

MECHANISMS OF PROFESSIONAL TRAINING IN GENERATING (EVEN) BETTER VETS. APPROACHES TO LEARNING AS MEDIATORS OF THE RELATIONSHIP BETWEEN DEPRESSIVE TENDENCIES AND ACADEMIC PERFORMANCE IN FEMALE VETERINARY STUDENTS

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ABSTRACT. The timely identification of learning approaches is an essential aspect in those forms of education where the capacity of understanding, permanent integration of new knowledge as opposed to rote learning is key to a successful career. Moreover, literature underscores the importance of affect in the learning processes. The major aim of our study was to test (*i*) the relationship between depressive tendencies and academic performance, and (*ii*) the mediating effect of approaches to learning (deep, strategic, and surface approach) between depressive tendencies and academic performance in veterinary students. Our study included 260 voluntary female students (mean age 20.88 years), assessed on the following levels: academic performance, depressive tendencies (Beck Depression Inventory), and approaches to studying (ASSIST). Our results indicate that depressive tendencies present a significantly negative relationship with academic performance, suggesting that female veterinary students with depressive symptoms tend to have lower academic performance. Furthermore, all three types of approaches to learning are significant predictors of academic performance: the deep and the strategic approach have a positive predictive value, while the surface approach has a negative effect. Our results also indicate that

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strategic and surface approaches are significantly related to depressive tendencies. Finally, both strategic and surface approaches proved to function as mediators between academic performance and depressive tendencies. In other words, female students with more intense depressive tendencies favor less strategic approaches and use more surface approaches which further decreases academic performance, implicitly decreasing the level of professional development and the probability of matching with the specific needs of the labor market.

Keywords: *deep learning, strategic learning, surface learning, depressive tendencies, academic performance*

1. Introduction

The accelerated social, technological, and economic changes of the last few decades (Amundson, 2006) have significantly contributed to the reconsideration of career development and lifelong career management, as well as underlying mechanisms (Bloch, 2005; Demirel, 2009). Recently, increasingly more policy-makers and employers have expressed their concerns regarding the degree of match between the skills of their workforces and the actual needs of the labor market (World Economic Forum, 2014). The skill-mismatch, namely, the gap between the skills possessed by the employees and the actual skills that are needed to perform a specific job raises several extremely important questions. One of these questions refer to the gap between the skills with which education endows students and what is actually needed on the job. The scientific literature has identified different types of skill-mismatch, as follows: skill shortage (the demand for a particular type of skill exceeds the skills the person possesses); qualification mismatch (the level of qualification and/or the field of qualification is different from that required to perform the job adequately); over-(under-) qualification/ education (the level of qualification/education is higher (lower) than required to perform the job adequately); skill gap (the type or level of skills is different from that required to perform the job adequately); over-(under-) skilling (the level of skill is higher (lower) than required to adequately perform the job)

(Cedefop, 2010; OECD, 2011). Consequently, the quality and specificity of education becomes an extremely salient issue with both short and long-term consequences.

Thus, the adaptation to the newly formed work-conditions require the existence of specific abilities through which one can continuously acquire, update, and enhance one's knowledge-base necessary for the successful fulfillment of different work-related tasks (Kirkwood, Bond, May, McKeith, & Teh, 2010).

Traditional teaching and assessment styles mostly promote the development of passive learning habits, significantly undermining the acquisition of those learning abilities which would facilitate enduring adaptation to the newly formed work environments (Entwistle, 1997). Not surprisingly, in the last decades, the development and maintenance of high quality learning among students has become a considerable priority both for academic education and funding authorities (Byrne, Flood, & Willis, 2004; Zeegers, 2004). Educational policies have repeatedly emphasized the need for recalibrating the major educational objectives (Perry, Phillips, & Hutchinson, 2006; Boekaerts & Corno, 2005; Winne & Perry, 2000; Zimmerman, 1990), suggesting that education should focus especially on the development of those abilities that sustain in students self-regulated learning, and stimulate permanent and active engagement in significant learning processes. In this sense, research within higher education has begun to systematically investigate the factors and mechanisms that facilitate successful academic learning.

Recent research yielded that the quality of academic learning depends on a myriad of factors, which may be grouped in several major categories, as: individual student characteristics, the requirements of the disciplines(s) that are studied (e.g., type of assessment, work-load, quality of teaching, teaching objectives), characteristics of the departmental and university culture, etc. (Rowe, 2002; Ramsden, 1991). The domain that was most widely investigated was that of student characteristics. For a long time, students' intellectual abilities and previous academic achievements have been considered the best predictors of success in higher education (Gottfredson, 2002; Zeegers, 2004). However, subsequent research indicated that the measures of intelligence accounted

much less than previously presumed of the variance in academic performance (Chamorro-Premuzic & Furnham, 2004, as cited in Rogaten, Moneta, & Spada, 2013). Consequently, research started to investigate specific student learning styles, which were supposed to be strongly associated with learning outcomes. Most of the learning style models developed in time (e.g., Myers-Briggs, 1998; Felder-Silverman, 1996; Kolb, 1985) approach these abilities exclusively referred to the students' personal characteristics, without taking into consideration the crucial importance of external factors and their interaction.

Based on Marton and Saljö's (1976) original research, the alternative model based on the students' approaches to study considers learning from a more holistic point of view, as an interaction of the students' characteristics and the specificities of the educational context (Entwhistle, Tait, & McCune, 2000; Tait, Entwhistle, & McCune, 1998; Marton & Saljö, 1997; Entwistle & Tait, 1990; Entwistle & Ramsden, 1983). In other words, approaches to learning describes the way in which students, based on their attitudes towards learning and their intentions regarding the learning outcomes, respond to an academic task in a given context (Byrne et al., 2004; Diseth, 2001; Biggs, 1993). Next, we will briefly present the major tenets of this approach.

1.1. Approaches to studying

In their seminal investigations targeting the identification of individual differences in learning, Marton and Saljö (1976) found that the depth of understanding and processing an academic task was strongly determined by students' intentions towards learning prior to the actual learning process. According to these authors' observations, students select specific learning strategies in order to attain their primary goals. Marton and Saljö's (1976) original theory referred to two distinct factors: deep and surface learning. Later approaches expanded the bi-factorial model, introducing the third factor, that of strategic learning (Entwistle, Hanley, & Ratcliffe, 1979).

The *deep approach* to learning is characterized by the student's intention of understanding the material that has to be learned, associated with continuous attempts to integrate the newly processed materials with what is already known. The learning process is driven by intrinsic

motivation, being fueled by epistemic interest and the need of vocational development (Diseth, 2001; Ryan et al., 2004). Students using this kind of learning usually monitor their own understanding and progress in learning (Entwistle, McCune, & Walker, 2000), the most frequently used strategies being: establishment of relationships between ideas, search for patterns and principles, use of evidence, examining the logic of an argument (Entwistle, 2000).

Surface approach is characterized by the rote memorizing of facts, without attempting to understand the material at hand. Students using this form of learning do not usually understand the relevance of a material or the value of a course. They usually cannot integrate the newly learned information into a whole (Ryan et al., 2004). Their learning is usually driven either by the fear of failure or by the concern to complete a course or only to pass the exam. Because of their inflexible, mechanical learning, students resorting to this type of learning cannot transfer the memorized concepts to new situations and new material. The surface approach is usually associated with different forms of rote learning (Diseth, 2001). Notwithstanding, there are specific situations when the appropriately applied rote, mechanical learning of a material may become an efficient learning strategy, since it may facilitate the encoding of relevant material into memory (Ryan et al., 2004).

The *strategic approach* is usually adopted by students who aim to obtain the highest possible grades, by adapting their learning to the specific assessment demands (Byrne et al., 2004; Diseth, 2000). Such students usually have well-organized learning habits, efficient time management skills, are highly capable to monitor the effectiveness of their learning (Entwistle, 2000; Ryan et al., 2004). An important incentive in this strategy is the students' need to compete with their colleagues. Unlike deep and surface approaches, the strategic approach is not associated with specific learning strategies. Students adopting this kind of approach usually flexibly adapt their learning strategies (operation, comprehension, rote learning) in order to attain their objectives (highest grades possible) (Diseth, 2001).

Out of the three types of approaches to learning, the deep, profound one is considered as most desirable, and surface learning as the most undesirable (Rowe, 2002). From the efficiency point of view, the

deep approach is the one that assists students in achieving the most solid knowledge base that would help them transform declarative knowledge into procedural one. Highest academic achievements are usually attained when students adopt the deep strategic approach. However, it is important to emphasize that this approach, which is mostly related to academic achievement is efficient only in those cases when assessment procedures stimulate and reward personal understanding (Entwistle, 2000).

1.2. Characteristics of studying veterinary medicine

The basic education for obtaining a Doctor Veterinary Surgeon (DVM) degree in Romania lasts for 6 years. Beginning with their first semester of study, vet students are presumed to process a considerable amount of information from very diverse and complex domains (anatomy, comparative anatomy, biology, biophysics, biomathematics, chemistry, physics, histology and embryology, genetics, and so on). They have to attend both courses (predominantly teaching) and seminars (predominantly practical laboratory activities). In order to succeed in both activities, students are supposed to memorize large amounts of information during courses, and to transform declarative knowledge in procedural one during laboratory activities. In these conditions superficial learning would only be useful for short periods of time, since memorization without understanding and finding relationships with concepts would seriously jeopardize practical activities (Kogan, McConnell, & Schoenfeld-Tacher, 2005; USAMV, 2018).

1.3. Affect and academic performance

The scientific literature abounds in studies underscoring the importance played by affect in the learning processes (D'Mello & Graesser, 2012; Linnenbrink, 2007; Turner & Schallert, 2001). Positive and negative emotions experienced in the classroom, during the learning process (inside and outside school, during preparation for examinations), social emotions associated with academic performance, emotions originating from private life (family, friends) all seem to have a powerful impact on the way students learn, approach learning, and achieve (Pekrun, 2014). More specifically, the quality and intensity of affective states determines

the amount of attention assigned to a task, the motivation and involvement in learning, as well as the type of strategy selected to learn (Schutz & Pekrun, 2007). However, the bulk of investigations focused most intensely on studying students' test anxiety and considerably less on other emotions, as depression, anger, hopelessness, shame, and the entire range of positive emotions (Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Pekrun, 2007). Research has repeatedly indicated that there is a significant association between depression and efficiency of learning (Ellis, Seibert, & Varner, 1995; Ellis & Ashbrook, 1988; Shapiro, Shapiro, & Schwartz, 2000), relationship influenced by the impairment of different subjacent cognitive abilities as memory, attention, speed of processing, decision making (Burt, Zembar, & Niederehe, 1995; Hubbard, Hutchison, Turner, Montroy, Bowles, & Rypma, 2016; Underwood, 2013).

Regarding the way students approach learning, research indicates that usually positive affect is strongly associated with strategic learning while negative (e.g., depressive tendencies) affect with the surface approach (Rogaten, Moneta, & Spada, 2013). Similarly, positive affect is a very good predictor of academic performance, while negative affect predicts low academic achievement (Rogaten et al., 2013).

Since negative affectivity and depressive tendencies are relatively frequent among female medical (human and veterinary) students, and higher than in the male students (Levey, 2001; Shapiro et al., 2000; Brewin & Firth-Cozens, 1997; Elliot & Girard, 1986; Firth-Cozens, 1990; Kogan et al., 2005; Rosal, Ockene, Ockene, Barrett, Ma, & Herbert, 1997), the timely identification of learning approaches is an essential aspect in those forms of education where the capacity of understanding, permanent integration of new knowledge as opposed to rote learning is key to a successful career, the major aims of our study was to test (*i*) the relationship between depressive tendencies and academic performance, (*ii*) the mediating effect of approaches to learning (deep, strategic, and surface approach) between depressive tendencies and academic performance in veterinary students.

2. METHODS

2.1. Participants

Since the overwhelming majority of students at the Veterinary Institute in Cluj-Napoca, Romania is female, and in order to have enough statistical power on a homogeneous sample, we decided to focus this study only on investigating the learning approaches and mental health of female vet students, males' learning approaches being subject of a different investigation. Consequently, we included in our study 260 voluntary female students, with an average age of 20.88 years (SD= 1.77 years).

2.2. Instruments

Academic performance was measured by the average grade obtained at the end of first semester. These values may vary from 1 to 10. The academic performance in our sample varied from 5.80 to 10, with an average of 7.65 (SD= 0.87).

Depressive tendencies were measured with the Beck Depression Inventory-II (BDI, Beck, Rush, Shaw, & Emery, 1979; Romanian adaptation David & Dobrean, 2012). The BDI is a 21-item, multiple-choice format inventory, designed to measure the presence of depression in adults and adolescents. Each of the 21 items assesses a symptom or attitude specific to depression, inquiring its somatic, cognitive, mood, and behavioral aspects. By its assessments, single scores are produced, which indicate the intensity of the depressive episode. Scores ranging from 0 to 9, represent normal levels of depression. Scores situated between 10 and 18 represent mild to moderate depression; values between 19 and 29 represent moderate to severe depression, while scores above the value of 30 represent severe depression. Internal consistency indices of the BDI are usually above .90. In our study we did not use clinical cut-off points for analysis or selection of participants, but treated depression tendencies as a continuum ranging from minimal to maximal scores obtained by participants on the BDI scale.

Approaches to studying were assessed with ASSIST (Approaches and Study Skills Inventory for Students, Tait, Entwistle, & McCune, 1998), adapted to Romanian. The ASSIST is a 52-item self-report questionnaire,

assessing the three major approaches to leaning on a 5-point Likert scale (1= disagree, 5=agree). Each of the three subscales of the ASSIST is divided in further subscales, as follows: (a) *Deep approach*: seeking meaning, relating ideas, use of evidence, and interest in ideas; (b) *Surface apathetic approach*: lack of purpose, unrelated memorizing, syllabus-boundness, and fear of failure, and (c) *Strategic approach*: organized studying, time management, alertness to assessment demands, achieving, and monitoring effectiveness. Cronbach's alpha for the three subscales are satisfactory (Deep approach = .83; Surface approach= .89; and Strategic Approach= .76).

2.3. Procedure

All students were assessed by the same investigator. After giving their written consent, they had to complete the paper-pencil set of the instruments selected to assess the target variables. The completion of a set of questionnaires (demographics, BDI and ASSIST) took around 30 minutes.

3. RESULTS

In Table 1 we presented the descriptive statistics for the main variables assessed in this study.

Table 1.
Descriptive statistics of the sample for the main variables included in the analysis

	Minimum	Maximum	Mean	Std. Deviation
Age	19	34	20.88	1.77
Academic performance	5.80	10.00	7.65	0.87
Deep approach	6	119	62.48	10.58
Strategic approach	13	108	68.20	13.40
Surface approach	9	100	42.91	10.56
Depression tendencies	0	50	9.28	7.93

Table 2 presents the correlations between depression tendencies, learning styles, and academic performance.

Table 2.

The matrix of correlation between Depression, Learning styles and objective academic performance

Measure	1	2	3	4
1. Academic performance				
2. Deep approach	.157**			
3. Strategic approach	.255**	.560**		
4. Surface approach	-.213**	-.069	-.113	
5. Depression	-.153*	-.005	-.223**	.377**

* Statistically significant at $p < 0.05$, **Statistically significant at $p < 0.01$, $N = 260$

As it can be noticed, depression tendencies are negatively correlated with academic performance (with a small to moderate effect size), and also correlated with two of the learning styles measured (negative low to moderate correlation with strategic approach and moderate positive correlation with surface approach). Also, the same two strategies are related to academic performance (positively with strategic approach and negatively with surface approach). In other words, conditions are satisfied for testing the mediation role of those two learning approaches (strategic and surface) between depression tendencies and academic performance.

Strategic Approach as a mediator

In Figure 1 we present the mediation diagram of the relationship between Depression and Objective Academic Performance, mediated by Strategic Approach.

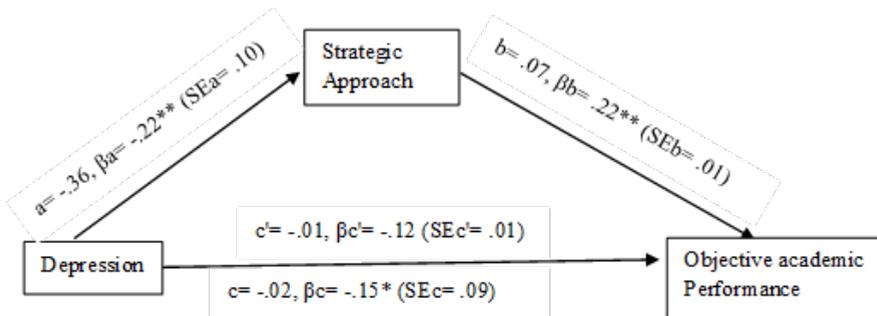


Figure 1. The diagram for the mediation of Strategic Approach between Depression and Objective Academic Performance ($N = 260$ female students)

As Figure 1 shows, there is a significant but small total effect of Depression upon Objective Academic Performance ($\beta c = -.15, p = .031$). When controlling for the mediator, the predictor has no significant direct effect ($\beta c' = -.12, p = .094$). The mediation effect ($c - c' = a * b$) proved to be statistically significant according to the Sobel test ($Z = -3.20, p = .001$). The proportional effect size of the mediation effect, computed as $[(c - c') * 100] / c$ according to MacKinnon (2008) indicates that 20% of the total relation between Depression and Academic Performance is mediated by Strategic Approach.

Surface approach as a mediator

In Figure 2 we present the mediation diagram of the relationship between Depression and Objective Academic Performance, mediated by Surface Approach.

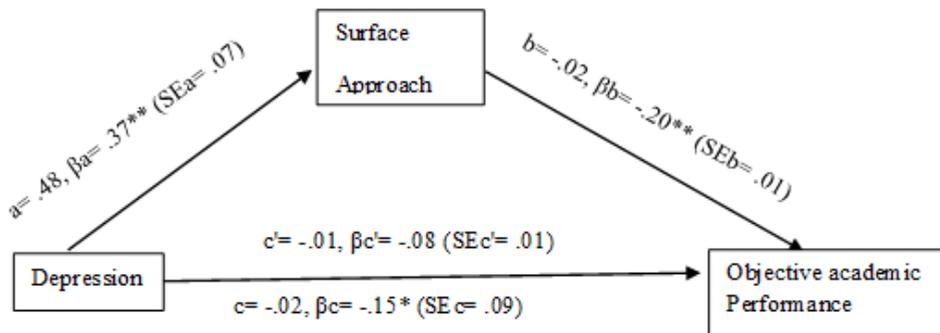


Figure 2. The diagram for the mediation of Surface Approach between Depression and Objective Academic Performance (N= 260 female students)

As figure 2 shows, when controlling for the mediator, the predictor has no significant direct effect ($\beta c' = -.08, p = .303$). The mediation effect ($c - c' = a * b$) proved to be marginally significant according to the Sobel test ($Z = -1.92, p = .054$). The proportional effect size of the mediation effect (MacKinnon, 2008) indicates that 46% of the total relation between Depression and upon Academic Performance is mediated by Surface Approach.

4. DISCUSSIONS AND CONCLUSIONS

As presented in the introductory part of this paper, there is a perceived mismatch between the skills of workforce and the actual needs of the labor market, namely, a gap between the skills education endows students with and the real need on the job. Consequently, the quality and specificity of education becomes an extremely salient issue with both short and long-term consequences (Cedefop, 2010; OECD, 2011). In this regard, one of the major issues refers to the way students approach studying. More specifically, the problem resides in the possibility that some students use deep learning, thus enhancing the chance to process information in depth, while others resume to surface learning, by which they prefer rote learning, thus memorizing information for a short period of time (usually for examination), and neglecting to deepen their knowledge base (Entwistle et al., 2000; Ryan et al., 2004). Moreover, literature indicates that there is an empirically based association between approaches to learning and affective states, thus the academic performance of students and implicitly professional formation depends upon intrapersonal factors (D'Mello & Graesser, 2012; Linnenbrink, 2007; Turner & Schallert, 2001).

Closing in these questions to the specific case of medical and veterinary students, they are presumed to process a considerable amount of information from very diverse and complex domains (Rogaten et al., 2013). In order to succeed in both activities, students are supposed to memorize huge amounts of information, and to transform declarative knowledge in procedural one. In these conditions superficial learning would only be useful for short periods of time, since memorization without understanding and finding relationships with concepts would seriously jeopardize practical activities. In this context, clarifying the relationship of affective life with approaches to learning, as well as academic performance and professional development, becomes a topic of great relevance.

The main objectives of our study were to test: (i) the relationship between depressive tendencies and academic performance, and (ii) the mediating effect of approaches to learning (deep, strategic, and surface approach) between depressive tendencies and academic performance in veterinary students.

Our results indicate that depressive tendencies present a significantly negative relationship with academic performance which confirms

previous findings (e.g., Rogaten et al., 2013), suggesting that female veterinary students who experience negative affectivity from the depressive spectrum tend to have lower academic performances. Furthermore, we found that all three types of approaches to learning are significant predictors of academic performance. More specifically, the deep and the strategic approach have a positive predictive value, while surface approach has a negative effect. Regarding the relationship between approaches to learning and affect, our results indicate that strategic and surface approaches are significantly related to depressive tendencies. Finally, both strategic and surface approaches proved to function as mediators between academic performance and depressive tendencies. In other words, female students with more intense depressive tendencies favor less strategic approaches and use more surface approach which further decreases academic performance, which implicitly decreases the level of professional development and matching with the specific needs of the labor market (Kogan, McConnell, & Schoenfeld-Tacher, 2005).

We would like to reiterate the idea that this kind of investigations concentrate on elucidating the mechanisms subjacent the academic learning process, and implicitly on the enhancement of the match between the developed skills and the actual needs of the labor market. In this context, our results suggest several practical directions to follow in the process of generating better veterinary professionals. First of all, in this process, the focus should be moved from the one exclusively technical (specific contents, knowledge, competencies) toward the mechanisms behind professional training such as the affective and the in-depth cognitive dimensions. Thus, at a more general level, affective states and traits, depressive tendencies of veterinary students should be identified and interventions should be implemented to reduce maladaptive tendencies where inappropriate levels of functioning might interfere with professional training. Also, approaches to studying should be measured, and based upon the proportion of cases with rather dysfunctional approaches, programs should be conceived and implemented in order to stimulate or develop deep and strategic approaches and discourage surface approaches.

One of the major limitations of our investigation is that it is cross sectional correlational study which can prove direct or mediational relationships only in a statistical sense, without establishing causality. Nevertheless, the direction of established relationships derived from this investigation may be used in further experimental or longitudinal studies, which enables researchers to obtain the proof for the temporal succession of the assessed variables. Another limitation of this study refers to the fact that our sample is exclusively formed of female participants, which is based on the fact that the proportion of male and female students at the Veterinary University in Cluj is mainly inclined towards female students. Consequently, further studies should include a corresponding number of both male and female students, which would allow a comparative analysis between male and female participants in order to detect whether gender can moderate the relationships yielded by us. Furthermore, we consider that future studies could include in the mediating models other variables, complementary to the learning approaches assessed by us, as well as expand the investigation to other faculties/specialties, also including a cross-cultural perspective.

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