

## The factors in the decision-making of high school graduates about higher education in the digital era

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### ABSTRACT

Numerous specialists from different fields and perspectives have investigated determinants affecting the choice of future career path by school-leavers. The present study aims to analyze the factors influencing the decision of applicants to choose an academic major at a higher educational institution in the context of the digitalization of education. The authors developed the questionnaire for interviewing respondents. The survey involved a total of 160 students from Russia and Kazakhstan. The study took place from September to November 2022. The researchers collected a large amount of data, including the average scores of students and first-year students' responses to the survey. The analysis of these data revealed many factors that influence a school graduate's decision on a future academic major. The results describe three groups of factors that influenced the students' decisions, namely family, social, and academic ones. The findings suggest that students choose an academic major more independently when they have an online learning experience. In the context of digitalized education, respondents are more likely to discuss their profession with peers or friends in social networks than with parents (0.49 vs. 0.31).

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## 1. INTRODUCTION

The digitalization of education has become a driver of reorganization in several processes and mechanisms of educational space functioning [1]. Students and learners have begun to search for new ways to find and improve schemes for acquiring new information, communicating with peers, or performing academic tasks. As a result, digital online tools have become an influential factor in the applicant's decision on the future profession. Modern learners can analyze the labor market in their region without outside help, identify the advantages and disadvantages of selected universities, or determine their career orientation [2]. The senior high school year is typically the high time for students to think of their future career prospects. However, while some have carefully considered career plans, others decide on a place to study based on financial resources, location, knowledge, competition, and other reasons. The choice of university and major depends on many factors: occupational prestige, expected salary, opinions of peers and teachers, and personal preferences [3].

At the same time, family has the weightiest influence on a graduate student's decision on higher education. Parents tend to express a rigid active position by putting forward the major or higher education institution that they like. Meanwhile, the needs and desires of the child are ignored or taken into account minimally [4], [5]. Some parents prefer a passive position, excluding themselves from participation in the choice of their child's future career. In this case, the child must independently choose the university and department they want to enter or whether they want to apply to university at all [6]. At the same time, the student learning environment, such as distance or traditional education, has a decisive influence on student career guidance. Today, school students can learn the peculiarities of their behavior and brain or find the facts about any interesting profession without any assistance [7]. Even without giving direct advice and guidance, the family transmits its values and attitudes to the younger generation, which in turn follows the established model of behavior [8].

For this particular reason, parents should understand that, in most cases, their children will adopt the norms and opinions prevailing in their family. Indeed, the degree of involvement in a child's future career choices varies from one family to another and presupposes both positive and negative influences [9]. These influences determine the motivation of students to choose a particular profession. It is crucial to consider this aspect, as well as identify key factors and causal relationships of a student's career choice in the context of digitalized education.

Scholars highlighted several theories of career aspirations, such the theory of Eli Ginzberg, the theory of Robert Havighurst, the theory of Ann Roe, and the theory of Linda Gottfredson. Ginzberg suggested that career choice is a continuous process that occurs in a succession of three periods: fantasy choices (before age 11), tentative choices (between ages 11 and 17), and realistic choices (between ages 17 and young adulthood) [8]. Havighurst outlined six stages of choosing a professional future but claimed that parents influence only the first of them. This stage, defined as "identification with a worker," includes ages 5 to 10. At this stage, children identify themselves with a worker who is close to them as their father, mother, or another significant person [8].

Roe's theory refers to Maslow's hierarchy of needs [8]. She believed that any needs that were not satisfied in childhood would either be eliminated from the child's consciousness or become unconscious motivators. Roe argued that parenting styles represent a key child's career choice influencer. She included the following six parenting styles in her model: overprotection, overdemanding, emotional rejection, neglect of the child, casual acceptance, and loving acceptance. In line with this, Roe hypothesized that children who experienced the first three parenting styles are likely to be oriented toward working with people in the future, while the others would be oriented toward careers related to science and engineering [10]. The last of the four theories is the one coined by Gottfredson. The author stated that children's career choices are dependent on seven primary factors: gender, social class, background, intelligence, interests, competencies, and values. Gottfredson proposed four different stages of cognitive development, each of which implies rethinking previously chosen careers. Although the researcher did not indicate a direct parental influence on children's career choices, she did mention that a college student is more likely to have the knowledge needed for one parent's job rather than for any other profession [11].

Researchers have used questionnaires to qualitatively assess family influence on career decisions. The results indicate that the career information provided by parents is most often consistent with established family traditions. In addition, children from families who own private businesses are often under considerable pressure in terms of future occupation choice. In this case, family members believe that it is economically beneficial for the younger generation to continue the family practice. Concurrently, scholars note that it is common for a high school student to be pressured by the success of older siblings in a particular industry. This pressure can be both overt or unconscious [11], [12].

In general, academic papers on the topic confirm the importance of parental influence on students' career choices [8]. In this regard, there is an interesting study that looked at factors affecting the career path preferences of adolescents from Pennsylvania, United States. Using 12 focus groups, its author established that parents demonstrated their expectations by showing increased support for certain professions. Hence, the older generation encouraged enthusiasm for certain occupations and unconsciously shaped students' opinions about them [13].

As practice shows, senior students tend to adopt the norms and values of their parents and then regard them as their own. Available survey results evidence that 46% of adolescents have the same ideas about career paths as their parents, while 36% state that their views are very similar. Researchers suggest that parents show nonverbal reactions to their child's interest in a particular career. It is said that adults often underestimate children's intuitive abilities and overestimate their self-control and self-knowledge. Even though many parents try to take a neutral stance on their children's future career choices, certain opinions are sometimes difficult to control [14].

The strength of parental influence on graduates' decisions about their future career choices frequently depends on the relationship between family members. The matter here stands for the mutual parent-child affection as well as the quality of the day-to-day relationship. Adolescents who feel very attached to their parents are likely to be more anxious if adults disagree with their choice of profession. On the other hand, if students feel emotionally distant from their parents, they are more likely to make more independent decisions about their future occupations [15].

Some studies on children's gender socialization have come to similar conclusions. They have found that a child's gender largely correlates with parental expectations. For example, fathers and mothers expect different career choices from male and female children. In addition, research uncovered that female adolescents are inclined to seek advice on career paths from their mothers, while fathers influence children of both genders. Thus, the perceptions of gender roles, despite current trends, can significantly affect a child's major choice [8], [14], [16].

Modern society makes more and more demands for education and realizes the need for highly qualified personnel at all levels. However, in the context of the Russian education system, which also extends to the Commonwealth of Independent States (CIS) countries, students choose their future profession at an early age (17-18 years) [17]. Specialized training mainly covers senior grades (9th-11th grades) and less often begins with 8th and 7th grades. Pre-professional training takes place 1-2 years before the specialized training. Therefore, in the studied countries, students are more likely to ask for advice before making this decision. The students receive advice from their social circle: family, friends, or classmates [18].

Another interesting study in the field links the concepts of family influence, academic satisfaction, self-efficacy, and happiness. In this fashion, researchers suggest that career choices will determine students' quality of life, and for people who spend most of their time at work, career choice is a factor directly affecting happiness. The study of this issue rests on an ecological concept. The concept consists of four systems: micro (individual passions and goals), meso (peer influence), eco (influence of relatives), and macro (influence of various ideologies) [19].

The question about the principles of the upcoming decisive choice constantly interested educational sphere representatives. In fact, the decision to enroll in a higher education institution can depend on many factors, from personal and subconscious goals and intentions to direct influence, such as the media, friends, and family. The extensiveness of the topic is the reason for incomplete research. Nevertheless, the advent of digitalized education has significantly changed the approach to choosing a profession. At the same time, students' career orientation varies by their native regions. Thus, European and American students have more time and opportunities to analyze the labor market and implement professional solutions, while Russian and Kazakh students tend to enter universities promptly. This study is relevant for those interested in how family values and other factors influence the decision of high school graduates to obtain higher education in a digital environment. The study's novelty is the determined dependence of Russian and Kazakh university students' career choices on various influence factors in the context of digitalized modern education.

As a result, the current study aims to analyze the factors influencing applicants' decision to choose an academic major at a higher educational institution in the context of digitalized education. Accordingly, the research tasks are the following: i) determine the main factors influencing students' decisions on academic majors at universities; ii) interview first-year university students to identify their motivation in choosing an academic major; and iii) identify the key factors and causal relationships of students' choice to learn online and offline.

## **2. RESEARCH METHOD**

### **2.1. Research design**

The study employed a survey of first-year students who had just decided on an academic major. The students voluntarily participated in the survey. The respondents were searched in corporate student chats at the studied universities. The survey took place in September-October 2022. The students were interviewed with the author's questionnaire based on relevant literature, such as [20]. The questionnaire was uploaded in Google Forms format. It was translated into two languages: Russian and Kazakh. The questionnaire consisted of 10 questions developed by the authors as shown in Table 1. It also contained open-ended questions. The results were processed in November 2022.

The questionnaire revealed the influence factors on the choice of the profession to study at a university. The respondents had to assess each generated factor using the Likert scale: 0=no impact; 1=very low impact; 2=low impact; 3=high impact, 4=very high impact. The obtained data were used to form a DEMATEL correlation matrix of the factors with the sample characteristics.

Table 1. Online questionnaires addressed students and parents to identify the influence factors on major choice decisions

Student questionnaire	Answer
1. What is your major?	
2. How many members of your family have the same major?	
3. Where did you first hear about this major?	
4. Who (what) influenced your decision to pursue this major?	
5. Do you enjoy studying this major?	
6. What is most important to you about this major?	
7. Do your interests match the major you chose?	
8. Would you like to work within the chosen major in the future?	
9. What was your family's reaction to your major choice?	
10. Which major would you choose if you had unlimited resources?	

## 2.2. Participants

The study of the influence on graduates' decision to obtain higher education included interviewing applicants from two countries: Russia and Kazakhstan. In total, the study involved 80 students from Russia, including first-year students from I.M. Sechenov First Moscow State Medical University (Sechenov University) and Pacific State University with different majors and education. At the same time, 80 students from Kazakhstan also took part in the survey. They were students from the Eurasian National University and S.D. Asfendiyarov Kazakh National Medical University (KazNMU).

The total number of male Russian students was 42.5% (34 people), and females were 57.5% (46 people). Their academic majors were natural sciences (12.5%, 10 people), technical sciences (36.25%, 29 people), social sciences (31.25%, 25 people), and humanities (20%, 16 people). At the same time, 57.5% of students were from rural areas (46 people), and 42.5% were city residents (34 people).

The gender distribution of students from Kazakhstan was 52.5% male (42 people) and 47.5% female (38 people). Kazakh respondents also specialized in natural sciences (16.25%, 13 people), technical sciences (20%, 16 people), social sciences (33.75%, 27 people), and humanities (30%, 24 people). The share of city residents was 48.75% (39 people); the remaining 51.24% (41 people) were from small towns as presented in Table 2.

The selection of students was random through a questionnaire sent via e-mail. The participants were the first 80 applicants from each educational institution of the country. The study used the usual random sample. Based on the total number of medical students studying at these universities, the acceptable sampling error does not exceed  $p=3.81$ . Thus, the sample is sufficiently representative for the study. There was the analogical number of respondents in the studies [21], [22].

Table 2. Research sample characteristics

	Russia		Kazakhstan	
	%	Number of people	%	Number of people
Males	42.5	34	52.5	42
Females	57.5	46	47.5	38
Natural sciences	12.5	10	16.25	13
Technical sciences	36.25	29	20	16
Social sciences	31.25	25	33.75	27
Humanities	20	16	30	24
City dwellers	57.5	46	48.75	39
Small-town dwellers	42.5	34	51.24	41
Online learning	44.75	36	57.5	46
Offline learning	55.25	44	42.5	34

## 2.3. Data analysis

The academic performance of students participating in the study was analyzed by finding the arithmetic mean of all scores received during the academic semester. The survey used a multi-stage quota selection. The sampling error was calculated with (1).

$$\text{Sampling Error Formula} = Z \times \frac{\sigma}{\sqrt{n}} \quad (1)$$

Z=the indicator of the required confidence interval (95%);

n=sample size;

$\sigma$ =the standard deviation of the sample.

Thus, the sampling error was 0.677 or about 1%. Therefore, the quality of the received data is reliable, since there are no unaccounted errors, and the accounted errors do not exceed the specified level. The questionnaire for the survey of students and learners was tested for reliability with Cronbach's alpha. The interpretation of Cronbach's alpha values is as: >0.9 excellent; 0.8 good; 0.7 acceptable; 0.6 doubtful; and >0.5 unsatisfactory [23]. The cumulative Cronbach's alpha value for the questionnaire was 0.936. Thus, the questionnaire is reliable and applicable to the survey.

The study used the Cochran-Mantel-Haenszel test to determine the impact of the confounding variables. The average influence of the confounding variables was 0.0076. Consequently, the confounding variables did not significantly impact the results of the study. IBM SPSS Statistics and Microsoft Excel 2007 served as tools to process data in this study.

#### 2.4. Ethical issues

All participants of the study received information about the study's goals and objectives. The students agreed to the processing and analysis of the data collected during the survey. The study collected personal (students' gender and origin) and professional (students' academic majors) information to ensure completeness. However, the information was not disclosed in any way. The survey was conducted and coordinated with the representatives of the ethics committees of the studied educational institutions.

#### 2.5. Research limitations

The sample of students was random. It included representatives of different genders, majors, and origins. The questionnaire items compiled purposefully for the study were as simple as possible. However, the study had some limitations. They were mainly related to students' psychological characteristics that cannot be considered in this study, for example, latent motives of the educational activity or the consciousness of respondents. In addition, students may not perceive some behaviors or actions as influencing their choices.

### 3. RESULTS

The survey showed that most students were satisfied with the choice of their academic majors (both in Russian and Kazakh universities). The family influence on students' choice was almost the same: (0.525) and (0.538), respectively. At the same time, only a third of the respondents (0.349) and (0.249) confirmed the presence of their own motivation. Additionally, some respondents justified their choice by the prestige of the university or other academic factors as depicted in Table 3.

Table 3. Student survey outcomes

	Russia (%)	p	Kazakhstan (%)	p
1. My academic major matches the academic major of one of my family members	11.25	12.9 (13.1) [0.518]	23.75	22.9 (253.1) [0.418]
2. I first heard about my academic major from my family	78.75	78.0 (77.9) [0.249]	85	88.0 (87.9) [0.349]
3. My family influenced my academic major choice	41.25	48.9 (43.1) [0.525]	46.25	48.9 (48.1) [0.538]
4. I like my future academic major	55	55.3 (54.5) [0.347]	63.75	64.3 (64.5) [0.347]
5. The most important thing in my academic major choice was personal motives	31.25	36.4 (36.8) [0.349]	27.5	26.4 (26.8) [0.249]
6. My interests match the chosen academic major	62.5	66.4 (66.3) [0.375]	55	36.4 (36.8) [0.349]
7. I do not want to work within the chosen academic major in the future	48.75	43.4 (46.9) [0.537]	52.5	55.9 (54.8) [0.349]
8. My family supported my academic major choice	67	66 (66.8) [0.597]	54.5	55.5 (55.8) [0.349]
9. I would choose the same academic major even if I had unlimited resources	11.25	11.4 (11.8) [0.349]	15	15.4 (15.3) [0.349]

Thus, the survey results revealed three groups of factors that influenced students' decisions: family (includes the influence of family members on decisions; the presence of one or more family members with a similar academic major); social (opinions of other people, peers, and friends; information in social networks, on the internet); academic (the characteristics of an academic major/university; personal academic performance; learning format (offline/online)). Each parameter has an indirect influence on the decision of an individual, depending on gender, chosen academic major, and place of residence. Table 4 shows the generated correlation of results according to the students' characteristics and factors influencing their professional decision.

Table 4. The influence of factors (F) on the choice of each group of respondents (C)

Respondents (C)	Factors (F)		
	Family	Social	Academic
Males	2.71	3.18	3.33*
Females	3.11	3.28*	3.21
Natural sciences	4.01*	2.16	3.42
Technical sciences	2.97	3.04*	2.26
Social sciences	2.88	3.78*	2.44
Humanities	2.65	4.19*	2.85
City dwellers	3.14	3.55	4.27*
Small-town dwellers	4.56*	4.13	2.63

\*Highest score

The highest scores are highlighted for each column. The applicants from small towns gave the influence of their parents on the academic major choice the highest score (4.56). Social factors had the least influence on the choice of natural science major (2.16).

The obtained data were used to model a DEMATEL matrix based on the initial matrices for each respondent from the survey results. The impact level between *F*s was determined by asking participants to indicate the direct influence of each *F* on other factors. The average matrix was subtracted and its values of column (i) and row (j) values were estimated based on the impact level between these *F*s. This calculation used the correlation effect between all respondents as shown in Table 5. The values with asterisk represent the highest value for each column and row, meaning the largest correlations of results between all groups.

Table 5. Correlation of the influence of factors on the choice of each group of respondents

Respondents	Factors		
	Family	Social	Academic
Males	0.58	0.61*	0.47
Females	0.67*	0.66	0.51
Natural sciences	0.13	0.24	0.47*
Technical sciences	0.21	0.39	0.63*
Social sciences	0.33	0.46*	0.44
Humanities	0.37	0.41*	0.38
City dwellers	0.32	0.47	0.48*
Small-town dwellers	0.79*	0.55	0.27

\*Highest score

Therefore, the intra-group correlation for each criterion indicated that the most obvious factors influencing the career choice of the studied sample were social and academic. Nevertheless, the highest correlations were among students from small villages who listened to the opinion of the family (0.79). The same applies to female learners who generally consult with their parents about their future profession more than males (0.67 vs. 0.58). The highest correlation among social professions relates to the opinions of other people. Thus, the opinion of other people was more important to applicants who entered a social or humanitarian major (0.46 and 0.41, respectively). The responses of those students who had chosen technical and natural majors demonstrated the lowest differences between correlations. However, most respondents' motivation was due to academic factors - 0.47 and 0.63. At the same time, students noted the high influence of the education format on their motivation for the chosen academic major as seen in Table 6.

Table 6. Correlation (C) of the learning format's influence on student motivation factors (F) when choosing a career

C	F		
	Family	Social	Academic
Online	0.31	0.49	0.77
Offline	0.51	0.58	0.44

The obtained results suggest that students choose an academic major more independently if they have an online learning experience. In the context of digitalized education, respondents were more likely to discuss their profession with peers or friends on social networks than with their parents (0.49 vs. 0.31). At the same time, students pay more attention to the prestige of a university and information about the profession when they have access to internet resources -0.77.

#### 4. DISCUSSION

The study collected a large amount of data for analysis. Surveys conducted among Russian and Kazakh students and their parents allow deducing the level of influence of family traditions on school leavers' decisions regarding higher education. In more precise terms, the study showed that the decision of more than half of the respondents from both countries (66.25% of Russian and 56.25% of Kazakh students) was affected by their parents. This outcome can be tracked in numerous studies on the topic. Many researchers have obtained the same conclusions based on the survey of school students or analysis of their choice of educational institution and department [8], [19], [24]–[27].

It is worth noting that, for the most part, students' parents did not realize that they had anyhow affected their children's decision to enroll in a particular field. The presence of direct or indirect influence was admitted by 32.5% of families from Russia and 38.75% of families from Kazakhstan. This point is fully in line with the outcomes obtained by other specialists [14]. Having conducted relevant surveys, they confirmed that parents often underestimate the quality and quantity of their influence on schoolchildren. Besides, many scholars [28]–[31] stated that the transmission of norms, values, and attitudes begins when the child is still in the early childhood stage. The imposition of one's opinion may be implicit and hidden in nonverbal means of communication or one-second reactions. Therefore, even the most unbiased parents may unintentionally affect their child's career choice. On the other hand, the studies by Aldowah *et al.* [32] indicate that AI or virtual and augmented reality tools improve students' career guidance process in the early stage of their studies. At the same time, it is important to integrate these technologies into the educational process as well as to consider the survey results in the present study.

Decision-making is a complex process. There are many different factors to consider when making a career decision. The choice of a particular model depends on several factors that are decisive for each individual [33]. In general, the variations of career decision-making models include: i) rational decision-making model: this model involves analyzing all possible options and choosing the option with the highest probability of success; ii) a value-based decision-making model: this model implies choosing which option best suits one's values and goals; iii) intuitive decision-making model: it involves using intuition to choose the best option; and iv) group opinion-based decision-making model: this model relies on feedback from other people that influences a decision.

At the same time, some authors argue cultural characteristics of a person primarily determine their future professional orientation. For example, some cultures value the traditional roles of men and women, influencing the career choices of young people. Similarly, there are certain career opportunities available only to certain groups of people in some cultures [34]. Besides cultural peculiarities, the individual perception of a person plays an essential role. After all, a student's choice of career depends on their individual experience and personality. Thus, students with a positive experience or strong abilities in a particular field of activity are more likely to choose a career in this field [35]. As indicated in previous studies, another factor influencing career guidance is the experience of a person with a particular career direction, that is, the so-called career swimming. Career swimming is a common experience that can be positive for students. Students previously engaged in career swimming were more likely to be satisfied with their lives and careers than those who were not. Career swimming can help people find their calling and become happier with their lives [36].

A study conducted at a university in North Carolina (United States) suggests that a variety of aspects, such as family, school, society, and social and economic factors can manipulate one's career decision. But, still, researchers admit that family is the most powerful of them. Although parents of students believe that they have a neutral position regarding the choice of their children's profession, additional research confirms the opposite. The older generation is highly authoritative when acting as an example. The available findings demonstrate that children begin to identify themselves with their parents' occupations at an early age—as soon as they can pronounce the job title of their mother or father [8]. Researchers pay special attention to the connections between parents and the career decisions of their children. The study of some scientists has shown that parental ties, dysfunctional career thoughts, and career research positively correlate with the effectiveness of career decision-making. Consequently, students with stronger parental ties are less likely to have dysfunctional career thoughts and tend to engage in career research. They also more frequently demonstrate high self-efficacy in making career decisions. That is, the influence of the family on the career development of the child in the future is sufficiently significant [37].

The conclusions of this research also align well with judgments reported in a study examining the relationship between high school graduates' reasons for choosing a profession and their level of happiness [19]. Students' answers to the question, "Which major would you choose if you had unlimited resources?" evidence that the vast majority of the surveyed would not opt for the field they study if they had boundless opportunities at their disposal. In addition, only half (44% of students in Russia and 51% of students in Kazakhstan) of all the first-years enrolled liked studying the subjects of their major. It is interesting to note

that among those whose choice was influenced by parents or other relatives, the percentage of satisfaction with the learning process constituted 51% and 60%, respectively.

Analyzing these arguments, one can infer that making an independent decision on the choice of a future major directly affects academic performance. That is, students will be more successful in their studies if they choose a university and a department independently. By pursuing their interests and going after their dreams, learners have a better chance of graduating from a higher education institution with splendid knowledge and becoming professionals in their field [38]. On the other hand, researchers noted the importance of implementing certain measures to improve the career guidance process for students. Previous study [39] noted that adaptability to a career and self-assessment of personal career decisions are important factors of career success. They recommend developing programs that help people acquire these skills to succeed in today's changing labor market. In addition, these programs form a future balance between work and family. The authors argue that the initially constructed professional orientation contributes to a balance between work and family [40].

## 5. CONCLUSION

The study analyzed a large amount of data, including students' average academic scores and first-year students' responses to the survey. The analysis showed that many factors can influence a school graduate's decision on a future academic major. The survey results revealed three groups of factors that influenced students' decisions: family, social, and academic.

The scientific value of this study lies in the possibility of using the survey data and the conclusions. This study is relevant for those interested in the influence of family values and other factors on high school graduates' decision to obtain higher education in a digital environment. The practical significance of the study is due to the possibility of reviewing and improving the factors influencing an applicant's decision on the future profession in the context of education in a digital environment. In addition, the study provides data that are useful in expanding self-improvement opportunities for adolescents. Future researchers should focus on developing programs to improve the understanding of applicants' professional orientation. Those programs would increase students' independence in choosing a higher education major. Additional studies can pay attention to the possibility of developing teacher training programs that could purposefully and effectively improve the professional orientation of applicants choosing their higher education.





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