GRADE POINT AVERAGE: THE RELATIONSHIP WITH RESULTS OF ENTRANCE ASSESSMENT, LEARNING MOTIVATION, ACHIEVEMENT MOTIVATION, AND PERCEPTION OF TEACHER LEADERSHIP

Nataliia Sereda[1]✉
Svitlana Reznik[1]
Tetiana Solodovnyk[1]
Zhanna Bogdan[2]
Oleksandr Romanovskyi[1]

[1]National Technical University «Kharkiv Polytechnic Institute», Ukraine

[2]Simon Kuznets Kharkiv National University of Economics, Ukraine

✉ nataliia.sereda@khpi.edu.ua

ABSTRACT

The purpose of this study is to determine the relationship between the GPA of graduates of social majors at National Technical University «Kharkiv Polytechnic Institute» (Ukraine) with the results of the entrance assessment, learning motivation, achievement motivation, and perception of teacher leadership, based on the correlation and regression analysis of the study with a total of 502 respondents.

Results of the presented study demonstrate a significant correlation between the level of academic success and the level of educational and cognitive motivation of graduates (r = 0.644, p < 0.010). A less strong connection was found between graduates' GPA and the entrance examination results (r = 0.502, p < 0.010). The weakest, albeit statistically significant, relationship is between GPA variables and students' perception of teacher leadership (r = 0.160, p < 0.010), as well as between GPA and motives for creative self-realization (r = 0.139, p < 0.010). The article also carried out a correlation analysis for groups of students by level of education, form of study, majors, and gender of respondents. Obtained results are discussed with the purpose of improving the procedure for selecting applicants for admission to universities and improving the educational process.

KEYWORDS

Achievement motivation, entrance assessment, Grade Point Average, learning motivation, teacher leadership

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Highlights

- *Compared to other variables researched, students' educational and cognitive motives have the strongest connection with GPA.*
- *The focus on reforming the system of admission in Ukrainian HEI should be based on a statistical assessment of its effectiveness.*
- *The identified relationships between GPA and student motivation can be utilized to improve students' learning outcomes.*
- *The students' perception of their teachers, particularly their leadership skills, is also important for the educational process results.*

INTRODUCTION

The results of teaching and learning in universities are characterized by a number of indicators, including the academic performance of students. During the study process at Higher Education Institutions (HEI), the most complete academic performance is represented by the average score of the graduate's diploma (GPA), as the entire period of a student's education and the success of their studies in all disciplines of the curriculum are taken into account. GPA can be related to many different factors. In our research, we focused attention, firstly, on the results of the entrance assessment (competition score) as a reflection of the level of initial training of students,

secondly, on the motivation of students as a reflection of their interests, desires, and aspirations, and, thirdly, on their perception of teacher leadership.

Students' perception of teachers is important for learning outcomes (Nabaho et al., 2017). Havik and Westergård (2020) determined the relationship between students' perception of classroom interactions, teachers' emotional support, and the involvement of students in the learning process. Marksteiner et al. (2021) determined that the peculiarities of students' perception of their teachers may be associated with the frequency of their unethical behavior (writing off homework and exam tests). Students' perception of teachers is a component of the educational environment that affects students' learning and academic achievements (Shah et al., 2019) and may be related to student motivation (Noels et al., 1999).

Our study includes students' perception of teacher leadership due to the fact that such leadership aims to improve students' learning and success level. However, the problem of the relationship between teacher leadership and students' achievements has not been studied enough by empirical methods of research (Wenner and Campbell, 2017).

Student's learning outcomes can also be influenced by the particular characteristics of admission to HEI. In Ukraine, after graduation from high school, applicants for HEI are based on the calculation of the competitive score. In 2008, a radical reform took place in the system of admission for the bachelor's level of education, which introduced External Independent Testing (EIT) instead of entrance exams, which were organized and conducted by each HEI independently. Bekeshkina et al. (2015: 5) note that the EIT system «made it possible to improve the efficiency and fairness of the HEI admission system». Since 2010, the competitive score for admission has been calculated based not only on the EIT results but also on the average score of the secondary education document (average score of the school leaving certificate).

At the same time, reforms in the admission system to HEI at both the bachelor's and master's levels of education in Ukraine still go on, and certain changes occur almost every year. These changes need to be evaluated in terms of their effectiveness, feasibility, and impact on students' further education at HEI. However, a generalized statistical assessment of the reform at the all-Ukrainian level was carried out based on the results of admission to the bachelor's programs in 2008-2011 and also in 2015 (Bekeshkina et al., 2015). For the years 2008-2011, the predictive validity of the criteria for the competitive selection of students was checked, i.e., to what extent the criteria for the competitive selection of students (the EIT average score and the average score of the school leaving certificate) allow predicting the academic success of students in the first year of HEI. In 2015, only a statistical assessment of the correlation between the average score of the EIT and the average score of the school leaving certificate was conducted, and the predictive validity of the entrance assessment results was not evaluated (Bekeshkina et al., 2015).

None of such all-Ukrainian statistical assessments were conducted for the master's programmes. The State Institution «Ukrainian Center for Educational Quality Assessment» (UCEQA) carries out EIT for admission to the bachelor's degree, as well as the foreign language Unified Entrance Exam (UEE «Foreign (language)») and the Unified Professional Entrance Test (UPET) for admission to the master's program of some majors. One of the activities of UCEQA is also monitoring studies of the quality of education. However, they are carried out for primary education only (Ukrainian Center for Educational Quality Assessment, 2007). It can be noted that the reforms of the Ukrainian system of admission to HEI continue. Still, there is a lack of statistical assessment of the relationship between the results of the entrance assessment and the subsequent success of students in HEI.

It should also be noted that one of the most influential factors of successful teaching and learning is motivation (Filgona et al., 2020). Motivation is important for a student's academic progress (Hamdan et al., 2010). That is why, in our work, we decided to compare the strength of the connection between motivation and other variables and students' academic results.

Therefore, the purpose of this work is to determine the relationship between the GPA of graduates and the corresponding variables - the results of the entrance exam, students' motivation, and their perception of teacher leadership.

The structure of the article consists of an introduction with a justification of the objectives of the study, a theoretical framework with an analysis of the features of joining the Ukrainian HEI, an analysis of educational motivation and achievement motivation, the definition of teacher leadership and the justification of its importance for the educational process; the section «research methodology» provides data on the methods used and the research procedure; the obtained quantitative results are presented in the section «results of the study», and their interpretation and comparison with the results of other studies are given in the section «discussion», the article ends with conclusions drawn from the results of the study.

THEORETICAL FRAMEWORK

Learning outcomes can be influenced by various factors. The 3P learning model (Biggs, 2003) considers factors that relate to three points in time: presage, process, and product, respectively. Presage includes two major aspects: student characteristics and teaching context. Pascarella's learning model (1985) also pays attention to the structural/organizational characteristics of institutions. Trigwell and Prosser (1997) added to the Biggs model (2003) such an important factor as students' perception of the learning context. In our study, we considered the factors that characterize students (prior knowledge, motivation), as well as their perception of their teachers.

Learning motivation

Learning motivation has a significant impact on the effectiveness of student learning (Gao, 2019). Filgona et al. (2020) declare learning motivation the central element of good teaching and the single most important element of learning. Hu et al. (2016) indicate academic motivation as a key determinant of academic performance.

The results of a number of studies confirm the relationship between learning motivation and students' academic achievement (Chang and Tsai, 2022; Duchatelet and Donche, 2019; Farnam and Anjomshoaa, 2020; Titrek et al., 2018).

Teachers pay considerable attention to student motivation to ensure effective teaching and learning (Hamdan et al., 2010; Law and Chuah, 2009; Sedden and Clark, 2016; Tabatabaei et al., 2017).

According to the model by Rean and Yakunin in the modification of Badmaeva (Kominko and Kucher, 2005), educational motivation may include external (communicative, prestige, social, avoidance of failure) and internal (educational and cognitive, professional and creative self-realization) motives of the student. Since research results indicate that internal (intrinsic) motivation is more effective for the results of students' academic activities (Ghanizadeh et al., 2017; Taylor et al., 2014), the relationship between these motives and GPA is studied in our work.

Achievement motivation

Achievement motivation means striving for high results in various activities. According to the theory of Atkinson (1957, 1964) individual differences in achievements are determined by the predominance of the level of motivation to achieve success over the motivation to avoid failure. People with high achievement motivation tend to be more persistent in achieving success (Cooper, 1983).

McEwan and Goldenberg (1999) conclude that Atkinson's theory of achievement motivation is confirmed based on the fact that the participants in their experiment had high achievement motivation, and academic success was determined by their first-semester grade point average (GPA). The results of a significant positive relationship between achievement motivation and students' academic results have been obtained in a number of studies (Busato et al., 2000; Ergin and Karataş, 2018; Mahdavi et al., 2021; Richardson and Abraham, 2009).

The results of a meta-analysis by Robbins et al. (2004) found that the best predictors for the GPA of college students were academic self-efficacy and achievement motivation.

Thus, one of the tasks of our work was to compare the strength of the relationship between students' achievement motivation and GPA.

Teacher leadership

Teacher leadership is determined by the high quality of pedagogical work in the classrooms, but at the same time, «going beyond the boundaries of the classroom», which involves active cooperation with other teachers, participation in professional communities, conducting professional master classes, developing programs, etc. (Wenner and Campbell, 2017). Sometimes, teacher leadership involves a formal position, but more often, it is an informal role (Wenner and Campbell, 2017; Katzenmeyer and Moller, 2011). Teacher-leaders influence students, other teachers, the professional-pedagogical community, the educational institution, but the ultimate goal of their leadership is the improvement of the educational process and the students' success (Wenner and Campbell, 2017).

Sometimes, the leadership of scientific and pedagogical workers of universities is considered exclusively in the context of their scientific activity. Liu et al. (2016) developed a mechanism for calculating the bibliometric indicator of Academic Leadership, which makes it possible to evaluate the effectiveness of the teacher's research activities as the ratio of the results obtained and the resources used. At the same time, a number of researchers do not consider it right that in the evaluation of the leadership of teachers at universities, more attention is paid to the research activities of teachers than to their success in teaching (Hofmeyer et al., 2015; Nunn and Pillay, 2014).

Draper et al. (2015) especially emphasize the interconnectedness of leadership and innovation in teaching. Leadership is important for innovation in education through the following: leading by example, creation of professional teams and communities for interaction aimed at improving the education process, persuasion, and influence. Wenner and Campbell (2017) in their review of theoretical and empirical research on teacher's leadership in K-12 schools conducted between 2004 and 2013, they report that the teacher's leadership is the second most important factor affecting the students' learning.

At the same time, scientific and teaching activities can be interconnected. Swihart et al. (2016) conducted a study at 33 research universities in the United States, showing that teachers with a bigger number of scientific results (number of publications and citation indices) were more effective. Still, this dependence was the lowest for teachers of social and management disciplines.

Taking into account the importance of teacher leadership in improving the educational process, in our work, we studied the relationship between students' perception of their teachers as leaders and their GPA.

Peculiarities of admission to higher education institutions in Ukraine

After receiving a general secondary education, a person has the opportunity to enter Ukrainian Higher Education Institutions. The terms of admission to higher education (both the first bachelor's and second master's level of education) are subject to approval by the Ministry of Education and Science of Ukraine every year. Every year, in these conditions, there are certain changes related to the search for optimal ways to admit applicants to study at HEI. Changes could relate to the number of applications that applicants could submit, the rules for providing places for study at the expense of the state budget, the rules for passing competitive selection, etc. (Ministry of Education and Science of Ukraine, n.d.). For example, the innovations of 2016 included the acceptance of documents for admission exclusively in electronic form through the electronic cabinets of the applicant, the ability to submit 15 applications for five different specialties under the state order for full-time education, and the introduction of a new principle for the distribution of places of study at the expense of the state budget for those students who scored the highest scores in the competition for a particular specialty in Ukraine (Ministry of Education and Science of Ukraine, n.d.).

There are different rules for admission of applicants to HEI in the world practice. High-quality selection in HEI should be based on the readiness of applicants for higher education as well as take into account the accuracy of predicting the learning success of students in HEI (Maruyama, 2012). In the USA, it is a common practice to use tests of educational competence - Scholastic Assessment Test (SAT) и American Test College Programme Assessment Test (ACT). The SAT contains a verbal and math subtest. The ACT contains four subtests: English, math, reading, and scientific reasoning. SAT and ACT are among the best predictors of academic performance in college (Coyle, 2006).

In Ukraine, when entering a bachelor's degree, applicants take subject tests that determine the results of learning in various subjects in the scope of the secondary school program. In 2010-2012, in Ukraine, an experiment was carried out on the use of a test of general educational competence, but it did not gain wide use. For admission to HEI, an applicant should choose the specialty in which he wants to study, and entrance tests depend on this specialty (only the Ukrainian language test is mandatory for everyone). The testing procedure involves passing External Independent Testing (EIT), which is conducted in specially organized testing centers.

For example, the students of the specialty «Psychology» participating in our study for admission to the bachelor's degree compiled EIT in three subjects: Ukrainian language and literature (as mandatory), biology (as profile), and a test on choice of the following subjects - History of Ukraine, Mathematics and/or Foreign Language. In 2021, there were changes in the rules and mandatory subjects for the specialty «Psychology» became Ukrainian Language and Literature and Mathematics, and it was suggested to choose one subject from six: History of Ukraine, Biology, Foreign Language, Physics, Chemistry, and Geography (Ministry of Education and Science of Ukraine, n.d.). For each test, a threshold score is determined, the only one for the whole of Ukraine, and defining the border «passed / failed the test». In the future, participation in the competition depends on the total of points scored and assumes that applicants with the highest scores enter the HEI.

Admission to master's degrees in Ukraine is also being reformed. The students who participated in our study for admission to the magistracy passed a test in Foreign Language (mandatory for all specialties) and a professional entrance test (depending on the specialty for which the applicant is applying). The third variable in determining the competitive score is the average score of the bachelor's degree.

It is common for undergraduate or graduate admissions to use a 600-point grading scale to determine the overall competitive score. If necessary to transfer one scale to another, generally recognized scales are used (for example, in cases where the applicant's scores on a document on previously received education are set on a different scale) (Ministry of Education and Science of Ukraine, n.d.; National Technical University «Kharkiv Polytechnic Institute», n.d.).

Master's Admission Reforms Concern Testing Procedure and Test Content. The focus on subject testing remains, but starting from 2017, gradually, for some specialties, not only the definition of the subject but also educational competencies become a component of professional testing. However, in 2021, this rule has not yet been extended to all master's degrees within Ukraine.

The change in the procedure for admission to the magistracy consists of the gradual, starting from 2016, the conduct of entrance examinations not in the educational institutions where applicants enter but in independent centers, similar to the EIT carrying out. The testing for admission to the master's degree in these centers was called the Unified Entrance Exam in a foreign language (UEE (FL)) and the Unified Professional Entrance Test (UPET).

Due to the insidious military aggression of Russia against Ukraine, the rules for entry in 2022 were simplified to preserve the intellectual potential of the nation and ensure the safety of test participants.

The post-war revival of Ukraine will also require a definition of what higher education should be, what the entrance should be for applicants to higher education, and what reformation paths will need to be chosen in the future in order to make education effective and meet the social demands of Ukrainian society.

MATERIALS AND METHODS

Participants

The study took into account the results of graduates of three years (2018 - June 2020) of the Department of Pedagogy and Psychology of Social System Management named after academician I.A. Ziaziun of the Faculty of Social and Humanitarian Technologies of National Technical University «Kharkiv Polytechnic Institute» (NTU «KhPI», Ukraine). The work was carried out within the framework of departmental studies of the problems of increasing the efficiency of the educational process of students of the department and studies of leadership in education. The total number of graduates of the mentioned Department in the specialties «Psychology», «Educational and Pedagogical Sciences» and «Public Management and Administration» was 562 people during this period. However, some of them did not answer the questions of the test and questionnaire in full. Also, a small number of students transferred to study at NTU «KhPI» from other educational institutions. Therefore, their competitive scores on the entrance assessment were not taken into account. So, statistical calculations were carried out for 502 respondents. 271 of them were full-time graduates, 231 were part-time graduates, 168 were bachelor's degree graduates, 334 were master's degree graduates, 124 were male, and 378 were female.

Instruments

The results of the entrance assessment of applicants, which are taken into account for participation in the competition and enrollment for training, are published every year in the public domain on the website (Unified State Electronic Database for Education, n.d.), which data were used by us in our work. As it has already been noted, the competitive score of applicants for both bachelor's and master's programs was calculated on a 600-point scale, taking into account the results of the relevant subject tests and the average score of the diploma of preliminary education, which allows for statistical calculations and comparisons of results.

The academic success of students in the Ukrainian HEI is assessed by teachers simultaneously on three scales: traditional for Ukraine (which existed even before joining the Bologna Process) four-point scale («excellent» - five points, «good» - four points, «satisfactory» - three points, «unsatisfactory» - two points), one hundred points (0-100) and the scale of the European Credit Transfer and Accumulation System (ECTS) (A, B, C, D, E, F, FX). We used a more accurate and flexible scale, namely a 100-point one in our study. The GPA was calculated according to

the practice accepted in Ukraine as the sum of the points received by the student for the entire period of study, divided by the number of grades (Bekeshkina et al., 2015).

The study also used the results of assessing the positive motivation of students' learning, which were determined by three scales of the methodology for diagnosing the learning motivation of students, developed by Rean and Yakunin in the modification of Badmaeva (Kominko and Kucher, 2005): educational and cognitive motives, professional motives and motives of creative self-realization. The methodology provides for students' answers to a set of questions on a 5-point Likert scale: 1 point corresponded to the minimum significance of the motive, 5 - to the maximum. The scale of educational and cognitive motives involves diagnosing students' interest in new knowledge and the desire to learn successfully; the scale of professional motives determines the propensity for a particular profession, education for implementation in future professional activities; the scale of creative self-realization is aimed at determining interest in creative activity. In total, there were 15 questions of the methodology on these scales, and the arithmetic mean of the students' answers was determined for each scale (Kominko and Kucher, 2005).

Diagnostics of students' achievement motivation was determined according to the Ehlers method. Students gave «yes» or «no» answers to 41 questions; the number of points according to the method was calculated using a corresponding key, according to which one point was awarded for answers «yes» or «no» to certain questions (Danylchenko and Vertel, 2012).

Students' perception of teacher leadership was determined by a questionnaire. Graduates were asked to answer the question, «During your studies at the University, how often did your lecturers show teacher leadership?» in accordance with a 5-point Likert scale: 1 - very rarely; 2 - rarely; 3 - mediocre; 4 - often; 5 - very often. It should be noted that leadership is one of the scientific directions of the graduation department of these students, and some of them participated in research in this field. This was manifested through participation in student conferences and seminars, writing theses of reports and articles, as well as in the topics of coursework and final qualification papers. Almost every student studied one or more leadership courses, including the «Pedagogical leadership» discipline. In addition, the students' conscious answers to the questions of the questionnaire were facilitated by the instruction and discussion with them of the essence of the concept of «teacher leadership».

Data analysis

Correlation-regression analysis was used to assess the relationship between variables. Correlation analysis allows you to assess the strength of the relationship between variables. This type of statistical analysis is used to assess the predictive validity of input assessment methods (Bekeshkina et al., 2015; Westrick et al., 2019). The study used Pearson's correlation coefficient for statistical analysis. It is widely used in science to measure the degree of linear dependence between two variables, which takes values between or equal to −1 to +1 (Stigler, 1989). Regression analysis provides an opportunity to obtain more information and determine the degree to which changes in one variable can lead to changes in another. However, the mutual correlation of variables among themselves (Table 1) in our study does not allow applying regression analysis in these cases. Therefore, the construction of the regression model was carried out only for several independent variables. The quality characteristic of the regression model is determined by the coefficient of determination (R squared), which shows what percentage of the variation of the dependent variable is explained by the variation of the independent variable. Another important indicator in calculations is the F-test, which is used to assess the significance of the coefficient of determination (Rouaud, 2013).

Null hypotheses (H_0) were formulated that no statistically significant relationship exists between the average score of the graduates' diploma (independent variable) and the corresponding dependent variables (results of entrance assessment, professional motives, motives of creative self-realization, educational and cognitive motives, achievement motivation, students' perception of teacher leadership). For example, H_{01}: there is no statistically significant relationship between the average score of a graduate's diploma and their entrance exam result. When the calculated values were below the significance level of 0.05, the null hypothesis was rejected. Descriptive statistics are presented in Table 1. The average GPA was 85.020 ± 8.200, the average result of the entrance assessment was 460.570 ± 67.020, the average values of professional motives, motives for creative self-realization, educational and cognitive motives were, respectively, 3.770 ± 0.88.000, 3.710 ± 0.970, 3.440 ± 0.810, achievement motives were 17.300 ± 4.070, perception of teaching leadership was 3.020 ± 1.120.

Variables	Min	Max	*M*	*SD*
Grade Point Average	64.520	98.760	85.020	8.200
Result of entrance assessment	189.000	600.00	460.570	67.020
Professional motives	0.800	5.800	3.770	0.880
Motives of creative self-realization	0.500	5.000	3.710	0.970
Educational and cognitive motives	1.000	5.000	3.440	0.810
Achievement motivation	3.000	28.000	17.300	4.070
Perception of teacher leadership	1.000	5.000	3.020	1.120

Table 1: Descriptive statistics for all study variables

RESULTS

The results of the correlation analysis for the entire sample of graduates (502 people) are presented in Table 2. As can be seen from Table 2, GPA and the competitive score of the entrance assessment are significantly correlated with each other ($r = 0.502$, $p < 0.010$); however, the relationship between

GPA and the level of educational and cognitive motivation of graduates is stronger ($r = 0.644$, $p < 0.010$). The weakest, albeit statistically significant, relationship is between variables representing GPA and students' perception of teacher leadership ($r = 0.160$, $p < 0.010$), as well as between GPA and motives for creative self-realization ($r = 0.139$, $p < 0.010$).

Variables	Grade Point Average	Result of entrance assessment	Professional motives	Motives of creative self-realization	Educational and cognitive motives	Achievement motivation	Perception of teacher leadership
Grade Point Average	1.000						
Result of entrance assessment	0.502**	1.000					
Professional motives	0.308**	0.070	1.000				
Motives of creative self-realization	0.139**	0.022	0.287**	1.000			
Educational and cognitive motives	0.644**	0.315**	0.502**	0.419**	1.000		
Achievement motivation	0.449**	0.267**	0.348**	0.255**	0.574**	1.000	
Perception of teacher leadership	0.160**	0.024	0.067	0.042	0.176**	0.182**	1.000

** - *correlation is significant at the 0.010 level (two-tailed).*

Table 2: Correlation between GPA, competitive entrance assessment score, motivation, and students' perception of teacher leadership, 2018-2020 (source: own calculation)

All variables on the scales of positive learning motivation and achievement motivation of graduates correlate with each other. Students' perception of teacher leadership is also related to students' educational and cognitive motives ($r = 0.176$, $p < 0.010$) and achievement motivation ($r = 0.182$, $p < 0.010$). To obtain more information regarding the relationship between certain variables, a regression model was built (Tables 3, 4, 5) for the GPA dependent variable and independent variables that do not correlate with each other, namely: competitive score of entrance assessment, motivation of professional activity, perception of teacher leadership. The choice of these independent variables is due to the fact that the model with other variants of independent variables without cross-correlation results in a lower coefficient of determination.

Model	*R*	R-squared	Adjusted R-squared	Standard error of estimate
	0.586[a]	0.344	0.340	6.661

[a] - *predictors: (const) competitive entrance assessment score, professional motivation, perception of teaching leadership.*

Table 3: The value of the coefficient of determination, 2018-2020 (source: own calculation)

As can be seen from the table, 34% of the variance of the GPA of graduates is determined by the variation of the set of variables «competitive score of entrance assessment», «motivation of professional activity», and «perception of teacher leadership».

Model*	Sum of squares	Degrees of freedom	Mean square	*F*	Significance
Regression	11583.290	3	3861.097	87.013	0.000[b]
Residual	22098.132	498	44.374		
Total	33681.422	501			

* - *analysis of variance, where a is the dependent variable: GPA.*

[b] - *predictors: (const) competitive entrance assessment score, professional motivation, perception of teaching leadership.*

Table 4: Results of model testing using Fisher's test, 2018-2020 (source: own calculation)

The F-test (Table 4) shows that the coefficient of determination is statistically significant. Regression analysis also shows the significance of all independent variables and that the most significant factor is the result of the entrance assessment.

Model	Unstandardized coefficients		Standardized coefficients	*t*	Significance
	B	Standardized error	Beta		
(Constant)	45.704	2.455		18.613	0.000
Result of entrance assessment	0.059	0.004	0.480	13.197	0.000
Professional motives	2.485	0.341	0.266	7.284	0.000
Perception of teacher leadership	0.958	0.266	0.131	3.603	0.000

Table 5: The value of the regression coefficient of the model, 2018-2020 (source: own calculation)

It should also be noted that the construction of a single-factor regression model, in which educational and cognitive motivation is an independent variable, allows us to obtain a determination coefficient of 0.414, which shows greater adequacy of the model. The results of correlation analysis for groups of students by level of education, form of study, specialties, and gender of respondents are given further.

As noted above, out of 502 respondents, 168 people completed a bachelor's degree, 334 a master's degree. Table 6 shows the Pearson correlation coefficients depending on the level of education.

Variables	Result of entrance assessment	Professional motives	Motives of creative self-realization	Educational and cognitive motives	Achievement motivation	Perception of teacher leadership
Bachelor's graduates (n = 168)						
Grade Point Average	0.453**	0.412**	0.148	0.588**	0.432**	0.191*
Master's graduates (n = 334)						
Grade Point Average	0.451**	0.241**	0.141*	0.663**	0.499**	0.156**

** - correlation is significant at the 0.010 level (two-tailed).

* - correlation is significant at the 0.050 level (two-tailed).

Table 6: Correlation between GPA, competitive entrance assessment score, students' motivation and perception of teacher leadership for the groups of bachelors (n = 168) and masters (n = 334), 2018-2020 (source: own calculation)

As can be seen from the tables, for bachelors, motives of creative self-realization do not have a significant relationship with GPA; for masters, such a relationship is significant at the 0.05 level. The relationship between GPA and graduate perceptions of teacher leadership is significant at the 0.05 level for undergraduates and 0.01 for masters.

Table 7 provides data for samples by form of education.

Variables	Result of entrance assessment	Professional motives	Motives of creative self-realization	Educational and cognitive motives	Achievement motivation	Perception of teacher leadership
Graduates of full-time education (n = 271)						
Grade Point Average	0.559**	0.332**	0.154*	0.652**	0.473**	0.212**
Graduates of part-time education (n = 231)						
Grade Point Average	0.313**	0.300**	0.136*	0.632**	0.440**	0.102

** - correlation is significant at the 0.010 level (two-tailed).

* - correlation is significant at the 0.050 level (two-tailed).

Table 7: Correlation between GPA, competitive entrance assessment score, motivation, and students' perception of teacher leadership for full-time and part-time graduates, 2018-2020 (source: own calculation)

For part-time graduates, not only GPA and educational and cognitive motivations (r = 0.632, p < 0.010) but also GPA and achievement motivation (r = 0.440, p < 0.010) have a stronger relationship compared with the indicators of the correlation between GPA and the results of the entrance assessment (r = 0.313, p < 0.010). The correlation coefficient between GPA and professional motives turned out to be close in strength (r = 0.300, p < 0.010). The correlation coefficient between GPA and graduates' perception of teacher leadership is not statistically significant, in contrast to full-time graduates (r = 0.212, p < 0.010). For both full-time and part-time graduates, the relationship between GPA and motives for creative self-realization is the weakest among other variables and is significant at the level of 0.050 (r = 0.154 and r = 0.136, p < 0,050, respectively).

Table 8 provides data for samples by specialty.

Variables	Result of entrance assessment	Professional motives	Motives of creative self-realization	Educational and cognitive motives	Achievement motivation	Perception of teacher leadership
Graduates of the specialty «Psychology» (n = 233)						
Grade Point Average	0.548**	0.133	0.050	0.714**	0.554**	0.144
Graduates of the specialty «Educational, Pedagogical Sciences» (n = 138)						
Grade Point Average	0.463**	0.349**	0.059	0.590**	0.457**	0.283**
Graduates of the specialty «Public Management and Administration» (n = 131)						
Grade Point Average	0.398**	0.171	0.195*	0.639**	0.457**	0.094

** - correlation is significant at the 0.010 level (two-tailed).

* - correlation is significant at the 0.050 level (two-tailed).

Table 8: Correlation Between GPA, Competitive Entrance Assessment Score, Motivation, and Student Perceptions of Teacher leadership for Social Science Graduates, 2018-2020 (source: own calculation)

For graduates of all three majors, the correlation between GPA and learning-cognitive motives is stronger compared to other variables. For graduates of the specialties «Psychology» and «Educational, Pedagogical Sciences,» the correlation coefficient between GPA and professional motives is significant at the level of 0.01 (r = 0.364, r = 0.349, respectively), for graduates of the specialty «Public Management and Administration» the correlation between these variables are insignificant. For graduates majoring in «Psychology» and «Public Management and Administration», the relationship between GPA and motives for creative self-realization is significant at the level of 0.050 (r = 0.140, r = 0.195 respectively), but for graduates majoring in «Educational, Pedagogical Sciences», the relationship between these variables is insignificant. For graduates majoring in «Psychology» and «Educational, Pedagogical Sciences», the correlation coefficient between GPA and perception of teacher leadership is significant at the level of 0.010 (r = 0.178, r = 0.283 respectively), for graduates majoring in «Public Management and Administration», the relationship between these variables is insignificant.

Table 9 represents data for samples by male and female gender.

Variables	Result of entrance assessment	Professional motives	Motives of creative self-realization	Educational and cognitive motives	Achievement motivation	Perception of teacher leadership
Male graduates (n = 123)						
Grade Point Average	0.548**	0.351**	0.155	0.687**	0.509**	0.167
Female graduates (n = 379)						
Grade Point Average	0.488**	0.286**	0.115*	0.622**	0.414**	0.165**

** - *correlation is significant at the 0.010 level (two-tailed).*

* - *correlation is significant at the 0.050 level (two-tailed).*

Table 9: Correlations between GPA, Competitive Entrance Assessment Score, Motivation, and Student Perceptions of Teacher leadership for Male and Female Graduates), 2018-2020 (source: own calculation)

For male graduates, the correlation between GPA and motives for creative self-realization, as well as between GPA and perception of teacher leadership, is insignificant. For female graduates, the relationship between these variables is significant: between GPA and motives for creative self-actualization at the level of 0.050 (r = 0.115), between GPA and perceptions of teacher leadership at the level of 0.010 (r = 0.165).

DISCUSSION

In all comparisons made in our study, a statistically significant relationship was found between the results of the entrance exam and the GPA, which, to a certain extent, corresponds to other similar studies (Bekeshkina et al., 2015; Čechová et al., 2019; Vulperhorst et al., 2018; Westrick et al., 2019). At the same time, the strength of the relationship varies across studies.

In the all-Ukrainian study of the predictive validity of the results of the entrance assessment for admission to the bachelor's degree, the following data were obtained: the correlation of the sum of the average EIT score and the average score of the document on secondary education with grades for the first year of study in HEI for 2010 was 0.549 (number of study participants was 27817), for 2011 it was 0.526 (number of study participants was 21227) (Bekeshkina et al., 2015). In our study, for undergraduate students, the correlation coefficient was 0.453; however, as it was noted, we considered students' grades not only for their first year only but also for their entire HEI period of study.

The correlation coefficient of the cumulative result of the introductory assessment, which included the average EIT score and the average score of the document of secondary education, and the first-year grades for male students was 0.470 (for 2011, the number of participants is 8832), for female students it was 0.504 (for 2011, number of participants 9533) (Bekeshkina et al., 2015). In contrast to these results, in our study, the correlation coefficient for male students was higher than for female students: it made 0.548 and 0.488, respectively. In the same study, the correlation data for different fields of knowledge were given: «Education» 0.538, «Social and Behavioral Sciences» 0.581, «Management and Administration» - 0.540 (Bekeshkina et al., 2015). In our work, the following results were obtained for specialties belonging to the relevant fields of knowledge: «Educational, Pedagogical Sciences» 0.463, «Psychology» 0.506, «Public Management and Administration» 0.398.

In contrast to the all-Ukrainian monitoring (Bekeshkina et al., 2015), research at the University College of the Netherlands under the Bachelor of Arts program (Vulperhorst et al., 2018) in order to find the most effective way to select high school students for participation in University programs studied the academic performance of students both in the short term (after completion of the first year of study - FYGPA (First Year GPA)) and in the long-term perspective. Selection to the college is based on HSGPA (High School GPA)). The predictive validity of HSGPA was higher for FYGPA than for final GPA, but in the context of our study, we considered the latter calculations. For two different high school programs, the correlation between HSGPA and final GPA was 0.580 (sample size was 315 individuals) and 0.550 (sample size was 113 individuals), respectively. For the entire population of study participants, the correlation was 0.620 (Vulperhorst et al., 2018). In our study, the correlation for bachelors is 0.453.

A number of studies have been aimed at determining the correlation between the results of various types of entrance exams and the subsequent academic performance of students during their training. Admission to European universities is mostly based on grades obtained at the previous stage of study (grade-based admissions).

Makransky et al. (2017) conducted a study at the University of Southern Denmark that demonstrated that admission based on a cognitive ability test followed by multiple mini-interviews (MMIs)) was more productive in terms of students' subsequent academic performance compared to students who were admitted based on grades. Thus, among students who were admitted to the University through the assessment of cognitive (test) and non-cognitive (MMI) skills, there was a significantly lower percentage of those who left training after the 1st year of study, the risk of failing the final exam after the 1st and 2nd years of study was lower. In addition, such students demonstrated a higher level of self-efficacy in academic learning and critical thinking.

Mengash's (2020) study, which lasted from 2016-2019 in Saudi Arabia with the participation of 2039 students, revealed that among the criteria for selecting applicants at the stage of preliminary admission, namely the High School Grade Average (HSGA), the Scholastic Achievement Admission Test (SAAT) and the General Aptitude Test (GAT); the SAAT is the most indicative. It seems to be the best way of predicting the Cumulative Grade Point Average (CGPA) of students while studying at the University the most accurately. This even led to changes in the College of Computer and Information Sciences (CCIS) admission system: it was decided to increase the weight of the SAAT criterion and change the weight of the three admission criteria (HSGA, SAAT, and GAT) from 60%, 20%, 20% to 30%, 40% and 30% respectively. As a result, the level of students with excellent or very good first-year CGPAs increased by 31% in 1 year of study.

Bestetti et al. (2020) considered the relationship between the university admissions test (UAT) and academic achievements at the end of the study, i.e., with the grades obtained in the Organized Structured Clinical Examination (OSCE), in the progress testing (PT), and in the final marks of the clerkship (FMC) in the conditions of the Department of Medicine, University of Ribeirão Preto, Ribeirão Preto City, Brazil. The UAT includes multiple-choice questions (MCQ) (the items include Biology, Portuguese Language, Mathematics, Geography, General and Brazilian History, Chemistry, and Physics) and an essay, which is aimed at revealing the applicant's ability to organize thoughts, present ideas in a logical sequence, and the ability to think analytically. Admission to the University is based on a formula that combines the UAT score with the scores obtained in the National High School Exam. The results of the study showed a moderate correlation between the UAT indicators and OSCE, PT, and FMC marks ($r = 0.460$; $p = 0.010$). No correlation was found between essay grades and OSCE, PT, and FMC marks.

As has already been mentioned, a feature of admission to Ukrainian HEI (for both bachelor's and master's programs) is subject-oriented assessment. In contrast to this admission criterion, in some countries of the world, tests of general educational competence, i.e., general readiness for successful study in HEI, are used. The American SAT is one of these tests. A study by Westrick et al. (2019) revealed that the correlation of SAT and HSGPA with first-year academic performance (FYGPA) is 0.61. An experimental pilot study was conducted on the introduction of a test of general educational competencies as an entrance test for HEI in Ukraine in 2010-2011. The test included two components: verbal and communicative (analytical reading, critical reading, essay writing) and logical and mathematical (Liashenko and Rakov, 2012). However, this practice was not implemented in the system of evaluating applicants for admission to HEI in Ukraine. A greater focus on tests of general academic competence, rather than on subject tests, when entering HEI in Ukraine can be the subject of debate.

The fact that the work (Bekeshkina et al., 2015) has determined a tendency to decrease the prognostic validity of all indicators of the competitive selection of HEI students during 2008-2011 deserves special attention. As we mentioned above, not all Ukrainian studies were conducted after 2011.

In general, we believe that the focus on reforming the Ukrainian HEI admission system should be based on a statistical assessment of its effectiveness. In order to improve the entrance assessment, it is necessary to take into account the connection between the points of the entrance assessment and the further academic performance of students at the University. In particular, the choice of whether admission should be based on the results of a subject test or a test of general academic aptitude; which subjects for admission to a particular major should be mandatory for testing; a list of which subjects can be offered to applicants to choose from all these questions require statistical evaluation. Our results demonstrate that the level of some motives has a higher correlation coefficient with GPA than the result of the entrance assessment, and these may be implemented as additional admission requirements - letter of motivation or admission interview for applicants. In such cases, the assessment criteria should be the applicant's strong interest in education, gaining new knowledge, acquiring a profession, as well as the need for high achievements, etc.

Our research work showed that, for all calculations, in comparison with the correlation between GPA and the result of the entrance assessment, the correlation between GPA and educational-cognitive motives of graduates had a higher coefficient. In addition, for Master's degree graduates, part-time graduates and graduates of the specialty «Public Management and Administration», a higher correlation coefficient was also noted between GPA variables and achievement motivation. The lowest GPA correlation coefficient from the results of the entrance evaluation was obtained from graduates in absentia and graduates in the specialty «Public Management and administration», the highest - among the graduates of full-time education, male graduates and graduates of the specialty «Psychology». As for the variables of study motivations, they had a statistically significant positive relationship with GPA. The obtained result corresponds to the results of similar studies (Chang and Tsai, 2022). The weakest relationship was observed between the motives of creative self-realization and GPA, and the strongest one was between educational and cognitive motives and GPA. It is possible to recommend that teachers use various means of motivation in the educational process, given that different motives have different connections with student learning outcomes.

At the same time, achievement motivation had a statistically

significant relationship with GPA for all groups of students, which teachers can use to improve teaching and learning outcomes.

Students' perception of their teachers is also important for the results of the educational process. We observe a positive statistically significant relationship between GPA and perceptions of teacher leadership for the entire collection of observations, as well as for bachelor's and master's. The significant relationship between GPA and the perception of teacher leadership among full-time students compared to part-time students can be explained by the greater number of interactions with teachers of the first group of students compared to those of the second group. The significance of the relationship also turned out to be dependent on the gender and major (specialty) of the students, which requires further research. In general, the results of our work correspond to the model of learning by Trigwell and Prosser (1997), who considered students' perception of the learning context as an important factor in learning outcomes. Recent research by García y García (2021) also proved that good teachers are one of the most important factors determining the academic success of university students. On the basis of this, teachers can be recommended to pay attention to how students perceive the presence or absence of teacher leadership.

The variable that had the strongest relationship with GPA among other variables, both for the entire collection of observations and for all separate groups of students, is students' educational and cognitive motives. These results to some extent correspond to the results of studies in which the relationship between the need for cognition and learning outcomes has been determined (Grass et al., 2017). The need for cognition is defined as an individual tendency to engage in and enjoy cognitive endeavors (Grass et al., 2017; Grass et al., 2018; Strobel et al., 2019). We agree with the thesis of Grass et al. (2017) that it is necessary to intensify the study of the need for knowledge in the context of higher education.

The potentially debatable question is whether it is possible to use the knowledge about the significant connection between the educational and cognitive motives of students and GPA when determining the admission procedure to HEI. At the same time, teachers should take into account the strength of the connection between these motives and the academic performance of students. Encouraging the desire to learn and maintaining students' cognitive interests can be an important strategy for improving learning outcomes and may help to reduce or eliminate negative factors of students' learning, such as gaps in basic (initial) knowledge, etc. Further research can be carried out in this direction.

The conduct of this study was limited to the students of three majors at one university. Further research with students of other majors may show different results regarding a greater or lesser relationship between GPA and entrance assessment results, which is confirmed by a 2015 Ukrainian study (Bekeshkina et al., 2015). In addition, other results may be obtained by comparing the strength of the relationship between GPA, motives, and perceptions of teacher leadership. Nevertheless, the obtained data is significant and can be used for further discussion regarding effective conditions for university admissions. We also consider it promising to continue research to compare the influence of the relationship between various factors on the academic success of students in order to determine ways to improve the educational process.

CONCLUSION

For the entire collection of observations, the results showed a statistically significant relationship between GPA and all variables - the results of the entrance assessment (competition score), learning motivation, achievement motivation, and students' perception of teacher leadership. Accordingly, the null hypotheses (H_0) were rejected. A comparison of groups of students was also carried out according to the level of education, form of study, specialties, and gender of the respondents.

The variable that had the strongest relationship with GPA among other variables, both for the entire collection of observations and for all separate groups of students, is students' educational and cognitive motives. The correlation between GPA and entrance test scores was weaker (less strong). For master's degree graduates, part-time graduates, and «Public Management and Administration» graduates, a higher correlation coefficient was also noted between the variables GPA and achievement motivation.

The results of the regression analysis showed that from the set of independent variables represented by «competitive score of entrance assessment,» «motivation of professional activity,» and «perception of teaching leadership,» the result of entrance assessment can be considered the most significant factor. However, the construction of a one-factor regression model, in which educational and cognitive motivation is an independent variable, demonstrates a greater adequacy of the model.

In order to improve the entrance assessment, it is necessary to take into account the connection between the points of the entrance assessment and the further academic performance of students at the University. In particular, the results of our study may be implemented as additional admission requirements - a letter of motivation or admission interview for applicants. In such cases, the assessment criteria should include the applicant's strong interest in education, gaining new knowledge, acquiring a profession, as well as the need for high achievements, etc. The identified relationships between GPA and student motivation, as well as between GPA and student perceptions of teacher leadership, are noteworthy for improving students' learning outcomes.

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