Evaluation of Factors Affecting the Activity of University Students as Specialists in Modern Research

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Abstract: A student with basic knowledge (who receives this knowledge directly from traditional education) is often not satisfied with the knowledge in the specialty he/she has acquired during the educational process. He/she prepares himself/herself as a future specialist through other possible means. Using the opportunities provided by society, the student improves and develops throughout the academic years. At the same time, one of the main problems is assessing the knowledge acquired by the student in traditional education and in extracurricular activities. The article provides a comparative analysis of the models applied in various studies to assess the knowledge and skills of the student during his/her studies at the university. As a result of the analysis, it became clear that researchers mainly study the behavior and success of the student, his/her extracurricular knowledge and skills, individually for each academic year. In the studies, the skills arising from basic knowledge, the student's personal interests, social activities, language skills, etc., are examined, and the data collected through various surveys are systematized, and various models are proposed, taking into account cause-and-effect relationships. The models proposed in the studies allow predicting the direction in which the student is formed as a specialist. On the other hand, using the results, it is possible to direct the student more correctly, taking into account his personal abilities.

Keywords: Assessment of students, educational performance, individual characteristics, personal interests, language skills, fuzzy model

1. Introduction

Modern information technologies allow solving problems that arise during the acquisition of knowledge, regardless of where it is stored or financial, administrative, or other constraints. The global network can deliver large volumes of information resources digitally to any user. The ability to access information from various sources allows you to answer any query and find related information. Since they do not require special knowledge from users (in terms of technical or software knowledge), these resources are accessible to every user. In such a situation, the task of adapting the modern educational process to this situation is also faced. These resources are accessible to every user because they do not require special knowledge (both technical and software). In such a situation, the task of adapting the modern educational process to this situation is also faced. In this case, each student in the education system becomes the subject of his own development, is constantly in search, and does not limit himself to the knowledge provided by standard education. Naturally, the student wants to adapt to the requirements of the labor market, and to realize

himself as a specialist in the future, he also tries to establish active relations with the environment. Only in this case can the student express himself and develop to the fullest.

Thus, each student, who has basic knowledge, improves and develops as a "student" of the university throughout the entire educational process, using not only the knowledge provided in traditional lectures, seminars, and laboratory subjects but also various sources the internet, knowledge provided in various educational courses, and information obtained by participating in quizzes, subject Olympiads, symposiums, and conferences [1]. In this case, one of the main problems is to determine the extent to which the knowledge acquired by the student affects his or her development as a future specialist [2].

2. Analysis of Existing Studies

A fuzzy model is proposed to assess the impact of students' extracurricular activities on their academic performance using a Bayesian approach [3]. It is noted that the model can consider various types of extracurricular activities that a student engages in in addition to their major.

A model is proposed for how information provided in standard education is stored in a student's memory and used during academic attestation, depending on the student's psychophysiological characteristics [4]. The study refers to the student's sociability, emotional stability, preference, responsibility, etc., characteristics. The influence of individual characteristics on the results of attestation was studied through a sociological survey [5].

A review of Blackboard, Desire2Learn, Moodle, WebCT, Sakai, Virtools, WorldToolKit, Juggler, Dolphin, ToolBook, Act3D, Amira, Unity3D, Alternativa3D, and other systems widely used in modern education showed that, as a rule, a modern educational system is actually a collection of static hypertext documents. All students receive the same educational material and similar tasks to manage the acquired knowledge and skills, regardless of their individual characteristics [7]. On the other hand, the collective activities of students during the attestation stage require a different approach to the mechanism of their knowledge acquisition [8].

The current era, characterized by rapid technological changes and the application of artificial intelligence in most infrastructure and production areas, places high demands on the quality of training specialists for the formation and development of the information society. One of the main requirements for university graduates is that they must possess a number of professional and psychological characteristics that can provide them with a high rating in the competitive labor market.

Naturally, when choosing a future professional direction, a student should evaluate not only his desires and aspirations but also his opportunities arising from his personal qualities [9]. In some cases, these assessments are incomplete because they are subjective, in which case the student seeks to meet these requirements by changing the direction of their extracurricular activities [10], [11]. Of course, to give the future specialist the right direction by taking into account individual characteristics, we must have a model that evaluates these characteristics [12]. Researchers use various methods to model the role of individual characteristics in the formation of a future specialist, including quantitative assessments of competencies with a systematic approach [12], based on various social surveys, such as the 16-factor Kettell survey [13], or psychological tests [14]. It should be noted that the main idea in modeling the impact of individual characteristics on specialist training is that these characteristics are not uniform and depend on subjective assessments. It is under these conditions that various researchers prefer fuzzy models[15], [16], [17]. The fuzzy approach has shortcomings, particularly that it can model individual characteristics not assessable with quantitative measures through membership functions, making this methodology necessary.

3. Comparative Analysis

Activities related to quality control of specialist training at the university should cover all areas of the educational process, as well as quality control of the resources that provide this activity [1]. In some cases, assessments of the quality control of specialist training are subjective in nature because they are influenced by various objective and subjective problems and difficulties. One of the most important of these problems is the problem of monitoring and evaluating the development of students' general cultural and professional competencies. In the training process, researchers face serious difficulties due to uncertainty in determining the nature and structure of competencies, as well as the methods and tools for their monitoring and assessment. According to sociological studies, most researchers identify the lack of reliable and convenient assessment methods as a significant problem [18]. However, it should be noted that many researchers prefer traditional assessment of knowledge, since the factors in the process of assessing specialist training are probabilistic and sometimes uncertain. This assessment occurs at all stages of education: ongoing assessment in seminar and laboratory classes, midterm assessment of students, and final assessment of graduates. As a result, although the higher education system is said to be focused on developing skills in students, in reality, a situation arises where traditional knowledge is valued.

Researchers prefer to use risk analysis in assessments [19]. It is known that in risk theory, the probability of making incorrect or unnecessary management decisions arising from the characteristics of certain events and types of human activity, or the probability of obtaining unplanned results when carrying out a certain activity, is considered risk [20], [21], [22].

The research study analyzes the methodological foundations of a “serious games”-based measurement mechanism for assessing the professional skills of university students [23]. The study was carried out through observable behavioral indicators within game scenarios for competency indicators (problem solving, decision-making, collaboration, and systematic thinking). The assessment process was based on quantitative measurements and statistical analyses, and compared with traditional survey and test methods. The results indicate that the serious games approach increases the reliability and discriminability of the measurement and reduces the risks of subjective assessment. This methodological framework acts as an alternative model that can be applied to multidimensional and dynamic assessments of professional levels in higher education. Another research study was conducted to examine the structural and methodological foundations of a pedagogical assessment model aimed at diagnosing the professional and cultural competencies of higher education students [24]. The authors have developed a multidimensional assessment framework for cognitive, behavioral, and value-oriented components by dividing competencies into a system of measurable indicators. The diagnostic process is based on a combination of tests, observation protocols, and expert assessment methods to collect empirical data. The collected data is analyzed through statistical processing, allowing for differentiation of competency levels. The article makes a scientific contribution to the field of professional-level assessment in higher education by presenting a systematic methodological approach that increases the reliability of pedagogical diagnostics and the objectivity of measurement. The main goal of universities' activities at all levels of modern higher education, undergraduate, graduate, and postgraduate, is to prepare qualified specialists who are ready for professional activity and development, have social and professional mobility, and can adapt to changing external conditions [25], [26], [27].

As is known, the state standards for specialty modules include competencies that characterize the specificity of the educational process and the quality of training for modern university graduates. The structural elements of competence are a generalized expression of experience consisting of the integration of activities arising from the individual characteristics of the student, teaching methods, and techniques for solving problems that may occur in teaching into a single unit. The main requirement for competencies includes the constant updating and enhancement of knowledge and the acquisition of new information by university

students to successfully solve tasks. The university raises the issue of the continuity of competence development at all stages of training, from the first stages of higher education to the final years, and requires the consideration of specific competences in each direction of training [28].

Educational institutions around the world provide guidance and counseling services to help students effectively overcome life's challenges and obstacles. Researchers have extensively analyzed the factors that may influence students' academic performance[30], [31]. Previous studies have used correlation analysis, decision trees, and random forests to identify factors affecting student performance [32].

Fuzzy sets have been used to characterize students' knowledge status, which has highlighted the lack of collaborative support and feedback in e-learning systems [33]. Similarly, other researchers have compared recommender system methods with traditional regression methods and applied them to educational data for intelligent tutoring systems, increasing the accuracy of predicting student performance [34]. The authors discussed building a semantic student profile using fuzzy logic and online survey results that only use knowledge about students' interests and style to predict students' learning preferences based on their interests and learning style[35]. Later, some authors emphasized the application of fuzzy sets to data representation, claiming that self-awareness is essential to their model [5], [17]. Several studies have proposed systems that identify different stages of truancy and offer motivational phrases and advice to support students in different scenarios[2]. A system based on comprehensive information about students' grades in various subjects provides results that increase the efficiency and accountability of decision-making and improve the educational system at the university[36]. An intelligent system for determining student progress has been developed using various methodologies such as the Big Five Factor and Five Factor Model, intelligence quotient tests, and self-assessment [37]. The contributions of this work include data set collection; comparative analysis, which machine learning algorithm is better at predicting openness to new opportunities and career readiness; and providing empirical evidence of the interaction between career aspects of students' personalities and their impact on transition readiness.

4. Conclusion

The models proposed in the analyzed research studies are built for a specific case, taking into account the profile of each university and the profile of the specialty. Naturally, these models cannot be applied to other universities without the same changes**.** This is primarily due to the fact that the parameters used in building the proposed models are of different natures: deterministic, probabilistic, and fuzzy. On the other hand, each university is independent in terms of both its internal structure and educational activities, which individualizes the educational process. Currently, in most universities, the average grade of academic performance is taken as an indicator of a student's success, while in others, the student's behavior and social activities also affect successful completion of the university. On the other hand, the availability of social and technical infrastructure at universities (library, cafeteria, dormitory, cultural events, etc.) directly and indirectly affects students' academic success. It is known that a student choosing a professional career should evaluate not only their dreams and aspirations but also their capabilities arising from their personal qualities. Researchers use various methods to model the role of individual characteristics in the formation of a future specialist. These methods include quantitative assessments of competencies using a systematic approach based on various social surveys, such as the 16-factor Kettell survey or psychological tests, as well as fuzzy models, correlation analysis, decision trees, and random sampling methods. Studies have shown that while the main factor in assessing a student's level of preparation is their academic performance, universities also require students to demonstrate cultural competencies. The main reason for this is that the structural elements of competence are a generalized expression of experience consisting of the integration of activities arising from the individual characteristics of the student, teaching methods, and techniques for

solving problems that may occur in teaching into a single unit. The university raises the issue of the continuity of competence development at all stages of training, from the first stages of higher education to the last courses, and requires the consideration of specific competences in each direction of training.

Author Contributions

All authors participated in writing the manuscript, critically revised it for important intellectual content, and approved the final version for publication.

Conflict of Interest

The authors declare no conflicts of interest.

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