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The Impact of Student Style Differences and Motivation on Learning Outcomes in Management Education: An International Inquiry

Eva Cools
Vlerick Business School, Belgium

Karlien Vanderheyden
Vlerick Business School, Belgium

Kristin Backhaus
School of Business, State University of New York at New Paltz, USA

ABSTRACT

The present study aims to provide further insights regarding the impact of students' cognitive styles, learning styles, and motivation on learning outcomes in higher education. We studied 322 management and MBA students from two business schools, respectively in Belgium (n = 244) and Canada (n = 78). As hypothesized, the effect of cognitive styles and learning styles on academic achievement was mediated through the intervening mechanism of motivation. This research extends the education and styles literature by investigating the combined impact of individual style differences and intervening mechanisms on student learning outcomes across two different cultures. Moreover, it contributes to educational practice in higher education by providing relevant insights to stimulate the design of constructive student-centred learning environments.

INTRODUCTION

In the last decades, research has univocally proven the importance of motivating students. For example, motivated students tend to have a better learning process and outcome (Deci & Ryan, 1985; Lepper, Corpus & Iyengar, 2005), higher self-esteem (Deci & Ryan, 1995), 2006), more creativity (Eisenberger & Shanock, 2003), improved psychological well-being (Ryan & Deci, 2000), and more self-regulation (Pintrich & De Groot, 1990). In general, authors have stated that motivation contributes to the successful school performance of students (Gottfried, Marcoulides, Gottfried, Oliver, & Guerin, 2007). However, despite the ample research on motivation antecedents, the impact of individual learner differences has often been neglected (Pintrich, 2003). This is particularly surprising as the need for a 'more personal' pedagogical approach grows with the increasing diversity of the student population (Friga, Bettis, & Sullivan, 2003) and the enhanced focus on student-centred and life-long learning (Evans & Cools, 2011).

Furthermore, with the recent shift in educational priorities from 'teaching' to 'learning' (Whetten, Johnson, & Sorenson, 2009) teachers are required to rethink their teaching approaches. The emphasis on 'learning' indeed implies a shift in two ways: (1) from a focus on what the teacher does to what students do during the course; and (2) from a focus on the performance of the teacher (faculty evaluation) to students' performance (academic achievement) (Barr & Tagg, 2005; Whetten et al., 2009). Yet, a commonly used practice is

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to design curricula and deliver courses with a 'one size fits all' assumption (Evans, Cools, & Charlesworth, 2010), and as such neglect individual learner differences. Although extensive research has tried to unravel the learning process of students and to determine the influencing factors of students' learning outcomes, research that takes into account the joint effect of multiple factors is scarce (Gully & Chen, 2010). This is surprising, as learning outcomes are influenced by a multitude of variables (Dobson, 2009; Noftle & Robins, 2007). With motivation being a direct path to this ever important student performance, the need to uncover the impact of individual differences seems an important avenue for further research.

In sum, in this study we aim to contribute to current student motivation research by examining the impact of individual differences on motivation and academic achievement. By doing so, we look beyond the isolated exploration of individual factors and build an integrative theoretical model that focuses upon how combined individual differences are linked to different motivations and learning outcomes (Gully & Chen, 2010).

THEORETICAL BACKGROUND

Motivation has been defined as the psychological processes that arouse and direct behaviour towards attaining some goal (Greenberg & Baron, 1997), and in this sense play a critical role in people's choice to pursue, initiate, and respond to learning opportunities (Van Nuland, Dusseldorp, Martens, & Boekaerts, 2010). Motivation can be seen as an activator or energizer of goal-oriented behaviour. Generally, people can be motivated to perform primarily for the pleasure derived from the activity itself (intrinsic motivation) or they can be motivated to learn because of something separate from the activity (extrinsic motivation) (Amabile, Hill, Hennessey, & Tighe 1994). Students are likely to be intrinsically motivated if they attribute their educational results to internal factors they can control, believe they can be effective agents in reaching desired goals, and are interested in mastering a topic rather than just rote-learning to achieve good grades. Extrinsic motivation usually comes from outside the learner, such as getting good grades to compete with others, to earn more money, or because of coercion or threat of punishment. In the past, motivation was described as a unidimensional concept, with only intrinsic motivation having beneficial outcomes (Deci & Ryan, 1985). For example, adding rewards, competition and deadlines would increase extrinsic and as such be detrimental for intrinsic motivation. For a long time, motivation research thus focussed on how to encourage intrinsic motivation and shun extrinsic motivation. However, more recently authors have concluded that both motivational types have an orthogonal nature (i.e., they are independent dimensions) (e.g., Gagné et al., 2010; Hidi, 2000), which is the presumption we also take in this research.

The impact of both intrinsic and extrinsic motivation on academic achievement has received much research attention (e.g., Areepattamannil & Freeman, 2008; Green, Nelson, Martin, & Marsh, 2006; Hidi & Harackiewicz, 2000; Pintrich, 2003). These studies concluded that students scoring high on intrinsic motivation have a greater recall of learned materials (Ryan, Connell, Plant, Robinson, & Evans 1984), higher intellectual performance (Gottfried & Gottfried, 2004), and greater persistence (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004) than those showing a low score on intrinsic motivation. Also, despite the more moderate attention given to extrinsic motivation, it is shown to be related

to self-regulation and goal setting (e.g., Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). When studying the direct link between motivation and academic achievement, research concluded that intrinsically motivated learners tend to achieve higher levels of academic performance compared to extrinsically motivated learners (Deci & Ryan, 1985; Komarraju, Karau, & Schmeck, 2009). However, this link has not been found in all studies (Taht & Must, 2010). Some scholars attributed these unequivocal results to the fact that most authors only investigate single-directional effects of motivation on academic achievement rather than its effect in an integrative model that tests the interrelatedness with other individual factors (e.g., Cheng & Ickes, 2009; Ning & Downing, 2010).

In this context, it is suggested that both stable and flexible individual differences could impact academic motivation, but conclusions are preliminary at best (Komarraju et al., 2009). To extend our understanding in this regard, we investigate the impact of stable student characteristics (i.e., cognitive styles) and flexible characteristics (i.e., learning styles) on both intrinsic and extrinsic motivation, and on academic achievement. Before moving on to the methodology, we will define these two concepts and indicate what is already known from previous research regarding their relationship with motivation.

Cognitive styles have been conceptualised as stable attitudes, preferences, or habitual approaches determining a person's typical mode of perceiving, remembering, thinking, and problem solving (Messick, 1996). More recently, they have been defined as individual differences in information processing that are partly fixed, relatively stable and possibly innate preferences (Peterson, Rayner, & Armstrong, 2009). They are considered to be an influential stable characteristic that people bring to the learning situation (Riding & Sadler-Smith, 1997), which implies that they can be generalised across different contexts and that they are not likely to change based on a specific learning context. Following recent evolutions in the style field, we preferred a multidimensional perspective in this study (Hodgkinson & Sadler-Smith, 2003; Kozhvnikov, 2007). Cools and Van den Broeck (2007) developed and validated a multidimensional cognitive style model based on three styles. Individuals with a knowing style prefer a logical, rational, and impersonal way of information processing; they make informed decisions on the basis of a thorough analysis of facts and figures and rational arguments. Individuals who score high on planning are attracted by structure, they prefer well-organized environments, they make decisions in a structured way, and they are concerned with efficiency in decision making. Individuals with a creating style search for renewal, they like to work in a flexible way, they prefer creative and unconventional ways of decision making, and they make decisions based on intuition. To the best of our knowledge, the relationship between cognitive styles and motivation remains unresearched.

Learning styles represent "how one prefers to learn about a certain matter" (Zhang, 2001: 100). Learning styles are defined as an individual's preferred ways of responding (cognitively and behaviourally) to learning, which changes depending on the environment or context (Peterson et al., 2009). Riding and Rayner (1998) point out that learning styles differ from cognitive styles, in that cognitive styles refer to the usual way in which a person assesses, perceives, and remembers in general, whereas learning styles are used to emphasise the effect of cognition within a specific learning context. A learning style is in this sense not a relatively fixed entity, such as a trait, but it is considered to be malleable,

depending on the specific learning context (Duff, 2004). In their multidimensional learning styles model, Towler and Dipboye (2003) distinguish five learning styles. Discovery learners enjoy a broad range of learning situations and have an inclination for exploration during learning. They show a preference for interactive activities, informational methods, and active-reflective activities. Experiential learners enjoy jumping straight into a task and putting newly acquired knowledge to immediate use. They have an impulsive orientation and desire hands-on approaches to instruction. Group learning is related to preferences for action and interactive learning. Group learners prefer to work with others while learning. Observational learning refers to a preference for informational methods and active-reflective methods. Observational learners tend to be passive learners who need external cues to help them learn and enjoy concrete experiences that have been organized by others. Structured learners rely on their own information-processing strategies to enable effective learning to occur, and prefer to impose their own structure on learning. The relationship between learning styles and motivation received some attention in the past (Baker, 2004; Garcia-Ros & Perez-Gonzalez, 2011). For example, a relationship between deep level learning (Ames & Archer, 1988) and intrinsic motivation has been found. To the best of our knowledge, the impact of learning styles on extrinsic motivation has not been studied yet.

In summary, this inquiry aims to explain the impact of specific cognitive styles and learning styles on academic achievement mediated by students' internal and external motivation. By doing so, we hope to create more conceptual clarity and an integrated framework that can explain the influence of individual differences on motivation and academic achievement, taking into account both intrinsic and extrinsic motivation. Moreover, by including both cognitive and learning styles in this study, we can also contribute to the debate within the style field about the conceptual similarities and differences between both concepts (Kozhevnikov, 2007; Zhang, Sternberg, & Rayner, 2012). As recognised by style scholars, the field of individual style differences is diffuse (Zhang et al., 2012), with different authors using concepts such as cognitive styles, learning styles, and learning preferences randomly and interchangeably, and there seems to be no consensus on how these concepts are interrelated (Sadler-Smith, 2001). For instance, in a recent study Cools and Bellens (2012) tested the assumptions of Curry's onion model (i.e., theoretical framework situating related style and learning concepts on three layers based on their stability in learning situations) and found no support for the hypothesis that cognitive styles would be more stable than approaches to learning.

METHOD

Participants

We studied 322 undergraduate, graduate, and MBA students of two business schools in Belgium and Canada through a self-reporting questionnaire. These two countries and institutes were chosen because they all represent an Anglo-Saxon educational setting and are characterized by an international student public with interactive teaching methods. In total, 244 postgraduate and MBA students from a business school located in Belgium participated in this research (mean age = 26.70, ranging from 21 to 48 years; 70% men and 30% women; 67% national and 33% international students) and 78 students of a Canadian

business school (mean age = 22.06, ranging from 20 to 44 years; 53% men and 47% women; 73% national and 27% international students). Standard university procedures for ethical approval were adhered to in the data collection. In addition, it was clearly explained to the participants that the survey was for research purposes only, that their participation was voluntary, and that they could withdraw from the study any point in time.

Measures

To select the measures, we considered their usefulness and relevance in the context of our overall conceptual framework and also took into account cross-cultural validation evidence (e.g., Cools, De Pauw, & Vanderheyden, 2011; Moneta & Siu, 2002) to make sure to have appropriate scales for international research. We created a composite score for each scale by averaging the responses across the items used for the measure. Higher scores on a measure reflect higher levels of the construct. The survey was pre-tested with academics and students to check whether the questions were clear and understandable.

Cognitive styles

The 18-item Cognitive Style Indicator (CoSI; Cools & Van den Broeck, 2007) distinguishes between: a knowing style (4 items; $\alpha = .68$, e.g., 'I like to analyze problems'), a planning style (7 items; $\alpha = .85$, e.g., 'I prefer clear structures to do my job'), and a creating style (7 item; $\alpha = .82$, e.g., 'I like to extend the boundaries'). The response format is a five-point likert scale from 1 (totally disagree) to 5 (totally agree).

Learning styles

We used the 54-item Learning Style Orientation Inventory (LSOI) of Towler and Dipboye (2003) to assess learning styles, which differentiates between: discovery learning (14 items; $\alpha = .83$, e.g., 'I am a reflective person while learning'), group learning (7 items; $\alpha = .78$, e.g., 'I like discussions in groups'), experiential learning (13 items; $\alpha = .72$, e.g., 'I like to dive in and practice'), structured learning (11 items, $\alpha = .77$, e.g., 'I like to break a task into simpler terms'), and observational learning (9 items; $\alpha = .73$, e.g., 'I learn best when pictures or diagrams are provided'). The response format is a five-point likert scale from 1 (totally disagree) to 5 (totally agree).

Motivation

The student version of the 30-item Work Preference Inventory (WPI), developed by Amabile and colleagues (1994), was used to assess motivation. This scale was developed to measure longitudinal changes in motivation and sees intrinsic motivation (15 items; $\alpha = .72$, e.g., 'I enjoy trying to solve complex problems') and extrinsic motivation (15 items; $\alpha = .74$, e.g., 'I am strongly motivated by the grades I can earn') as two orthogonal rather than unipolar factors. The response format is a four-point likert scale from 1 (never or almost never true) to 4 (always or almost always true).

Academic achievement

As our data were collected in two different institutes (implying diverse educational systems), we used country-specific indicators of academic achievement to take into account the context-specificity of achievement scores. In the Belgian business school, a weighted aggregation of scores on diverse business-related courses was calculated for each of the respondents, whereas the Canadian respondents provided us with their average term percentage.

Data analysis

Correlation analysis (Table 1, page 96) was used to explore the relationships among the measured variables. To empirically test the conceptual framework, we conducted path analysis using Amos version 19. (We used z-scores to be able to compare the outcome variable (academic achievement) in Belgium and Canada.)

RESULTS

Table 1 shows the correlations, means, and standard deviations of the study variables. The results of our path analysis indicated a good fit of the hypothesized model to the data, supporting the proposition that the cognitive styles and the learning styles have an indirect effect on academic achievement through the intrinsic and extrinsic motivation of the students. The chi-square/degrees of freedom ratio ($\chi 2/df$) was 1.23, which is well below the standard criterion of 5 (Schumacker & Lomax, 2004). The Comparative Fit Index (CFI = .99) and Normed Fit Index (NFI = .98) were higher than .90 in the two samples and the Root Mean Square Error of Approximation (RMSEA) was .027. These fit indices provide support for a robust theoretical model and demonstrate better fit than the alternative model in which we tested a direct effect of cognitive styles and learning styles on academic achievement. Figure 1 (page 97) summarizes the significant standardized path coefficients.

Looking at the relationship between cognitive styles and motivation, both the knowing and creating cognitive styles were found to have a positive influence on intrinsic motivation, while the planning cognitive style had a negative influence on intrinsic motivation. The knowing and the creating style were not related to extrinsic motivation, while the planning style was positively correlated to the extrinsic motivation of the students. Based on these results, it seems like students with a higher score on the planning style are more extrinsically motivated and hence learn because of external factors, such as earning good grades. To the contrary, the two cognitive styles that are considered to be more conceptual in nature (i.e., the knowing style and the creating style) seem to be motivated to learn because of factors related to the learning activity itself. These are interesting findings adding to existing research on cognitive styles, as previous research did not focus on the direct relation between cognitive styles and motivation.

Focusing on the learning styles, discovery learning, experiential learning and structured learning were positively linked to intrinsic motivation, while a negative relationship was found between group learning and intrinsic motivation. Observational learning was the only

learning style which was positively linked to extrinsic motivation, which might fit with the assumption that observational learners are rather passive learners who prefer learning contexts that are pre-structured for them by others. The negative link between group learning and intrinsic motivation is striking, as collaborative learning is often used in education settings these days based on the assumption that learning in group can stimulate students' learning experience. A potential reason for this result might be that group learning leaves little room for using your own approach to learning. Amabile and colleagues (1994) found a positive link between intrinsic motivation and deep task involvement, which might be difficult to achieve in group learning because of the consensus that team members need to find within a group learning context? This seems an interesting avenue to explore in further research.

Furthermore, the cognitive styles and the learning styles (except for discovery learning) had an indirect effect on academic achievement through motivation. This is in line with the earlier research of Lu, Yu and Liu (2003) who did not find a direct link between learning styles and learning performance. Concerning the general assumption that styles and overall ability are independent (Riding & Rayner, 1998), and hence have a differential influence on task and learning performance, this is an encouraging finding that shows that learners of all types can achieve equally well.

Finally, looking at the relation between motivation and academic achievement both intrinsic motivation as well as extrinsic motivation were positively linked to academic achievement. These findings confirm the importance of researching both types of motivation as independent dimensions and not as a unidimensional concept (Gagné et al., 2010).

With regard to the control variables we found that the older the students are, the less they are extrinsically motivated. Our results also showed that the female students in our dataset were more intrinsically motivated than the male students, and that the Canadian students were less intrinsically and more extrinsically motivated compared to the Belgian students

IMPLICATIONS AND LIMITATIONS

This study aimed to contribute to the education and to the styles literature by investigating the combined impact of individual style differences and motivation on student learning outcomes. The effects of cognitive styles, learning styles, and motivation were explored in relation to academic achievement amongst business school students from Belgium and Canada. As hypothesized, we found that cognitive styles and learning styles indirectly had an impact on academic achievement through the mediating role of motivation.

Looking back to the gaps identified in previous research, our study contributes to the existing research base in the following ways. Firstly, contrary to the preponderance of studies that link one individual difference with learning outcomes, we looked at learning through an integrative theoretical model, using motivation as a mediating process. Support was found for this model in the two countries, providing evidence for the usefulness of looking at the direct and indirect influence of both stable person characteristics (i.e., cognitive styles) and adaptable strategies (i.e., learning styles) through motivation to

understand students' learning outcomes. Interestingly, there is no direct link between cognitive and learning styles and academic achievement, although we did find that students with particular cognitive styles have a preference to apply learning styles that are in line with their cognitive profile. For instance, we found that people with a planning style showed a preference for a structured and observational learning style, whereas a positive correlation was found between a discovery and an experiential learning style and the creating style. Not surprisingly, the knowing style showed a negative correlation with group learning, indicating a preference for a more individual study approach for people with a more rational, analytical way of information processing. Importantly, despite these links between people's cognitive and learning profiles, we did not find an effect on their academic achievement. Given these findings, it seems that both opponents as well as proponents in the debate concerning the 'matching hypothesis' (i.e., which assumes that people learn and perform best in a situation that matches their style) are partially right, in the sense that people tend to choose a learning approach that matches their style, but there is no direct effect on academic achievement. Debates regarding this so-called 'matching hypothesis' still continue within the cognitive style field (Pashler, McDaniel, Rowher, & Bjork, 2009), with some scholars supporting the beneficial effects of matching styles with learning processes (Mayer, 2011), and others favouring the idea that people might learn more when there is a mismatch between their cognitive style and the learning method (Evans & Waring, 2011). Given the findings of this inquiry, more research is needed to further unravel the complexities of the learning process and to find answers to the 'matching hypothesis'. Interestingly, teachers can also use the findings about the link between styles and motivation to stimulate learning. For instance, to encourage the motivation of learners with a predominant planning style, it seems a good approach to focus on the grades, whereas it is better to focus on the intrinsic aspects of the learning activity itself for students with a knowing or creating style. In addition, if a teacher wants to stimulate students' intrinsic motivation, group learning activities do not seem to be the right approach.

Secondly, we conducted an international study, involving higher education students of Belgium and Canada. There is a lack of international research in the styles field (Cools, Armstrong & Verbrigghe, 2014), which makes it difficult to generalize research findings to other countries, as you cannot assume that the context will be completely the same without checking your findings in different situations. Certainly in the context of research that focuses on factors and processes that affect learning outcomes, a multi-country study seemed warranted given the many potentially influencing factors (Gully & Chen, 2010). Hence, studying different countries is certainly an added value, which needs to be further explored in future research.

Thirdly, we studied the role of motivation in the learning process in relation to other individual factors and not in isolation (Beier & Kanfer, 2010), thereby also taking a multidimensional rather than an unitary perspective. Given the diverse relations of cognitive styles and learning styles with both types of motivation, conceptualising intrinsic and extrinsic motivation as two independent factors seems warranted (Gagné et al., 2010). With regard to the link between motivation and academic achievement, both intrinsic motivation and extrinsic motivation are positively related to academic achievement, which

is an interesting finding in the debates in which intrinsic motivation often seems to be considered to be more positive than extrinsic motivation.

Fourthly, our results confirm the utility and relevance of taking a multidimensional perspective on styles rather than a unidimensional perspective in which people receive one style score situated on an analytical-intuitive dimension (Kozhevnikov, 2007; Sadler-Smith, 2009). We found a negative relation between the knowing style and group learning and a positive correlation with structured learning. The planning style was significantly and positively related to observational and structured learning, and the creating style to experiential and discovery learning. The knowing style and the creating style had a positive influence on intrinsic motivation, whereas the planning style had a positive influence on extrinsic motivation. Hence, a multidimensional style perspective proves to be interesting, as it can lead to more fine-grained results with relevance for educational practice. Of course, further research with alternative cognitive style and also learning style models is needed to replicate and extend the findings of this study and to enable further generalisation of these results (Cools et al., 2014).

Obviously, the following limitations also characterized this study and need to be addressed in future research. A first limitation of this study is that we did not explicitly take contextual factors, such as the learning and teaching environment (e.g., didactical methods used, teaching style), into account in our conceptual framework. This implies that we cannot derive from our results the extent to which the differences and similarities between the countries can be attributed to the specific environment in which the students are learning, despite the fact that we consciously attempted to choose fairly similar educational institutes. In line with the situational strength hypothesis (i.e., the idea that situational characteristics have the ability to stimulate or restrict the expression of particular individual differences) (Meyer, Dalal, & Hermida, 2010), it is important to explicitly involve contextual factors in future research to get a better view on the combined impact of individual differences, contextual factors, and intervening processes on learning outcomes (Gully & Chen, 2010). Specific contextual factors of interest are course design and objectives, teaching style, and applied didactical methods.

A second limitation concerns the fact that we used country-specific indicators of academic achievement. We cannot guarantee that these indicators are completely comparable across countries, although we did check the distribution of each of the indicators in the different countries (following an unsatisfactory-satisfactory-good-excellent logic) and found a fairly similar distribution in each of the countries. Further research, with a more standardized academic achievement measure that can be meaningfully used in different countries, is necessary to cross-validate and replicate the findings of this study.

A third limitation is related to the cross-sectional, quantitative design of our study. Survey research is a fairly easy way to collect large numbers of data, although this might be at the expense of fine-grained, contextualized understanding (Creswell, 2003). Qualitative or mixed-method research has the advantage of leading to a better understanding of the meaning of what is observed as it results in data of greater depth and richness (Shah & Corley, 2006). In addition, a longitudinal approach can also be useful to get a better view on how learning styles and motivation evolve over time. There still seems to be an

overemphasis on cross-sectional research designs at the expense of longitudinal studies in this context. Vanthournout, Donche, Gijbels, and Van Petegem (2011) plea for using more longitudinal designs to empirically study the potential stability versus changeability of students' learning processes, as there is currently still a lack of these types of inquiries. To strengthen the findings of future research and gain deeper insights into the implications of style differences for learning, it will be important to strive to more diverse research designs (i.e., qualitative, mixed-method, and longitudinal designs). This way, it will be possible to obtain a good grasp on the influencing factors of learning, which will contribute to more specific, applicable, timely, and relevant findings for people in practice.

CONCLUSION

The current evolution towards student-centred learning (Whetten et al., 2009) fits within the philosophy that education needs to enhance students' positive reactions and minimize negative ones to learning. Learners approach learning in different ways, and research has demonstrated that a 'one-size-fits-all' paradigm is no longer an effective model for today's students (Evans et al., 2010). Instead, educators must make use of appropriate diverse learning methods, didactics, and educational interventions to create a constructive, positive learning climate. To reach this, however, it is necessary to develop a good understanding of the impact of individual differences on learning outcomes, which was exactly the starting point of our research. Indeed, researchers in education have emphasized that, in order to improve the quality of learning, it is important to understand the process of learning. This study provides a useful framework to better understand how individuals learn and how the learning process influences learning outcomes, although further international, mixed-method, longitudinal research in diverse contexts is needed to cross-validate and strengthen our findings.

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Correspondence

Eva Cools
Vlerick Business School
Reep 1
9000 Gent
Belgium
E-mail: eva.cools@vlerick.com

			Cognitive styles			Learning styles					Motivation	
	M	*SD*	K	P	C	D	G	O	St	Exp	I	Ext
Cognitive style[a]												
Knowing (K)	3.64	.72										
Planning (P)	3.62	.78	.17**									
Creating (C)	3.87	.69	.02	-.39**								
Learning style												
Discovery (D)	3.31	.57	.03	-.41**	.54**							
Group (G)	2.84	.72	-.19**	-.06	.08	.05						
Observational (O)	3.68	.55	.03	.44**	-.11*	-.35**	.15**					
Structured (S)	3.29	.61	.14**	.72**	-.29**	-.28**	-.02	.37**				
Experiential (Exp)	3.70	.44	.06	-.06	.38**	.09	.22**	.26**	-.04			
Motivation												
Intrinsic (I)	3.04	.33	.24**	-.30**	.52**	.47**	-.17**	-.19**	-.14*	.28**		
Extrinsic (Ext)	2.73	.40	.11*	.37**	-.26**	-.32**	-.06	.31**	.32**	-.02	-.26**	

Table 1: Descriptive Statistics and Correlations of Study Variables (N = 322)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$

[a] Cognitive and learning styles were measured using a five-point Likert scale (1 = totally disagree to 5 = totally agree) and the motivation scale used a four-point likert scale from 1 (never or almost never true) to 4 (always or almost always true).

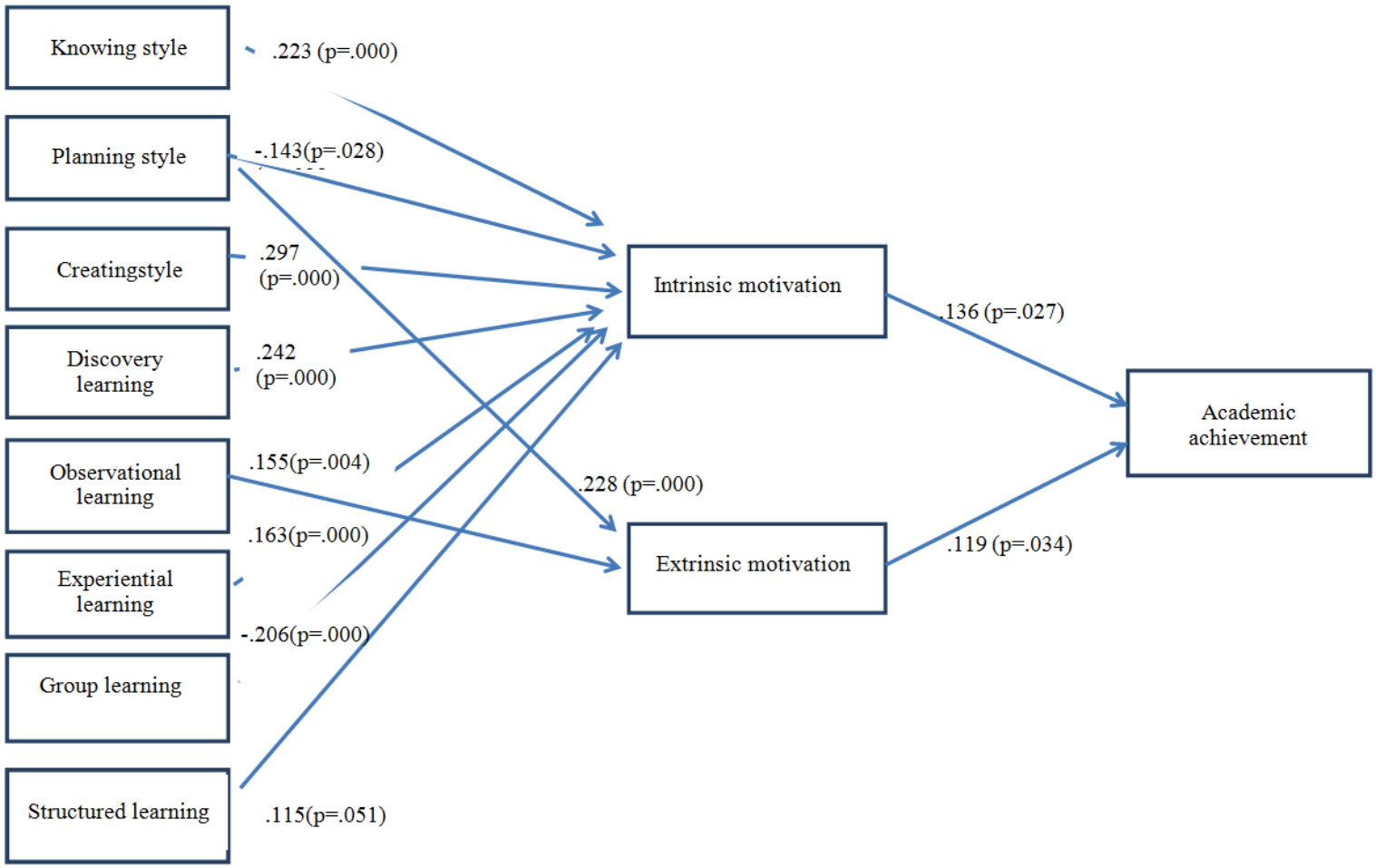

Figure: 1: The Impact of Cognitive Styles and Learning Styles on Academic Achievement, Mediated by Motivation (significant standardized path coefficients)