




# Development of an Information and Reference Application for Vocational Guidance of Students

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**Abstract:** The problem of choosing a specialty and direction when entering higher education, is now more and more urgent. Every year, according to statistics in Kazakhstan, more than 60% of university graduates do not work in their speciality of choice. This problem is more often associated with the fact that students choose a speciality and apply for a grant, and in the process of learning they understand that they do not want to work as an engineer for example and tries to find another work. Some of that problem could have been prevented if professional orientation in secondary education had been conducted in schools of Kazakhstan. Career guidance is a number of activities that need to be carried out systematically in primary and high schools. There is a lot of information available in the Internet, but being a schoolboy, a student of grade 9-10, it is very difficult to find reliable information. Consciously make an admission plan and go step by step to the goal. In my application there will be one centralized database, which would allow you to first undergo diagnostics, then make the right choice of direction and speciality. As a result, get a plan for admission to a university in any country. This article reviews the information and reference material, analyzes the market and current specialties in Kazakhstan for further employment, as well as all the necessary information to diagnose their abilities and build an individual plan for admission to university.

## 1 INTRODUCTION

Career guidance is an important aspect of human development, largely influencing the path of professional development and success, because the choice of the future profession shapes the individual's life.

Choosing a profession is an important and responsible stage in the life of a young person. The definition of the sphere of professional activity means the choice of future preferences in relation to the circle of communication, lifestyle, work environment. Career guidance has the objective of working with students towards the interaction between the present and the future for their professional self-determination.


The concepts of choosing a profession and career guidance are, by their nature, different processes, although both unidirectional. The choice of profes-


sion is carried out by each person who is determined by the sphere of professional activity: this is a process of professional self-determination, which is not necessarily accompanied by career guidance work organized in a secondary school (Belyakova and Zakhkharova, 2020)


The choice of profession is the result of career guidance. This result can be considered as a solution to one of the most important economic problems – the balance between a limited labor market and labor resources.

The right choice of profession testifies to the rational allocation of labor resources, the improvement of the institutional environment of the economy, which acts as an additional incentive for its development.

The goal and main objective of career counselling is to provide people (usually students) with the skills and knowledge they need to make important decisions throughout your life. Career counselling goals and objectives can shape an individual's future, change his outlook on life and his ability to succeed. Career de-

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velopment is a lifelong process that actually started with birth. From that day, our likes and dislikes, our abilities, background, and circumstances will all influence the type of career we choose. Career counselling is a process with the potential to help understanding the person we are, helping making the right choices, not just for the professional career for also for life. Career counselling not only helps shaping the personality but it will help being more organized and a better person, through various methods. Career counselling helps you to gain focus which can truly reflect in our deeds and work (The Purpose of Career Counseling, n.d.).

This paper focus on the development of an online career counseling application, that will aggregate information from higher education institutions, professional orders and other sources. This tool constitutes an entry point for students, providing information and answers to their questions and doubts.

The paper is structured in five sections, starting with this introduction. Section 2 describes the tools and research on the area. Section 3 describes a web-based tool for vocational guiding. The paper continues in section 4, with some practical scenarios and finishes in section 5 with some conclusions.

## 2 RELATED WORK

During the process of searching and researching the career counseling subject, it was evident that the problem of choosing a profession and further employment is transversal to all countries. The decision on the degree to follow is a fundamental moment of life, as it affects one's future (Nesterenko et al., 2021).

According to a report on the state of education in Italy, presented last year by the Italian Ministry of Education, University and Research, the percentage of students who enrolls at University right after the conclusion of upper secondary education is about 49% and it has registered a slight decrease during the last 5 years (Barana et al., 2016). Moreover, the academic path often proves to be harder than expected: only 55% of students pass more than half of the first-year exams and the 18% do not pass any of them. These results are even more alarming if we focus on engineering and technology faculties: the percentage of students who collect more than half of the credits after the first year decreases to 47% and the 21% is not able to pass any exam.

These are, many times, related to bad choices, due to insufficient information about relevant specialties and essential professions and programs. Pursuing popular programs or professions can often lead

to over saturation of the labor market, then lawyers, then financiers, leaving unfilled vacancies in other essential professions (e.g. engineers or teachers). Employers blame the lack of work experience on many graduates, and students continue to gain "experience" in Employment Centers and at the Labor Exchange.

Graduates of technical universities enjoy an advantage in employment – they are much more in demand in the domestic labor market by 75%, while humanities are in demand by slightly more than 50% (Trudbox, 2021).

Career guidance, like any other independent science, has its own history of origin. The history of career guidance as a science dates back to the late 1800s and the dawn of the 20<sup>th</sup> century. Career consultations were born in the United States due to a combination of various socio-economic reasons: the growth of industry, migration of people from rural areas to cities, and other changes accompanying rapid industrialization. The problem of searching for a job, the difficulty of employers selecting the most "suitable" people for vacant positions was more acute than ever, which led to an increased need for more organized efforts to help people find work.

The first stage of career guidance development was employment services (1890-1919) (CareerGuidance history, 2021). The founding father of career guidance is Frank Parsons: Parsons' career counseling model was based on simple logic and common sense and relied on the skills of observation and interviewing a consultant. A little later, psychological tests became an important factor and a necessary part of the first functional stage in career guidance, that is, self-assessment.

After monitoring the current situation in Russia, there are a number of tasks that hinder the correct professional choice, and therefore it is possible to put forward the hypothesis "The system of professional orientation in Russia is not built properly, career decisions for most applicants are often due to the influence of family, friends, the level of s/p and other indirect reasons, and as a result, training in a profession that is not directly correlated with their desires, opportunities and interests". This is due to personal, objective and subjective factors (Aggarwal and Shrivastava, 2021).

The survey had the participation of 50 students of the Financial University under the Government of the Russian Federation, studying at the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> courses of the Faculty of Management, in the direction of training "Personnel Management": 44 girls and 6 boys aged 17 to 23 years. The overwhelming number of respondents graduated from school in a big city - 34 people (68%), 1 person in rural areas (2%),

the rest come from medium and small towns.

As a result of the survey conducted on the identification of problems of professional orientation of young people, it is possible to identify a number of problems obtained directly empirically (Pulyaeva, 2020).

There is a big problem of insufficient awareness of young people about the world of professions: about the content of work, about working conditions, about the demand and prospects, and even about rare professions, the existence of which many do not even suspect. It is impossible to say that awareness is completely absent, since some respondents still replied that they had sufficient information or searched for it independently in various sources. The data suggest that young people get information mainly from the Internet and ask for advice from parents and relatives, which, of course, is not the merit of career guidance, but a common pattern concerning family relations and the development of information technology. Career guidance activities should use these mechanisms, but not be replaced by them.

Despite the fact that career guidance does not provide relevant information in full, young people do not show a desire to possess this information when choosing a profession, which is indicated by their inaction.

It is worth noting that applicants highly appreciate the status of an educational institution, the prestige of studying at this university, the attitude of employers to the diploma of this institution, so, one of the problems today is not only the problem of the functioning of the entire system of career guidance, but also the problem of the lack of an explicit desire to engage in self-orientation, the uncertainty of the goals of self-determination in the professional sphere, since most respondents did not even resort to the help of a professional consultant.

43.3% of those who passed any methods of diagnostics and applied to specialized centers noted that the results obtained during the study did not coincide with their real choice, and this is a clear indicator that people engaged in career guidance work are not competent enough, do not have a specialized education, but work on the basis of a banal passing of the simplest test, which is available to every user on the Internet, and voicing the automatically obtained result. All this activity creates only visibility and is carried out without a significant impact.

Students are convinced that after they have entered the university, it no longer makes sense to change their profession. This is another indirect problem of career guidance. Society dictates the rules and criteria for building a successful career, which excludes making mistakes and their further correction. Finally,

more than half of the students are not sure that they will work in their specialty.

Summing up the results of the survey as a whole, it should be noted that according above (section 2) the hypothesis given earlier are absolutely confirmed by empirical data. The creation of a concept of psychological and pedagogical support for self-determined people, expressed with the real support of experts, scientists, specialist consultants, families, medical institutions, industries, mass media, government agencies, etc. significantly increase the effectiveness of professional orientation, and it is also important for eliminating the shortage of staff. To do this, it is necessary to pay more attention to the profile education of specialists working in the field of career guidance and to increase the degree of involvement of relevant social partners-representatives of professions to create an interesting and diverse environment (circles working together with professionals in their field, industrial excursions, etc.), in the process of teaching and raising children, starting from kindergarten and ending with people who already have an education, working in the profession, but experiencing the painful consequences of a wrong choice (Pulyaeva, 2020).

A distinctive feature of the career guidance system in Japan is that it is almost entirely concentrated in high school, and not in specialized centers (Ukko, 2021). Career guidance here is deeply integrated into the educational process and forms the core of the curricula for secondary schools. In Japan, career guidance begins in the seventh grade. To control the formation of the readiness of 12-14 year-olds to consciously choose their professional path and to prepare for the profession.

The rector of the University of Asia, Professor Sh. Fukuyama, has developed a special test to quantify this ability of schoolchildren (Marsh, 2019). This test was called the "F-test" (Fukuyama-test) to assess the ability to methodically choose a profession. Since 1950, it has been repeatedly used in many schools in Japan, which made it possible to take measures to improve career guidance for this stage of education.

In 1972, the test was published. From this the author pays special attention to the cross-cultural comparison of test results. Thus, a significant role was played by comparing the data of Japanese and American schoolchildren, since it was from the USA that the new educational system and some significant principles and methods of career guidance were taken, which were reflected in the basic concepts and specific methods of career guidance in Japan. The name of the test, where "methodical choice" is indicated, reflects the technology, or the procedural characteristic of decision-making, the sequence of actions that

makes it related to “methodological theory of the choice of professions” by the founder of the American career guidance F. Parsons (Inaba et al., 1992).

Also, external factors may influence the student in making decisions for future profession. There are three main pervasive factors investigated in this study in influencing the career decisions of youths in both individualistic and collectivist societies. In collectivist societies, parental intervention is understood as a requirement to support their children’s efforts and equip them to be responsible and economically productive. Meanwhile, the standard practice in society is for parents to endorse their children’s opinions and encourage them to choose careers that make them happy. Overall, further research is imperative to guide the understanding of parental influence and diversity in bicultural and migrant youths’ career prospects and their ability to use the resources available in their new environments to attain meaningful future career goals. Additional research, particularly qualitative, is required to explore the level of family involvement in youths’ career choices among migrant families in different cultural settings (Abbas et al., 2021).

However, in practice, most of students make their decisions with the help of their parents, choosing traditional professions or following a family dynasty profession, where their grandfather is a doctor, the father also a doctor and so, the son must also choose to be a doctor. This may hinder or wrongly influence the career choice (Akosah-Twumasi et al., 2018).

To support students to select the higher education degree area and to allow them to get information about the possibilities, a web-based tool was developed for vocational assistance.

### 3 WEB-BASED VOCATIONAL ASSISTANT

A possible solution of the career guidance problem is the development of an information and reference application for vocational guidance of students. This application include a centralized database of universities from various countries, organizing information by region and by universities’ requirements. The entry to the application is a mosaic of the universities and a search box, that can filter by country or university program they need (Figure 1). When the student click on an item, they can see all the information about that countries university and their requirements.

The web application also includes diagnostic tests by different psychologists to identify students inclinations and abilities. Then, in the main part of application, online support is available, with feedback for

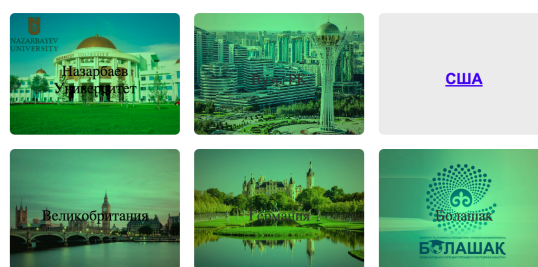


Figure 1: Mosaic of University.

each student (Figure2).

After finishing the test, students can see the result listing suitable specialities, according to answers. The methodology of these tests is based on the classification of professional interests. They allow to determine in which area it is best for a high school student to choose a specialty in which he will undergo vocational training after school.

According to this classification, the world of modern professions can be divided into 5 main types:

1. “Man is nature” (P). Representatives of these professions share one very important quality - love of nature. But love is not contemplative, which almost all people possess, considering nature to be the most favorable environment for recreation, and the active one is connected with the knowledge of its laws and their application. It is one thing to love animals and plants, to play with them, to enjoy them, and quite another thing to regularly, day after day, take care of them, observe, treat, walk, regardless of personal time and plans. A specialist should not just know everything about living organisms, but also predict possible changes in them and take measures. Initiative and independence in solving specific tasks, care, patience and foresight are required from a person. A person working in the field of “man-nature” should be calm and balanced;
2. “Man-technique” (T). The peculiarity of technical objects is that, as a rule, they can be accurately measured in many ways. When processing, converting, moving, or evaluating them from an employee accuracy and certainty of actions are required. Technology as an object of ore presents ample opportunities for innovation, invention, creativity. Therefore, qualities such as practical thinking becomes important. Technical imagination, the ability to mentally connect and disconnect technical objects and their parts are important conditions for success in this field;
3. “Man is a sign system” (H). We meet with signs much more often than we usually imagine. These



Figure 2: Types of career guidance diagnostics according on request.

are numbers. Codes, conventional signs, natural or artificial languages, drawings, formula tables. In any case, a person perceives a sign as a symbol of a real object or phenomenon. Therefore, it is important for a specialist who works with signs to be able, on the one hand, to abstract from the real physical, chemical, mechanical properties of objects, and on the other, to represent and perceive the characteristics of real phenomena or objects behind the signs. To work successfully in any profession of this type, it is necessary to be able to mentally be immerse in the world of seemingly dry designations and focus on the information that they carry in themselves. Special requirements of this type of profession are imposed on attention;

4. “Man is art” (X). The most important requirements imposed by professions related to visual, musical, literary, artistic, acting and stage activities of a person are the ability to the arts, creative imagination, imaginative thinking, talent, diligence;
5. “Man-man” (H). Even choosing a profession that is not directly related to communication, the right thing is usually associated to the attention payed to sociability and contact. Think about where you are going and how you address people. Who would you like to communicate with - yourself or others? The main content of work in professions like “man-man” is reduced to the interaction between people. If this interaction does not improve, then the work will not improve either. Qualities necessary for working with people include calm,

good mood in the process of working with people, the need for communication, the ability to mentally put yourself in the place of another person, quickly understand the intentions, thoughts, mood of people, the ability to understand human relationships, good memory (the ability to keep in mind the names and characteristics of many people), the ability to find a common language with different people, and patience (Klimov, 2021).

Based on these, an example of a possible test could point to a “Man-Man” type profession. This includes professions focusing in communication with people and their mutual influence, such as doctor, teacher, manager, teacher, psychologist, salesman, coach. An important quality in these professions is not only the desire, but also the ability to actively interact with people and communicate productively. Important specifics in the preparation are good knowledge of the professional sphere and developed communication skills. With this result, the student could start approaching one of the following professions: Psychology, SMM Manager, Internet Marketer, Project Manager, Marketing, Management.

In addition, if individual consultation is necessary, it should also be possible to access an online bot (virtual counselor), which will use the database of frequently asked questions to select the most acceptable advice. After analysing all the abilities, grades and the virtual counselor will show the individual plan to student with several possible universities, with their requirements and steps that should student make to achieve the goal.

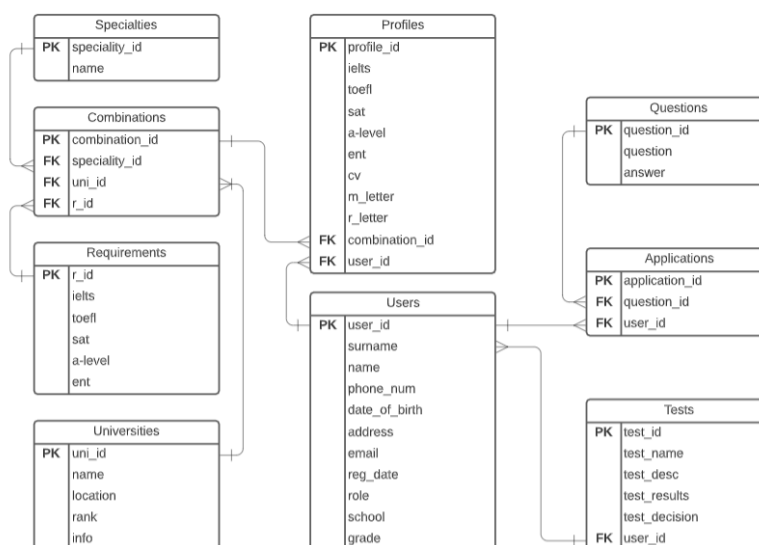


Figure 3: Entity–relationship model.

The information is stored in a MySQL database, structured in nine entities (Figure 3).

The web application is being developed in PHP and technologies such as HTML, CSS, and JS, ensuring user-friendly interface and functionality. Users are structured in two roles: an administrator who has access to all pages, including management pages, where it is possible to update, add or delete data from the database using SQL queries; and users, who have access only to the general functions of the site, such as the selection of information about universities, access to the profile, as well as to the analysis of their test results (Figure 4).

#### 4 PRACTICAL SCENARIOS

The web application is currently in development and we expect to have a prototype for testing in Kazakhstan. After eventual improvements and corrections, it will be extended with information from other countries.

Nowadays there is no such similar application for secondary schools. This application is the centralized data base of all information needed for student to make decision and best choice of their future speciality. Using this application gives good support for high school student. This application is free and has user friendly interface with opportunity to communicate with online counselor if while the process some question occur, also it will analyse all students requests and in the end will give more suitable option and plan for student.

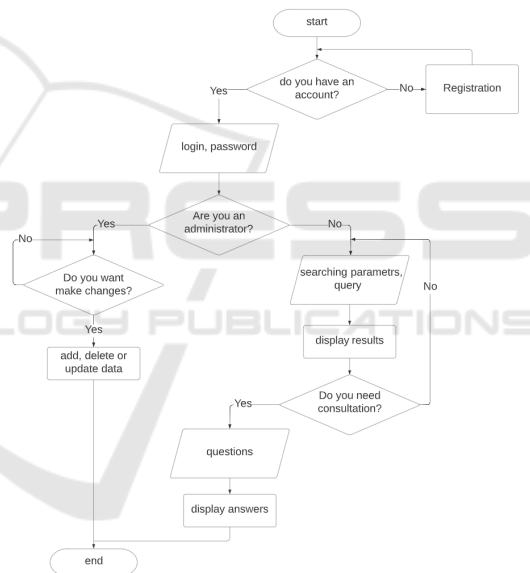


Figure 4: Flowchart.

The benefits of the application is that the all information needed will be in one place. Students and their parents find information, answers all the questions using only this application. Also the main benefit is that it will be free and all graduates can use it regardless of social status and other factors.

#### 5 CONCLUSIONS

Each year, one of the main problems of all school graduates is career choice. Because of sparse information, students are prone to wrong choices, thus en-

rolling in areas and institutions that are not suitable for them and their capabilities.

This paper described the importance and design of an online career counseling application, for vocational guidance of students. The main goal of this application is to provide a service for career and university selection advice for students, through centralized information and virtual vocational assistant for students. So they can without searching the information in different resource, using only this application make their decisions.

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