations is presented. The lowest value shows Y is 129.833 and the highest value shows X1 is 546481.333. In terms of standard deviation values, X1 also shows a high value of 56412.666. The high value of standard deviation shows the sufficient spread of the sample. An indicator of the strength of relationship between the variables is Cramer's V. This indicator varies between 0 and 1. A value of 0 indicates no relationship between the variables. The values of current studies range from 0.001 to 0.888 where Y-0.001, X3-0.139 indicates weak relationship with the variables, values X1-0.403 shows medium relationship and value X2-0.888 shows strong relationship. The indicators of normal distribution are skewness and excess kurtosis. Excess kurtosis shows the peaks of distribution, the degree of skewness shows the normal distribution of variables. Parameters of skewness varying from -1 to +1 are rated as excellent, values between -2 and +2 are considered acceptable, in this study the value of Y-1.386 indicate excellent parameters. The parameters X1, X2, X3 have negative zero skewness which means they are acceptable if the skewness is between 0.4 and -0.4 which is the criterion for large samples. A negative value indicates a flat distribution. When the kurtosis and skewness are close to zero, the model is considered a normal distribution (George & Mallery, 2019; Hair et al., 2022). According to the V-Kramer value, a value of 1 indicates perfect relationship and 0 indicates no relationship. The null hypothesis whose value is greater than zero $p > 0.05$ means that it is a normal distribution and is accepted, while if the value is less than $p < 0.05$ it indicates non-normality of the distribution and is rejected (Martínez-Camblor et al., 2014). In this study, the indicators indicate normal distribution except for the Y value, 0.001.

The following Table 4 indicates correlation matrix.

TABLE 4. Correlation matrix

Item	Y	X1	X2	X3
Y	1.000			
X1	0.599	1.000		
X2	0.479	0.187	1.000	
X3	0.432	-0.316	0.695	1.000
Note: compiled by authors				

According to the results obtained during the analysis of the correlation matrix, we can see a strong relationship between the number of universities and the number of specialists employed in economic activities, which is 0.695. The number of universities also has a slightly higher than average relationship and shows a value of 0.599 with the variable X1-number of university students, but the effect of the number of universities on the number of graduated students shows a weak correlation, 0.187.

The hypotheses were tested:

H1: Number of universities impact the number of students – supported.

H2: Number of universities impact the number of graduated students – supported.

H3: Number of universities impact the employed population 15-28 years old by economic activities – supported.

5. DISCUSSIONS

The research results showed that teachers sometimes are pushed to soften requirements when working on the educational curriculum as students come unprepared to work on online platforms or search for correct sources of information. Moreover, students are required to use their digital skills constantly for every class. However, some teachers do not consider the level of digital literacy among students as it is a mutual requirement. Nevertheless, existing studies mostly discuss that it is mainly the responsibility of academic staff that students are not improving their skills, and low level of digital skills among teachers is the main reason for students' poor digital skills and knowledge (Hillier, 2017; McDougall et al., 2018).

Most existing studies discuss that digital skills have become a compulsory characteristic of a student (Radovanović et al., 2020; Tohara et al., 2021). Notwithstanding, basic knowledge of digital tools usage, such as personal computers is taught at the stage of secondary education. Therefore, the responsibility put on higher educational institutions must be related to the digital knowledge background of students. Secondly, the results of the questionnaires supported that specialty plays a significant role in the distribution of the current educational curriculum is usually based on the specialty. However, the survey results showed that there were students from three specialties. Among students of humanitarian specialty, 80% stated that they studied subjects related to digital literacy; among students of technical specialty, they comprise 77%; among students of economic specialty, 94% stated that they had subjects related to digital literacy and skills development.

According to the survey results, most subjects studied by students were in the humanities. This shows that the current educational curriculum of universities is dominated by humanitarian subjects, which contradicts the current realities of digitalization. Previous studies showed that the job market is primarily driven by emerging technologies (Connell et al., 2014). Thus, digital technology and ICT are drivers of economic and social development (Kim et al., 2011, p. 22), affecting education, medicine, business, culture, and more. There is a shortage of professionals with digital skills, but the market is oversaturated with specialists with soft skills (Wenjing & Jin, 2021). However, technology is the engine for creating innovation. Digital technologies are increasingly being embedded in organisations, which requires the importance of developing and mastering hard skills and digital skills. This means that digitisation and technical subjects need to be introduced in all education programmes, as competent professionals with digital skills in all areas are still lacking.

It can be assumed that a lack of digital skills and access to digital tools results in the failure of students. Although scientists discuss that digital hub development is based on the labor force potential, this issue has yet to be studied. This shows that putting the responsibility on one side is wrong. Digital hubs are a combination of various organizations and specialists who are willing to create a space beneficial for the private sector and the community as well (Hall et al., 2012; Abisuga-Oyekunle, 2020; Rundel et al., 2020)

The development of digital hubs goes through the development of digital skills. The role of competent specialists is fundamental while forming digital hubs. However, compared with the previous generations, computers and technologies have become part of almost every job. Although students enlarge their digital knowledge and improve their digital literacy through an educational curriculum of higher educational institutions, secondary education acts as a booster. It would be practical for stakeholders of digital hubs to organize meetings in the region and discuss the educational curriculum with the specialties and skills needed at the job according to the fields of study. Based on that, the educational curriculum must be developed on the digital literacy background of students to accelerate the development of digital hubs.

In conclusion, it is significant to equally develop both humanities and technical specialties in higher education institutions. The number of universities influences the number of students, graduated students, and employed population. It is also important to include technical subjects in all specialisations, as digitalization affects all areas of life and requires skilled professionals in the labour market. Previous studies did not consider educational programs (Miörner et al., 2019). Current study shows that Basic digital skills impact students' performance, and there is a lag in understanding further digital skills.

6. CONCLUSIONS

The current research focused on studying digital skills among bachelor's degree students. Development and practice of digital skill is crucial for the potential of digital hubs development. Usually, practice and improvement of digital skills is achieved through the educational curriculum at higher educational universities. Therefore, universities stand out as the entire space for digital hub development.

The study results showed that economic specialities are more focused on developing digital literacy, using digital tools that develop students' digital skills. The next is the interaction between students and the academic staff during the educational process. The results showed that in those universities where the work of students is done through online platforms and exclude paper routine, digital skills are used constantly. Moreover, it is easier to detect that students need more experience and knowledge in digital tools. They are more experienced in searching for correct sources of information for studying educational material. Although students have skills in using digital gadgets such as mobile phones and state themselves as confident users of personal computers, this only sometimes contributes to their ability to work on online platforms. Moreover, the results reveal that this is one of the primary reasons for the failure of students to pass their assignments on time.

Universities can adopt foreign experience and introduce the subject of study skills, which prepares first-year students to study in higher educational institutions. A low level of digital literacy and lack of experience or practice using online platforms impacts the quality of the educational curriculum.

To sum up, higher education institutions need to improve the educational curriculum for first-year students and include courses on the preparation of students to study in a particular university. Overall, the role of universities remains prestige in labour market. Teachers and students must pass training on online platforms or software students learn to use during education. This way, the education process will be interactive, and students will have the opportunity to develop their skills.

AUTHOR CONTRIBUTION

Writing – original draft: Galiya Seitkan, Kuralay O. Nurgaliyeva.
Conceptualization: Galiya Seitkan, Kuralay O. Nurgaliyeva.
Formal analysis and investigation: Kuralay O. Nurgaliyeva, Aigul Akparova.
Funding acquisition and research administration: Galiya Seitkan, Kuralay O. Nurgaliyeva, Aigul Akparova.
Development of research methodology: Galiya Seitkan, Aigul Akparova.
Resources: Kuralay O. Nurgaliyeva, Aigul Akparova.
Software and supervisions: Galiya Seitkan, Aigul Akparova.
Data collection, analysis and interpretation: Galiya Seitkan, Kuralay O. Nurgaliyeva, Aigul Akparova.
Visualization: Kuralay O. Nurgaliyeva, Aigul Akparova.
Writing review and editing research: Galiya Seitkan, Kuralay O. Nurgaliyeva.

References

1. Abisuga-Oyekunle, O. A., Patra, S. K., & Muchie, M. (2019). SMEs in sustainable development: Their role in poverty reduction and employment generation in sub-Saharan Africa. *African Journal of Science, Technology, Innovation and Development, 12*(3), 405-419. https://doi.org/:10.1080/20421338.2019.1656428

2. Atoy Jr, M. B., Garcia, F. R. O., Cadungog, R. R., Cua, J. D. O., Mangunay, S. C., & De Guzman, A. B. (2020). Linking digital literacy and online information searching strategies of Philippine university students: The moderating role of mindfulness. *Journal of Librarianship and Information Science, 52*(4), 1015-1027. https://doi.org/10.1177/0961000619898213
3. Banai, R. (2020). Pandemic and the planning of resilient cities and regions. Cities (London, England), 106, 102929 – 102929. https://doi.org/10.1016/j.cities.2020.102929
4. Connell, J., Gough, R., McDonnell, A., & Burgess, J. (2014). Technology, work organisation and job quality in the service sector: an introduction'. *Labour & Industry: a journal of the social and economic relations of work*, *24*(1), 1-8. https://doi.org/10.1080/10301763.2013.877117
5. De, R., Pandey, N., & Pal, A. (2020). Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice. *International Journal of Information Management, 55*, 1–5. https://doi.org/:10.1016/j.ijinfomgt.2020.102171
6. Dyba, M., Gernego, I., Dyba, O., & Oliynyk, A. (2020). Financial support and development of digital rural hubs in Europe. *Management theory and studies for rural business and infrastructure development*, *42*(1), 51-59. https://doi.org/10.15544/mts.2020.06
7. Eshet-Alkalai, Y. (2004). Digital Literacy: A Conceptual Framework for Survival Skills in the Digital era. *Journal of Educational Multimedia and Hypermedia*, *13*, 93-106. Retrieved from https://www.learntechlib.org/primary/p/4793/
8. Fagerberg, J. (2009). *Innovation: A guide to the literature*. Oxford, Oxford University Press.
9. George, D. & Mallery, P. (2019). IBM SPSS Statistics 26 Step by Step a Simple Guide and Reference (16th Ed.). New York, USA: Routledge.
10. Ghafar, A. (2020). Convergence between 21st century skills and entrepreneurship education in higher education institutes. *International Journal of Higher Education*, *9*(1), 218-229. http://dx.doi.org/10.5430/ijhe.v9n1p218
11. Guzmán-Simón, F., García-Jiménez, E., & López-Cobo, I. (2017). Undergraduate students' perspectives on digital competence and academic literacy in a Spanish University. *Computers in Human Behavior*, *74*, 196-204. http://dx.doi.org/10.1016/j.chb.2017.04.040
12. Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (3 ed.). Thousand Oaks, CA, Sage.
13. Hall, J., Matos, S., Sheehan, L., & Silvestre, B. (2012). Entrepreneurship and innovation at the base of the pyramid: A recipe for inclusive growth or social exclusion? *Journal of Management Studies*, *49*(4), 785–812. http://dx.doi.org/10.1111/j.1467-6486.2012.01044.x
14. Har, E., Amri, M. & Gusmaweti (2022). Skills and Ict Science Learning Toward Teachers' South Coast District. *International Journal of Emerging Trends in Science and Technology*, *9*(9), 11-19. https://dx.doi.org/10.18535/ijetst/v8i9.02
15. Henriksen, C. (2011) Media and ICT in a Learning Perspective. Available online: http://www.dpu.dk:/en/research/researchprogrammes/mediaandict/ (accessed on 10 September 2023)
16. Hillier, M. (2018) Bridging the digital divide with off-line e-learning. Distance Education, 39(1), 110-121. https://doi.org/:10.1080/01587919.2017.1418627
17. Horton, F. W. Jr (2008). *Understanding Information Literacy: A Primer*. Paris, UNESCO.
18. Kara, M. (2022). Revisiting online learner engagement: Exploring the role of learner characteristics in an emergency period. *Journal of Research on Technology in Education, 54*(1), 236-252. https://doi.org/:10.1080/15391523.2021.1891997
19. Kelly, T., & Firestone, R. (2016). How tech hubs are helping to drive economic growth in Africa. WDR 2016 Background Paper, World Bank, Washington, DC. Available online: https://openknowledge.worldbank.org/handle/10986/23645 (accessed on 10 September 2023)
20. Kim, B.J., Kavanaugh, A.L., Hult, K.M. (2011). Civic Engagement and Internet Use in Local Governance: Hierarchical Linear Models for Understanding the Role of Local Community Groups. *Administration & Society*, *43*(7), 807–835. https://doi.org/10.1177/0095399711413873
21. Lee, S. M., & Trimi, S. (2021). Convergence innovation in the digital age and the COVID-19 pandemic crisis. *Journal of Business Research*, *123*, 14–22. https://doi.org:/10.1016/j.jbusres.2020.09.041

22. Mahmood, K. (2009). Gender, subject and degree differences in university students' access, use and attitudes toward information and communication technology (ICT). *International Journal of Education and Development using Information and Communication Technology*, *5*(3), 206-216.
23. Martínez-Camblor, P., Carleos, C. & Corral, N. (2014). Cramér-Von Mises Statistic for Repeated Measures. *Revista Colombiana de Estadística, 37*(1), 45-67. https://doi.org/10.15446/rce.v37n1.44357
24. McDougall, J., Readman, M., & Wilkinson, P. (2018). The uses of (digital) literacy. *Learning, Media and Technology*, *43*(3), 263-279. https://doi.org/10.1080/17439884.2018.1462206
25. Perez, K. & Torelló, P. (2012). The digital competence as a cross-cutting axis of higher education teachers' pedagogical competences in the European higher education area. *Procedia - Social and Behavioral Sciences*, *46*, 1112 – 1116. https://doi.org/10.1016/J.SBSPRO.2012.05.257
26. Radovanović, D., Holst, C., Belur, S., Srivastava, R., Houngbonon, G., Le Quentrec, E., Miliza, J., Winkler, A., & Noll, J. (2020). Digital Literacy Key Performance Indicators for Sustainable Development. *Social Inclusion*, *8*(2), 151-167. https://doi.org/10.17645/si.v8i2.2587
27. Rundel, C. T., Salemink, K., & Strijker, D. (2020). Exploring rural digital hubs and their possible contribution to communities in Europe. The Journal of Rural and Community Development, 15(3), 21–44. Available online: https://www.researchgate.net/publication/344625289_Exploring_Rural_Digital_Hubs_and_Their_Possible_Contribution_to_Communities_in_Europe (accessed on 10 September 2023)
28. Simona, L. C., Gianluca, A., Marco, G., Federica, O., & Laura, P. (2017). Is it the way they use it? Teachers, ICT and student achievement. *Economics of Education Review*, *56*, 24-39, https://doi.org/10.1016/j.econedurev.2016.11.007
29. Somerville, M., Smith, G. & Macklin, A. (2008). The ETS iSkills (TM) assessment: a digital age tool. *The Electronic Library*, *26*, 158-171. https://doi.org./10.1108/02640470810864064
30. Tohara, A. J. T., Shuhidan, S. M., Bahry, F. D. S., & Nordin, M. N. (2021). Exploring digital literacy strategies for students with special educational needs in the digital age. *Turkish Journal of Computer and Mathematics Education*, *12*(9), 3345-3358. https://doi.org/10.1007/978-3-030-98040-5_3
31. Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? *Education and Information Technologies*, *26*(5), 6401-6419. https://doi.org:/10.1007/s10639-021-10633w
32. Van Deursen, A.A.M. (2010). Internet Skills: Vital assets in an information society. Available online: https://doi.org/10.3990/1.9789036530866 (accessed on 10 September 2023)
33. Wang, Q. (2020) Higher education institutions and entrepreneurship in underserved communities. *Higher Education*, *81*, 1273–1291. https://doi.org:/10.1007/s10734-020-00611-5
34. Wenjing L. & Jin L. (2021). Soft skills, hard skills: What matters most? Evidence from job postings,.*Applied Energy*, *300*, 117307. https://doi.org/10.1016/j.apenergy.2021.117307
35. Yu, Zh. (2022). Sustaining Student Roles, Digital Literacy, Learning Achievements, and Motivation in Online Learning Environments during the COVID-19 Pandemic. *Sustainability*, *14*(8), 4388. https://doi.org:/10.3390/su14084388

AUTHOR BIOGRAPHIES

***Galiya Seitkan** – PhD student, Al-Farabi Kazakh National University, Department of Management, Faculty of Higher School of Economics and Business, Almaty, Kazakhstan. Email: galeka_07_96@mail.ru, ORCID ID: https://orcid.org/0000-0002-5674-4901

Kuralay O. Nurgaliyeva – Cand. Sc. (Econ.), University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: nurgalieva.k@uib.kz, ORCID ID: https://orcid.org/0000-0002-8735-667X

Aigul Akparova – PhD, Professor, Kazakhstan University of International Relations and World Languages named after Abylai Khan, Almaty, Kazakhstan. Email: aigul.akparova@mail.ru, ORCID ID: https://orcid.org/0000-0003-0085-3057