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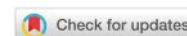
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## Mental Representations as The Students' Academic Success Predictor

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**Abstract:** The analysis is aimed at defining peculiarities of mental representations in homogeneous cluster groups, represented by the students characterized by different (high, average or low) academic progress levels. Deductive and correlation design of the research is defined here as a general method. Statistic design: the research is held taking into account a mixed method, including several qualitative and quantitative techniques of data processing and interpreting; more specifically cluster analysis (used for relatively homogeneous groups defining), multiple regression analysis (used to determine the impact of mental representations characteristics on academic success) as well as Kruskal-Wallis rank sum test. The average value of the regression model significance reflects the veracity of the research results. The attained statistic results prove that mental representations have peculiar impact on students' academic success and there is an effect of the students' academic activity progress splitting. On the one hand, the research helps to identify cluster groups of students characterized by success exteriorization indices growth and academic success indices reduction. On the other hand, non-linear impact of mental representations characteristics on students' academic success was identified (the effect of inversion); i.e. some mental representations indices are highly developed, but the quality of education is low and individual resource is hard to implement in everyday life. Academic progress index, high level of studying and professional competences acquirement orientation as well as the activity factor are defined as measures of academic success mental representations splitting in groups. These results and conclusions prove the scientific fact that mental representations have an influence on the students' academic success. This influence is multidimensional and vague. These facts offer a challenge of the research in considering highly-effective psychotechnologies for developing mental representations in general and students' academic success in particular.

*Keywords:* predictors, mental representations, academic success, academic progress, implicit theories.

### Introduction

Modern society requires competitive erudite persons, aimed at developing and able to adapt to changes; this request helps to form such social value as success. That is why the problem of modern young people being successful becomes extremely topical nowadays. Success conditions systematizing helps to assume that there is a stable structure of intellectual and personal variables, acting as a so-called "skeleton", providing real and potential success. Mental representations of success may be considered as crystallizing bases of this stable structure. Person's potential, but first and foremost actual success in different spheres of activity depends on mental representations, notions and images formed on success (Romero-Galisteo et al., 2022; Welsch and Zimmer, 2018). Success actualization in educational and professional activities becomes one of the most important indices for employers: they prefer hiring those students who were successful in educational activities and had advanced academic achievements. (Goegan and Daniels, 2021). That is why the basic variables in this research are the students' academic success and its predictors, represented by mental representations.

Academic success has been a relevant problem for many decades (Ishkov, 2019; Lewis and Yates, 2019). Theoretic analysis of modern researches showed that the academic success can be expressed through a great variety of criteria/indices. These criteria include academic progress (Fréchette-Simard et al., 2022); average mark, knowledge and skills achieved and overall satisfaction (Goegan and Daniels, 2021); completion of education and positive experience in professional algorithms, practical evaluation of schemes and models (Roshchevskaya, 2013); being ready to defend own point of view, active and

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positive attitude to studying/working; being adaptive (being ready to confront challenges) (Nadtochyy, 2017); effective record-keeping and time-management (Gaponova and Popova, 2016; Lewis and Yates, 2019); academic stress resistance (Martin et al., 2022); time for answering questions, answer correctness coefficient and decision-making confidence coefficient (Bakanov and Zelenova, 2015), etc.

However, the question of which variables are predictors of academic success is still topical. Analysis of different researches in this sphere showed that the academic success predictors can be conditionally subdivided into intellectual/cognitive, personal/non-cognitive and situational (connected with tasks, their complexity, strategy of studying, etc.). The last group of variables is large enough and is studied in various pedagogic and psychological researches. It includes the model of education (e.g., the model of flipped classroom, which helps to reduce stress and to increase academic progress) (Aydin and Demirer, 2022) and strategies of education (Freiberg-Hoffmann et al., 2022) using modern humanitarian technologies (dialogic, critical thinking development, projecting, self-presentation) (Sokolova and Khudoteplova, 2017) and such methods of education as experimental learning (Li and Li, 2021), frequency of students interacting with teachers as well as an academic validity (as a stimulation and support of students achievements) (Li and Li, 2021), etc.

The level of an intellectual activity efficiency is, in many respects, a defining factor for academic success. There are many researches proving these stable links. General (i.e. intelligence, creativity) (Bezerra, Alves and Azoni, 2022) and specific (speed of information processing, memory, thinking, attention, imagination and speech) cognitive predictors determine academic success at the beginning of studying as well as at other stages of getting education. These predictors define abilities to establish logical connections and to identify what is critically important and what is merely a detail (Larkina, 2021; Postavnev et al., 2020). For example, in a situation of solving averagely complex school tasks, a high level of cognitive development and a high need for cognition contribute to internal motivation and involvement in studying, helps educating process to be successful (Lavrijsen et al., 2021). Critical thinking correlates with academic self-esteem (average or moderate level of critical thinking is connected with adequately high academic self-concept) (Dehghani et al., 2011; Mafarja and Zulnadi, 2022). Intelligence and person implicit theories acceptance is a determining cognitive factor of academic efficiency and success (Dweck, 2015).

Intellectual flexibility/humility as well as fluid intelligence are one of the most important cognitive predictors of academic success. Intellectual humility determines the efficiency of fulfilling tasks of different complexity degrees and efficiency of coping with problems in future life (Ratu, Rai and Savitri, 2021). Flexible intelligence (including non-verbal one) has an impact on creation in case of indirect influence of field independence (acting as cognitive style), which can determine academic success (Bouchebra et al., 2022; Giancola, Palmiero and D'Amico, 2022). Intellectual activity (as the sign of involvement and intellectual activity satisfaction) is one more intellectual predictor. The higher the intellectual activity is, the higher academic success in humanitarian and linguistic (not mathematical or standardized tests) disciplines is (Hülür et al., 2018).

Intellectual peculiarities being predictors of academic progress are the most important prognostic indices; they help to make increasingly more accurate prognoses of academic success as students grow older. At the same time, it is difficult enough and not justified in all cases to rely just on the levels of intellect, creativity and other cognitive processes development (Dvojnjin and Trockaya, 2022).

The more person is oriented on achieving the goal, the higher personal achieving motivation is, the better educational, cognitive, professional and self-actualization motivation is developed, the higher students' success self-esteem is. The success self-esteem is studied as one of the mental representations of academic success (Eksakusto, Kibalchenko and Duganova, 2022; Karlen, Hirt and Stebner, 2021; Kornilova, Kornilov and Chumakova, 2009).

The range of non-cognitive (personal) variables is wide enough. Senior high school students' academic success was found out to be connected with such regulative universal academic activities as targeting, situation analysis, planning, self-control, correcting and volitional efforts (Dracheva, 2015). Moreover, there is a consistent positive correlation of educational motivation, scrupulosity and the so-called "Big five" factors (extraversion, agreeableness, conscientiousness, emotional stability and openness) with academic progress (Albar et al., 2022; Busato et al., 2000).

Self-esteem as well as significantly positive possible "Self" (including time spent for thinking process, current achievement strategies, etc.) may be potential predictors of academic success (Tommasi et al., 2022); possible "Self" is connected with self-development motivation and is the basis for high motivation for achieving goals in educational sphere (Vasilevskaya and Molchanova, 2021). The level of anxiety (personal and situational ones) (Bagandova et al., 2018), hardiness (Legostaeva, 2019), learning and cognitive motivation (Fréchette-Simard et al., 2022), self-efficiency and self-direction (Koh et al., 2022),

etc., are also rated as personal predictors of academic success.

If summarizing the results of the academic success intellectual and personal predictors studying, we may suppose that the method based on integration of these variables is the most advanced and prospective one. The complex of intellectual and personal features/resources (experience, targeting and correcting of goals based on this experience, own abilities) but not just separately defined variables determine the quality of academic progress and success in general. The data achieved during separate (single) studies support this approach (Smirnov, 2014; von Keyserlingk et al., 2022; Zirenko, 2018). Mental representations and human ideas are core/basic factors in this approach. Mental representations (connected with human intellectual and personal peculiarities) are the most important prognostic indices of potential and current success; they are being set up in a process of life and reflect the view of the world, society and self, formed in a process of life (Kholodnaya, 2019). Thus, mental representations can define the efficiency of success (in different activity types) actualization (Sipovskaya, 2015; Smirnov, 2014).

Being an operating form of mental experience, refracting through the identity of the subject, mental representations are characterized by individual resource value and guide a person to achievements, intentions and correct behavior. If speaking about the system of academic success predictors data, mental representations influence on academic success (including its being non-linear) is still insufficiently studied (Kholodnaya, 2020). There are few researches studying metacognitive skills and metacognitive experience from the point of view of their ability to effect positively on person choosing this or that cognitive strategy while solving problems and meeting wide range of educational challenges (Savin, 2004; Schuster et al., 2020; Sipovskaya, 2016; Trifonova, 2021; Volkova and Kholodnaya, 2018).

Such aspects of mental representations as intelligence and personal implicit theories acceptance, success achievement motivation, "Self" perception, metacognitive knowledge and personal success self-esteem are of great interest nowadays. Thus, the present research is aimed at studying mental representations as a subjective form of ongoing processes vision and the students' academic success predictors.

The study is based on content analysis, which helped to suggest that a multidimensional effect of mental representations on the students' academic success would be found.

So, the core objectives of the study were as follows: to identify cluster groups in accordance with the indices of mental representations and academic success of students; to determine the influence of mental representations characteristics on the students' academic success and correlations of these characteristics with the help of regression analysis and to analyze the features of mental representations of students' (included into different cluster groups) academic success.

## Materials and Methods

Two hundred and twelve students 1st-year students aged 18 and 19 years of Southern Federal University took part in the research (62% - male students, 38% - female ones). The participants of the research were chosen from 587 students enrolled in the Basics of Project Management course. Taking part in the research was of their own volition (they could have withdrawn from participation at any step of the research; no one decided to recuse) and non-reimbursable.

Empiric research was held in two steps. Deductive and correlative design of the research is defined here as a general method. It includes the following qualitative and quantitative techniques of the results processing and interpreting: typing or classification typing method (cluster analysis) was used to organize students into relatively homogeneous groups pursuant to indices of mental representations and academic success; multivariate regression analysis was used to analyze mental representations impact on academic success; comparative analysis ("cross-sectional method") and statistic criteria were aimed at determining differences between the groups.

Several methods and techniques were used to define academic success and mental representations indices. Students' questionnaires with the academic progress data was aimed at biographic data acquisition and students' educational progress self-report. Implicit theories questionnaire (IT) (Dweck, Smirnov's variation) was used to study the indices of such scales as "Stackable" intelligence theory acceptance", "Enriched" personality theory acceptance", "The aims of education acceptance" and "Education self-estimation". Students' success achievement motivation questionnaire (Pakulina) helped to study such indices as "Success exteriorization" and "Success interiorization". Personal differential ("My own self" variant) (Bazhin & Etkind) aimed at getting results for "Assessment" factor (My own self)", "Strength" factor (My own self)" and "Activity" factor (My own self)" scales. The scale of success and satisfaction with life self-esteem (Dembo-Rubinstein variation) helped to study Current, Perfect and

Potential subjective success self-assessment indices. Metacognitive knowledge and metacognitive action self-esteem methods (Poshekhonova & Kashapov) were aimed at analyzing "Metacognitive knowledge" and "metacognitive activity" scales. Ranking indices (as academic success complex assessment) were used as students' academic success markers. Rating system is used in the University where the research was held. This system is accessible for students as well as for the University management and allows to control students' academic progress (0 to 100 credits) in all subjects during each term. Thus, each student has an own average academic progress rating.

## Results

Cluster analysis was used at the first step of the research to define groups homogeneous in levels of mental representations academic progress variables formation (table 1).

**Table 1**  
*Students' mental representations and academic progress characteristics*

Independent variables		Independent variables	
1.	Metacognitive knowledge	9.	Current subjective success self-assessment index
2.	Metacognitive experience	10.	Perfect subjective success self-assessment index
3.	"Stackable" intelligence theory acceptance	11.	Potential subjective success self-assessment index in case of personal abilities subjective assessment
4.	"Enriched" personality theory acceptance	12.	"Assessment" factor (My own self)"
5.	The aims of education acceptance	13.	"Strength" factor (My own self)"
6.	Education self-estimation	14.	"Activity" factor (My own self)"
7.	Success exteriorization	15.	Progress (rating index)
8.	Success interiorization		

Three groups were defined while analyzing dendrogram resulting from clusterization; this fact is the indicative of tendency to normal distribution with 3.44 % deviation from standard distribution.

First group includes 26 students (12.26 % of the total number) – students with academic progress average index (67 points); this index shows satisfactory level according to a point rating system (100 % of students included in this group are characterized by low progress indices). This group can be notionally called "Average progress" according to criterion of academic progress.

Second group consists of 152 persons (71.7 %) – students with average rating of 85 points, i.e. excellent level in accordance with the point rating system. This group is characterized by high progress indices and can be called "High progress: current and potential". The name of the group detailing is connected with the fact that 42.1 % of students here are characterized by average progress index, 50 % – by high academic progress index and 7.9 % of them have satisfactory progress. The number of students with satisfactory progress index is significantly smaller that the number of students with average ( $\varphi^*_{emp} = 10.82, p=0.01$ ) and high ( $\varphi^*_{emp} = 9.16, p=0.01$ ) ones. Thus, the average and high academic progress indices significantly prevail in this group.

Thirty-four students (16.04 %) form a third group; these students are exemplified by average academic progress indices: 73 points – a good progress level. This group is notionally called "Conditionally average progress". The members of this group are ranged wider that the members of the previous one. It includes students with non-satisfactory progress – 17.6 %, satisfactory one – 14.7 % (33.1 % in sum), average (good) progress – 35.3 % and high one – 32.4 %. This group is characterized by academic progress complete splitting.

It should be also emphasized that the respondents included into second and third groups differ in academic progress levels. Clusterization procedure shows that these groups include students similar in mental representations indices variety. The level of students' mental representations formedness hypothetically serves as the academic progress indices splitting criterion.

Results analysis showed correlation according to the degree of success mental representations indices expression described in table 2.

**Table 2**  
The levels of expressiveness of the success mental representations (SMR) indices

	The levels of indices manifestation in "n" variables in groups (per cent)						The number of dominating indices (per cent)
	High (B)		Average (C)		Low (H)		
	n	%	n	%	n	%	
"Average progress" (1)	4	26.7	2	13.3	9	60	60 per cent – low with the elements of high manifestation level (26.7 per cent)
"High progress: current and potential" (2)	6	39.9	7	46.7	2	13.4	13.4 per cent – average with the tendency to high level (39.9 per cent)
"Conditionally Average progress" (3)	3	20.0	5	33.3	7	46.7	46.7 per cent – low tended to the average manifestation level (33.3 per cent)
Dominant	2 <sup>nd</sup> group	39.9	2 <sup>nd</sup> group	46.7	1 <sup>st</sup> group	60.0	

The first group (so called "Average progress") is characterized by low academic progress as well as by ill-defined mental representations predictors predominance. However, the students included in this group show better results and higher indices in such characteristics as "Enriched" personality theory acceptance", "Stackable" intelligence theory acceptance", "The aims of education acceptance" as well as "Success exteriorization" than the students of the other ones. If comparing to other groups, this one is close to "Conditionally average progress" in mental representations indices.

The second group ("High progress: current and potential") differs from other ones; the students in this group are characterized by average and high academic progress; at the same time, averagely expressed mental representations tending to high expression prevail here. Two variables ("The aims of education acceptance" and "Perfect subjective success self-assessment index") are poorly defined here, if comparing to other groups.

The third group of students ("Conditionally average progress") is notable for different levels of academic progress and poorly expressed mental representations indices. This group's results in such variables as "Current subjective success self-assessment index", "Strength" factor (My own self)", "Assessment" factor (My own self)" are higher than the results of students in other groups.

Thus, "High progress: current and potential" group significantly differs from the other ones in dominating of averagely and positively expressed mental representations indices. The "Average progress" group, on the contrary, is characterized by poor expression of these indices. The "Conditionally average progress" group is in a middle position with average mental representations indices expression.

Coefficients (the sum equals one) of mental representations characteristics predominating in splitting equations (Rn) in the levels of expression (H, C, B) were defined while converting percent into nonintegrals:

$$1^{\text{st}} \text{ group } R1 = 0,6H + 0,27B + 0,13C$$

$$2^{\text{nd}} \text{ group } R2 = 0,5C + 0,40B + 0,10H$$

$$3^{\text{rd}} \text{ group } R3 = 0,5H + 0,30C + 0,20B$$

These results show the success mental representations indices being non-linearly distributed; this fact may be proved by regression analysis. These results can be determined by the progress and its predictor's correlation being multidimensional and complex.

The second step of the empiric research and a process of different levels of academic progress definition (regression analysis) helped to determine consistency of regressions and report for models (see Tables 3-5).

All the used variables are defined as academic progress predictors; they are used in different hierarchic order; the use of Kruskal-Wallis's H criterion proves this difference. The defined cluster groups differ in such indices as "academic progress" (H=55.51, p=0.00); "Education self-estimation" (acting as an academic success predictor and intellectual success self-presentation) (H=9.51, p=0.01); and "Enriched" personality theory acceptance" (H=6.95, p=0.01). If analyzing regression models content, note that the "Activity" factor (My own self)" predictor is the first one in all groups with averagely equal values (1st group – 26.6; 2nd group – 25.8; 3rd group – 25.8). This predictor is included into a pleiad with different hierarchically dominating variables and is safe to be the core sign of young people being active, engrossed with a life processes (which is typical of this age).

The first group: "Activity" factor (My own self)" (VAR 14) forms hierarchically significant complex of

the following predictors: "Strength" factor (My own self)" (VAR 13) (28.15), "Perfect subjective success self-assessment index" (VAR 10) (9.19) – highest rate in all groups; "Metacognitive activity" (VAR 2) (8.88) (see Table 3).

**Table 3**  
*Regression indices in "Average progress" cluster group*

ANOVA				
Model	Sum of squares	Degrees of freedom	F	P-Value
Regression	12.82	14	3.96	0.01
a. Dependent variable: 15				
b. Predictors: constant = 31.84; characteristics and $\beta$ -coefficients of each variable: VAR14 ( $\beta=0.67$ ), VAR13 ( $\beta=0.66$ ), VAR10 ( $\beta=0.64$ ), VAR2 ( $\beta=0.63$ ), VAR 8 ( $\beta=-0.88$ ), VAR 3 ( $\beta=0.60$ ), VAR 6 ( $\beta=0.53$ ), VAR 12 ( $\beta=0.51$ ), VAR 11( $\beta=0.50$ ), VAR 1( $\beta=0.47$ ), VAR 5( $\beta=0.45$ ), VAR 9 ( $\beta=-0.52$ ), VAR 4( $\beta=0.33$ ), VAR 7( $\beta=0.30$ )				

These predictors influence an academic success no matter the education self-estimation index is expressed in a significantly weaker way here comparing to two other groups. Such characteristics as "The aims of education acceptance" (VAR 5) (the highest rate among groups); "Current subjective success self-assessment index" (VAR 9); "Enriched" personality theory acceptance" (VAR 4) (also the highest rate among groups); "Success exteriorization" (VAR 7) (the highest rate among groups, significant differences with the 3rd group:  $U_{emp} = 534.5$ ;  $U_{cr} = 620$ ,  $p = 0.01$ ) have the least impact on the academic progress of this group participants. The students related to this group are much more stable and show more academic, cognitive and professional motivation than the students included into the second one. This group is characterized by the higher expression of the "Stackable" intelligence theory acceptance" index than in other groups no matter the students included into it are insufficiently targeted at studying and learning skills ( $U_{emp} = 533$ ,  $U_{cr} = 604$ ,  $p = 0.05$ ).

If speaking about the second group, the "Activity" factor (My own self)" (VAR 14) forms hierarchically significant complex linked with such predictors as "Success interiorization" (VAR 8), "Current subjective success self-assessment index" (VAR 9) and the "Stackable" intelligence theory acceptance" (VAR 3) (see Table 4).

**Table 4**  
*Regression indices in "High progress: current and potential" cluster group*

ANOVA				
Model	Sum of squares	Degrees of freedom	F	P-Value
Regression	1870.12	14	2.49	0.00
a. Dependent variable: 15				
b. Predictors: constant = 33.48; characteristics and $\beta$ -coefficients of each variable: VAR 14 ( $\beta=0.72$ ), VAR 8 ( $\beta=0.70$ ), VAR 9 ( $\beta=0.67$ ), VAR 3 ( $\beta=0.65$ ), VAR 2 ( $\beta=0.62$ ), VAR 12 ( $\beta=0.60$ ), VAR 13 ( $\beta=0.56$ ), VAR 10 ( $\beta=0.55$ ), VAR 6 ( $\beta=0.55$ ), VAR 7 ( $\beta=0.52$ ), VAR 5 ( $\beta=0.50$ ), VAR 11 ( $\beta=-0.48$ ), VAR 4 ( $\beta=0.45$ ), VAR 1 ( $\beta=0.41$ )				

Specific character of the students' knowledge structures and personal experience has an impact on their academic success. The students included into this group are active in studying (VAR 14) but are afraid of challenges, consider them as condition to further intellectual growth as well as the reason of this growth rate reduction. Such characteristics as "The aims of education acceptance" (VAR 5), "Potential subjective success self-assessment index" (VAR 9) (in case of own abilities subjective assessment), "Enriched" personality theory acceptance" (VAR 4) and "Metacognitive knowledge" (VAR 1) have the least effect on this group students' progress. It is noteworthy that the "Success interiorization" holds more expression ( $U_{emp} = 534.5$ ;  $U_{cr} = 620$ ,  $p = 0.01$ ) in this group than in a third one.

The third cluster group is specific for the "Activity" factor (My own self)" (VAR 14) forming hierarchically significant complex with "Metacognitive knowledge" (VAR 1), "Enriched" personality theory acceptance" (VAR 4) and "Current subjective success self-assessment index" (VAR 9) (see Table 5).

**Table 5**  
Regression indices in "Conditionally Average progress" cluster group

ANOVA				
Model	Sum of squares	Degrees of freedom	F	P-Value
Regression	10507.99	14	2.53	0.03
a. Dependent variable: 15				
b. Predictors: constant = 0; characteristics and $\beta$ -coefficients of each variable: VAR 14 ( $\beta=0.94$ ), VAR 1 ( $\beta=0.93$ ), VAR 4 ( $\beta=0.89$ ), VAR 9 ( $\beta=0.87$ ), VAR 13 ( $\beta=0.86$ ), VAR 10 ( $\beta=0.77$ ), VAR 6 ( $\beta=0.59$ ), VAR 8 ( $\beta=0.57$ ), VAR 12 ( $\beta=0.55$ ), VAR 2 ( $\beta=0.55$ ), VAR 11 ( $\beta=0.53$ ), VAR 5 ( $\beta=0.51$ ), VAR 7 ( $\beta=0.49$ ), VAR 3 ( $\beta=-0.49$ )				

Moreover, "Metacognitive knowledge" and "Enriched" personality theory acceptance" indices are the academic progress hierarchically valuable predictors. They are much poorly expressed here than in two previous groups. Such characteristics as "The aims of education acceptance" (VAR 5), "Success exteriorization" (VAR 7) and "Stackable" intelligence theory acceptance" (VAR 3) are formed better than in the second group, but have little effect on academic progress of students. Significantly higher "Ego self" index ( $U_{emp} = 330.5$ ;  $U_{cr} = 331$ ,  $p = 0.01$ ) is specific of the students of this group.

## Discussions

According to the results of the first stage of the study, one can conclude that the second group ("High progress: current and potential") and the third one ("Conditionally Average progress") are characterized by high mental representations indices; on the other side, academic progress quantitative indices are splitting and dividing into opposite sub-fields. That is, in case of sufficiently high quantitative indices of mental representations characteristics, opposite academic progress indices are observed. If speaking about the first group "Average progress" there is a reverse effect. Low academic success index became a measure of mental representations indices splitting; mental representations indices are expressed at low, average and high levels here. According to modern researches (Kholodnaya, 2020), intelligence (namely, mental representations) indices, no matter they are of high, average or low levels, can be associated with both high and low academic progress of students. Consequently, success indices of high, average and low levels as well as success mental representations "split" into different areas depending on the underlying productive or non-productive components. This fact is proved by some modern researches as well (Dyupina, 2021; Kibalchenko, Eksakusto and Chegodaeva, 2021).

The complex of predictors of the first "Average progress" group were analyzed at the second stage of the research. The resource link of the students included into this group is strong; i.e. they are able to focus on the process of teaching and getting skills; to assess intelligence objectively and to change internal mental action into an external one. However, they scarcely use this resource strong link in an educational activity.

Moreover, there is a contradiction: on the one hand, students demonstrate greater (comparing to others) stability and belief in their development and the achievement motivation expressiveness; on the other hand, they tend to consider themselves (situationally) unsuccessful; to be unstable in choosing and using effective metastrategies of learning, self-regulation skills and irrational in using school time (Volkova and Kholodnaya, 2018). They have problems with realizing correct means of information obtaining and processing, strategies and requirements for problems solving, etc. In other words, there is a contradiction between the implicit nature of evaluating one's efforts and the existing metacognitive resource. It is fair to assume that the correlation of low-level metaknowledge and implicit aspirations for one's personality "enrichment" make it difficult to change one's own action from internal to external one. In other words, there is an inversion phenomenon in this group, i.e. these students have high cognitive performance, but other (non-cognitive) indices are low, i.e. the index of knowledge is highly developed, but the procedural side of the activity is underused (Cheng and Cheung, 2005).

Differences in the success interiorization index expression intensity detected in the second group (students with high progress) are expressed in the following understanding of success: the success is personal, depends on personal achievements; it is perceived as a result of personal activity, as a specific mental state as well as difficulties overcoming and vocational aptitude. The students of this group (opposed to the students of other ones) consider success as a positive result in studying and working. Meanwhile, the indices of "The aims of education acceptance", "Enriched" personality theory acceptance"

and "Metacognitive knowledge" are of lower level than in two other groups. That is why the students of this group use these indices in an educational activity less frequently. Thus, according to metacognitive theory, there is a difference between person's metacognitive knowledge (understood as the vision of own thinking process) and the strategies being factors of metacognitive activity. This activity tend to increase. That is why the students with high progress can change the ways of information processing from peculiar focus (result) to metacognitive one; this fact helps to develop their cognitive processes perception (Moritz and Woodward, 2007).

The students of "Conditionally average progress" group show the lowest level of the implicit theory acceptance index expression. This fact characterizes these students as those who find it difficult to assess their learning efforts; have weak achieving motivation, insufficiently developed educational and cognitive motives and motives of creative self-actualization. Arguably, they do not work enough on themselves and on changing their personal characteristics. They differ from the other groups of students by lower potential success self-assessment index and subjective assessment of their abilities; i.e. they underestimate their capabilities because their abilities metacognitive awareness is poorly formed.

The results of the research let us conclude that the students of all three groups are situationally (inconsistently) oriented on the "Enriched" personality implicit theory acceptance". They find it difficult to assess their learning efforts; do not work enough on themselves and on changing their "enriched" personality characteristics. The motives of creative self-actualization are underdeveloped in all three groups; but the level of this development differs (1<sup>st</sup> group – 5.35; 2<sup>nd</sup> group – 2.18, 3<sup>rd</sup> group – 1.94). There is an interesting tendency if speaking about the "Stackable" intelligence theory acceptance": the students of all three groups are highly oriented on studying and getting professional skills (1<sup>st</sup> group – 9.38; 2<sup>nd</sup> group – 7.38, 3<sup>rd</sup> group – 8.2). The students are not afraid of challenges and consider difficulties as conditions of further intellectual growth. There is some ambivalence: on the one hand, students do not work enough on themselves and their personal qualities, they do not believe that there are no limits for personal development; on the other hand, they believe in intellectual development and the intelligence "growth" during the process of studying. This conclusion aligns with modern studies of mental abilities and their non-linear connection with academic and life success (Kholodnaya and Sipovskaya, 2023; Ushakov, 2011).

One more tendency was found out during the study: the lower the level of academic success index is, the higher the index of the success exteriorization is. Such external characteristics of success as high financial level of life and high social status (honours, power, etc.) become much more important for students. The result is specific because the students participated in the research are the future IT-specialists; they are interested in being employed as early as it is possible (most of them get jobs while being the first- or second-year students of Universities). The quality of their educational activity runs low and educational self-esteem decreases (the average point rating also reduces); but their financial well-being (helping to focus on success internal attributes) increases.

The lack of significant differences of such characteristics as "Self" assessment", "Self" activity", "Metacognitive knowledge" and "Metacognitive activity" indicates the fact that despite the differences between success and progress mental representations, the students of all groups have almost the same educational experience and level of knowledge; act almost identically in social and educational spheres. The students of all groups tend to value their current success at a quite low rate (5 points out of 10) regardless of their academic success. This is an indirect sign of the fact that modern young people (including future IT-specialists) do not consider getting education at the higher professional education establishment and average mark as being the bases of success (successful studying and professional success do not correlate with each other in their opinions). Nevertheless, the average assessment of perfect success in all groups equals 9 points (of 10), while potential success assessment (taking into account all the abilities) is at the rate of 8 points (out of 10); i.e. almost all young people are skeptic about their abilities and future achievements.

Thus, this research identifies the impact of mental representations characteristics on the students' academic success. This fact confirms the hypothesis of the study. Furthermore, the content of mental representations has rather a complex and ambiguous impact on students' academic success, which is more characteristic of students with low academic progress level. The phenomenon, when some separate indices of mental representations ("Enriched" personality and intelligence theory acceptance, "The aims of education acceptance" and "Belief in personal potential success acceptance) are highly-developed but the quality of education is low and students find it difficult to use their resources, is called an inversion effect. This effect reflects a multidimensionality of mental representations impact on academic success. As a result, it is necessary to carry out an additional research (factor analysis in particular) to study variability of mental representations as academic success predictors.



## Conclusions

This research shows that studying mental representations (being success predictors) as well as their impact on the students' academic success is topical nowadays. Three groups of students were defined in a process of diagnostic results clustering: "High progress: current and potential", "Conditionally average progress" and "Average progress".

The students with low academic progress accept more personal and intelligence implicit theories and have low education self-assessment. This fact shows discrepancy between implicit character of personal efforts assessment and current metacognitive resource. Therefore, those mental representations characteristics, which are formed and developed better, have a minimal impact on academic success in accordance with the regression model. Low level of academic progress becomes the measure of mental representations characteristics splitting in this group. Mental representations indices, connected with low academic progress, are expressed on low, average and high levels.

A full picture of educational indices (high, average, satisfactory and unsatisfactory) splitting is found in a group of students with "conditionally average progress". The "Self" power" index is maximally expressed here and its impact becomes one of the peculiarities of the indices splitting. The students of this group are supposed to be more self-confident and tenacious (they choose this variable more often than the students in other groups do) because they have to be more impregnable during an educational process and to put up a good show in conditions of average cognitive abilities. The index of "Enriched" personality theory acceptance is poorly expressed in this group. Therefore, these students find it difficult to assess their own abilities and to change their personal characteristics while studying. Their achievement motivation and self-improvement are underdeveloped.

The students of "High progress: current and potential" group are characterized by having high mental representations characteristics indices; nevertheless, academic progress quantitative indices are splitting and dividing into opposite sub-fields. One of the basic predictors in this group is internal structures forming by the way of auditory material retention, life experience gaining and general development of a person. The effect of metacognitive theory may be observed here; i.e. the better the metacognitive strategies comparing to metacognitive knowledge are formed, the better the conditions for cognitive processes, new knowledge developing, own academic and general success recognizing are.

Mental representations impact on the students' academic success was indicated in general. This impact is multidimensional, ambiguous and worth further studying. It may help to create highly effective psychological technologies for mental representations of general and academic success development.

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### Conflict of interests

The authors declare no conflict of interest.

## Author Contributions

Conceptualization, I. A. K., T. V. E.; Investigation, I. A. K., T. V. E.; Data curation, I. A. K.; Methodology, I. A. K.; Writing – original draft, T. V. E.; Writing – review & editing, T. V. E.. All authors have read and agreed to the published version of the manuscript.

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