PREDICTORS OF ACADEMIC ACHIEVEMENT IN HIGHER EDUCATION

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Abstract

In this study we investigated the relationship between academic achievement and the students' characteristics such as personality traits, learning motivation or intellectual ability. Our intention was to highlight possible predictors of academic achievement on the level of higher education. A sample-group of 284 pre-service teachers voluntarily participated in the study. The results showed a significant correlation between academic achievement and some personality variables such as conscientiousness, emotional stability, self-esteem and self-control. Moreover, intellectual ability and intrinsic motivation positively correlated with academic achievement, as shown in previous studies. Regression analysis further revealed that the most important predictors of academic achievement were intrinsic motivation, intelligence, self-control and self-esteem. Overall, it seems that identifying the predictors of academic achievement and wisely integrating them in the classroom setting could significantly improve the quality of instruction in higher education.

Keywords: academic achievement; higher education; personality factors; learning motivation.

1. Introduction

Within the context of the university pedagogy, the studies dedicated to academic achievement are generally oriented towards identifying the factorial constellation that is significantly influencing students' results. According to the research performed by Bruinsma (2003), the investigations destined to these problems start from various points of views and are generally placed at the confluence of multiple approaches that may be of a psychological, social, organizational, economical or pedagogical type. By performing a detailed analysis of factors lying at the basis of school/academic achievement, Nicola (2000) reaches to the conclusion that these factors may be grouped, by the criterion of their modality of action, into two large categories: *internal factors* (biological and psychological) and *external factors* (the institutional structure of the education system; the pedagogical organization of the learning process; social and cultural factors).

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The internal (biopsychological) factors and the academic achievement

The majority of the studies aiming at matters concerning the academic achievement are focusing on underlining the relationship between the *internal factors* and the academic achievement. The specialty literature specific for the beginning of the 20th century keeps record of studies that concentrate especially on establishing a relationship between intellectual factors and academic achievement. The results of the research related to this theme have shown that intelligence is one of the best predictors of the performances achieved by students on the academic level (Harris, 1940, apud Busato et al., 2000; Gagné and Pére, 2001; Neisser et al., 1996, apud Farsides and Woodfield, 2003; O'Connor and Paunonen, 2007). Over the last years, the studies approaching these problems have extended the spectrum of intellectual variables having a significant impact on the academic achievement and reveal the importance of cognitive processes (memory, thinking, imagination) and metacognitive processes as well in achieving academic success (Cuasay, 1992; Bruinsma, 2004).

Recent investigations performed in order to determine the best predictors of academic achievement are drawing attention upon the fact that the intellectual factors do not succeed in completely explaining the differences in academic achievement between students (Chamoro-Premuzic and Furnham, 2006). Under these circumstances, the research performed over the last decades has proposed to investigate the role of noncognitive factors in predicting academic results. Numerous studies are focusing on the relationship between academic achievement and the 5 personality traits comprised under the Big Five model: conscientiousness, extraversion, agreeableness, neuroticism and openness to experience. Since the studies are performed upon populations of students that are extremely various from the socio-economic, cultural, ethnic and intellectual point of view, the results obtained are controversial and many times even contradictory. For example, conscientiousness is considered one of the best predictors of the academic achievement, the results generally enlighten significant correlations between the two variables (Blickle, 1996; Busato et al., 2000; Farsides and Woodfield, 2003; Conard, 2006). Despite numerous facts, there are studies indicating that an extremely high level of conscientiousness has negative repercussions over the academic results. Thus, an experiment performed by Cucina and Vasilopoulos (2005, apud O'Connor and Paunonen, 2007) revealed the fact that the extremely conscientious students obtained significantly lower results in comparison with students who proved to own a moderate level of this personality factor.

A large range of studies have in view to establish the relationship between academic achievement and the two forms of motivation (intrinsic and extrinsic). The greatest part of research brings into light positive, significant correlations between the intrinsic motivation to learn and the results obtained by students on the academic level (Eppler and Harju, 1997; McCoach and Siegle,

2001). Another conclusion of the research performed regarding this theme indicates the absence of correlation between the extrinsic motivation (materialized into orientation towards performance) and the academic achievement (Preckel, Holling and Vock, 2006). The above-mentioned researchers opinionated that the orientation towards performance (as an extrinsic form of motivation) may have as consequences the preference for non-difficult tasks, lack of perseverance and the decrease in academic results when confronting the inherent obstacles of the learning process.

On the whole, the regression analyses recorded by the specialty literature have proved that among the psychological factors, the following are identifying themselves in the category of best predictors of academic achievement: intelligence (Gagné and Pére, 2001; Farsides and Woodfield, 2003), intrinsic motivation (Eppler and Harju, 1997; McCoach and Siegle, 2001), emotional stability (Kahn, Gailbreath, Chartrand, 2002), conscientiousness (Blickle, 1996; Busato et al., 2000; Conard, 2006) and openness to experience (Farsides and Woodfield, 2003).

From the category of biological factors, the gender is highly frequently mentioned by studies aiming at explaining the difference in academic results between students. The specialty literature records a multitude of studies that are highlighting the significantly better academic results of girls in comparison with those of boys (Borg and Falzon, 1991; Slobodskaya, Safronova and Windle, 2005; Jansen and Bruinsma, 2005). Yet there are studies that do not notice the existence of a significant difference between girls and boys as concerns the level of academic achievement (Preckel, Holling and Vock, 2006). In trying to find an explanation for this absence of consensus regarding the gender correlates of academic achievement, the researchers approaching these matters have reached to the conclusion that the relationship between the two variables is generally mediated by other biological factors (health, physiological balance etc.), psychological ones (motivation, conscientiousness, anxiety, self-efficacy, self-esteem etc.) or contextual factors (field of study, the socio-economical status of the family etc.), with no significant differences of gender concerning the academic abilities (Borde, 1998; McNabb et al., 2002).

The external (sociopedagogical) factors and the academic achievement

Referring to the relationship between *external factors* and academic achievement, we have identified studies which investigate the impact of the design and implementation of the curricular offer over the results obtained by students. More precisely, there are studies indicating that the level of academic achievement is influenced by different aspects relating to the organization of the curriculum and of the instructive-educational process (the number of didactic activity weeks per semester, the number of classes per week, the number of courses held within a certain period of time). As Bruinsma (2003) shows, the general tendency depicted from the majority of the studies is that a large

number of didactic activity weeks, along a small number of courses held within the same period of time should correlate with a high level of academic achievement. Beyond the aspects relating to elaboration, the implementation of the curriculum raises the problem of quality regarding the instructive-educational process on the level of higher education. Numerous studies are underlining the significant impact of the quality of instruction upon students' academic results (Jansen and Bruinsma, 2005; Betoret 2006; Taspinar, 2007, Lim et al., 2008).

Factors relating to family are also integrating themselves in the category of external factors having a significant influence upon the students' success. The research has shown that an important role in predicting the academic achievement is held by variables such as: parents' level of education, parents' academic expectations and the family learning environment. As for the parents' studies, the conclusions drawn from studies reveal, as a general tendency, the existence of a positive significant correlation between the parents' level of academic education and the students' academic achievement (Pascarella and Terenzini, 1991; Tinto, 1993). Despite these results, there are also studies that do not support this hypothesis, by demonstrating that there is no significant correlation between the two variables (De Jong et al., 1997, apud Bruinsma, 2003). Within a study performed by Shim and Felner (2000) the results have shown the fact that, from the category of family factors, students' perception upon parents' academic expectations represents the most important predictor of academic achievement. Thus, the students owing a high level of academic achievement tend to consider that their parents have high expectations regarding the results got by their children in formal education. On the whole, although the predictive value of the family characteristics are varying from one study to another, the family contribution to the students' academic achievement remains indisputable.

The objectives of the study

The recent studies have tended to include a large range of internal and external factors for the educated subject in the analysis of academic achievement, with the intention to design predictive models meant to explain a percentage as large as possible from the variance of academic results obtained by the tertiary education students. By following this direction of research, our study is aiming at two objectives:

- the analysis of the relationship between academic achievement and certain categories of internal factors: motivational and temperamental factors, factors of character, intellectual factors and factors relating to the expressions of the self (correlational analysis);
- identification of the best predictors of academic achievement in higher education (regression analysis).

2. Method

Participants

A number of 284 freshman students, enlisted at the Teaching Staff Training Department of the University „Transilvania" of Brasov were included in this study. Among these, 143 (50.4%) were attending a socio-humanist profile faculty, whereas 141 (49.6%) were attending a scientific profile faculty. The participants' ages ranged between 19 and 27 years old (M=20.35; SD=1.33). In terms of gender, 55 students (19.4%) belonged to the masculine gender and 229 (80.6%) to the feminine gender.

Measures

The performed research was of transversal type and has included two categories of variables:

- *The dependent variable*: the academic achievement measured by the mean of the academic results obtained by students at two exams within the psycho-pedagogical training module: *Educational psychology and Pedagogy* (Introduction to Pedagogy and The Theory and Methodology of the Curriculum).
- *Independent variables (predictors)*: intellectual factors, temperamental factors and factors of character (evaluated by *The 16 Primary Factors Questionnaire of Personality*); factors relating to the expressions of the self (measured by *The Self Perceiving Questionnaire* and by *The 16 Primary Factors Questionnaire of Personality*– the O factor and the Q_3 factor); motivational factors (assessed by the *Questionnaire of motivation*).

The 16 Primary Factors Personality Questionnaire (16 PF) designed by Cattell is a multiphase inventory destined to the simultaneous measurement of 16 first order personality factors and 4 second order factors (extraversion/ introversion, adaptation/anxiety, sensitivity/ dynamism, obedience/ independence) in subjects with ages above 18 years old. The questionnaire contains 187 closed questions, with pre-encoded answers, every question providing three alternative answers, from which the subject will choose one. The wording of the items have two models: some of them include questions concerning the own behaviours of the subject and expression of opinions or general attitudes about people; the others are asking the subject to choose between two possible jobs, recreative activities, types of people or alternatives regarding value judgments. There are also verbal or numerical items destined to the assessment of a resolutive ability factor (Minulescu, 1996).

The Self-Perception Questionnaire was elaborated by A. Clinciu (2010) through selecting, adapting and assembling items from the questionnaires

proposed by Lelord and André (2003), in order to explore the attitude towards the own person, more precisely the level of self-esteem. This questionnaire contains 30 pairs of items, every pair being represented by two personality traits, attitudes or antinomic behaviours. The pairs of items are bipolary disposed, on both sides of an assessment scale that comprises seven stages, graduated by codes from –3 to +3, the subject being requested to mark with a sign (x) the measure to which a certain trait or behaviour relates to him. The scoring is performed by adding the negative and the positive values in order to obtain a total value representing the level of self-esteem of the subject with two sub-compounds: a negative (self-depreciative) one and a positive (self-appreciative) one.

The dominant type of motivation to learning (intrinsic or extrinsic) was identified by *The Questionnaire of Motivation* elaborated by Teresa M. Amabile. The author proposed a tool to evaluate motivation („The Inventory of Preference towards Work"), which we have adapted to the aims of the investigation, using it to identify the type of motivation that lays at the basis of the students' learning process. The questionnaire highlights motivational preferences defined on two main scales (intrinsic, extrinsic) and four subscales, two intrinsic („Pleasure", „Challenge") a two extrinsic („Recognition", „Reward") (cf. Constantin, 2004). The questionnaire consists of 30 items in the form of statements scored by the subject on a four-step scale indicating the frequency with which certain behaviour manifests itself. The total score is made by adding the scores corresponding to every one of the four subscales.

Procedure

At the beginning of the academic year, the participants were presented with the objective of the study and were asked to sign a participation consent form. During the first semester, *The 16 PF Personality Questionnaire* was applied and along the second semester the other two investigation tools were completed: *The Self-perception Questionnaire* and *The Motivation Questionnaire*. The academic achievement was measured at the end of the academic year, by calculating the arithmetical mean of the results obtained for the two exams within the frame of the psycho-pedagogical training modulus.

3. Results

3.1. The correlational analysis

In order to achieve the first objective of the research we resorted to the estimate of the Brvais - Pearson (r) correlation coefficient value and we continued by establishing its statistical significance at $p<0,05$ and $p<0,01$. The data in Table 1 registers the results of the correlational analysis between the dependent variable (the academic achievement) and the predictor variables

measured within the frame of the investigation (intellectual factors, temperamental factors, factors of character, factors relating to the expressions of the self and motivational factors).

3.1.1. The relationship between the intellectual factors and the academic achievement

The data in Table 1 primarily indicates a direct and strongly significant correlation between the intellectual potential (the B factor) and the level of academic achievement ($r = 0.53$; $p < 0.01$); this fact reflects the decisive role of intelligence in the process of learning and, implicitly, in obtaining good results at exams in the university education. According to this data, in the framework of the investigated batch, the high level of academic achievement associates to the abstract, quick thinking, the capacity to learn easily and a high level of intelligence. The low level academic results, found at the lowest limit of promotion may be explained by the concrete thinking, the tendency to have difficulties in learning, low resolutive ability and implicitly, a relatively low level of intelligence.

Our study results prove to be concordant with the results of a multitude of studies recorded in the specialty literature. As far back as in 1940, Harris stated that „the most important predictors of academic achievement are intelligence and motivation" (apud Farsides and Woodfield, 2003). Numerous later studies come to confirm this conclusion, by highlighting the essential role that the intellectual ability holds in obtaining the academic achievement (Anderson and Keith, 1997; Busato et al., 2000; Ackerman and Heggestad, 1997, apud O'Connor and Paunonen, 2007). The results of a study performed at the University of Amsterdam on a target-population of 409 students included in a longitudinal research carried on along three academic years are convincing in this sense. The research brought into light the existence of some significant correlations between the intellectual ability and academic achievement at the end of the first academic year ($r = 0.15$; $p < 0.01$) and of the third year of study ($r = 0.11$; $p<0.05$), the level of academic achievement being represented by the total number of credits obtained at the end of every academic year (Busato et al., 2000).

Table 1. *The significance of the correlation between the predictor variables and the academic achievement*

Predictor variables	*Value of correlation coefficient*	*Significance*
A - openness, cooperation	**r = 0.42**	**p < 0.01**
B - intelligence, abstract thinking	**r = 0.53**	**p < 0.01**

C- emotional stability, maturity	**r = 0.44**	**p < 0.01**
E - dominance, aggressivity	r = -0.11	NS
F - enthusiasm, spontaneity	**r = 0.12**	**p < 0.05**
G - conscientiousness, conformism	**r = 0.38**	**p < 0.01**
H - courage, sociability	r = -0.12	NS
I – subtle, intuitive thinking	r = -0.09	NS
L – suspicion, distrust	r = -0.58	NS
M - imagination, unconventionality	r = -0.22	NS
N - subtlety, diplomacy	r = 0.22	NS
O – self-distrust, culpability	**r = 0.14**	**p < 0.05**
Q1 - nonconformism, tolerance	r = -0.51	NS
Q2 – self-sufficiency, independence	r = -0.53	NS
Q3 – self-control	**r = 0.47**	**p < 0.01**
Q4 – high ergic tension	r = -0.12	NS
Adaptation / Anxiety	**r = -0.23**	**p < 0.01**
Introversion/ Extraversion	r = 0.83	NS
Sensitivity/ Dynamism	**r = 0.12**	**p < 0.05**
Obedience/ Independence	r = 0.22	NS
Self-esteem	**r = 0.49**	**p < 0.01**
Intrinsic motivation	r = 0.58	p < 0.01
Extrinsic motivation	r = -0.13	p < 0.05

Although the results obtained in the framework of our study are concordant with the majority of results of similar studies in the specialty literature, there are studies that underline a weak correlation between intelligence and academic results. Thus, the study designed by Farsides and Woodfield (2003) on a target-population of 432 students is highlighting an insignificant correlation between abstract intelligence and academic results expressed in the form of the general means for the 2nd and 3rd years of study. The high level of academic results was associated rather with personality factors (openness to experience, conscientiousness, agreeability), a conclusion which draws attention upon the role of personality non-cognitive factors in obtaining the academic achievement.

3.1.2. The relationship between the temperamental factors and the academic achievement

Within our study, the A factor associates with high academic results ($r = 0.42$; $p<0.01$), this way indicating a high level of academic achievement with open, cooperative, outgoing, sociable and adaptive students. At the opposite pole, we find the students whose cold, reserved, detached and shy attitude associates with a low level of exam results. By analysing the data, we notice a

direct, powerfully significant correlation between the high emotional stability represented by the C factor and the students' academic results ($r = 0.44$; $p < 0.01$). These results are suggesting that students who are emotionally stable, mature, realistic and calm tend to obtain higher level academic performances in comparison with the majority of the students expressing emotional instability.

When we explore the specialty literature, we notice the existence of studies providing various results concerning the relationship between emotional stability and academic achievement at the university level. Thus, there is the research bringing into light the existence of a direct, significant correlation between the two variables (Kahn, Gailbreath, Chartrand, 2002; Chamorro-Premuzic and Furnham, apud O'Connor and Paunonen, 2007). Despite these conclusions, the majority of the studies belonging to the specialty literature are underlining the lack of correlation between emotional stability and academic results (Blickle, 1996; Busato et al., 2000; Farsides and Woodfield, 2003; Conard, 2006). Consequently to a longitudinal study carried on over a period of three years at two Dutch universities it was concluded that there is no significant correlation between emotional stability and academic results reflected by the general scores at the end of every year of study. Also, the same study shows that the emotional stability does not correlate even with the results obtained at the first exam in faculty, where the students' emotional charge is supposed to be more powerful than at the majority of exams given later (cf. Busato et al., 2000).

Another variable from the sphere of temperament – the F factor – significantly correlates with the academic achievement ($r = 0.12$; $p < 0.05$), indicating a high level of success among the students characterized as cheerful, active, talkative and exuberant, meanwhile the non-exuberant, sober, reserved and prudent students tend to obtain lower academic results in comparison with the first category.

From the point of view of the secondary personality factors, we notice the existence of a negative and powerfully significant correlation between anxiety and academic achievement ($r = -0.23$; $p < 0.01$), meaning that the high scores for this factor are associating with a low level of academic performances. If we speculate, we may say that the high level of anxiety manifested by the majority of the students who register a low level of success may equally represent one of the causes and effects of the low academic results. Thus, the feelings of uncertainty, disquiet and strain, very likely due to a fragile self esteem, has negative effects upon the learning activity, as it weakens the capacity of focusing and diverges the attention from the working task towards the cause of anxiety that the student experiences, meaning his/her negative feelings, a fact that impede on the maximum valuation, on the academic grounds, of the intellectual potential he/she disposes of. On their turn, the low academic results are bringing large prejudices to self respect, intensifying the feelings of inferiority, uncertainty and culpability, with a level of anxiety

progressively increasing. And yet, although some specialty studies (cf. Ausubel and Robinson, 1981) are indicating that, normally, anxiety has energizing effects upon the learning process, this finding is not valid in all cases and for any age. The conclusions of our study are standing in disagreement with the results obtained consequently to a study designed on a target-population of 667 freshman students at three universities in the United States. The data resulted proved that anxiety cannot be considered a predictor of academic achievement, the correlation between this factor and the students' academic results being placed much below the minimum threshold of statistical significance (Kahn, Gailbreath and Chartrand, 2002).

High level academic achievement associates also with the factor indicating the level of dynamism in a person; there is a direct and significant correlation between the high quotations at this secondary factor and high academic results ($r = 0.12$; $p < 0.05$). According to these results, the great part of the students with high academic results express a dynamic, enterprising and determined behaviour, they are oriented mainly towards what seems clear and indisputable to them and have the tendency to take action directly when confronted with various problems. At the opposite end, there are the students proving an artistic temperament, the ones sensible to the refinements of the existence and having a strong tendency towards reflection and analysis; these students tend to get lower academic results in comparison with those in the first category.

With a reference to the secondary order personality factor which indicates introversion/ extraversion, the data in Table 1 points out the absence of a significant correlation between this variable and the academic results. In the specialty literature, the studies exploring the relationship between extraversion and academic achievement present various results. Thus, the conclusions of some studies indicate the non-existence of a significant correlation between the two variables, the results obtained being in agreement with those provided by our investigation (Kahn, Gailbreath and Chartrand, 2002; Farsides and Woodfield, 2003; Conard, 2006). In disagreement with these results, there are studies which underline the existence of a negative, strongly significant correlation ($r = -0.13$; $p < 0.01$) between the level of extraversion and the results obtained at certain exams in faculty (cf. Busato et al, 2000). Yet, within the framework of the same study, it was found that there is no significant correlation between the general scores obtained by students at the end of every one of the three years of study and the level of extraversion.

3.1.3. The relationship between the factors of character and the academic achievement

A direct, strongly significant correlation is to be noticed between the academic achievement and the G factor which indicates the force of the Super

Ego ($r = 0.38$; $p < 0.01$). According to this data, we appreciate that the majority of the students who register high scores at the G factor manage to obtain high academic results due to their conscientiousness, perseverance, strong feeling of responsibility and emotional maturity. The conscientiousness, consistency, determination, conformity and order that characterize them may lead to a high degree of adaptation to the demands of the formal university field, the students approaching the proposed tasks and activities in a serious, responsible manner, a fact that assures their success. At the opposite side, we suppose that the majority of their colleagues are obtaining low academic scores at this factor exactly because of this deficiency in Super Ego strength. The inconsistency in accomplishing tasks, the insecurity and inattentiveness concerning the academic activities associated with the tendency to back out of the group activities tend to drive the students towards relatively low academic results, within the circumstances of a student-focused formative education in which the group tasks and activities are frequent and the summative assessment is completed by the formative one, this fact presupposing the high frequency of the individual and group tasks.

Various researches that investigated the relationship between conscientiousness and academic achievement present conclusions which are consistent with those provided by our study. Thus, the strong significant correlations between the two variables demonstrate that the G factor may be considered a good predictor of success at the university level (Blickle, 1996; Busato et al., 2000; Paunonen and Ashton, 2001; Farsides and Woodfield, 2003; Conard, 2006). The results of the meta-analysis performed by O'Connor and Paunonen (2007) upon the most recent studies that approach the link between conscientiousness and academic achievement demonstrates the existence of a significant correlation between the two factors. It is remarkable that from the 23 studies included in the meta-analysis, 18 present a significant correlation between the mentioned variables, thus the conclusion regarding the especially important role of conscientiousness in predicting different categories of results obtained by students in university education is reinforced. The same researchers mention the existence of studies claiming that an extremely high level of conscientiousness reverberates negatively over the academic results. Thus, the experiment designed by Cucina and Vasilopoulos (2005, apud O'Connor and Paunonen, 2007) carried forth that extremely conscientious students got significantly lower academic results in comparison with students owning a moderate level of this personality factor. These conclusions are in disagreement with those pointed out by our study and by most part of the research on this issue; they are drawing attention one more time over the divergences between specialists regarding the prediction of academic achievement.

3.1.4. The relationship between the factors relating the expressions of the self and academic achievement

By analysing the results, we notice the existence of a direct, significant correlation ($r = 0.14$; $p<0.05$) between the academic performances and the high scores at the O factor which indicates the level of self-trust. Thus, the students manifesting self-distrust, associated with the tendency towards perfectionism and culpability, together with a slightly condition of anxiety and worry tend to get superior academic results in comparison with students who prove to be content and self-assured, trusting their abilities, relatively insensitive to others' reactions and relaxed when confronting problems and their solving. In this case, a relatively negative attitude towards the own person which associates with a moderate state of anxiety and concern has positive repercussions on the results obtained at assessments during the faculty, a fact supporting the idea presented by the researchers Ausubel and Robinson (1981), according to which anxiety may have energizing, beneficial effects upon the academic achievement.

Strongly relating to self-trust, another factor in our study that associates with the academic achievement is represented by the self-control (the Q3 factor). The data in Table 1 underlines the existence of a direct, strongly significant correlation between the two variables ($r=0.47$; $p < 0.01$). According to this these results, the students investigated who got better results express a strong control of emotions and of their general behaviour, they care for the social actions, show high expectations regarding their social reputation and sometimes have a tendency towards perfectionism. On the other hand, the majority of students who prove to have a weak self-control, expressed by lower emotional control and lack of interest towards the social requests and rules, obtain poor academic results. Some high level of academic achievement is registered among students owning an increased sense of duty and placing a lot of pressure on themselves, which are traits highlighted by the O factor.

The data resulted from the investigation is highlighting the existence of a direct, strongly significant correlation ($r = 0.49$; $p < 0.01$) between the level of self-esteem and the academic performances. According to these results the majority of students obtaining high grades on the summative assessments during the faculty own a significantly higher level of self-esteem in comparison with the students whose results are placed at the lowest limit of success. On the opposite side we find the students facing strong inferiority feelings, manifesting lack of trust and uncertainty, aspects that may negatively affect the exam results. On its turn, the quality of results obtained on academic grounds is likely to maximize or minimize the level of students' self-esteem. These conclusions are consistent with the results indicated by some specialty studies (Lelord and André, 2003) and explain the placing of self-esteem among the predictors of academic achievement.

3.1.5. The relationship between the motivational factors and the academic achievement

By analysing the results in Table 1, we have noticed the existence of a direct and strongly significant correlation between the results at exams and the level of intrinsic motivation ($r= 0.58$; $p < 0.01$). In this sense, the students owning a high level of academic achievement prove to be strongly motivated by curiosity, new and difficult problems, the pleasure to work and express themselves by what they do and prefer the activities that request and develop mental abilities. Opposing to these, the majority of the students obtaining relatively weak results are motivated rather extrinsically and prefer to have clearly specified aims and action methods while they appreciate success by reference to others and rewards.

The literature in the domain keeps record of studies whose results are consistent with those obtained in the framework of our study. A representative example in this sense is provided by Eppler and Harju (1997) who have studied the relationship between academic achievement and the two forms of motivation: the intrinsic motivation to learn (materialized in orientation towards aims) and the extrinsic motivation (seen as orientation towards performance, which manifests through the need to be positively appreciated and the tendency to avoid the negative assessments). The study was performed on a population of 262 American students enlisted in different years of study. The results brought into light a positive, statistically significant correlation between the academic achievement (operationalized as the mean of academic results at the end of a semester) and the intrinsic motivation to learn. Another conclusion of the study materialized in the absence of the correlation between extrinsic motivation (materialized in the orientation towards performance) and academic achievement, results that are placed somehow in disagreement with the results of our study but underline the insignificant impact of extrinsic motivation upon getting the academic achievement.

3.2. The regression analysis

In order to identify the best predictors of academic achievement in the university education we have referred to the determination of the value of the multiple correlation coefficient (R) and the determination coefficient (R^2). In this respect, the academic achievement (operationalised as the arithmetic mean of the exam results) is considered the dependent variable (or the criterion variable) and the rest of the analysed factors represent the independent variables or the predictors of academic achievement. In order to determine the multiple correlation coefficient (R) and the determination coefficient (R^2) we referred, in a first phase, to the analysis of the correlations between the academic

achievement and the independent variables, and also of the correlations between the independent variables considered two by two in order to keep the most significant combination of data, when it is well-known that the highest the R value, the larger the correlation coefficients between the dependent and the independent variables, and the smallest the intercorrelation coefficients (between the independent variables) (Table 2).

If we analyse the data in Table 2, we find that, in the category of independent variables which present strongly significant correlations with the dependent variable (the mean of academic results), the following are to be placed: the A factor – openness, cooperation ($r = 0.42$; $p < 0.01$); the B factor – intelligence, abstract thinking ($r = 0.53$; $p < 0.01$); the C factor – emotional stability, maturity ($r = 0.44$; $p<0.01$); the G factor – conscientiousness, conformism ($r = 0.38$; $p < 0.01$); The Q3 factor– the self-control ($r = 0.47$; $p < 0.01$); anxiety ($r = -0.23$; $p < 0.01$); self-esteem ($r = 0.49$; $p< 0.01$); intrinsic motivation ($r = 0.58$; $p < 0.01$). We may add, to these independent variables, the ones that significantly correlate with the academic achievement at the first threshold of significance: the F factor – enthusiasm, spontaneity ($r = 0.11$; $p < 0.05$); the O factor – self-distrust, culpability ($r = 0.14$; $p < 0.05$) and the personality factor which indicates the degree of dynamism ($r = 0.12$; $p < .05$).

Table 2. *The matrix of intercorrelations*

Variables	Acad. success	A	B	C	F	G	O	Q3	Esteem	Anx.	Dyn.	Int. mot.
Acad. success	1. 00	0.42**	0.53**	0.44**	0.11*	0.38**	0.14*	0.47**	0.49**	-0.23**	0.12*	0.58**
A	0.42**	1.00	0.37**	0.58**	-0.05	0.26**	0.19**	0.29**	0.43**	-0.04	0.42*	0.32**
B	0.53**	0.37**	1.00	0.48**	-0.01	0.31**	0.05	0.30**	0.27**	-0.13*	0.07	0.33**
C	0.44**	0.58**	0.48**	1.00	-0.01	0.41**	0.24**	0.36**	0.36**	-0.05	0.26**	0.32**
F	0.11*	0.11*	-0.01	-0.01	1.00	0.09	0.17**	-0.06	0.01	0.22**	0.08	0.10
G	0.38**	0.26**	0.31**	0.41**	0.09	1.00	0.26**	0.39**	0.37**	-0.22**	-0.01	0.23**
O	0.14*	0.19**	0.05	0.24**	0.17**	0.26**	1.00	0.09	0.21**	0.28**	0.04	0.17**
Q3	0.47**	0.29**	0.30**	0.36**	-0.06	0.39**	0.09	1.00	0.23**	-0.68**	-0.01	0.35**
Esteem	0.49**	0.43**	0.27**	0.36**	0.01	0.37**	0.21**	0.23**	1.00	-0.09	0.10	0.37**
Anx.	-0.23**	-0.04	-0.13*	-0.05	0.22**	-0.22**	0.28**	-0.68**	-0.09	1.00	0.14*	-0.10

Dyn.	0.12*	0.42*	0.07	0.26**	0.08	-0.01	0.04	-0.01	0.10	0.14*	1.00	0.09
Int. mot.	0.58**	0.32**	0.33**	0.32**	0.10	0.23**	0.17**	0.35**	0.37**	-0.10	0.09	1.00

* significant correlation at $p<0.05$;.** significant correlation at $p<0.01$.
Acad. success = academic achievement; A= A factor from the 16 PF; B = B factor from the 16 PF; C= C factor from the 16 PF; F= F factor from the 16 PF; G= G factor from the 16 PF; O= O factor from the 16 PF; Q3= Q3 factor from the 16 PF; Esteem = self esteem; Anx. = anxiety; Dyn. = dynamism; Int. mot. = intrinsic motivation.

Starting from these values of the Bravais - Pearson (r) simple correlation coefficient, the data was subjected to statistical processing by the multilinear regression technique. In Table 3, the information concerning the predicting power of the obtained models is synthesized by presenting the values of the multiple correlation coefficient (R) and the determination coefficient (R^2), where the latter indicates the proportion of the variance for the dependent variable which may be explained by the combination of the four independent variables.

Table 3. *The values of the multiple correlation coefficients and the determination coefficient*

Predictors of academic achievement	*Multiple correlation coefficient*	*Coefficient of determination*
Intrinsic motivation	$R = 0.58$	$R^2 = 0.33$
Intrinsic motivation; Intelligence (The B factor)	$R = 0.68$	$R^2 = 0.46$
Intrinsic motivation; Intelligence (the B factor); Self-esteem	$R = 0.72$	$R^2 = 0.51$
Intrinsic motivation; Intelligence (the B factor) ; Self-esteem; Self-control (The Q3 factor)	$R = 0.75$	$R^2 = 0.55$

The results obtained by calculating the multiple correlation coefficient and the determination coefficient demonstrates that regarding our study, the category of best predictors of academic achievement comprises four variables: intrinsic motivation, intelligence, self-esteem and self-control. The four independent variables associated are forming a predictive model capable to explain approximately 55% of the variance of the academic achievement ($R^2 = 0.55$).

4. Discussion and conclusions

According to the obtained results, a multitude of personality factors correlate with the academic achievement. Thus, there is a direct and strongly significant correlation ($p < 0.01$) between academic achievement and the personality variables which indicate: openness, cooperation (the A factor of 16 PF); emotional stability, maturity (the C factor); conscientiousness, conformism (the G factor); self-esteem; it may be added here also the personality factors which correlate directly, and significantly ($p < 0.05$) with the academic achievement: enthusiasm, spontaneity (the F factor); uncertainty, worry (the O factor) and the second degree personality factor which indicates the degree of dynamism; anxiety has also proved to be a secondary factor with serious

implications upon the academic achievement since it correlates negatively with the level of the students' results.

By analysing the relationship between the motivational factors and the academic results it was found that between the intrinsic motivation and the level of academic achievement there is a direct, strongly significant correlation ($r = 0.54$; $p < 0.01$) and between the extrinsic motivation and success there is a reversed significant correlation ($r = -0.13$; $p < 0.01$), meaning that at the university level the superior rank needs of the Maslow pyramid have the precedence and are essential to learning and, implicitly, in obtaining academic achievement.

According to the results of the regression analysis, the following factors are to find their places in the category of best predictors of academic achievement: *intrinsic motivation*, *intelligence* (the B factor of the 16 PF), *self-esteem and self-control* (the Q3 factor of the 16 PF), the four independent variables associated forming a predictive model capable to explain approximately 55% from the variance of the academic achievement. These results may be materialized as landmarks for the improvement of the instructive-educational process on the level of higher education. So the data analysis revealed the especially important role of intrinsic motivation in predicting the academic achievement, this variable managing to explain approximately 33% from the variance of the results obtained by students at exams. As a consequence, the stimulation of learning motivation outlines as a real challenge for the university professors who are called to use teaching-learning-assessment strategies capable to increase the epistemic curiosity, the interest for the discipline of study and the desire for self-realization of the students. According to the specialty studies, professors may influence in a positive manner the students' motivation to learn through a large range of teaching methods, the teaching based on the interests and real capacities of the students and also by defining realistic aims (Bruinsma, 2003).

The obtained results are drawing attention upon the necessity to deeply explore the students' capacities in order to design teaching strategies that may lead to the valuation and improvement of their intellectual potential. According to the regression analysis results, intelligence is an important predictor of academic achievement and this aspect is pointing out the necessity to place the learning tasks in the area of the proximal development of the students in order to create the best circumstances for progress towards knowledge. The professors' attitude is also highly important when we consider the general instructive-educational process and especially the students' activities. More precisely and in agreement with the results of our analysis, self-esteem has a very important role in predicting the academic achievement, a fact that indicates the necessity of adopting a supporting attitude towards students, by underlining the positive aspects and the registered progress in order to reach to a realistic and positive self-image.

A possible opening of this paper may consist in investigating a larger range of internal and external factors implicated in academic achievement that may be able to explain a higher percentage of the variation of academic results obtained by students at summative assessments during the faculty courses. Starting with the factors that are significantly influencing the academic results, the researchers in the field of university pedagogy may have in view the elaboration and implementation of some strategies of psycho-pedagogical intervention destined to improve the level of academic achievement in higher education.

References

1. ANDERSON, E. S., KEITH, T. Z. (2001). *A longitudinal test of a model of academic achievement for at-risk high school students.* In *The Journal of Educational Research, 90 (5),* 259-268.
2. AUSUBEL, D. P., ROBINSON, F. G. (1981). *Învăţarea în şcoală (Learning in school).* Bucureşti: EDP.
3. BETORET, F. D. (2006). Testing an Instructional Model in a University Educational Setting from the Student's Perspective. *Learning and Instruction, 16,* 450-466.
4. BLICKLE, G. (1996). Personality traits, learning strategies, and performance. *European Journal of Personality, 10,* 337-352.
5. BORDE, S. F. (1998). Predictors of student academic performance in the introductory Marketing course. *Journal of Education for Business 73 (5),* 302–306.
6. BORG, M. G, FALZON, J. M (1991). *Predictors of overall performance* in a B. Ed. Course and in Educational Psychology. *Assessment in Higher Education, 16 (2),* 149-156.
7. BRUINSMA, M. (2003). *Effectiveness of higher education. Factors that determine outcomes of university education.* Groningen, The Netherlands: GION/COWOG.
8. BRUINSMA, M. (2004). *Motivation, cognitive processing and achievement in higher education.* In *Learning and Instruction, 14,* 549-568.
9. BUSATO, V. V., PRINS, F. J., ELSHOUT, J. J., HAMAKER, C. (2000). *Intellectual ability, learning style achievement motivation and academic achievement of psychology students in higher education.* In *Personality and Individual Differences, 29,* 1057-1068.
10. CHAMORRO-PREMUZIC, T., FURNHAM, A. (2003). *Personality predicts academic performance: Evidence from two longitudinal university samples.* In *Journal of Research in Personality, 37,* 319-338.
11. CLINCIU, A. I. (2010). *Două instrumente destinate evaluării de sine (Two instruments destined to self-evaluation).* In E. Avram (editor), *Sănătatea şi calitatea vieţii (Health and Quality of Life).* Bucureşti: Editura Universităţii.

12. CONARD, M. A. (2006). *Aptitude is not enough: How personality and behavior predict academic performance.* In *Journal of Research in Personality 40,* 339-346.
13. CONSTANTIN, T. (2004). *Evaluarea psihologică a personalului (The psychological evaluation of personnel).* Iaşi: Editura Polirom.
14. CUASAY, P. (1992). *Cognitive factors in academic achievement.* In *Higher Education Extension Service Review, 3,* 3-10.
15. EPPLER, M., A., HARJU, B., L. (1997). *Achievement motivation goals in relation to academic performance in traditional and nontraditional college students.* In *Research in Higher Education, 38 (5),* 557-573.
16. FARSIDES, T., WOODFIELD, R. (2003). *Individual differences and undergraduate academic achievement: the role of personality, intelligence and application.* In *Personality and Individual Differences, 34,* 1225-1243.
17. GAGNÉ, F., PÉRE, F. S. (2001). *When IQ is controlled, does motivation still predict achievement?.* In *Intelligence 30,* 71-100.
18. JANSEN, E. P. W. A., BRUINSMA, M. (2005). *Explaining achievement in higher education.* In *Educational Research and Evaluation, 11 (3),* 235-252.
19. KAHN, J. H., GAILBREATH, R. D., CHARTRAND, J. M. (2002). *The Utility of Career and Personality Assessment in Predicting Academic Progress.* In *Journal of Career Assessment, 10 (1),* 3-23.
20. LELORD, F., ANDRE, C. (2003). *Cum să te iubeşti pe tine pentru a te înţelege mai bine cu ceilalţi (Love yourself to better understand the others).* Bucureşti: Editura Trei.
21. LIM, J., KIM, M., CHEN, S. S., RYDER, C. E. (2008). *An empirical investigation of student achievement and satisfaction in different learning environments.* In *Journal of Instructional Psychology 35 (2),* 113-119.
22. MCCOACH, D. B., SIEGLE, D. (2001). *Why try? Factors that differentiate underachieving gifted students from high achieving gifted students.* Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA. (ERIC Document No. 454678).
23. MCNABB, R., PAL, S., SLOANE, P. (2002). *Gender differences in educational attainment: the case of university students in England and Wales.* In *Economica 69 (275),* 481-503.
24. NICOLA, I. (2000). *Tratat de pedagogie şcolară (A treaty of school pedagogy).* Bucureşti: EDP.
25. O'CONNOR, M. C., PAUNONEN, S. V. (2007). *Big Five personality predictors of post-secondary academic performance.* In *Personality and Individual Differences, 43,* 971-990.
26. PASCARELLA, E., TERENZINI, P. (1979). *Interaction effects in Spady and Tinto's conceptual models of college attrition.* In *Sociology of Education 52 (4),* 197-210.
27. PRECKEL, F., HOLLING, H., VOCK, M. (2006). *Academic underachievement: relationship with cognitive motivation, achievement*

motivation, and conscientiousness. In *Psychology in the Schools, 43 (3)*, 401-411.
28. SHIM, M. K., FELNER. R. D., SHIM, E (2000). *The effects of family structures on academic achievement.* Paper presented at the Annual Meeting of the American Educational Research Association in New Orleans, April 2000. (Available on line at http://www.eric.ed.gov).
29. SLOBODSKAYA, H. R., SAFRONOVA, M. V., WINDLE, M. (2005). *Personality, temperament and adolescent adjustment in modern Russia.* In *Personality and Individual Differences (39)*, 167-178.
30. TASPINAR, M. (2007). *The cooperative learning method in teacher training.* In *International Journal of Educational Reform 16 (1)*, 54-70.
31. TINTO, V. (1993). *Leaving College. Rethinking the Causes and Cures of Student Attrition.* Chicago and London: The University of Chicago Press.