

AN EXAMINATION OF THE APPLICABILITY OF BIGGS' 3P LEARNING PROCESS MODEL TO ITALIAN UNIVERSITY

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Academic institutions have gradually structured their policies on the bases of their students' perceptions, satisfaction, and needs. The relationship between academic environment and learning quality has become central, leading to a broad range of studies. In the present study we investigated the applicability of Biggs' 3P learning process model to the Italian context. The sample consists of 874 students mostly enrolled in an undergraduate program in Psychological Sciences in five Italian universities. Students were recruited on campus and asked to complete a questionnaire. We assessed students' characteristics, perceptions of the learning environment, approach to the study and learning outcomes. The relationship between the presage, process and product aspects of the model were investigated using structural equation modelling techniques. Our data showed that students' positive perceptions of the academic environment are related to the adoption of deep approach to study, while negative perceptions are related to the adoption of

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superficial approach to study. Moreover, students' positive perceptions of the academic environment are related to better study outcomes and, more specifically, with better qualitative outcomes. Results confirmed the relationship described by Biggs, and suggested that this theoretical model, even taking into account the cultural differences, can be profitably applied to the Italian academic context.

1 Introduction

The present paper focuses on the relations between students' perception of academic environment, their learning approaches and (quantitative and qualitative) outcomes. Recent evolution in educational systems, the increasing time spent by people and organisations in personal and group training and the multiplication of universities, have generated a sharp increase in the competitiveness of institutions, a trait once limited to only a few centres of excellence. Since the 1970s, administrative headquarters have paid an increasing amount of attention to the quality of their university. The student has become the central focus for the university, which strives to offer a training product able to satisfy both students' expectations and the demand for specific skills from a labour market that changes rapidly and only accepts a high-level quality of preparation (Barattucci & Zuffo, 2012). In line with this, academic institutions have focused their attention and efforts on improving learning standards, and this has resulted in widespread monitoring of the quality of teaching, services and university organisation (Entwistle & McCune, 2004). Universities have gradually structured their policies on the bases of perceptions, satisfaction, needs, and requirements of their primary clients, namely the students (Zuffo & Barattucci, 2008; Zuffo & Barattucci, 2010). The relationship between academic environment and learning quality has become central and has led to a broad range of studies focused on the analysis of academic-related variables. This field of research has employed two main theoretical approaches: a systemic one, under the theoretical conceptualisation of Biggs (Biggs, Kember & Leung, 2001; Biggs, & Tang, 2007), and a phenomenographic approach, called Student Learning Perspective (e.g., Entwistle & McCune, 2004; Marton & Säljö, 1997; Ramsden, 2003; Prosser *et al.*, 2005; Trigwell, 2006; Trigwell, 2012). Research efforts, addressing the impact of students' perceptions, have often been framed within Biggs' (1989) model, which conceptualises the learning process as an interactive system of three sets of variables (which has been labelled 3-Ps model): the learning environment and student characteristics (presage), students' approach to learning (process), and learning outcomes (product). The model suggests that both personal and situational factors affect the way in which a student adopts specific approaches to study, which in turn influences the types of outcomes achieved; Presage factors (perceptions of the learning environment) can indeed directly affect learning outcomes. Presage factors

include personal characteristics of the student (prior knowledge, academic skills, personality) and learning environment characteristics (teaching methods, workload, course structure). According to this theoretical framework, students' perceptions of their learning environment, in light of their motivations and expectations, determine how situational factors influence approach to learning and learning outcomes. Process factors include the modality that students use to approach their learning (deep or surface). Product factors include the learning outcomes that students derive from the learning process (assessment scores, satisfaction and perceptions of transferable skills development). Literature based on this theoretical framework shows that the interplay between individual, interpersonal, and contextual factors is likely to produce situations of excellence, effectiveness of learning and academic success (Barrie, Ginns & Prosser, 2005; Trigwell, Ashwin & Millan, 2013). In particular, some variables related to the academic experience of students, considering the perceptions of learning environment and support services, have a great influence on academic performance, motivation, and approach to study (for a review, see Ginns, Prosser & Barrie, 2007; Trigwell, 2006; Richardson, 2005a; 2005b; Entwistle & McCune, 2004; Ramsden, 2003; Vermetten, Vermunt, & Lodewijks, 1999). These theoretical models are derived from academic institutions that center the learning and teaching process in a specific college environment, and previous literature suggests that the model accurately reflects the actual situation in several countries (e.g., Gieve & Clark, 2005; Aldridge & Fraser, 2000; Kember & Gow, 1990). Given the lack of studies into the Italian academic environment, and considering that many Italian universities have neither a closed campus, nor tutors, and have many other learning context differences, in the present study, we aimed to verify whether this theoretical model can be applied to reflect the Italian academic context. We predicted that the previously mentioned learning environment differences may be responsible for different relationships between the 3 sets of variables of the model, or different perceptions of the students.

2 The Present Research

In order to investigate the applicability of Biggs' 3P model to the Italian academic context, we carried out a study in which we directly analysed the influence that a number of environmental variables have on approach to study and on academic outcomes. More specifically, the present research aimed to identify both the similarities and differences between the environmental variables of the Italian and Anglo-Saxon contexts that were likely to influence approach to study and academic outcomes. First, we explored the relationship between students' individual characteristics (gender, ability, age) and perceptions of the academic context, approach to the study, and academic outcomes. The

main hypothesis of the study is relative to the profitable application of the 3-Ps model to the Italian context (Hp1): thus, we anticipated that individual characteristics of students, perceptions of the learning environment and the adoption of a specific approach to study would jointly influence academic outcomes, as modelled by Biggs. Within this super-ordinate hypothesis, we attempted to verify a set of specific lower-order hypotheses. In particular: We predicted that qualitatively different perceptions of the learning environment would be associated with different approaches to study (Hp2). In detail, we predicted that students' positive perceptions of the learning environment would be associated with a deep approach to study (Hp2a); and by contrast, that less favourable perceptions of the learning environment would be associated with a superficial approach to study (Hp2b). We also predicted that better perceptions of the learning environment would be associated with more positive study outcomes (Hp3). Finally, we anticipated that the deep approach would be associated with better academic outcomes than the surface approach (Hp4). The present study does not deal directly with operationalising and systematically testing all possible elements of the 3P model. The focus is thus on applicability of the 3P Learning Process Model to Italian universities and the differences between the environmental variables of the Italian and Anglo-Saxon contexts that can affect the approach to study and academic outcomes.

2.1 Method

The design of the research was correlational. To verify the goodness-of-fit of the proposed model in the Italian context (Hp1), we performed structural equation modelling with LISREL 8.7 (Jöreskog, & Sörbom, 2001). In order to verify the specific hypotheses, we conducted correlation and regression analyses.

2.2 Sample features

We recruited undergraduates from five Italian universities. They completed a questionnaire individually and anonymously, and participated in the study on a voluntary basis. Participants were recruited on campus and asked to complete a questionnaire regarding the university experience. Before submission of the questionnaire, students were exposed to the general instructions for completion. The administration of the questionnaires was carried out in the academic year 2011-2012. The choice of the sample was, therefore, not strictly probabilistic but, rather, of convenience. In total, 899 students completed the questionnaire, 25 of them did not complete the test exhaustively (missing > 5%) and related data were excluded from the subsequent analyses. The retained sample consists

of 874 students, 168 men and 706 women, in 92.2% of cases aged between 19 and 26 years (mean age = 22.71, SD = 4.36). The students were mostly enrolled in an undergraduate program in Psychological Sciences, while a small proportion whereas enrolled in a graduate program in Psychology. Students were largely enrolled in the second year (N = 303; 40%) and third year (N = 353; 45.4%) of the three-year degree. Students who have not completed course in due time represented a substantial portion of the sample (N = 122 subjects; 15.6%). As mentioned above, the survey was conducted at the Faculty of Psychology of five different Italian universities: 382 students (43.7%) from University 1, 112 (12.8%) from University 2, 109 (12%) from University 3, 141 (16.1%) from University 4, 130 (14.9%) from University 5 (Table 1).

Table 1
SUB-SAMPLES DESCRIPTION

	UNIV. 1	UNIV. 2	UNIV. 3	UNIV. 4	UNIV. 5	TOTAL
Participants	382	112	109	141	130	874
Female	310	96	98	110	112	726
Male	72	16	11	31	17	147
Average Age (years)	22.76 (2.69)	22.90 (4.63)	21.94 (5.51)	24 (6.16)	21.64 (2.07)	22.71 (4.36)

2.3 Measures

Data collection included the following variables of interest: students' characteristics (prior academic ability, motivation, self-efficacy), perceptions of the learning environment, approach to the study and learning outcomes (Average test score, reported satisfaction at course, class attendance, self-reported development of skills). Participants completed a questionnaire of 99 items in total (20 items for the socio-anagraphic part) - the Italian adaptation of a section of the Oxford Learning Context (Trigwell & Ashwin, 2003), including: the Student Course Experience Questionnaire (SCEQ) in the validated Italian form of 23 items (Barattucci & Zuffo, 2012), the validated Italian version of the Approach to Study Inventory of 12 items (*Ibidem*), the Motivation (8 items) and the Self-efficacy (4 items) scales adapted from the Motivated Strategies for Learning Questionnaire (Pintrich, Smith & McKeachie, 1989). In order to detect students' characteristics, we translated and adapted a section of the questionnaire used by Trigwell and Ashwin (2003) in the Oxford Learning Context. This section was implemented from the original to collect other information (grade-point average, gender, age, high school diploma, high school grade, education of mother and father, residence, number of repeated

exams, work experience, etc.). For the measurement of students' perceptions of their learning environment, the research team used the Italian adaptation of the Student Course Experience Questionnaire (Barattucci & Zuffo, 2012) in the short form of 23 items used by Trigwell and Ashwin (2003). For the measurement of motivation and self-efficacy two scales were used, respectively 8 and 4 items, adapted from the Motivated Strategies for Learning Questionnaire (Pintrich, Smith & McKeachie, 1989). For the measurement of the approach to study a short version of the Lancaster Approach to Study Inventory (LASQ) was used (Barattucci & Zuffo, 2012), also known as the Approach to Study Inventory (ASI), in the Trigwell and Prosser version (1991), used in "Oxford Learning Context Questionnaire" together with the instrument described above (SCEQ) from Trigwell and Ashwin (2003). The learning outcomes were examined through quantitative indicators of performance, students' perceptions of acquisition of skills and overall satisfaction for the course. The quantitative outcomes were measured through the following parameters: average user rating for exams declared (a variable similar to grade point average - GPA, used in literature in English-speaking contexts), measured on a scale from 18.00 (lowest average rating) to 30.00 (highest average rating), total number of repeated examinations declared per curriculum, measured on a scale from 0 (low) to 10 (high), class attendance declared, measured by mean students' responses to the item "My class attendance is" rated on a scale from 0% (low) to 100% (high). The perception of students of the acquisition and the development of generic skills that can be used in the workplace was measured by the Italian adaptation of the scale of the SCEQ (Barattucci & Zuffo, 2012) - Key Skills (Ramsden, 1991) in the version of Trigwell and Ashwin (2003). Course Satisfaction was measured by students' responses to the item "Overall, I am satisfied with the quality of this course", rated on a 5-point Likert scale from 1 (disagree) to 5 (agree).

3 Results

3.1 Preliminary Analyses

Table 2 represents values of internal consistency of the scales used in this study. Overall, the scales were confirmed to be reliable, albeit slightly lower than in the validation study (Barattucci & Zuffo, 2012). The Appropriate Assessment scale showed a not satisfactory value of Cronbach's alpha, substantially in all of the sub-samples, even though this is in line with other results from the same version of the scale in English ($\alpha = .60$, Trigwell & Ashwin, 2003) and other indications in the literature related to the shortened scale (Lizzio *et al.*, 2002; Ginns, 2003).

Table 2
CRONBACH'S ALPHA OF DIFFERENT SCALES IN THE TOTAL SAMPLE, IN THE DIFFERENT SUB-SAMPLE AND IN THE VALIDATION SAMPLE

Group	Scale	Items	Total sample	UNI 1	UNI 2	UNI 3	UNI 4	UNI 5	Validation sample
SCEQ	Appropriate Workload	4	.75	.71	.76	.80	.79	.71	.73
SCEQ	Good Teaching	6	.73	.74	.74	.70	.77	.62	.74
SCEQ	Collegiality	3	.69	.66	.67	.66	.77	.64	.69
SCEQ	Appropriate Assessment	3	.64	.61	.62	.67	.68	.62	.66
SCEQ	Key Skills	7	.73	.72	.63	.74	.75	.76	.75
	Motivation	8	.78	.77	.77	.83	.83	.76	.81
	Self-efficacy	4	.69	.67	.66	.74	.78	.69	.73
ASI	Deep Approach	6	.72	.74	.67	.68	.74	.64	.76
ASI	Surface Approach	6	.69	.71	.66	.68	.73	.69	.72

3.2 Relationship between students' individual characteristics and perceptions of the academic context, approach to the study, and academic outcomes

In order to check for gender differences, we performed a series of independent sample t-tests. Table 3 reported the comparison between mean scores of different scales in males and females. Gender differences emerged for the Surface Approach to Study scale ($t_{870} = 2.32$; $p < .05$), Motivation ($t_{870} = 2.20$; $p < .05$) and Self-Efficacy ($t_{870} = -2.63$; $p < .01$): women reported higher scores than men of surface approach to study and motivation, and lower scores than men on self-efficacy. In addition, gender differences in learning outcomes emerged, showing that women have better average test scores ($t_{844} = 3.00$; $p < .001$) than men and fewer repeated examinations ($t_{845} = 4.89$; $p < .001$). Gender differences did not emerge with regard to the perceptions of the academic environment.

Table 3
GENDER DIFFERENCES

Group	Female (N = 726)	Male (N = 146)
Appropriate Assessment	3.12 (.814)	3.00 (.835)
Good Teaching	2.75 (.675)	2.72 (.687)
Key Skills	3.47 (.650)	3.47 (.705)
Collegiality	3.08 (.805)	3.17 (.894)
Appropriate Workload	2.90 (.891)	2.94 (.862)
Deep Approach	3.95 (.574)	3.94 (.559)
Surface Approach	2.97 (.712)	2.82* (.608)
Motivation	4.13 (.522)	4.02* (.680)
Self-efficacy	3.70 (.650)	3.85** (.690)
Satisfaction	3.32 (1.117)	3.30 (1.073)
Average Test Score	26.23 / 30 (1.78)	25.71** / 30 (1.94)
Number of repeated exams	1.97 (2.01)	2.82*** (2.35)

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

We then conducted a series of multiple regression analyses to explore the effect of age. Age significantly predicted Collegiality ($\beta = -.11, p < .001$), Deep Approach ($\beta = .10, p < .001$), Surface Approach ($\beta = -.10, p < .01$). We then checked eventual relations between students' ability and outcomes. A one way Analysis of Variance (ANOVA) showed that the type of high school diploma (modern, technical, grammar) emerged as a significant predictor of average test scores ($F_{2, 865} = 4.80, p < .01$). The analysis showed that students with grammar school diplomas have the highest average test scores ($M = 26.31; SD = 1.41$) compared to other schools (modern school $M = 25.08; SD = 1.36$; technical school $M = 25.19; SD = 1.49$). Even the high school grade was a valid predictor of quantitative outcomes: the average test scores ($\beta = .43, p < .001$), the number of repeated examinations ($\beta = -.35, p < .001$), and also course attendance ($\beta = .11, p < .01$).

3.3 Relationship between perceptions of the learning environment and approach to study

In order to check H_{p2} , we performed two multiple regressions using all scales of SCEQ related to perceptions of the academic environment (Appropriate Workload, Appropriate Assessment, Collegiality and Good Teaching) as predictors of the mean scores of the scales of Approach to Study (Deep and Surface). Results are presented in Table 4.

Table 4
MULTIPLE REGRESSION OF SCEQ AS A PREDICTOR OF APPROACH TO STUDY

SCEQ scales	Deep Approach			Surface Approach		
	B	Beta	t	B	Beta	t
App. Workload	.036	.056	1.72	-.249	-.316	-10.04***
App. Assessment	.069	.098	3.01**	-.113	-.132	-4.22***
Good Teaching	.053	.062	1.80	-.125	-.121	-3.63***
Collegiality	.191	.274	8.04***	-.068	-.080	-2.45**
R ²	.109***			.176***		

* = p <.05; ** = p <.01; *** = p <.001

Globally, perceptions of the academic environment are valid predictors both of Deep Approach to Study ($F_{4, 869} = 26.45$; $p <.001$; $R^2 = .11$) and of the Surface Approach ($F_{4, 869} = 46.26$; $p <.001$; $R^2 = .18$). More specifically, as detailed in Table 4, Collegiality and Appropriateness Assessment scales significantly predicted a deep approach to study (Hp2a), while all scales of SCEQ emerged as significant predictors of a surface approach to study (Hp2b). Overall, the hypothesis Hp2 was confirmed. Considering some sub-samples too limited, we could not perform any analysis for differences between institutions, in line with the literature suggestions (Hox, Maas & Brinkhuis, 2010).

3.4 Relationship between perceptions of the learning environment and study outcomes

To verify that perceptions of the academic environment influence study outcomes, we performed a series of multiple regressions using SCEQ scales related to perceptions of the academic environment (Appropriate Workload, Appropriate Assessment, Collegiality and Good Teaching) as predictors of the average test score, the number of repeated examinations, satisfaction, the acquisition of key skills, and class attendance. Results are summarised in Table 5. The 4 scales of SCEQ emerged as significant predictors of all outcomes and, especially, of the qualitative (Table 5).

Table 5
MULTIPLE REGRESSION OF SCEQ AS A PREDICTOR OF OUTCOMES

SCEQ scales	Average Test Score			N° of repeated exams		
	B	Beta	t	B	Beta	t
App. Workload	.219	.107	2.98**	-.198	-.083	-2.41*
App. Assessment	-.133	-.060	-1.67	.037	.015	.424
Good Teaching	.161	.060	1.58	-.476	-.154	-4.24***
Collegiality	-.119	-.054	-1.44	.335	.131	3.68***
R ²	.031*			.037***		

* = p <.05; ** = p <.01; *** = p <.001

More specifically, the perception of an appropriate workload predicted the average test scores, while all scales, except that for Appropriate Assessment, are predictors of the number of repeated examinations. The perception of an appropriate workload is a predictor of satisfaction and of class attendance; good teaching is predictive of satisfaction and key skills, while collegiality is predictive of key skills scores and of the attendance of lessons. Finally, the Appropriate Assessment scale was not predictive of any outcomes (Table 6). Therefore, Hp3 was partially confirmed.

Table 6
MULTIPLE REGRESSION OF SCEQ AS A PREDICTOR OF STUDY OUTCOMES

SCEQ scales	Satisfaction			Key Skills			Class Attendance		
	B	Beta	t	B	Beta	t	B	Beta	t
App. Workload	.100	.080	2.71**	-.009	-.013	-.41	-.237	-.154	-4.63***
App. Assessment	.052	.038	1.30	.037	.046	1.51	-.013	-.008	-.24
Good Teaching	.782	.476	15.19***	.317	.325	10.07***	.298	.148	4.21
Collegiality	.090	.066	2.16*	.198	.247	7.77***	.301	.181	5.25***
R ²	.279***			.225***			.087***		

* = p <.05; ** = p <.01; *** = p <.001

3.5 Relationship between approach to study and study outcomes

To test the hypothesis that the adoption of different approaches to study is associated with different learning outcomes (Hp4), we performed a series of multiple regressions using ASI scales (Deep Approach and Surface Approach) as predictors for the following criteria: average test scores, number of repeated examinations, satisfaction, key skills and class attendance (Table 7 and Table 8).

Table 7
MULTIPLE REGRESSION OF DEEP APPROACH AS A PREDICTOR OF STUDY OUTCOMES

Deep Approach				
Criteria	F	R ²	Beta	t
Average Test Score	11.80***	.015	.120	3.44***
N° of repeated exams	6.64**	.008	-.088	-2.58**
Satisfaction	40.53***	.045	.211	6.37***
Key Skills	113.77***	.115	.340	10.67***
Class Attendance	7.20**	.008	-.092	-2.68**

* = p <.05; ** = p <.01; *** = p <.001

Table 8
MULTIPLE REGRESSION OF SURFACE APPROACH AS A PREDICTOR OF STUDY OUTCOMES

Surface Approach				
Criteria	F	R ²	Beta	t
Average Test Score	23.32***	.028	-.168	-4.83***
N° of repeated exams	6.45**	.008	.087	2.54**
Satisfaction	61.25***	.066	-.257	-7.83***
Key Skills	49.09***	.053	-.231	-7.01***
Class Attendance	8.07**	.009	-.096	-2.84**

* = p <.05; ** = p <.01; *** = p <.001

In line with Hp4, both deep and surface approach to study emerged as reliable predictors of all outcomes. These results suggested that the theoretical construct of the approach to study can be used profitably in Italian academic contexts.

3.6 A test of the applicability of the Biggs' model

The relationship between the presage, process and product aspects of the model and the super-ordinate hypothesis – that is, the applicability of the Biggs' model to the Italian Academic context, were investigated using structural equation modelling techniques (Bentler, 1990; Byrne, 1998). SEM permits the direct testing of the theoretical 3P model, through the calculation of a measure of fit between the proposed model and the optimal model derived from estimates of the various relationships. We adopted four different fit indexes: the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), the Non-normed Fit Index (NNFI), the Normed Fit Index (NFI) (Hu & Bentler, 1999). A good fit is generally indicated by a RMSEA

lower than .05, and by a CFI, a NFI, and a NNFI higher than .95 (the maximum value is 1.0) (Byrne, 1998; Hu & Bentler, 1999). As a first step, an adapted version of the Biggs' 3P learning process model was verified (Trigwell & Ashwin, 2003). The overall tested model includes latent independent variables: characteristics of the student (final school grade, motivation and self-efficacy) and perceptions of the academic environment; the model includes dependent variables: approach to study (which acts as a variable of moderation) and academic outcomes. The extent of adaptation between the proposed model and the optimal model, derived from estimates of the relationships between variables (Byrne, 1998) through structural equation models, was tested. Fit indexes were not satisfactory: the RMSEA was acceptable (RMSEA = .056), but the remaining indexes were all lower than .90 (CFI = .804, NFI = .802; NNFI = .818; $\chi^2 / df = 3.21$). The model showed many not significant parameters: the effect of the perception of the workload on the average test scores and satisfaction, the effect of the approach to study on average test scores, the effect of deep approach to study on perceptions of acquisition of soft skills, all at the limit of a low significance ($p < .078$); the effect of good teaching and collegiality on surface approach to study, and the effect of workload on deep Approach. The remaining parameters were all significant. We then revised the model by deleting the non-significant relationships between variables of the previously tested model (Figure 1). For the sake of simplicity, Figure 1 presents only the structure of the tested model, without the measurement model and the relationships between independent variables. The indices of fit of the revised model improved compared to the previous ones, but they were still not satisfactory: $\chi^2 / df = 3.11$; RMSEA = 0.052; CFI = .829; NFI = .814; NNFI = .866. It clearly emerged that the relationship between independent and dependent latent variables is confirmed by significant values of the Gamma and Beta, but the hypothesised model did not seem to fully converge with the data. Since, to the best of our knowledge, previous research did not directly verify the Biggs' model through SEM (adapted Biggs' 3P model; Trigwell & Ashwin, 2003), and considering the data which emerged in our sample, we relied on the conceptual model developed by Lizzio and colleagues (2002). The verification of this model showed a good, but not excellent, overall fit: $\chi^2 / df = 2.89$; RMSEA = .047; NFI = .885; NNFI = .912; CFI = .921.

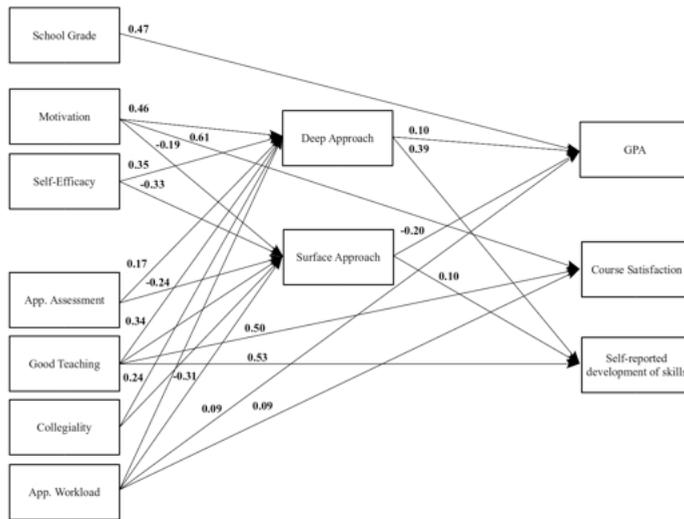


Fig. 1 – Path Diagram of Modified Biggs' 3P Learning Process Model tested through SEM. Only significant values are displayed in the diagram

Some parameters were not significant: the effect of workload on the approach to study, on average test scores and satisfaction, the effect of collegiality on satisfaction. Consequently, we tested the model as adapted by Lizzio et al. (2002), excluding the not significant relationships between variables previously described. The indices of fit improved, even though not all of them reach the threshold of excellence: RMSEA =.045; NFI =.898; NNFI =.921; CFI =.937; Chi² / df = 2.81. In Figure 2 the path diagram of the structure model is presented. Taking into account the relationships between the variables explained by the model (certainly not high, but all significant) and indexes of total acceptable fit, we can conclude that the theoretical model elaborated by Lizzio *et al.* (2002) profitably fits with the Italian sample. Given the very good but not excellent fit of the model, we also tested the opportunity that approach to study represents a consequence of students' perception of environmental learning but not a mediator of its effects on academic outcomes.

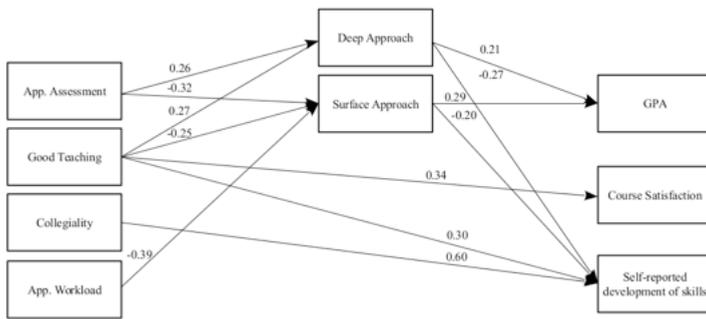


Fig. 2 – Path Diagram of Learning Process structure Model modified from Lizzio *et al.* (2002). Only significant values are displayed in the diagram

Thus, the model was further refined by eliminating the relationships between approach to study and academic outcomes. This model provided excellent fit indices, with a clear improvement over previous models: $\chi^2/df = 2.31$; RMSEA = .041; NFI = .928; NNFI = .942; CFI = .951 (Figure 3).

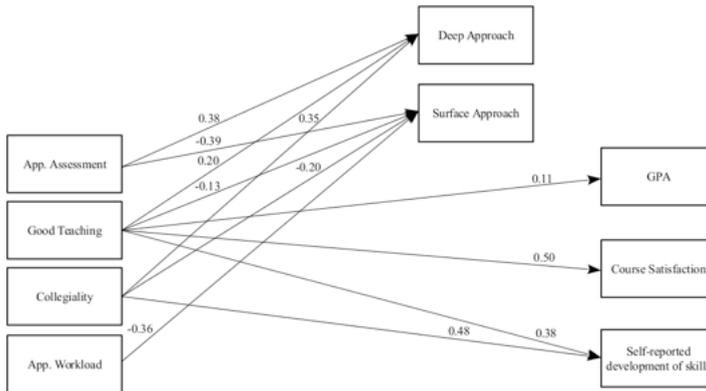


Fig. 3 – Path Diagram of Learning Process structure Model with Approach to study not mediating. Only significant values are displayed in the diagram

Lastly, we also tested a model that only considers students' perceptions and study outcomes; fit indices were egregious: RMSEA = .040; NFI = .953; NNFI = .964; CFI = .960; $\chi^2/df = 2.02$. It was impossible to compare this model with the previous one through the test of the χ^2 difference, as they are two nested models. The slight improvement of the indices of fit in the model that does not consider relationships between approach to study and academic outcomes, may indicate that the approach to study is not necessarily

a powerful mediating variable between academic perceptions and outcomes or, alternatively, that it is a mediating variable only for some specific academic context variables.

Conclusion

Today, the relationship between students' perception of academic environment, their learning approaches and (quantitative and qualitative) outcomes are central in the field of education. In the present paper, we investigated whether a well known established theoretical model, that is the Biggs' 3P Study Approach model, could fit the Italian academic context. Our findings showed that the theoretical model, in its modified version (Trigwell & Ashwin, 2003), is also reproducible in the Italian context, even if the fit between the empirical data and the theoretical model was less than optimal. By elaborating on the model on the basis of previous insights (Lizzio *et al.*, 2002), we found that our data fit better with a model that considered only the relationship between academic perceptions, study approach and study outcomes. In particular, we showed that students' positive perceptions of the academic environment are related to the adoption of deep approach to study, while negative perceptions are related to the adoption of superficial approach to study. Moreover, students' positive perceptions of the academic environment are related to better study outcomes and, more specifically, with better qualitative outcomes (course satisfaction, self-reported development of skills, lessons attendance). An unexpected result concerns collegiality: if, on the one hand, the perception of belonging to an academic community is predictive of qualitative study outcomes, on the other hand, it also appears to be linked with worse performance. This can be explained by the environmental differences of the Italian academic context: students who participate in college activities have a more active social life and relationships, and perhaps devote less time to study. Results underline that study approach may have only a partial mediation role between academic perceptions, individual characteristics and study outcomes. Study approach showed a clear mediation role between some specific perceptions of the academic environment (appropriate assessment, appropriate workload, collegiality) and quali-quantitative study outcomes. Further investigations should seek to explore whether some specific Italian contextual or cultural factors can affect the mediating role of approach to study. Several limitations of this study can be identified that need to be considered in future research. First of all, the nature of our convenience sample (students recruited on campus) may be responsible for the exclusion of the perceptions of students who do not attend lessons or visit the campus. Thus, we have to be cautious with our conclusions, which need to be confirmed with

a more heterogeneous sample. Moreover, we considered lesson attendance and satisfaction as outcome variables, but they might equally be regarded as presage factors; future research should investigate whether some specific aspects of students' satisfaction or lesson attendance may influence students' learning approaches and perceptions of the learning environment. Another point that merits consideration is that, due to the different sizes of the considered samples, we did not focus on differences between universities, missing a good opportunity to investigate relations between environmental characteristics and students' perceptions of learning experience, approach to study, and outcomes. Italian universities are differentiated by organisational context and characteristics (e.g., total number of students per year, degree of selectivity in admission to the first year, presence or absence of a campus, etc.) that can affect students' experience. Future ad hoc research should further explore differences between universities, faculties and other academic environment variables on learning approaches and outcomes. Overall, the theoretical model, considering cultural and system differences, can be profitably applied to the Italian academic context. From a practical point of view, this study suggests that Italian higher educational institutions should invest more in the area of students' perceptions. Many elements of the learning context can be controlled and managed in order to influence students' outcomes and study approach: teaching quality, services quality, course organisation, college environment and college activities. The need of both the Italian academic system and labour market for high quality universities appears crucial, and represents a strong challenge for the near future.

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