

EDU WORLD 2018
The 8th International Conference

**LEARNING PROCESSES AS MEDIATORS OF THE RELATION
BETWEEN CAUSAL ATTRIBUTIONS AND ACHIEVEMENT**

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Abstract

The present study investigated the relations between students' academic performance, their causal attributions for academic success and failure (i.e., internal or external, stable or unstable attributions, respectively), and their learning approaches (i.e., deep and surface learning approaches). Participants were 284 university students (mean age=19.89, SD=2.53), 66.5% females and 33.5% males. Self-reported measures were used for assessing students' both causal attributions and learning approaches. Our results showed that the surface learning approach correlated negatively, whereas the deep learning approach correlated positively with students' academic performance. The latter was also significantly positively related only with the internal causal attributions (both ability and effort), but not with the external attributions. Both learning approaches mediated the relation between internal unstable attributions (i.e., effort) and academic performance, but only the deep approach mediated the relation between internal stable attributions (i.e., ability) and performance. Further, academic implications of these findings are outlined and discussed.

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Keywords: Causal attributions, learning approaches, academic achievement.



1. Introduction

There is an evident bidirectional influence between students' learning motivation and their academic achievement. Technically, the more motivated people are, the better their performance and, in turn, a good performance would enhance or strengthen their learning motivation. Still, things are not that linear and simple. A good grade or a favourable outcome does not always have this positive impact on some students' motivation and attitude towards learning. Or, for getting this good grade some students do not always engage in deep processing or effortful learning strategies. Moreover, the very definition of a "good grade" is relative and very subjective, depending on the personal characteristics of a particular student. One major psychological variable that could explain these nuanced inter-individual differences is students' "cognitive lenses" through which they see and interpret their academic outcomes. An important element of this "cognitive set" is students' causal attributions for their academic success or failure, meaning the way they interpret and explain their own performance. As mentioned, a good grade *per se* sometimes is not enough to boost a student's learning motivation; the positive influence of this grade comes when it is "really yours", when the student feels that he/ she earned it or deserved it, meaning that the grade is perceived as a consequence of the student's cognitive engagement and effort. If the grade, despite of being good, is seen as a fortunate "accident" not related to personal engagement, it might lead to immediate positive affects, but it also might be less likely to strengthen the student's self-esteem, self-efficacy, or cognitive engagement in learning (Aspelmeier, Love, McGill, Elliott, & Pierce, 2012; Dong, Stupnisky, Obade, Gerszewski, & Ruthig, 2015).

2. Problem Statement

Weiner's seminal theory on the causal attributions of success and failure helps us understand, at least in part, the actual complexity of the reciprocal influence between academic achievement and motivation (Weiner, 2010). According to his theory, individuals' subjective explanations (i.e., attributions) for their outcomes can be analysed on two dimensions: *internal-external*, and *stable-unstable*, respectively. The first dimension distinguishes between the internal/ personal factors (individuals' characteristics are the cause), and the external factors thought to be responsible for the outcomes (the context or the others are the cause). The stability dimension refers to the probability of future reoccurrence of a specific factor thought to be the cause of the outcome; if that cause is stable, one would not expect it to change in the immediate future, thus expecting similar outcomes in the next similar situations. Combining these two dimensions, we speak of four types of causal attributions students can make for their academic performance: internal and stable (e.g., level of intelligence, abilities), internal and unstable (e.g., effort), external and stable (e.g., course difficulty, teacher's educational style), or external and unstable (e.g., luck, fate, teacher's mood). The third important aspect deriving from these combinations is the student's *sense of controllability* of the outcome. When this outcome is perceived to be controllable (i.e., internal attributions, especially the unstable ones) it means that the student thinks that it depends on him/ her, and that he/ she can make the difference if he/ she wants, especially regarding future outcomes. A higher sense of uncontrollability (i.e., external attributions) leads to resignation and to fatalism, making individuals think that things are how they are, that they cannot make a difference, and that the outcome it is not up to them.

There is a vast literature assessing how students' causal attributions or, in particular, their attribution style (when speaking of an individual's generalized, habitual tendency or pattern of explaining most of their outcomes in various situations; Peterson & Seligman, 1984) affect their motivation, attitude or behaviours in educational settings (Butnaru, Gherasim, Iacob & Amariei, 2010; Dong et al., 2015; Ho, Salili, Biggs, & Kit-Tai, 1999). In the present study we were interested in the influence of students' causal attributions on their cognitive engagement while learning, and, consequently, on their academic achievement. Within the conceptual framework known in the literature as the *student approach to learning* (Entwistle & Waterston, 1988), a key aspect in understanding academic achievement is to analyze students' perceptions of the academic tasks and, consequently, their learning strategies (Marton & Säljö, 1976). Biggs, Kember, and Leung (2001) distinguished between two different approaches in learning (i.e. a surface approach, and a deep approach, respectively), each leading to different academic outcomes and being differently associated with various achievement goals, selective retention, and meaning seeking. When engaging in deep learning, students show higher levels of intrinsic motivation therefore trying to maximize the meaning of the study materials, while employing a surface approach usually reflects students' fear of failure, short-term narrow objectives, less effort in trying to find the inner logic of the materials, and rote learning (Sorić & Palekčić, 2009). Nevertheless, making dispositional inferences and labeling one student as being a deep or surface learner might be inappropriate. We should also be aware of the fact that these learning approaches are also sensitive to the in-class learning context, especially to teachers' demands and evaluation criteria (Cuciac, Țepordei, Labăr, & Cuciac, 2015; Țepordei, Cuciac, Labăr & Cuciac, 2015).

3. Research Questions

Although using various operationalizations and different measures for the considered variables, previous studies generally showed that students' causal attributions, especially on the intentionality dimension, significantly influence their reliance on different learning strategies, which, in turn, have different effects on their academic outcomes (Drew & Watkins, 1998; Ho et al., 1999). The most consistent findings are that internal locus of control positively relates to academic achievement and cognitive engagement, while more superficial learning is negatively related to both internal attributions and academic achievement.

Based on Weiner's initial classical conceptualization of the four types of causal attributions, and using the newer revised form of the measure assessing students' learning approaches (Biggs et al., 2001), in the present study we were interested in analyzing the influence of students' causal attributions on their cognitive engagement while learning, and, consequently, on their academic achievement.

4. Purpose of the Study

The main objective of the present study was to address this issue and to see if the general relational pattern mentioned above is replicated also in the particular context of the Romanian university settings, for two reasons. First, because in the abovementioned studies it is specified that cultural differences may influence students' perceived causal relations between internal factors (especially ability and effort) and their academic outcomes. Second, because at least in our university, there has been a shift in the evaluation methods from more personalized, applicative tasks to standardized tests, due to the increasing number of

students and in order to reduce teachers' cognitive load and time costs. It is possible that this shift would also induce a shift in our students' learning strategies, as well as in their relations to academic achievement.

5. Research Methods

5.1. Participants and procedure

Participants in this study were 284 students, 33.5% males (95) and 66.5% females (189), with ages ranging from 18 to 38 ($M = 19.89$, $SD = 2.53$). Participation in the research project was entirely voluntary and anonymous. Upon the instructions given by the researcher, they completed the measures (first the R-LPQ-2F, then the MMCS) in their classrooms.

5.2. Measures

The Multidimensional Multiattributional Causality Scale (MMCS; Lefcourt, von Baeyer, Ware & Cox, 1979) is designed to assess the extent to which individuals attribute their success or failure in achievement and affiliation to four causal variables: ability, effort, context and luck. In this study, only the 24 achievement items were used. Respondents rated their answer on a five-point Likert scale ranging from 1= "totally disagree" to 5= "totally agree".

For assessing students' learning approaches we used the Revised Learning Process Questionnaire (R-LPQ-2F; Biggs et al., 2001), a 20-item instrument assessing the surface and the deep approach, respectively. Answers were given on a five-point scale rating from 1= "never or only rarely true for me" to 5= "always or almost always true for me".

Students' academic performance was measured by their final semestrial grade..

6. Findings

6.1. Statistical analysis

Analyses were performed using SPSS version 24 for Windows. For all instruments used in the study Cronbach's alphas were computed to check their internal consistency. Pearson product-moment correlation was used to examine the relationships between variables. The macro PROCESS for SPSS (Hayes, 2013) was used to test the mediation models. This procedure enables simultaneous testing of multiple mediators and provides bootstrap confidence intervals (CIs) for the indirect effects (Hayes, 2013). In each mediation model, 5000 bootstrap resamples were used to estimate the confidence intervals.

6.2. Correlations between students' learning approaches, causal attribution and performance

Results (see Table 01) show significant and positive correlation between performance and deep approach, ability and effort and significant and negative correlation between performance and surface approach. Therefore, correlations between performance and context and luck were not significant.

Also, there are significant and positive correlations between deep approach and ability and effort and significant and negative correlation between deep approach and context and luck. Correlations between surface approach and ability were not significant, but there exist significant and negative correlations between surface approach and effort and significant and positive correlations between surface approach and context and luck.

Table 01. Alpha Cronbach and correlations between students' learning approaches, causal attribution and academic performance

Variables	1	2	3	4	5	6	7
1. Academic performance	-						
2. Deep Approach	.195**	.789					
3. Surface Approach	-.210**	-.273**	.739				
4. Ability(Internal/Stable)	.222**	.354**	-.033	.708			
5. Effort (Internal/Unstable)	.212**	.372**	-.182*	.338**	.678		
6. Context (External/Stable)	-.094	-.143*	.455**	.106	-.161*	.702	
7. Luck (External/Unstable)	-.085	-.143*	.429**	.065	-.248*	.602**	.818
Mean	8.41	3.36	2.45	3.33	4.06	2.75	2.45
SD	.78	.57	.58	.65	.54	.70	.75

Note: * $p \leq .05$; ** $p \leq .01$. Alpha Cronbach are provided along the diagonal

6.3. Deep approach as mediator on relationship between ability and academic performance

Because surface approach does not correlate with ability, it is no longer justified to include it in the mediation model. A simple mediation analysis was conducted using regression analysis and 5000 bootstrap samples to examine whether the effect of ability on performance was mediated by deep approach. This analysis confirmed that there was a significant total effect of ability on performance (c), and this relationship remain significant when the effect of deep approach was also taken into account (c'). This analysis revealed that ability was significantly positively related to deep approach (a) and deep approach was significantly positively related to performance when controlling for ability (b). See Figure 01 for an illustration of these effects. Results showed that deep approach partially mediated the effect of ability on performance, as indicated by a significant indirect effect ($B = .056$, $SE = .031$, 95% BCa CI: .003, .124), such that the high levels of ability predicted better performance, and this was both directly and as well underlined by higher levels of deep approach.

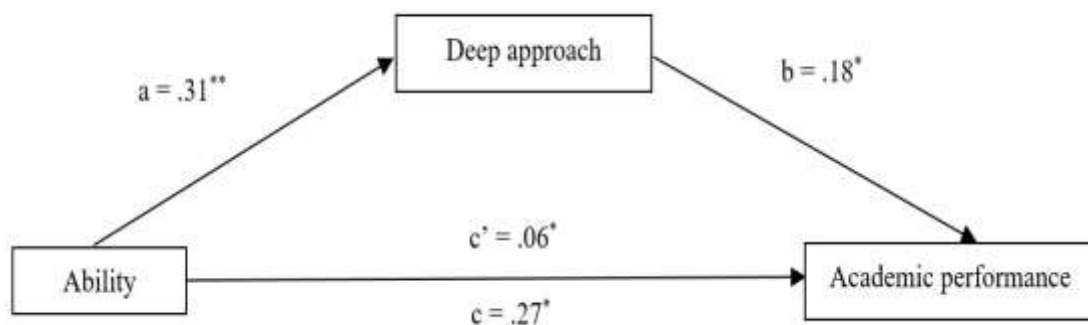


Figure 01. Mediation model regarding the mediating effect of deep approach on the relation between ability and performance. Unstandardized coefficient are presented (* $p \leq .05$; ** $p \leq .01$)

6.4. Deep approach and surface approach as mediators on relationship between effort and academic performance

A multiple mediation analysis was conducted using regression analysis and 5000 bootstrap samples to examine whether the effect of effort on performance was mediated by deep approach and surface approach.

The analysis confirmed that there was a significant total effect of effort on performance (c), and this relationship remain significant when the effect of deep approach and surface approach was also taken into account (c'). This analysis revealed that effort was significantly positively related to deep approach (a₁) and significantly negatively related to surface approach (a₂). Also, the deep approach was significantly positively related to performance (b₁) and surface approach was significantly negatively related to performance when controlling for effort (b₂). See Figure 02 for an illustration of these effects. As hypothesised, deep approach and surface approach partially mediated the effect of effort on performance, as indicated by a significant indirect effects (for indirect effect through deep approach, B = .052, SE = .035, 95% BCa CI: .013, .125, and for indirect effect through surface approach, B = .041, SE = .022, 95% BCa CI: .010, .095) such that the high levels of effort predicted better performance, and this was both directly and as well underlined by higher levels of deep approach and lower levels of surface approach.

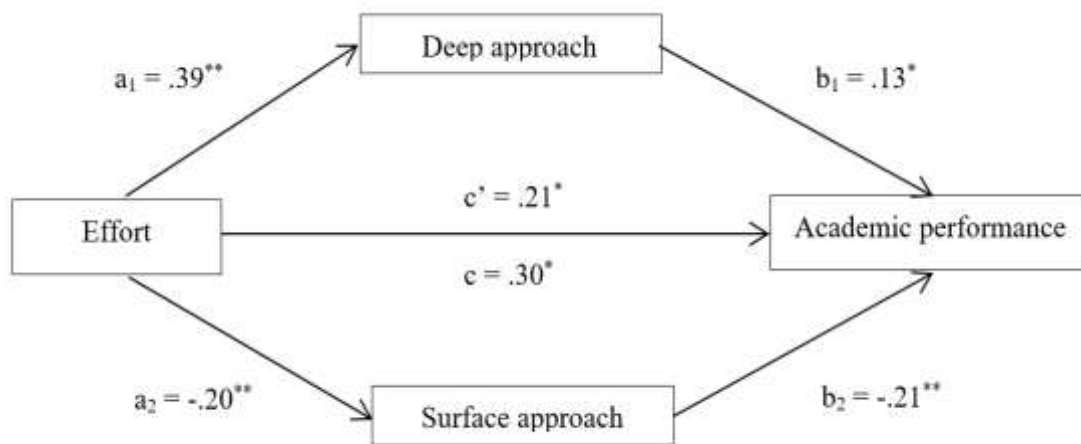


Figure 02. Multiple mediation model regarding the mediating effects of deep approach and surface approach on the relation between effort and performance. Unstandardized coefficients are presented. * $p \leq .05$; ** $p \leq .01$

7. Conclusion

The purpose of the present study was to investigate if and how Romanian university students' causal attributions for their success or failure influence their learning approaches and, consequently, their academic performance. First, the positive relation between academic achievement and internal attributions, and the non-significant correlation with the external attributions emphasize the idea that taking responsibility for their academic outcomes (either good or bad), and perceiving them as “deserved”, enable students' proactive behaviours for either maintaining or raising their performance. When external causality is inferred, students have a rather passive attitude, just hoping for the best, but without being able to exert a significant influence on a rather unpredictable outcome. Second, students' performance was found to be significantly positively correlated with their deep learning approach, and negatively correlated with the surface learning approach, indicating that high achievement in our university settings cannot be reached without cognitive engagement and meaningful processing of the contents to be learnt.

Third, the deep learning was positively associated with both internal attributions, and negatively with both external attributions, whereas the surface approach was significantly negatively related only with

the internal unstable attributions, and positively related with both external attributions. As Biggs et al. (2001) argue the student's approach to learning is a composite of a specific motive and an appropriate strategy. But motives are also influenced by their academic self-concept and their perceptions on the controllability of their academic performance (e.g., Drew & Watkins, 1998). Students who only want to get by with a minimal effort are more likely to rote learn some basic elements hoping that, if lucky, this will be enough. In contrast, students who are more motivated and self-confident focus on meaningful learning by exploring the new information and trying to make connections with their prior knowledge. Another aspect to be considered is the fact that having good grades is also important for the students with a high achievement motivation, therefore they are more likely to be pragmatic and to best adjust their learning strategy to the evaluation criteria.

The mediation analyses also revealed a nuanced pattern of influences, with both learning approaches significantly mediating the relation between internal unstable attributions (i.e., effort) and academic performance, but with only the deep approach mediating the relation between internal stable attributions (i.e., ability) and performance. Our results are somehow similar with those found by Drew and Watkins (1998), although they used slightly different conceptualizations of the considered variables. More specifically, their results showed that surface approaches fully mediated the relationship between internal locus of control and achievement, and that deep approach fully mediated the relationship between academic self-concept and achievement. Taken together, our results and theirs emphasize the idea that when students think they have control over their learning and academic outcomes they are less likely to engage in superficial learning which, in turn, has a positive influence on their achievement. When students tend to see their effort as the main determinant of their performance (i.e., internal unstable attributions), they are more likely to persevere and to try harder to obtain a deeper understanding of the learning materials, thus increasing the probability of a good grade. In case of success, this will strengthen their sense of controllability and they will maintain this positive attitude towards learning. In case of a failure, this type of attributions will make them take the responsibility and try harder, by putting more effort in their work.

The interesting thing is that the positive relation between internal stable attributions (i.e., ability) and performance was mediated only by the deep approach, with the surface approach being non-significant in this pattern. As the abovementioned authors also found in their study, it seems that when students have a positive academic self-concept they are more confident in their ability, their learning motivation is stronger, they perceive having a higher control over the learning material, thus easily engaging in a deep meaningful learning. It seems like when students rely on and have confidence in their ability, they do not even consider the superficial learning, the deep approach coming naturally for them, with a positive influence on their performance. The only potential setback for thinking mainly in terms of internal stable attributions is in case of failure, especially repeated failures. In such situations, compared with those thinking more in terms of effort, these students are more vulnerable to self-blaming, decreased academic self-concept, self-handicapping, and possibly, learned helplessness (Aspelmeier et al., 2012; Dong et al., 2015; Sălăvăstru, 2004).

These findings have important implications in educational university settings, especially regarding teachers' awareness of their potential influence on students' causal attributions and self-concept, and consequently, on their academic outcomes. The main idea is to shift students' causal inferences focus from the external factors to the internal ones, making them understand that their academic outcomes are not

arbitrary and that they are in control of their performance through perseverance and cognitive engagement. This shift may be influenced by systematic interventions as in causal attribution retraining (Perry & Penner, 1990), but also by paying attention to smaller, yet important educational aspects like feed-back, encouragements, positive social comparisons etc. For example, teachers should be aware of the fact that their feed-back is, in fact, a form of causal hetero-attribution of students' success or failure (Sălăvăstru, 2004), thus affecting their own attributions and self-concept. When teachers give a feed-back, they implicitly point out the factors presumably causing that specific performance, thus influencing the students' perceptions on internality and controllability. Through a more careful wording of their feed-backs, teachers may also influence their students' self-efficacy, their confidence in their ability, thus encouraging a deeper learning approach and, consequently, a better performance.

Another important educational aspect is the evaluation methods employed by the university teachers. First of all, they should encourage their students to adopt deep learning strategies either by exercising them during courses and seminars, or by making the evaluations in such forms that clearly show that superficial or rote learning is not enough to get by. Moreover, partial and final evaluations must be transparent and as unbiased as possible, helping students to understand that their grades is their merit, that their performance is not unpredictable or random (like in "the teacher was in a good mood", or "anyone could pass this test"), thus leaving less room for external causal attributions. An emphasis on the controllability would be more beneficial for students as internal attributions enhance their cognitive engagement in learning and subsequently improve or consolidate their academic achievement.

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