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Self-assessment of students' strengths and difficulties at work in the innovative program

Abstract: This article presents the results of an analysis of data from a survey "Which are your strengths and weaknesses". The target group of 956 students were engaged in an extensive survey, aged from 10 to 18. The survey conducted a self-assessment of their strengths and weaknesses in the context of their level of thriving in and outside the innovative program. The study aims to compare the overall psychological condition and the level of students' motivation who participate in an innovative program for specialized training with a control sample of students who are not engaged in innovative educational initiatives. In the methodological core of research design are implemented indicators that are calculated based on the results of two measures; The Strengths and Difficulties Questionnaire, which measures four difficulties domains of both psychological and educational development challenges, and the fifth domain referring to pro-social behaviour; and Brief Inventory of Thriving, a short scale for self-assessment of overall life satisfaction and achievement level. The target group of 956 students were engaged in an extensive survey, aged from 10 to 18. The survey conducted a self-assessment of their strengths and weaknesses in the context of their level of thriving in and outside the innovative program. The relevance of the results obtained from the pilot study is both to re-validate the methodology and to confirm or reject several hypotheses directly related to the educational impact and the personal contribution to the motivation of the participants in the innovative program.

Keywords: strengths, difficulties, thriving, innovation, assessment.



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Самооценка на силните и слабите страни на ученици, ангажирани в иновативна образователна програма

Резюме: Настоящата статия представя резултати от анализа на данни, получени при допитването „Кои са твоите силни и слаби страни?“ Целта на изследването е да се сравни психологическото състояние и нивото на мотивация на ученици, които участват в иновативна програма за профилирана подготовка с контролна група от ученици, които не са ангажирани в иновативни образователни инициативи. В методологичното ядро на изследователския дизайн са внедрени показатели, които се изчисляват на основата на резултати от две мерки – The Strengths and Difficulties Questionnaire, който измерва четири проблеми области в психологичното и образователно развитие и една област, която е фокусирана върху про-социалното поведение; и Brief Inventory of Thriving, кратка методика за самооценка на общото удовлетворение от живота и нивото на постижения. Целевата група от 956 ученици, участвали в изследването обхваща възрастта от 10 до 18 годишни. Самооценката на силните и слабите страни е осъществено в контекста и на общото чувство за преуспяване на участници, ангажирани в програмата на иновативен проект и такива, които са извън нея. Значението, което се отдава на резултатите, получени от пилотното изследване е както да се ре-валидира методологията, така и да се потвърдят или отхвърлят редица хипотези, свързани пряко с въздействието и приноса към мотивацията на участниците в иновативната програма.

Ключови думи: силни страни, слаби страни, преуспяване, иновации, измерване.



Introduction

Adolescence is a period of a child's development in which significant changes occur in his social and emotional world. As a result of the complex changes that occur in the child's body, character traits also develop and change. Searching for their own identity and affiliation to the world, adolescents face the challenge of having positive communication with their peers, to be able to perform their tasks to the end, to be responsible and well-meaning. The transition from the world of children to the world of adults fills adolescents with emotional excitement, often negative, as well as unwillingness to follow norms and to challenge the limitations. Their age also puts their persistence and the sense of self-control to the test. On the other hand, in the period of early adolescence, the need for interpersonal closeness, mutual love and emotional support, sharing and trust arises, which can be achieved through the development of integrity and strong character traits. Strong character traits are associated with high levels of satisfying relationships with peers, good self-control, concentration, goodwill, emotional resilience and competence, a sense of being prepared for the future, driven by a high desire to succeed.

The project for innovative education aims to increase the interest, activity and creativity of students by expanding innovative teaching methods, including learning by “making” and reorganizing the environment. Awareness of the choice of subjects in the second stage of his profiled training in the field of practical experience in STEM (Science, Technology, Engineering and Mathematics). The interdisciplinary approach helps to understand the learning content in an easy and accessible way, improves the environment, gives greater freedom of self-expression and feeling of personal well-being, developing critical thinking, integrating five different but very related subjects, enabling young people to make informed choices. Classification subjects help to choose the future profession in the field of technical and scientific specialities. In the implementation of the innovation, the integration model of education is based on teamwork and cooperation between students, between students and teachers, discovery, responsibility for their education, interest, motivation. This model of training, organization and management, as well as its expansion among other subjects, is a big step for the sustainability of knowledge and skills, for quality education and higher life satisfaction (*Petkov et al., 2019*).

Purpose, hypothesis, subject and methods of the research

The study aims to identify the strengths, weaknesses and the desire to thrive and succeed students of the 11th and the 12th grade, trained in the project “*STEM centre with virtual laboratories for learning*”. To achieve the goal of the study, the following tasks are defined:

- a) identification of the current state of the strengths, weaknesses and the pursuit of success among the respondents;
- b) analyze the links between strengths and weaknesses and the pursuit of success;
- c) bringing out the different ones based on gender and age in 3 educational groups – students from the 5th to the 7th grade, from the 8th to the 10th grade and students in specialized classes from the 11th to the 12th grade.

The hypotheses of the study, formulated in particular, assume that with the psychological development in adolescence, the desire to succeed increases, in particular, it is expected that there is a positive relationship between low levels of emotional difficulties and high levels of success. It is also assumed that compliance with the norms in adolescence leads to higher levels of thriving, with the meaning that it is expected that there is a positive relationship between low levels of norm problems and high levels of success. Third, it can be assumed that the lack of focus and concentration weakens the sense of thriving includes success and well-being in adolescents in both stages of learning. Therefore, we expect that high levels of hyperactive distraction lead to low levels of striving for success. The last working hypothesis states that in the presence of problems with peers, the desire to thrive decreases and it can be assumed that high levels of problems with peers lead to low levels of the personal of satisfaction and growth.

The subject of the study is a sample composed of an experimental and control group of participants (N = 956), who note their status as students from primary, basic and secondary education. The average age 15 ± 1 years (the age range of the participants was from 8 to 18 years). The participants are divided into three groups – 196 students in primary school (grades 5 to 7), 523 students in secondary education (grades 8 to 10) and 237 students in specialized profiles (grades 11 and 12). The design of the online survey allows participants to indicate their gender (male, N = 321 and female, N = 635) and place of residence (capital, N = 319, or other

location, N = 637). Only the demographically key indicators were taken into account when conducting the analysis and discussing the results. Filling time is also reported (average 22 minutes per participation).

The measurement methods used in the extensive study “*What are your strengths and weaknesses?*” are two of the four pilot scales completed in November-December 2020. The data and results presented in the publication cover the following measuring instruments.

1. *The Strengths and Difficulties Questionnaire (Goodman, 1997)*. It was adapted in 2005, with some of the statements reworded to be gender-neutral. The questionnaire is used and adapted in many cultures with the consideration that some of the subscales are sensitive to the population risk level (Giannakopoulos et al., 2009; Marzocchi et al., 2004; Niclasen et al., 2013; Shojaei et al., 2009). Provides indicators of five subscales, which are assessed with a Likert scale from 0 to 2, the absence or presence of a four kinds of difficulties or a strength. The reliability of the 25-items administered methodology is $\alpha=.591$. An index for general behavioural difficulties and five other sub-scales are displayed as follows:

- a) for negative emotional symptoms Cronbach’s α is ,753;
- b) the presence of friends and whether the relationships with peers are conflicted or not α is ,282);
- c) problems with self-control, concentration and hyperactivity $\alpha=.569$);
- d) conductive problems and violation of the norms ($\alpha=.430$);
- e) a scale for positive social orientation, benevolence and prosocial behaviour ($\alpha=.722$).

Analyzing factor loadings (by introducing Principal Component, Promax Rotation, Eigenvalue>1) 6 random factors were identified, which explain about 47.89% of the variations in the participants’ answers. Despite some issues with the main components confirmation, each of the five indices will be calculated according to the way indicated by the author of Bulgarian adaptation.

2. *Brief Inventory of Thriving (Su et al., 2015)* is a 10-item questionnaire that provides an opportunity for self-assessment with a Likert scale ranging from 1, “not at all” to 5, “completely yes” to what extent the statement characterizes the lifestyle of the participants. The scale reliability is $\alpha=.889$. In exploratory factor analysis (Maximum Likelihood, Promax) a general factor with a total explained variance of the model of 45.17% is derived. The model is relatively acceptable (Goodness-of-fit, $\chi^2=673,241$, $df=35$, sig.=,000). The short-scale measures one component which referred to thriving summing scores that referring to a overall positive functioning in different life areas considered important to most of the people and does not only include a sense of psychological well-being but also how positive social relationships are, whether participants maintain a supportive relationship, empathy and mutual assistance, the feeling that one contributes to the happiness of others and thus earns not only their respect but also trust and mutual devotion. The high indicator represents whether the person leads a purposeful and meaningful life, engaged in activities that contribute to growth, maintains self-esteem and looks to the future with optimism, having a sense of personal competence, whether he contributes to his prosperity and that of the group.

Results and discussion

To study the hypotheses, two types of analyzes were performed with the calculated results based on raw scores for a generalized index of personal difficulties, four subtypes of difficulties and the indicator of thriving as an expression of personal well-being and success. First, a correlation analysis was performed on the self-assessment data of the entire sample (Zero-order correlations), then the differences in the values of the correlation coefficients between the indices with partial correlation analysis to differentiate dependencies according to whether the participants are studying in an innovative school or not. From the results presented in Table 1, it can be concluded that index of general personal difficulties is moderate to strongly inversely related to the general feeling of thriving ($R = -.451$) as the value of the correlation does not change significantly when the target group is differentiated ($R = -.439$) (Table 1).

The magnitude of the desired effect of innovative education on the overall level of personal difficulty, if the accuracy of the SDQ scale can be relied on, and consequently the thriving rate increases moderately with applied innovations, supported by the relatively polarized correlation between the only strengths. The thriving index is inversely related to the level of general difficulties, as expected, both in the group of all students and in the target group of students from the innovative school. The changes in the values of the other correlations are similar, especially those that are in support of the first hypotheses.

Emotional difficulties and prosperity mark a pattern similar to the total difficulties index. As negative emotions increase, a general decline in overall well-being can be expected (Zero-order $R = -.423$; Partial $R = -.417$, both are significant, $p < .0001$). Conductiveness (violation of the norms) in both cases (from the general data pool and adolescents studying in the innovative school) does not have a moderate negative impact on overall subjective well-being and success, which may mean that either the level of self-reported propensity to break the rules is deliberately underestimated, or the developing self-awareness of boys and girls, regardless of where they study do not see small, expecting social desirability responding. This finding partially supports the second hypothesis only if the inverse sign and the degree of certainty of the correlation coefficient are taken into account (Zero-order $R = -.201$; Partial $R = -.176$; $p < .0001$).

Concerning the third hypothesis, according to which it can be expected that the level of distraction and difficulty in controlling motor and emotional impulses (hyperactivity) is justified in the results obtained (Zero-order $R = -.361$; Partial $R = -.351$; $p < .0001$). It can be expected that the feeling of satisfaction with life, personal growth and success depend to some extent on the ability to cope with deficits in concentration, emotional and motor impulses, from which neither the students of the innovative school, nor the other control group shows a significant difference. From the obtained correlation values it can also be expected that the problematic relationships with peers do not have a significant impact on the self-assessment of success (Zero-order $R = -.157$; Partial $R = -.160$; $p < .0001$).

To outline more precisely the similarities and differences, as well as to assess the magnitude and the level of significance depending on gender, age and type of school, an additional multiple analysis of variations (MANOVA) of participants' scores has been applied. It was found that gender does not affect largely, nevertheless the differences are very significant on the indicator of the presence or absence of emotional difficulties (Partial $\eta^2 = .015$ or 1.5% difference between male and female participants, sig. = .0002). The differences between the boy and girls seem to follow a common model when the type of educational institution is taken into account at the

same time (the differences between the focus and control groups are insignificant, $\text{sig.} = .700$). This pattern of negative emotionality in adolescents is not uncommon. Similar findings have been found for the Bulgarian population in previous studies (Costa & McCrae, 2007; Ferdinandov, 2020) (Figure 1).

The educational stage and the type of educational institution impact separately cannot be expected whether the students are from primary, secondary general and specialized training. It was found large and significant differences between the target group of students from the innovative school and the control group from other schools in terms of indicator for thriving. The difference is 0.9% in favour of the last educational stage (Partial $\eta^2 = .009$; $\text{sig.} = .01$) (Figure 2).

The lack of differences in the indices claiming to measure strengths and weaknesses can be attributed to the homogeneity of the school organizational culture, which implies equal perception and treatment of all students regardless of their age, both in terms of difficulties and in general support and training particular competences. To the positive relationships and the full meaning and experience of the time spent in the educational environment. If the interaction between the educational stage and the type of educational institution is taken into account, almost completely similar patterns are found ($p > .01$), i.e., the differences in the mean values are insignificant for both the experimental target group and the control sample.

Conclusion

Thus, considering the limitation of this type of cross-section data analysis participants are likely to be affected not only by the period of severe restrictive measures due to the spread of Sars-Cov-2 and the new strains the stage affects mainly the emotional condition, but also the nature of online education, which cannot compensate for the benefits of innovation applied in a real environment.

Some important limitations in the methodology were found in the analysis. Prevalent reliability issues and the validity of three of the five sub-scales of The Strengths and Difficulties Questionnaire were identified. It was mentioned the some shortcomings in the construction of the questionnaire itself probably distort the item-consistency and expected construct coherence, e.g., due to the partial cross-cultural applicability of the content concerning the peers-problems, conduct behavior and attention-deficits or due to the narrow Likert range for self-assessment, some specifics of the target and control samples, which probably affect the sensitivity of the measuring instrument adapted for high-risk groups contribute to the hypotheses which not found confirmation. On the other hand, the complementary tool Brief Inventory of Thriving demonstrates sufficiently high psychometric qualities and to some extent compensates the failures with its accuracy and sensitivity and draw the general picture of the final results, explaining in the expected way correlating significantly to the reliable indices for emotional symptoms and pro-social behavior.

However, some of the hypotheses that follow the intuitive expectations of straight and inversely proportional relationships between the newly adapted thriving index and the indicators for different types of difficulties, it can be said with certainty that the area of difficulty moderately reflects the current overall state of the students both in randomly selected schools and the STEM training group. Recent challenges and changes in society prescribe a central place for science and

innovation in joint efforts to achieve sustainable development of society. This also implies not only the presence of adaptive qualities of personality to the changing external environment which is the leading purpose of the project, but the development of strengths, enrichment of knowledge which could be measured even by a shorter, but combined into a more complex prolonged researching design.



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Appendix

Table 1: Mean values and values for correlations between indicators

Index	Mean	Std. deviation	Min	Max	1.0	1.1	1.2	1.3	1.4	1.5	2.0
1.0 Total Difficulties	17,42	5,47	2	30		,756**	,552**	,707**	,585**	-,238**	-,451**
1.1 Emotional symptoms	3,83	2,49	0	10	,750**		,218**	,352**	,257**	-,086**	-,423**
1.2 Conduct Problems	2,69	1,5	0	10	,550**	,198**		,350**	,139**	-,348**	-,201**
1.3 Hyperactivity	4,64	2,15	0	10	,709**	,345**	,361**		,158**	-,183**	-,361**
1.4 Peer Problems	5,07	1,6	0	10	,597**	,265**	,150**	,171**		-,092**	-,157**
1.5 Prosocial Behaviour	8,45	1,78	0	10	-,248**	-,095**	-,337**	-,191**	-,109**		,367**
2.0 Thriving	3,83	0,76	1,3	5	-,439**	-,417**	-,176**	-,351**	-,160**	,387**	

**correlations are significant at level $p < 0.005$. Up and left to the diagonal are presented Zero-order correlations. Down and right to the diagonal are calculated after partialing for students from innovation project.

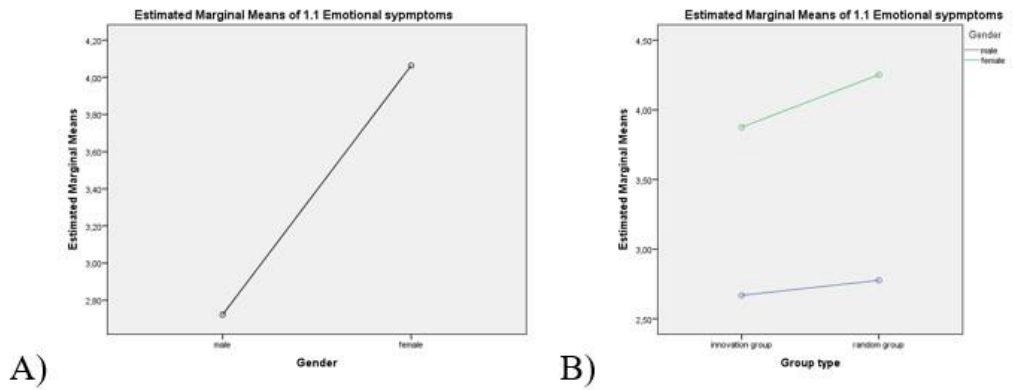


Figure 1. Gender differences (A), taking into account the type of school (B)

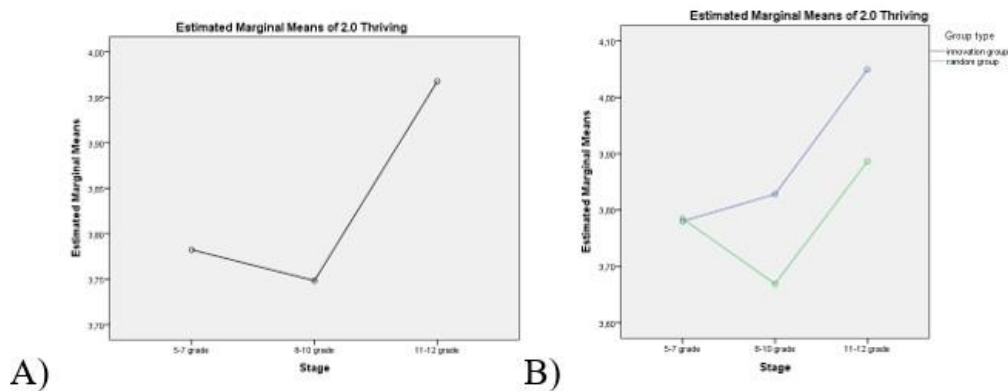


Figure 2. Differences in performance according to the stage (A) and type of school (B)