

Personality, Learning Styles, Learning Motivation, and Academic Performance: A Study of Macau Business Undergraduates in a Microeconomics Course

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Abstract

The importance of undergraduate business education is rooted in the preparation it provides for meeting the future challenges of the business jungle. However, empirical research about undergraduate business education in Macau is neglected to some extent. It is necessary to put more efforts to investigate this topic in order to provide more information for institutions of higher education to improve the quality of business education. The purpose of this study was to examine the possible relationships among Macau business undergraduates' personalities, learning styles, learning motivations, and academic performance. This study recruited 268 (92 males and 74 females) first-year undergraduate Chinese business majors from a university in Macau. Based on zero-order correlation, we found two variables significantly associated with academic performance: emotional stability from the personality variables, and self-efficacy from the motivational variables. Regression analysis revealed that three variables were valid predictors: test anxiety, self-efficacy, and Active-Reflective dimension. We examined possible effects of gender and Macau residency status on our sample's academic performance using two-way ANOVA, and found that the gender variable impacted our participants' academic performance (female students had higher scores than males did).

Keywords: Personality, Learning style, Learning motivation, Academic performance, Microeconomics course

1. Background

The importance of undergraduate business education is grounded in helping students smoothly joining their future business workforce. Its curriculum development, teaching approaches, and student learning all deserve more attention and further study (Behara & Davis, 2015). Among a number of variables that might impact student learning outcomes, students' personalities, learning styles, and learning approaches have been identified as key to learning success (Furnham, Monsen, & Ahmetoglu; Rosander & Backstrom, 2012; Swanberg & Martinsen, 2010).

In Macau, there are two main groups of students in post-secondary education: domestic students with permanent residency status ("local") and non-domestic students, mostly from Mainland China ("Mainland"). The two groups are ethnically similar, but have been raised in different social environments and educated differently. For example, local students learn more languages, and begin elective subjects during senior high school, while mainland students spend much more time on the humanities and sciences (see Table 1). Thus, the Macau setting is useful for cross-cultural comparisons of student learning and characteristics.

Table 1. Key differences between the Macau and Mainland educational systems

	Local	Mainland
Language of instruction	Cantonese, English	Mandarin
Foreign-language requirements	Mandarin, Portuguese	English
Time allocation in senior-high (grades 10-12)	Subject (%)	
	First language (14%)	Language (12%)
	Second language (14%)	Foreign language (12%)
	Mathematics (13%)	Mathematics (12%)
	Moral and civil law (2%)	Political thought (6%)
	Social sciences and humanities (4%)	History (6%)
	Natural sciences (4%)	Geography (5%)
	Information technology (2%)	Physics (8%)
	Physical education and health (5%)	Chemistry (7%)
	Fine arts (4%)	Biology (5%)
	Electives (18%)	Information technology (3%)
	Extracurricular (4%)	Physical education and health (6%)
	Others (16%)	Music and arts (3%)
		Electives (15%)

The values in the Local column have been calculated based on the number-of-minutes requirements as given in Appendix 4 of *Regulamento Administrativo n.º 15/2014, Quadro da organização curricular da educação regular do regime escolar local*. Subject names have been loosely translated from Portuguese and adjusted for cross-comparison purposes. The values in the Mainland column have been calculated from the number of required hours in 基礎教育課程改革綱要：全日制普通高級中學課程計畫. For values with a range, in both columns, the middle values have been used. Subject names have been loosely translated from Chinese and adjusted for cross-comparison purposes.

Macau has around a dozen (Note 1) post-secondary educational institutions. Due to immigration restrictions, most Mainland students must choose one from among the six that are classified as universities (Note 2). Each university has an upper limit on the number of students it can enroll, and a specific proportion of this total that can be allocated to non-domestic students. These numbers are not publicly available, but in practice, only the quotas for Mainland students appear to be binding.

The main languages of post-secondary instruction in Macau's business schools are Cantonese, English, and Mandarin. Portuguese, though also an official language, is less commonly used.

2. Literature Review

2.1 Personality and Learning

Many empirical studies have examined the relationship between business students' personalities and their learning (Olson, Ringhand, Kalinski, & Ziegler, 2015). Using the Keirsey Temperament Sorter (KTS II; Keirsey, 1998) as their personality measure, Russo, Mertins, and Ray(2013) found that among 109 American college students, individuals with certain personality traits (nonguardian and intuitive types) performed better in managerial accounting tasks than guardian and sensing types. Another study (Russo & Kaynama, 2012) that used the KTS-II, with 110 American business undergraduates, indicated that female students who were feeling and judging types performed better than others in their class.

Another popular personality measure is the Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985). McPherson (1999) investigated the relation between business majors and personality among 199 American undergraduates. The results showed that no single major had a statistically significant relationship with personality type. Bisping and Patron (2008) found that among 126 American college students, intuitive individuals performed significantly better than sensing individuals on the final exam of an introductory general business course. Lakhal, Frenette, Sevigny, and Khechine (2012) used the NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992) with 109 Canadian students, and found that personality as defined by this model had a predictive value on what type of business major a person will chose, after controlling for gender. In summary, then, the personality literature suggest that certain personality traits have either positive or negative relationships

with individuals' academic performance.

2.2 Learning Style and Academic Performance

The relationships between learning style and learning performance reported in the literature are mixed. Brunton (2015) used the Kolb Learning Style Inventory (LSI; Kolb, 1985) to study nine introductory microeconomics classes, and found that the students' learning styles had no significant effect on their performance. Torres (2014) examined the effects of Latino students' learning styles on their academic performance, and no relationship between these two variables was found. Inal, Buyukyavuz, and Tekin (2015) reported similar results regarding Turkish students.

However, Cakiroglu (2014) used LSI in the context of an online course, and found significant relationships between learning styles and learning performance. Shaw (2012) also used LSI, in a programming-language course, and the results indicated that different learning styles were significantly associated with significantly different learning scores, with the accommodator style related to better learning scores. In a similar vein, Battalio (2009) found significant associations between students' learning styles as measured by the Index of Learning Styles (ILS; Felder & Soloman, 1997) and their success in distance education. Ross, Drysdale, and Schultz (2001) used the Gregorc Style Delineator (Gregorc, 1986) as their measure of learning style, and found a significant effect of learning style on academic performance. And Surjono (2015) reported that, in online electronics courses in Indonesia, college students' course grades were better when the match between their learning styles and the presented material was closer.

In short, it seems that using different measures in different contexts yields wide discrepancies in findings about the relationship between learning styles and academic performance. More research should be devoted to further developing our understanding of why this is the case.

2.3 Learning Strategies and Academic Success

Radovan (2011) used the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1993) to investigate relationships between the dimensions of self-regulated learning and students' success. The results indicated that goal setting, task value, self-efficacy, and effort regulation were the major strategies that contributed to higher academic achievement. Cetin (2015) studied whether learning approaches and academic success were related for a group of Turkish students, and found both a significant positive correlation between GPA and the adoption of a deep learning approach, and a significant negative correlation between GPA and a surface learning approach. Wilson and Narayan (2016) found that students who used a larger number of distinct learning strategies performed better academically.

Two studies in a similar vein have been conducted in Hong Kong. Ning and Downing (2010) used the Learning and Study Strategies Inventory (LASSI; Weinstein, Palmer, & Acee, 2002) to investigate the effects of motivation and self-regulation on academic performance among Hong Kong undergraduates. The findings showed that motivation was the strongest predictor of academic performance. Yip (2013) indicated that several learning and study strategies effectively predicted the academic performance of Hong Kong high school students.

In summary, learning-strategy use seems to serve as a valid predictor of academic performance, though individuals' motivation to learn remains the strongest predictor of their academic success.

3. Purpose of the Study and Research Questions

The purpose of this study was to examine the possible relationships among Macau business undergraduates' personalities, learning styles, learning motivations, and academic performance. To our knowledge, no prior study has investigated these variables simultaneously in a business-education context. As such, it is hoped that the present research will provide important insights for Chinese business educators that will guide curriculum and pedagogy development, and ultimately cultivate students' learning success. Two research questions were asked: (a) What is the relationship between personality, learning styles, motivational learning, and business students' academic performance? And (b) Do gender and/or status as a Macau resident affect academic performance?

4. Methods

4.1 Participants

This study recruited 268 first-year undergraduate Chinese business majors from a university in Macau. All were taking a required microeconomics course, so there was no self-selection. We received 166 effective responses (see Table 2), defined as completed questionnaires returned by students who were actually present during class. Of these effective responses, 92 came from males and 74 from females; 53 were locals and 113 were Mainlanders. The difference in final scores between the course population and the sample was just 2.7%, and

their standard deviations were also similar.

Table 2. Summary data, first-year students enrolled in the bachelor of business administration program at a university in Macau during march 2016

Classes description	Number	
Students, total microeconomics enrollment	268	
Students, present during survey	193	
Returned questionnaires	192	
Completed questionnaires	166	
Female, local	15	
Female, Mainland	59	
Male, local	38	
Male, Mainland	54	
	Population	Respondents (170/268)
Score, deviation* from course average	-	+2.7%
Score, standard deviation	19.1%	16.9%

For some students, only the letter grade was available. In such cases, the mid-point of the score-range corresponding to the letter-grade has been used. *Due to confidentiality agreements, the population's average score has not been disclosed, only the difference between the population mean and the mean of the sampled students.

4.2 Measures

4.2.1 Personality

The Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) was used to measure the respondents' personality traits, which is based on the five-factor model (FFM) of personality consisting of emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness. The 10 items in the TIPI comprise five pairs, each covering one of the five dimensions of the FFM and consisting of one positively and one negatively keyed item. The participants were asked to evaluate their own personalities using a 7-point Likert rating scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*).

Gosling et al. (2003) assessed the reliability of each domain, and reported alpha coefficients of .68 (extraversion), .40 (agreeableness), .50 (conscientiousness), .73 (emotional stability), and .45 (openness to experience). These low values can be partly ascribed to the fact that each dimension has only two items. Nevertheless, the same author also reported adequate levels of test-retest reliability ranging from .62 to .77 over a six-week time span. In addition, Gosling et al. (2003) validated TIPI using both the 44-item Big-Five instrument (BFI; John & Srivastava, 1999) and the NEO-PI-R (Costa & McCrae, 1992). The results showed that the TIPI achieved adequate levels of convergent validity.

4.2.2 Learning Style

The Index of Learning Styles (ILS; Felder & Soloman, 1997) was used in the current study to measure students' learning preferences. It classifies learners in four bipolar dimensions: Sensing or Intuitive (S-N), Visual-Verbal (Vs-Vb), Active or Reflective (A-R), and Sequential or Global (Sq-G). More specifically, the S-N dimension refers to a person's preference for the type of information perceived; the Vs-Vb dimension, to the modality by which that sensory information is most effectively perceived; the A-R dimension, to the manner in which it is processed; and the Sq-G dimension, to the manner in which the learner progresses toward understanding (Felder & Silverman, 1988).

The ILS is a 44-item instrument, in which each learning style is associated with 11 items; each item's two options (a or b) represent one or the other category of the dimension. The main reason for this dichotomous structure is to force respondents to make a decision between two options, thereby increasing the chances of capturing their learning preferences. Litzinger, Lee, Wise, and Felder (2007) reported that Cronbach's coefficient alpha for S-N, Vs-Vb, A-R, and Sq-G of .74, .61, .46, and .50, respectively. They also examined the construct validity of the ILS and found that it yielded acceptable validity and reliability.

The dichotomous nature of the ILS is problematic when it comes to the use of statistics tests; for this reason, we followed Felder and Spurlin's (2005) suggestions that "a" responses should be treated as 1 and "b" responses as 0, yielding scores ranging from 0 to 11. This allows calculation of the Active, Sensing, Visual, and Sequential

scales. Scores for the opposite polarities – Reflective, Intuitive, Verbal, and Global – will be found as a complement of 11. For example, if the Active score is 6, the Reflective score will be 5, and if the Sensing score is 8, the Intuitive score will be 3.

4.2.3 Learning Motivation

Our study used the 44-item Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & deGroot, 1990). Answered via a 7-point Likert scale (from 1 = *not at all true of me* to 7 = *very true of me*), it covers five components: intrinsic value, self-efficacy, test anxiety, strategy use, and self-regulation. More specifically, intrinsic value measures students' intrinsic interest in their course work, and the importance they perceive it as having. Self-efficacy is their perceived competence and confidence with regard to the performance of class work. Test anxiety concerns students' worry about and cognitive interference during tests. Cognitive-strategy use refers to the use of the rehearsal, elaboration, and organizational strategies of studying. Finally, self-regulation pertains to metacognitive and effort-management strategies.

Pintrich and DeGroot (1990) reported internal consistencies of $\alpha = .89$ for intrinsic value, $\alpha = .87$ for self-efficacy, $\alpha = .75$ for test anxiety, $\alpha = .83$ for cognitive-strategy use, and $\alpha = .74$ for self-regulation. Pintrich et al (1993) used confirmatory factor analysis to determine the factor validity of the MSLQ scales, and found it to be reasonable. In addition, based on a meta-analytic review, Crede and Phillips (2011) concluded that the theoretical structure of the MSLQ was generally supported.

4.3 Procedure and Data Analysis

The students in the microeconomics course were informed of the purpose of the present study, and participated in it voluntarily. Our participants first were asked to provide their background info: age, gender, and Macau residential status, and then responded TIPI, ILS, and MSLQ. The survey took about 30 minutes to complete.

This study's dependent variable was academic performance, as measured by the actual final grades the participants obtained in their microeconomics course. Personality, learning style, and leavening motivation were treated as independent variables. In order to answer the research questions, we conducted three main statistical analyses: Pearson product-moment correlation coefficient, two-way between-groups analysis of variance (ANOVA), and multiple regression.

5. Results

5.1 Descriptive Statistics and Correlational Analysis

Table 3 presents the means, standard deviations, and the relationships between the three groups of variables and academic performance, arrived at via Pearson product-moment correlation coefficients. We found that emotional stability ($r = .140, p < .05$) and self-efficacy ($r = .142, p < .05$) had significant positive correlations with academic performance. Table 4 shows the mean scores of three sets of independent variables in terms of gender and residency status. With regard to personality, females had higher mean scores than males, except in the case of emotional stability; while students from the Mainland had higher mean scores than local students, except with regard to emotional stability and openness. In terms of learning styles, local students had higher mean scores than Mainland students. Regarding motivational learning, female and Mainland students had higher mean scores than male and local ones, except when it came to test anxiety and strategy use.

Table 3. Summary statistics and zero-order correlations between predictor variables and academic performance

Measure	M	SD	Intercorrelations with academic performance
Personality			
Extraversion	4.04	1.49	-0.04
Agreeableness	5.50	1.11	0.03
Conscientiousness	4.62	1.27	0.03
Emotional stability	4.75	1.27	0.14*
Openness	4.95	1.27	0.02
Learning style			
Active-Reflective dimension	5.29	2.10	-0.15
Sensing-Intuitive dimension	6.28	2.04	0.04
Visual-Verbal dimension	6.73	1.96	0.06
Sequential-Global dimension	5.20	1.78	0.02
Learning motivation			
Intrinsic value	4.42	0.96	0.06
Self-efficacy	4.28	1.03	0.14*
Test anxiety	3.78	1.35	-0.17
Strategy use	4.49	0.89	0.02
Self regulation	4.03	0.80	-0.09

* $p < 0.05$. ** $p < 0.01$.

Table 4. Mean scores of three groups of variables by gender and residency status

Measure	Female	Male	Local	Mainland
Personality				
Extraversion	4.35	3.79	3.68	4.21
Agreeableness	5.61	5.41	5.24	5.62
Conscientiousness	4.72	4.53	4.38	4.73
Emotional stability	4.46	4.98	4.78	4.73
Openness	5.13	4.81	4.56	5.14
Learning style				
Active-Reflective dimension	4.96	5.55	5.32	5.27
Sensing-Intuitive dimension	6.45	6.15	6.30	6.27
Visual-Verbal dimension	6.82	6.65	6.68	6.75
Sequential-Global dimension	5.36	5.07	5.92	4.86
Learning motivation				
Intrinsic value	4.47	4.38	4.10	4.57
Self-efficacy	4.36	4.21	3.73	4.53
Test anxiety	3.63	3.89	4.08	3.63
Strategy use	4.62	4.38	4.14	4.65
Self regulation	4.08	3.98	3.99	4.05

5.2 The Effects of Gender and Macau Residential Status on Academic Performance

A two-way between-groups ANOVA was conducted to explore the impact of sex (male or female) and Macau residency (yes or no) on academic performance. The results of Leven's Test of Equality were $F(3, 162) = 2.95$, $p = .034$, which suggested that our dependent variables across the groups were not equal. Therefore, pursuant to Pallant's (2013) recommendation, we decided to set a more stringent significance level (.01) for evaluating the results of two-way ANOVA. As can be seen from Table 5, no interaction effects were found, but there was a statistically significant main effect for gender, $F(1, 162) = 12.02$, $p = .001$; however, this effect size was small (partial eta squared = .07). The mean score for female students ($M = +6.06$, $SD = 13.55$) was higher than for male students ($M = -4.67$, $SD = 17.64$). There was no statistically significant main effect of being a Macau resident, $F(1, 162) = 5.71$, $p = .018$.

Table 5. Summary table for two-way analysis of variance of the effects of gender and macau residency on academic performance

Source	df	SS	MS	F	p	η^2
Gender (G)	1	2942.56	2942.56	12.02	.001	.069
Macau resident (M)	1	1397.28	1397.28	5.71	.018	.034
G X M	1	162.02	162.02	.66	.417	.004
Within cells	162	39676.26	244.92			
Total	166	790590.75				

5.3 The Influence of Personality, Learning Style, and Learning Motivation on Academic Performance

In order to understand whether students' personality, learning style, and/or learning motivation was able to predict their academic performance, we used stepwise multiple regression to evaluate the models. As Table 6 shows, three variables emerged as suitable for predicting academic performance: test anxiety $\beta = -.19, p = .013$, self-efficacy $\beta = .17, p = .026$, and the Active-Reflective dimension $\beta = -.17, p = .029$.

Table 6. Stepwise regression analysis summary for three groups of variables as predictors of academic performance

Step and predictor variable	B	SE B	β	t	p	R ²
Step 1						.03
Test anxiety	-2.14	.95	-.17	-2.25	.026	
Step 2						.05
Test anxiety	-2.29	.95	-.19	-2.43	.016	
Self-efficacy	2.54	1.24	.16	2.05	.042	
Step 3						.08
Test anxiety	-2.36	.94	-.19	-2.52	.013	
Self-efficacy	2.76	1.23	.17	2.25	.026	
Active-Reflective	-1.32	.60	-.17	-2.20	.029	

6. Discussion

According to Macau's Tertiary Education Services Office (2013), there were 3,959 local and 2,828 Mainland students enrolled in Business and Management at the bachelor's-degree level in Macau. Student heterogeneity is commonplace, but having two distinct groups of students placed in the same classrooms in similar numbers poses a special kind of challenge to Macau's business schools. Nevertheless, this same factor also renders any such school a particularly suitable environment for comparative studies of student characteristics and learning.

Based on zero-order correlation, we found that two variables were significantly associated with academic performance: emotional stability ($r = .140, p < .05$) from the personality variables, and self-efficacy ($r = .142, p < .05$) from the motivational variables. That none of other variables was significantly correlated to academic performance was surprising, and not in line with the findings of previous studies. One possible explanation is that these other studies' participants were drawn from business courses other than microeconomics, which is believed to be one of the more difficult subjects to learn for business undergraduates, especially (as in present case) first-year students. As such, it might be prudent for future studies to employ a wider range of business courses' grades as the index of academic performance.

We also examined possible effects of gender and Macau residency status on our sample's academic performance using two-way ANOVA, and found that the gender variable impacted our participants' academic performance (female students had higher scores than males did). The residency-status effect, in contrast, was statistically significant at $p = .05$ but not at $p = .01$. This may be due to the less-rigorous selection process faced by local students. For example, according to a 2014-15 report of the Education and Youth Affairs Bureau report (Note 3), there were 5,241 students enrolled in the final year of secondary school in Macau. There are 15,237 students registered in all bachelor's programs in the territory, which generally follow the four-year system, so first-years make up slightly more than one-quarter of the total number of students. In other words, there is slightly more than half a university place for each secondary-school graduate, a ratio that is much higher than that in Mainland China.

Finally, we wanted to know whether or not individuals' personalities, learning styles, and learning motivations played import roles in their academic performance. Regression analysis revealed that three variables were valid predictors: test anxiety ($\beta = -.19$), self-efficacy ($\beta = .17$), and Active-Reflective dimension ($\beta = -.17$). These

results suggest that students who have higher anxiety about testing will have lower scores in the course; that those who report higher levels of self-efficacy will obtain higher scores; and that those who are more Reflective-oriented will also have higher academic performance. Why other variables did not play any predictive role in our model is unclear.

7. Limitations

Three important limitations must be noted here. First, the students' personalities, learning styles, and motivations were measured using self-report instruments that may have contained unobserved systematic bias. Second, the current study used only microeconomics-course performance as a proxy for business-school achievement in general; and as previously mentioned, data derived from this difficult subject should be supplemented with data from other business courses that have more typically difficulty levels. Finally, our sample was recruited from a single institution, which may limit the generalizability of the results. Cross-cultural study of academic performance is a promising line of research, but a more diverse sample would be advisable.

8. Conclusion

The major findings of the current study suggest that, among our sample of Chinese business undergraduates in Macau, personality, learning style, and motivational orientation had only limited impacts on academic performance as measured by final scores in a first-year microeconomics course. More specifically, two motivational variables (test anxiety and self-efficacy) and one learning-style variable (the Active-Reflective dimension) influenced academic performance. Another potentially meaningful finding was that the female students had higher achievement than the male one did. However, these results are not conclusive because of several salient research limitations, as discussed above. For the future research directions, it is suggested that future researchers could seek to clarify the present findings across a wider range of business-course types, institutions, and cultural settings. In addition, the present study was a correlational study in nature, and it will be beneficial for conducting experimental studies to validate this line of research.

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Notes

Note 1. There are an unknown number of private post-secondary education providers in Macau, of which some are more well-known than others. These providers may periodically attempt to apply to become universities.

Note 2. <https://www.gaes.gov.mo/chinaenroll/big5/home.html>

Note 3. <http://portal.dsej.gov.mo/>