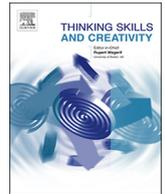




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Studying the impact of critical thinking on the academic performance of executive MBA students



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ABSTRACT

Developing critical thinking abilities is an essential aspect of education that has been the endeavor of many instructors throughout the years, as it is believed that it can lead to higher academic performance. The present paper aims to analyze the impact of critical thinking on the academic performance of executive Master of Business Administration (MBA) students. We perform multivariate analysis of variance (MANOVA) to analyze the impact of critical thinking on the academic performance in a sample of 1620 executive MBA students, in each of four academic areas (*i.e.*, Operations, Marketing, Finance, and Strategy & Leadership). The critical thinking variable is measured using the Watson Glaser Critical Thinking Appraisal (WGCTA) test and the academic performance variable is measured by the average grades obtained by the MBA students. In terms of findings, it is reasonable to advance that critical thinking has a positive impact on the average academic performance of MBA students. The analysis and interpretation capabilities are involved in the planning process, while the evaluation of arguments, inference, and deduction are important for decision-making. Both sets of skills are trained in the Marketing and Strategy & Leadership courses, with better results than those obtained in the Operations and Finance courses that demand more mathematical-analytical capabilities, verification of information, and capacity for decision-making, and with a view to solving problems in a more structured way. Critical thinking, broadly defined as the objective analysis and evaluation of an issue in order to form a judgement, has not been previously studied, to the best of our knowledge, in relation to the academic performance of MBA students. We also aim to contribute to the literature with evidence from the Peruvian arena. Implications for practice are provided.

1. Introduction

Over the past two decades, the Master of Business Administration (MBA), one of the most valuable post-graduate degrees available today, has turned into a competitive industry (Sharkey & Beeman, 2008), in which business schools compete for keen capable students (Segev, Raveh, & Farjoun, 1999). At the same time, however, there is a constant concern that MBA students are less than well-prepared when they enter the job market. As Deutschman (1991) indicated, “corporate recruiters complain that MBAs lack creativity, people skills, aptitude for teamwork, and the ability to speak and write with clarity and conciseness – all hallmarks of a good manager” (p. 68).

In recent years, several studies, such as the well-known study by Datar, Garvin, and Cullen (2011), have focused on rethinking the

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content of educational programs in business, in hopes that it will respond even better to the demands of both students and the business world. In their empirical study of MBA programs in Europe and the United States, Datar et al. (2011) concluded that business school research is relevant to the business practice and that the engagement of MBA students in academic matters is deficient. Consequently, they advanced that business schools need to reassess the facts, frameworks, and theories that they teach and, at the same time, rethink their curricula in terms of the hard and soft skills in the management practice and values. In an analysis across MBA programs, they outlined the opportunities to innovate and change the curricula. Thus, they identified eight *Unmet Needs of Management Education*: (a) the need for students to get a real global perspective; (b) leadership development, improved emotional intelligence, and ability to motivate, delegate and lead ethically; (c) the need to integrate concepts through a multidisciplinary approach that permits students to solve problems; (d) power and politics - students must understand how organizational processes work, and develop a good sense of how business works; (e) creative and innovative thinking; (f) oral and written communications skills to be capable of coherent and persuasive ideas and the communications skills to transmit ideas clearly and convincingly; (g) understand risks and how those risks affect more people than just themselves; and (h) the need to balance practice, theory, and experience. It is, thus, apparent that the current business world requires MBA students with a variety of skills, among which critical thinking has been accepted as one particular skill that allows overcoming problems and difficulties (Hudgins & Edelman, 1988).

In other words, as the business world becomes increasingly complex, it is evident now, more than ever, that MBA students need to have the ability to think for themselves and in an independent way, being able to critically examine and solve difficult problems, weigh possible alternatives, and make informed decisions and choices, among others. The business world's expectations are those of professionals who can "evaluate complex systems and information, detect, predict, advice, and recommend appropriate courses of action" (Reinstein & Bayou, 1997, p. 79). All of these processes are collectively known under the name of *critical thinking*, which constitutes the subject of our enquiry in the present paper. In this context, the development of higher levels of critical thinking – defined as the ability to consider the evidence, the context, the conceptualization, the methods, and the required criteria (Facione, 1990) – within the MBA programs turns out to be an imperative for many business schools.

Furthermore, the importance and impact of critical thinking on the students' academic performance has led to the development of research on the topic (see, for example, the study by Demirhan, Besoluk, & Önder, 2011). However, to the best of our knowledge, it has not yet been analyzed whether critical thinking is a predictor of the adequate performance of students in MBA programs and whether higher levels of the students' critical thinking are related to a better performance in certain academic areas; this is supported by the study by Stupnisky, Renaud, Daniels, Haynes, and Perry (2008).

The present paper aims to analyze the impact of critical thinking on the academic performance of executive MBA students (hereafter, *MBA students*). Finding out if there is any relation between the critical thinking capacity and the academic performance in MBA programs can help in promoting efforts to develop and use adequate teaching methods which are consistent with this capacity, enhance the importance of this capacity in the graduate education, and contribute to advancing it as a predictor competence of academic and professional success; as well as, encourage research that would relate it with other aspects of management education.

The remainder of the paper unfolds as follows. The next section (Section 2) discusses the theoretical framework, detailing the concepts of critical thinking and academic performance. Subsequently, we introduce the hypotheses relevant for the present study (Section 3), which are derived from the literature reviewed, followed by the methodology used (Section 4). Then, we present the results, which we discuss in detail (Section 5). The final section (Section 6) concludes the paper, with a discussion of the limitations of the study, implications for practice, and scope for future research on the topic.

2. Literature review

Critical thinking is a philosophical and multidisciplinary development concept (Saiz & Nieto, 2002), with philosophy, education, and psychology being the sciences that have inquired into and contributed to the development of the concept. Ennis (1993) defined critical thinking as "the reasoned and reflexive thinking that focuses on deciding what to believe and what to do" (p. 179). Alternatively, Diane Halpern, the author of the Halpern Critical Thinking Assessment (1998, 2014), one of the most widely used tools in the current research on critical thinking (Butler, 2012; Butler et al., 2012; De Bie, Wilhelm, & van der Meij, 2015; Nieto, Saiz, & Orgaz, 2009) considered that critical thinking is "thinking that is purposeful, reasoned and goal directed - the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task" (p. 450).

On the other hand, Brookfield (1987) considered that both rational and emotional components influence critical thinking, involving both culture and context. In this sense, from the perspective of the rational component, critical thinking is a set of higher-level thinking skills that can be improved and transferred, that include analysis, inference, deductive and inductive reasoning, while the emotional component refers to the inclination to apply critical thinking and includes truth seeking, open-mindedness, systematicity, analyticity, maturity, inquisitiveness, and self-confidence (Ennis, 1989; Facione, 2011; McPeck, 1990; Paul, 1987; Soodmand Afshar, Rahimi, & Rahimi, 2014; Yang & Chou, 2008).

In this study, we consider the more detailed definition in Watson and Glaser (2008):

A combination of attitudes, knowledge, and skills that include: 1) Attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true; 2) Knowledge of the nature of valid abstractions and generalizations in which the weight of accuracy of different kinds of evidence is logically determined; 3) Skills in employing and applying the above attitudes and knowledge. (p.3)

It is this definition of Watson and Glaser that has been the basis of many tests which were developed to measure critical thinking

and which are, furthermore, still widely used today to this purpose.

Additionally, Dressel and Mayhew (1954), in Gadzella, Ginther, and Bryant (1987), drew up a list of skills related to critical thinking: the ability to define problems; the ability to select relevant information that contributes to the resolution of problems; the ability to recognize solid and not solid assumptions; the ability to formulate and select hypotheses; and the ability to establish valid conclusions and to determine the validity of inferences. Using the experts' criteria and relying on the first research on the topic (Houle, 1943; Morse & McCune, 1957, in Gadzella et al., 1987), the items in the WGCTA are consistent with the five described skills.

Critical thinking is generally treated, therefore, as a set of capabilities that allow producing arguments, inductions, deductions, conclusions, and assessments on the basis of the gathered information. This concept is essentially applied to the educational sector, which seeks to ensure that the student understands, reflects, and solves problems efficiently, in such a way that he can develop an optimal ability to think critically in what concerns both academic and non-academic (ordinary) problems within the professional and personal environment (Saiz & Nieto, 2002). The importance placed on critical thinking has led to a substantial amount of research on critical thinking skills (for a more comprehensive review, see Pascarella & Terenzini, 2005). Despite this, however, as previously mentioned, little is known about what impact critical thinking has on students' academic performance, in general.

Academic performance is understood as the result that indicates achievement in education. Pizarro and Clark (1998) defined academic performance as "a measure of the response capacity of an individual, that expresses what a person has learned as a result of an instruction or training process; in addition, from the learner's perspective, it represents an individual's ability to answer to stimuli, objectives, and educational purposes previously established" (p. 223). There is a debate about the academic performance assessment (Edel Navarro, 2003), since the inclusion of context variables are required in order to have an appropriate weighting. Reyes Tejada (2003) made a distinction between academic "performance" and "progress." He proposed that the former depends on the student, while the latter is more the result of the teaching-learning process, which depends both on the teacher and the learner.

Although there are several means of capturing and communicating student learning and performance, a traditional way is through the course grades (Lake & Kafka, 1996), with the expectation that they reflect and are indicators or estimates of the student academic performance (see, for example, Airasian, 2000; Friedman & Frisbie, 2000; Nitko, 2001; Stiggins, 2001). The course grades are the valuations that the academic institutions give to the students' performance.

A review of the existent literature on the topic shows that, in time, academic performance has been associated with intelligence (Nácher, 2002; Furnham, 2012; Rosander, Backstrom, & Stenberg, 2011; Ruiz, Bermejo, Ferrando, Prieto, & Sainz, 2014), as well as with other cognitive and emotional factors, such as personality (Furnham, 2012; Harris, 1940; Vedel, Thomsen, & Larsen, 2015; Rosander et al., 2011), emotional intelligence, motivation (De Guzmán, Calderón, & Cassaretto, 2003), even weather or family dynamics (Escobedo & Cuervo, 2011; Rackensperger, 2012), and self-esteem and resilience (Kwek, Bui, Rynne, & So, 2013). It seems that there is not one single predictor of academic performance. During the first years of life, intelligence is shown to relate more strongly to the academic achievements; however, as the individual grows, other variables begin to gain greater importance for predicting academic achievement (De Guzmán et al., 2003). There is research that seems to indicate that the personality factors account for the variance in academic performance over and above intelligence (Poropat, 2009), while also possessing more predictive power than intelligence (Di Fabio & Busoni, 2007).

The education in administration has not been exempt from research that seeks variables related to the academic performance of professionals in training (Çilan & Can, 2014; and Gupta & Turek, 2015). In a research study, Cascón (2002) concluded that the psycho-pedagogical factor that has more weight in the prediction of academic performance is intelligence; therefore, for this author, it seems reasonable to apply standardized instruments to detect the potential groups at risk for academic failure.

Ricketts and Rudd (2005), also, studied the relationship between leadership, the ability for critical thinking, and academic performance in students who were youth leaders in the organization of Future Farmers of America (FFA) and found that the grade point average (GPA) of the students, as an indicator of student performance, was the best-known variable for explaining critical thinking. In addition, they found a relationship between leadership and critical thinking, more specifically, with GPA, leadership training score, and the critical thinking disposition of innovativeness accounting for 12% of the variance in the combined critical thinking skill.

Furthermore, in a research conducted in a sample of English students in Iran, Soodmand Afshar et al. (2014) found that critical thinking was a stronger predictor of academic achievement than autonomy and instrumental motivation.

Conversely, in a study with nursing students made by Bauwens and Gerhard (1987), it was found that critical thinking, as measured by the scores in the well-known Watson Glaser Critical Thinking Appraisal test (WGCTA) obtained at the beginning of the program, was highly correlated with the students' academic performance, which was measured by the final grade in all the courses.

Lastly, during the validation process of the Watson Glaser Critical Thinking Appraisal test (Watson & Glaser, 2008), it was found that there was a positive relationship between critical thinking and the scores obtained in the verbal intelligence quotient in Wechsler Adult Intelligence Scale-WAIS (p. 39), which suggests that it is appropriate to consider the possibility that critical thinking can also be a predictor of academic performance, just as the intelligence quotient. During the same process, in a sample of applicants for managerial positions, there were positive relationships in the tests taken during the evaluation of personnel, such as the Employee Aptitude Survey, Wesman Staff Test, and the Triggs, which suggests that critical thinking can predict the performance of the individuals in terms of managerial skills (p. 41). This last statement, of course, needs to be studied in greater depth.

3. This study

The graduate education in administration is usually divided into areas of learning. For the present study, we considered the academic areas of 'Operations', 'Finance', 'Marketing', and 'Strategy & Leadership'. The academic area of **Operations** includes tools

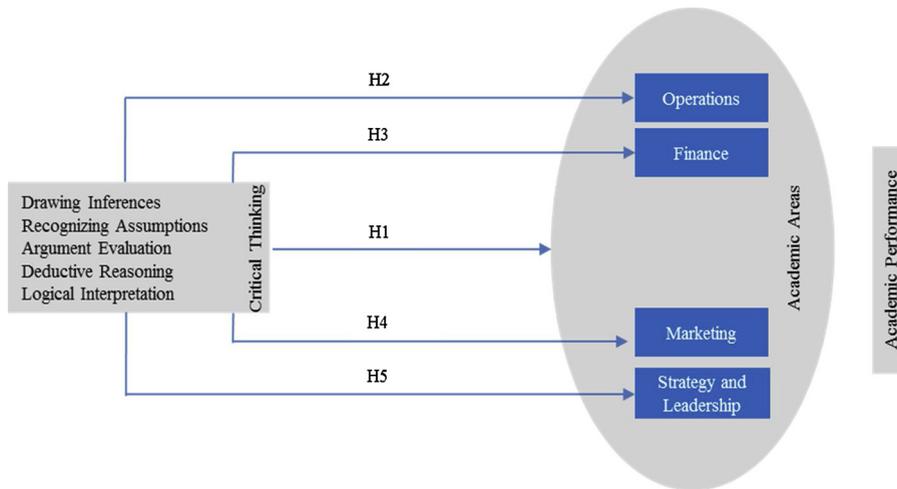


Fig. 1. Model and hypotheses.

for management decision-making, statistics for administration, operations management, information technology and e-business and supply chain management courses. The academic area of **Finance** includes financial accounting, managerial accounting, mathematics of finance, financial engineering and capital markets, international finance, business economics, macroeconomics and economic policy, and financial resources management courses. The academic area of **Marketing** includes marketing management, international marketing, sales management, innovative business entrepreneurship, and marketing research courses. The academic area of **Strategy & Leadership** includes organizational behavior, human capital development, effective communications, leadership and managerial attributes, negotiation and conflict management, and strategic management courses.

Based on the suggested relationship between critical thinking and academic performance in the literature, the following general hypothesis was formulated:

H1. Regardless of academic area, critical thinking has an impact on the academic performance of MBA students.

Furthermore, we were interested to specifically study the relationship between critical thinking and the academic performance in each academic area; hence, we formulated the following four sub-hypotheses:

H2. Critical thinking has a positive impact on the academic performance of MBA students in the academic area of Operations.

H3. Critical thinking has a positive impact on the academic performance of MBA students in the academic area of Finance.

H4. Critical thinking has a positive impact on the academic performance of MBA students in the academic area of Marketing.

H5. Critical thinking has a positive impact on the academic performance of MBA students in the academic area of Strategy & Leadership.

Fig. 1 below visually depicts the above-stated hypotheses.

4. Method

4.1. Participants

The study was developed with the population of executive MBA students at CENTRUM Católica Graduate Business School (CCGBS), an institution dedicated to graduate education and to the development of relevant academic research. Students enrolled in the executive MBA, also called Managerial MBA, are of an average age of 38, with a corporate experience of an average of 15 years.

In all, 1706 participants aged 22 to 66 years took part in the study, between 2005 and 2011 (31 participants in 2005, 271 in 2006, 290 in 2007, 256 in 2008, 360 in 2009, 312 in 2010, and 186 in 2011). Among them, 86 had missing data and were therefore excluded from the analysis. The final analyses were performed on 1620 participants (1174 males and 446 females). No refusals to participate were encountered.

4.2. Measurements

The critical thinking variable was measured by the scores obtained in the Watson Glaser Critical Thinking Appraisal test. The Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 1980) is an 80-item, multiple-choice, timed (generally lasting 40–45 minutes) ability test designed to measure an individual’s capability for critical thinking. It consists of five subtests that cover: (a) drawing inferences, which refers to the ability to discriminate between the degree of truth or falsity of an inference derived from

certain submitted information; (b) recognizing assumptions, where it is expected to see if the evaluated subjects recognize the assumptions or presumptions established in the given statements; (c) argument evaluation, which assesses the ability to distinguish between the arguments that are strong and relevant from those who are weak or irrelevant in particular situations; (d) deductive reasoning, in which it must be determined whether certain conclusions emerge necessarily from the provided information; and (e) logical interpretation, where it must be determined if the generalizations based on the information are true. A final score for Critical Thinking is measured. The WGCTA has been tested with regards to its reliability and validity (Watson & Glaser, 1980). It is to be mentioned that the participants were segmented into three groups according to the scores achieved in the WGCTA test, with cut-off points for local and international rules (Low, Medium, and High).

The academic performance variable, on the other hand, was measured by the average grades obtained in the courses of the corresponding academic area. It should be noted that students take exams in all the courses and that performance is measured in the same way across the courses, as the marking criteria are standardized. The following breakdown of marks (with their respective weights) applies to all the courses:

Individual Evaluations

Attendance and punctuality 10%

Class participation and final examination 40%

Essay 20%

Group Evaluations

Discussion and presentation of articles/cases/exercises 10%

Final applied project 20%

Total 100%

Furthermore, multivariate analysis of variance (MANOVA) was used to determine the impact of critical thinking on the academic performance of students across the academic areas. Then, if significant results are obtained, one-way analysis of variance (ANOVA) is utilized to examine the impact of critical thinking on the academic performance of MBA students in every academic area (*i.e.*, Operations, Marketing, Finance, and Strategy & Leadership).

4.3. Procedure

The WGCTA test was applied in the classroom, with the participants being recruited at the very start of their MBA program, during their first day of studies, when everyone was present. This recruitment method helped us to accede to the entire MBA population. Ethical permission was sought and obtained for the study; furthermore, participants were informed about the purpose of the research and were assured anonymity and confidentiality, with the possibility to withdraw from the study at any point in time. It should also be noted that although participants were thanked, no monetary incentives for taking part in this study were involved.

5. Results and discussion

Table 1 below reports the average performance of the MBA students (*Mean*), the variation in the average performance (*Std. Deviation*), and the sample size (*N*), for each of the critical thinking categories in every academic area. It can be observed that, overall, the average performance ranges from a minimum of 14.548 (in the area of Finance) to a maximum of 16.212 (in the area of Strategy

Table 1
Descriptive Statistics.

Academic Area	CTC	Mean*	Std. Deviation*	N
Operations	Low	14.586	1.303	209
	Medium	15.232	1.234	1162
	High	15.814	1.290	249
	Total	15.238	1.293	1620
Finance	Low	14.548	1.111	209
	Medium	15.245	1.081	1162
	High	15.723	1.077	249
	Total	15.228	1.128	1620
Marketing	Low	15.627	0.894	209
	Medium	15.927	0.807	1162
	High	16.164	0.945	249
	Total	15.924	0.852	1620
Strategy & Leadership	Low	15.447	0.985	209
	Medium	16.016	0.908	1162
	High	16.212	0.999	249
	Total	15.973	0.956	1620

Note. CTC – Critical thinking category. Grades in Peru range from 0 to 20 (100%), with a passing grade of 11 (55%). Top students graduate with scores of 17 (85%) on average. Students with QPRs of 16 (80%) and above are considered of excellent academic performance. *Rounded to three decimals.

& Leadership). By means of disaggregating the results based on the critical thinking category, we can further notice that for students with a low level of critical thinking, the lowest average performance is registered in the area of Finance (14.548), while the highest average performance is registered in the area of Marketing (15.627); similarly, for students with a medium level of critical thinking, the lowest average performance is registered in the area of Operations (15.232), while the highest average performance is registered in the area of Strategy & Leadership (16.016); finally, for students with a high level of critical thinking, the lowest average performance is registered in the area of Finance (15.588), while the highest average performance is registered in the area of Strategy & Leadership (16.212). The results also depict that, across the four academic areas, the standard deviations of the average performances for the categories of low and high level of critical thinking are always higher than the standard deviations of the average performances for the categories of medium level of critical thinking. The only exception is posed by the area of Finance, wherein the standard deviation of the high critical thinking category is slightly lower than the standard deviation of the medium critical thinking category.

MANOVA assumes that the within-cell (group) covariance matrices are equal, an assumption which holds if we have approximately equal cell sizes; that meaning, the largest cell size N is not more than 1.5 times larger than the smallest cell size N . As our design is unbalanced (see last column of Table 1), we use Box's M test to test the equality of the covariance matrices, using $p < 0.001$ as a criterion. In our case, Box's M (44.404) is not significant, with $p (= 0.002) > 0.001$, which indicates that there are no significant differences among the covariance matrices; hence, the assumption of homogeneity of covariance across the groups holds. We see that Wilk's Lambda test is significant, wherein Wilk's Lambda = 0.899, $F(8, 3228) = 22.057$, $p < 0.001$, multivariate $\eta^2 = 0.052$.

Nevertheless, given that the p -value ($= 0.002$) is very close to the threshold value of 0.001, we further consider Pillai's Trace as a more appropriate test statistic, which is very robust and not highly linked to assumptions about the normality of the distribution of the data. In this sense, using an alpha level of 0.05, we observe that Pillai's Trace test is significant, wherein Pillai's Trace = 0.1017, $F(8, 3230) = 21.6208$, $p < 0.001$, multivariate $\eta^2 = 0.051$. The multivariate $\eta^2 = 0.051$ indicates that approximately 5.1% of multivariate variance of the dependent variables is associated with the group factor.

We can, thus, conclude that both tests support the conclusion that there are statistically significant differences among the critical thinking categories on a linear combination of the four dependent variables, namely Operations courses average, Finance courses average, Marketing courses average, and Strategy & Leadership courses average. Hence, we can conclude that critical thinking impacts on the academic performance of MBA students across the four academic areas; hence, hypothesis H1 holds.

Having learned that MANOVA is significant, we will now examine the impact of critical thinking on the academic performance of MBA students in every academic area by means of examining the univariate ANOVAs. To this end, we need to comply with the assumption that the error variance of performances among the critical thinking categories of each academic area is equal. To do so, we further look at Levene's test of equality of error variances. As we can see in Table 2, Levene's test is not significant, in other words, the assumption is met for all the four academic areas, with $p > 0.05$.

We observe the following statistics from the univariate ANOVAs, for each of the academic areas: $F(2, 1617) = 54.761$, $p = 0.000$, $\eta^2 = 0.063$; $F(2, 1617) = 67.200$, $p = 0.000$, $\eta^2 = 0.077$; $F(2, 1617) = 23.240$, $p = 0.000$, $\eta^2 = 0.028$; and $F(2, 1617) = 41.642$, $p = 0.000$, $\eta^2 = 0.050$, respectively. It is to be noted that the p -values for the ANOVAs in the MANOVA setup do not consider that multiple ANOVAs have been conducted. To protect against Type I error, we use a traditional Bonferroni procedure and test each ANOVA at the 0.0125 level (0.05 divided by the number of ANOVAs conducted, which should equal the number of dependent variables). Results show that all the four ANOVAs are significant at the 0.0125 adjusted alpha level ($p < 0.001$ for the four ANOVAs). It can, thus, be said, that the average performances in all the four academic areas (Operations, Finance, Marketing, and Strategy & Leadership) are significantly different for students with different levels of critical thinking.

Further post-hoc Tukey tests for multiple comparisons show that the average performances across the three critical thinking categories within each academic area (namely, Operations, Finance, Marketing, and Strategy & Leadership) differ significantly at $p < 0.05$, with mean square errors of 1.567, 1.175, 0.707, and 0.807, respectively. Based on the above analysis of univariate ANOVAs and post-hoc tests, hypotheses H2, H3, H4, and H5 partially hold; in this sense, critical thinking has an impact on the academic performance of MBA students in the areas of Finance, Marketing, and Strategy & Leadership, respectively. The direction of impact can further be analyzed based on Table 3.

We can observe in Table 3 that all the betas are significant, at a 5% level. Based on the beta coefficients in Table 3 for the academic area of Operations, the average performance (intercept) decreases when the critical thinking level shifts from a high to a medium level (-0.582) and from a medium to a low level (-0.647), which proves our hypothesis H2 that critical thinking has a positive impact on the academic performance of MBA students in the area of Operations. Similar analyses based on Table 3 lead to prove hypotheses H3, H4, and H5 that critical thinking has a positive impact on the academic performance of MBA students in the

Table 2
Levene's Test of Equality of Error Variances.

	F	df1	df2	Sig.
Operations Courses Average	0.5953	2	1617	0.5515
Finance Courses Average	0.1548	2	1617	0.8566
Marketing Courses Average	1.7054	2	1617	0.1820
Strategy & Leadership Courses Average	1.8966	2	1617	0.1504

Table 3
Parameter Estimates.

Dependent Variable		Beta	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
						Lower Bound	Upper Bound	
Operations	Intercept	15.814	0.079	199.328	0.000	15.659	15.970	0.961
	Low	-1.229	0.117	-10.461	0.000	-1.459	-0.998	0.063
	Medium	-0.582	0.087	-6.657	0.000	-0.754	-0.411	0.027
	High	0 ^a						
Finance	Intercept	15.723	0.069	228.864	0.000	15.588	15.857	0.970
	Low	-1.175	0.102	-11.552	0.000	-1.374	-0.975	0.076
	Medium	-0.478	0.076	-6.314	0.000	-0.627	-0.330	0.024
	High	0 ^a						
Marketing	Intercept	16.164	0.053	303.359	0.000	16.060	16.269	0.983
	Low	-0.538	0.079	-6.816	0.000	-0.692	-0.383	0.028
	Medium	-0.238	0.059	-4.050	0.000	-0.353	-0.123	0.010
	High	0 ^a						
Strategic and Leadership	Intercept	16.212	0.059	274.345	0.000	16.096	16.328	0.979
	Low	-0.765	0.087	-8.743	0.000	-0.936	-0.593	0.045
	Medium	-0.196	0.065	-3.011	0.003	-0.324	-0.068	0.006
	High	0 ^a						

Note. ^a This parameter is set to zero because it is redundant.

areas of Finance, Marketing, and Strategy & Leadership, respectively.

Fig. 2 depicts the average performance of MBA students for the three categories of Critical Thinking (low, medium, and high) within each of the four academic areas, along with the lower and upper bounds, at a 95% confidence level. Based on Fig. 2, we can draw some noteworthy inferences.

First, it can be noted that, for the three categories of critical thinking, the average performances of students in the area of Operations are very similar to the average performances in the area of Finance, while the average performances of students in the area of Marketing are very similar to the average performances in the area of Strategy & Leadership.

Second, it is interesting to observe that the average performances of students with a high level of critical thinking in the areas of Operations and Finance are lower than the average performances of students with a medium level of critical thinking in the areas of Marketing and Strategy & Leadership.

Third, it can be noticed that, across the four academic areas in general, students with the highest critical thinking ability have a better performance than those with an average critical thinking ability and students with an average critical thinking ability have a better performance than the students with a lower critical thinking ability. Nevertheless, the greatest difference in the average performance made by the movement from a low to a medium or high level of critical thinking is registered in the academic areas of Operations and Finance.

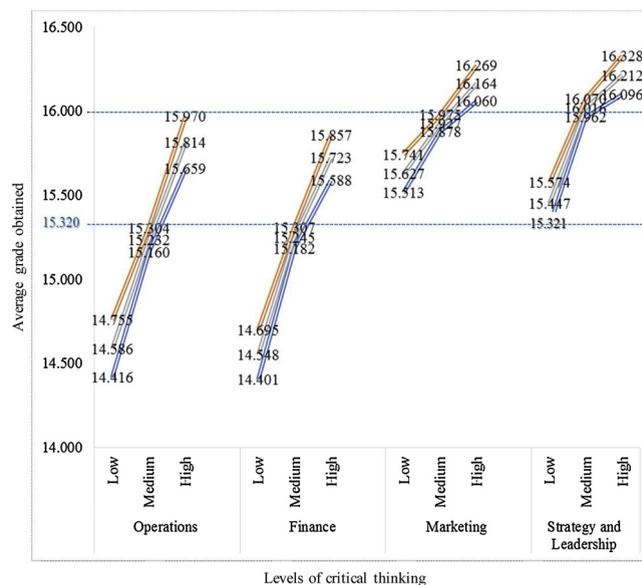


Fig. 2. Impact of critical thinking on academic performance in each academic area.

Note. In Peru, grades are measured on a scale from 0 to 20. As such, a grade of 16.000 is 80%, 15.320 is 76.6%, 15.000 is 75%, and 14.500 is 72.5%.

Finally, by means of inspecting the lower and upper confidence interval lines, at a 95% confidence level, we can observe that, within each academic area, the variation in the average performance of MBA students with a low and high level of critical thinking is generally higher than the variation in the average performance of MBA students with a medium level of critical thinking.

The above observations highlight the importance of the steps involved in the critical thinking process: detection of problems, ability to find evidence, assess the veracity, and make inferences and valid deductions and in the academic performance, which is understood as the assessment of the students' performance during his/her process of instruction, in this case, during an MBA.

Overall, the results suggest a positive impact of critical thinking abilities on the academic performance at a general and at a specific level – in the courses of Operations, Finance, Marketing, and Strategy & Leadership. These results are consistent with the results of other research studies, such as those by [Bauwens and Gerhard \(1987\)](#) and [Soodmand Afshar et al. \(2014\)](#). It is to be noted, however, that these studies were not performed on MBA students, who are usually more mature and experienced students.

6. Implications

Critical thinking, broadly defined as the objective analysis and evaluation of an issue in order to form a judgement, has not been previously studied, to the best of our knowledge, in relation to the academic performance of MBA students. The present paper aimed, thus, to analyze the impact of critical thinking on the academic performance in a sample of MBA students, in an attempt to also contribute to the literature with evidence from the Peruvian arena.

The results show that, in general, critical thinking has a positive impact on academic performance, and, in particular, on the academic performance in all the studied academic areas (with mean scores higher for the areas of Marketing and Strategy & Leadership). The MBA students with higher critical thinking ability have a better performance than those with an average critical thinking ability and students with an average critical thinking ability have a better performance than the students with a lower critical thinking ability.

It should be noted that the results must be interpreted with caution, as the study is limited to the purposive population of selected executive MBA students at CENTRUM Católica Graduate Business School. As such, it is recommended that further research should be conducted in other business schools if the results are to be expanded to the business schools' world. Nevertheless, we believe that the findings of the present research could still serve as a reflection of what might be expected at a more general level for critical thinking to support a good academic performance.

An avenue for future research that we would like to explore as our next step is developing and testing further hypotheses, for example, about why students of Marketing and Strategy experience a stronger positive impact of critical thinking on performance. Unfortunately, such an analysis was not possible with our current available data; despite this, the present research holds its own value derived from counting with data from a very large sample size of 1706 students (with valid data from 1620 respondents), collected between 2005–2011. Future research could also strengthen the present analysis by means of incorporating additional variables, such as the learning styles of the MBA students or a consideration of their skills in terms of hard and soft skills. On the other hand, however, the assessed relationship between critical thinking and academic performance could be better established if other variables that can intervene in the process of teaching are controlled. This would provide a clearer picture of the role that critical thinking capabilities play in influencing academic performance. Experimental studies are suggested, where variables that cannot be controlled in our design do not intervene, such as the time frame and the possible influence of other factors in the final academic performance.

A better-balanced MBA curriculum, between hard and soft skills courses, needs to be developed to provide graduates with better managerial tools for their future careers. Critical thinking is a soft skill that should be stressed in the different courses of an MBA program as an important trait to be developed in managers.

In terms of practical implications, our findings support the usefulness of the Watson-Glaser Critical Thinking Appraisal Test as a potential predictor of MBA success. The results may also be used by MBA course designers (especially those working in the academic areas) to incorporate in their courses materials that seek to further stimulate the students' critical thinking processes. In this sense, MBA instructors may train their students in thinking critically and analytically and may seek opportunities to enhance their students' higher-order thinking skills (e.g., by asking them challenging and inferential questions) and making them to write essays in each course, which will allow the instructors to know these skills in their students. This paper joins the rather small pool of studies that provide evidence from the Peruvian higher education arena (see, for example, [D'Alessio & Avolio, 2011](#); [Charles & Gherman, 2014, 2015](#)) and it is the authors' hope that it will lead to more, much-needed research on MBA programs and business schools in Peru.

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References

- Airasian, P. W. (2000). *Assessment in the classroom: A concise approach* (2nd ed.). Boston, MA: McGraw-Hill.
- Bauwens, E. E., & Gerhard, G. G. (1987). The use of the Watson-Glaser critical thinking appraisal to predict success in a baccalaureate nursing program. *The Journal of Nursing Education, 26*(7), 278–281.
- Brookfield, S. (1987). *Developing critical thinkers*. Milton Keynes, England: Open University Press.
- Butler, H. A. (2012). Halpern critical thinking assessment predicts real-world outcomes of critical thinking. *Applied Cognitive Psychology, 26*(5), 721–729.
- Butler, H. A., Dwyer, C. P., Hogan, M. J., Franco, A., Rivas, S. F., Saiz, C., et al. (2012). The Halpern Critical Thinking Assessment and real-world outcomes: Cross-national

- applications. *Thinking Skills and Creativity*, 7(2), 112–121.
- Cascón, I. V. (2002). Predictores del rendimiento académico en alumnos de primero y segundo de BUP [Predictors of academic performance in high school students (sixth and seventh grade)]. Retrieved from: <http://campus.usal.es/~inico/investigacion/jornadas/jornada2/comun/c19.html>.
- Charles, V., & Gherman, T. (2014). Factors influencing students' choice of a B-school. *The New Educational Review*, 37(3), 117–129.
- Charles, V., & Gherman, T. (2015). Student-based brand equity in the business schools sector: An exploratory study. *The New Educational Review*, 42(4), 165–176.
- Çilan, Ç. A., & Can, M. (2014). Measuring factors effecting MBA students' academic performance by using categorical regression analysis: A case study of institution of business economics, istanbul university. *Procedia-Social and Behavioral Sciences*, 122, 405–409.
- D'Alessio, F. A., & Avolio, B. E. (2011). Business Schools and Resources Constraints: A Task for Deans or Magicians? *Research in Higher Education Journal*, 13, 1–37.
- Datar, S. M., Garvin, D. A., & Cullen, P. G. (2011). Rethinking the MBA: Business education at a crossroads. *Journal of Management Development*, 30(5), 451–462.
- De Bie, H., Wilhelm, P., & van der Meij, H. (2015). The Halpern critical thinking assessment: Toward a Dutch appraisal of critical thinking. *Thinking Skills and Creativity*, 17, 33–44.
- De Guzmán, I. N., Calderón, A., & Cassaretto, M. (2003). Personalidad y rendimiento académico en estudiantes universitarios [Personality and academic performance of university students]. *Revista de Psicología*, 21(1), 119–143.
- Demirhan, E., Besoluk, Ş., & Önder, I. (2011). The change in academic achievement and critical thinking disposition scores of pre-service science teaching over time. *Journal of Educational Science*, 403–406.
- Deutschman, A. (1991). The trouble with MBAs. July 29 *Fortune*, 67–79.
- Di Fabio, A., & Busoni, L. (2007). Fluid intelligence, personality traits, and scholastic success: Empirical evidence in a sample of Italian high school students. *Personality and Individual Differences*, 43, 2095–2104.
- Dressel, P., & Mayhew, L. (1954). *General education: Exploration in evaluation. Final report of the cooperative study of evaluation in general education*. Washington DC: American Council of Education.
- Edel Navarro, R. (2003). *El rendimiento académico: concepto, investigación y desarrollo [Academic performance: concept, research and development]*. REICE: Revista Electrónica Iberoamericana sobre Calidad, Eficacia y Cambio en Educación.
- Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher*, 18(3), 4–10.
- Ennis, R. H. (1993). Critical thinking assessment. *Theory into Practice*, 32(3), 179–186.
- Escobedo, P. S., & Cuervo, Á. V. (2011). Una aproximación a la relación entre el rendimiento académico y la dinámica y estructura familiar en estudiantes de primaria [An approach to the relationship between academic performance, the dynamics and family structure in primary school students]. *Revista Intercontinental de Psicología y Educación*, 13(2), 177–196.
- Facione, P. A. (1990). Critical Thinking: a statement of expert consensus for purposes of educational assessment and instruction. The Delphi report: research findings and recommendations. Prepared for the American philosophical association. (ERIC Document Reproduction Service No. ED315 423).
- Facione, P. A. (2011). *Critical thinking: What it is and why it counts*. Millbrae, CA: California Academic Press.
- Friedman, S. J., & Frisbie, D. A. (2000). Making report cards measure up. *Education Digest*, 65(5), 45–50.
- Furnham, A. (2012). Learning style, personality traits and intelligence as predictors of college academic performance. *Individual Differences Research*, 10(3), 117–128.
- Gadzella, B. M., Ginther, D. W., & Bryant, W. (1987). Teaching and learning critical thinking skills. *Paper presented at the 26th international congress of psychologist*.
- Gupta, A., & Turek, J. (2015). Empirical investigation of predictors of success in an MBA programme. *Education + Training*, 57(3), 279–289.
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Disposition, skills, structure training, and metacognitive monitoring. *American Psychologist*, 53(4), 449–455.
- Halpern, D. F. (2014). In D. F. Halpern (Ed.). *Thought and knowledge: An introduction to critical thinking* (5th ed.). Hove: Psychology Press, Taylor and Francis Group.
- Harris, D. (1940). Factors affecting college grades: A review of the literature, 1930–1937. *Psychological Bulletin*, 37, 125–166.
- Houle, C. (1943). Evaluation in the eight-year study. *Curriculum Journal*, 14, 18–21.
- Hudgins, B. B., & Edelman, S. (1988). Children's self directed critical thinking: A model for its analysis and two examples. *The Journal of Educational Research*, 81(5), 262–273.
- Kwek, A., Bui, H. T., Rynne, J., & So, K. K. F. (2013). The impacts of self-esteem and resilience on academic performance: An investigation of domestic and international hospitality and tourism undergraduate students. *Journal of Hospitality & Tourism Education*, 25(3), 110–122.
- Lake, K., & Kafka, K. (1996). Reporting methods in grades K–8. In T. R. Guskey (Ed.). *Communicating student learning. 1996 yearbook of the association for supervision and curriculum development* (pp. 90–118). Alexandria, VA: Association for Supervision and Curriculum Development.
- McPeck, J. E. (1990). Critical thinking and subject specificity: A reply to Ennis. *Educational Researcher*, 19(4), 10–12.
- Morse, H., & McCune, G. (1957). *Selected items for the testing of study skills and critical thinking* (3rd ed.). Washington, DC: National Council for the Social Studies.
- Nácher, V. (2002). *Personalidad y rendimiento académico [Personality and academic performance]*. Spain: Jornades de Foment de la Investigació de la Universitat Jaume I.
- Nieto, A. M., Saiz, C., & Orgaz, B. (2009). Análisis de la propiedades psicométricas de la versión española del HCTAES-Test de Halpern para la evaluación del pensamiento crítico mediante situaciones cotidianas [Analysis of the psychometric properties of Halpern's HCTAES-Test Spanish version for the assessment of critical thinking in everyday situations]. *REMA*, 14(1), 1–15.
- Nitko, A. J. (2001). *Educational assessment of students* (3rd ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research, Vol. 2*. San Francisco, CA: Jossey-Bass.
- Paul, R. (1987). Dialogical thinking – Critical thought essential to the acquisition of rational knowledge and passions. In J. Baron, & R. Sternberg (Eds.). *Teaching thinking skills: Theory and practice* (pp. 127–148). New York, NY: Freeman.
- Pizarro, R., & Clark, S. (1998). Currículo del hogar y aprendizajes educativos. Interaccion versus estatus [Home curriculum and educational learning. Interaction versus status]. *Revista de Psicología de la Universidad de Chile*, 7, 25–33.
- Poropat, A. E. (2009). A meta-analysis of the Five-Factor model of personality and academic performance. *Psychological Bulletin*, 2, 322–338.
- Rackensperger, T. (2012). Family influences and academic success: The perceptions of individuals using AAC. *Augmentative and Alternative Communication*, 28(2), 106–116.
- Reinstein, A., & Bayou, M. E. (1997). Critical thinking in accounting education: Processes, skills and applications. *Managerial Auditing Journal*, 12(7), 336–342.
- Reyes Tejada, Y. N. (2003). *Relación entre el rendimiento académico, la ansiedad ante los exámenes, los rasgos de personalidad, el autoconcepto y la asertividad en estudiantes del primer año de psicología de la UNMSM*. Lima, Peru: Relationship among academic performance, test anxiety, personality traits, self-concept, and assertiveness in first-year psychology students at National University of San Marcos.
- Ricketts, J. C., & Rudd, R. D. (2005). Critical thinking skills of selected youth leaders: The efficacy of leadership development, critical thinking dispositions, and student academic performance. *Journal of Agricultural Education*, 46(1), 33–43.
- Rosander, P., Backstrom, M., & Stenberg, G. (2011). Personality traits and general intelligence as predictors of academic performance: A structural equation modelling approach. *Learning and Individual Differences*, 21(5), 590–596.
- Ruiz, M. J., Bermejo, R., Ferrando, M., Prieto, M. D., & Sainz, M. (2014). Intelligence and Scientific-creative thinking: Their convergence in the explanation of students' academic performance. *Electronic Journal of Research in Educational Psychology*, 12(2).
- Saiz, C., & Nieto, A. M. (2002). Pensamiento crítico: capacidades y desarrollo [Critical Thinking: capacities and development]. *Pensamiento crítico: conceptos básicos y actividades prácticas*, 15–19.
- Segev, E., Raveh, A., & Farjoun, M. (1999). Conceptual maps of the leading MBA programs in the United States: Core courses, concentration areas, and the ranking of the school. *Strategic Management Journal*, 20, 549–565.
- Sharkey, T. W., & Beeman, D. R. (2008). On the edge of hypercompetition in higher education: The case of the MBA. *On the Horizon*, 16(3), 143–151.
- Soodmand Afshar, H., Rahimi, A., & Rahimi, M. (2014). Instrumental motivation, critical thinking, autonomy and academic achievement of Iranian EFL learners. *Issues in Educational Research*, 24(3), 281–298.
- Stiggins, R. J. (2001). *Student-involved classroom assessment* (3rd ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.
- Stupnisky, R. H., Renaud, R. D., Daniels, L. M., Haynes, T. L., & Perry, R. P. (2008). The interrelation of first-year college students' critical thinking disposition, perceived academic control, and academic achievement. *Research in Higher Education*, 49, 513–530.
- Vedel, A., Thomsen, D. K., & Larsen, L. (2015). Personality, academic majors and performance: Revealing complex patterns. *Personality and Individual Differences*, 85, 69–76.
- Watson, G., & Glaser, E. (1980). *Watson-glaser critical thinking appraisal manual*. San Antonio, TX: Psychological Corporation.
- Watson, G., & Glaser, E. M. (2008). *Watson-glaser critical thinking appraisal: Short form manual*. USA: NCS Pearson.
- Yang, Y. T. C., & Chou, H. A. (2008). Beyond critical thinking skills: Integrating the relationship between critical thinking skills and dispositions through different online instructional strategies. *British Journal of Educational Technology*, 39(4), 666–684.