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## Personal and Pedagogical Interaction Factors as Determinants of Academic Achievement

Ana Paula Cardoso<sup>a, \*</sup>, Manuela Ferreira<sup>b</sup>, José Luís Abrantes<sup>c</sup>,  
Cláudia Seabra<sup>c</sup>, Cesário Costa<sup>d</sup>

<sup>a</sup>*Instituto Politécnico de Viseu, CI&DETS, ESEV, Portugal*

<sup>b</sup>*Instituto Politécnico de Viseu, CI&DETS, ESSV, Portugal*

<sup>c</sup>*Instituto Politécnico de Viseu, CI&DETS, ESTGV, Portugal*

<sup>d</sup>*Colégio Liceal de Santa Maria de Lamas, CI&DETS, Portugal*

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### Abstract

This study intends to relate self-esteem, teacher-student interaction, student-student interaction and learning performance, and its direct and indirect relationships with academic achievement. Using a sample of about 2000 Portuguese high school students, a structural model reveals that low social self-esteem directly and negatively influences teacher-student interaction and student-student interaction and also learning performance. Teacher-student interaction directly and positively influences student-student interaction. Teacher student-interaction and student-student interaction directly and positively influence learning performance, which in turn influences directly and positively academic achievement. Corroborating previous studies, these findings suggest that an appropriate pedagogical interaction provides an effective learning environment that enhances student's learning outcomes, namely academic achievement. Recommendations for teachers and school managers are addressed.

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*Keywords:* Academic achievement; learning performance; teacher-student interaction; student-student interaction; self-esteem

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### 1. Introduction

A vast literature exists on predicting and explaining learning activity and outcomes (Kornilova, Kornilov, & Chumakova, 2009). To help ensure that the several goals and dimensions of outcomes in the educational setting are represented, the use of multiple outcomes variables is recommended (Marks, 2000). Many measures of learning

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\* Corresponding author. Tel.: +351-232-419-000; fax: +351-232-419-002  
E-mail address: a.p.cardoso62@gmail.com

outcomes have been used in educational research including course grades (Brokaw & Merz, 2000; Kornilova et al., 2009), student perceptions of overall learning (Clarke, Flaherty, & Mottner, 2001) overall course value perceptions (Marks, 2000), and exam scores (Hamer, 2000; Ritchie & Volkl, 2000).

In this study we'll consider two learning outcomes: learning performance and academic achievement. Learning performance can be defined as students' self-evaluation of acquired knowledge, understanding and skills developed, and their desire to learn more (Young, Klemz, & Murphy, 2003). Academic achievement can be described by the grades obtained in the subject.

Predicting and explaining students' academic performance is not an easy task. There are several factors related with learning outcomes, including personal and contextual factors. Although it is broadly, consensually understood that teaching and learning are multidimensional constructs, there is little agreement on the nature and number of the dimensions that accurately and completely measure the learning experience (Patrick & Smart, 1998; Shevlin, Banyard, Davies, & Griffiths, 2000).

A personal factor that may influence learning outcomes is self-esteem, which may be defined as an individual's sense of value or self-worth, or the extent to which individuals value, appreciate or like themselves (Ahmed & Bruinsma, 2006; Lane, Lane, & Kyprianou, 2004; Phan, 2010). Self-esteem could be high or low depending on the comparison between the self-image and the ideal I (Lovell, 1979). Low self-esteem is related with the reluctance to accept risks in the learning activity or in their relationships (Lawrence, 2000a).

An important contextual factor related to the learning process is pedagogical interaction between teacher and students, and among students. Traditional learning models, centered on the teacher, with the student assuming a passive role are outdated. Alternatively, creating classroom environments that actively engage students have the potential of stimulating the development of self-regulated learning (Young, 2005). The teacher may usefully encourage student questions and comments, allow for queries pertaining to learning, and create a learning environment that promotes divergence and complexity of thought (Paswan & Young, 2002; Peltier, Hay, & Drago, 2005).

A relevant conceptual framework for investigating self-regulated learning and related factors is social cognitive learning. Bandura's (1986) social cognitive learning framework is based on three primary factors (the social environment, personal cognitive factors, and actual behaviors) that interact so that people are both products and producers of environments. Learning is viewed "as knowledge acquisition through cognitive possessing of information, acquired both from being a part of society and from individual thought process" (Young, 2005, p. 26).

Within this scope, interaction dynamics in the classroom and self-esteem of students are considered essential to understand the quality of student learning. Despite the complexity of interpersonal relationships, empathy is considered one of the most appropriate requirements to establish a favorable atmosphere in the classroom. Thus, this study seeks to analyze the interaction between the key players in the pedagogical act, and students' low self-esteem and the influence of these factors in creating a productive learning environment and therefore a greater academic achievement.

This paper starts with an overview of literature and then develops the conceptual framework and the hypothesis. A presentation of research methodology follows. Empirical data from the survey involving the 1986 students is used to test the conceptual framework empirically, using confirmatory factor analysis and structural equation modelling. The paper concludes with research implications for educators and school managers.

## **2. Literature revision**

### *2.1 Self-esteem*

Self-esteem is a very important psychological construct to understand human behavior, especially in the learning domain. However, no single definition is accepted among all researchers (Pajares, 1996). In a simple definition, Rosenberg (1965) refers to self-esteem as "a positive or negative attitude that the individual presents in relation to himself" (p. 30). It can be seen as a "person's evaluation of the discrepancy between their self-image and their ideal self" (Lawrence, 2000a, p. 4).

Self-esteem is a multidimensional concept and consists of different theoretical facets (Smith, Sapp, Farrell, & Johnson, 1998). This judgment of overall self-worth includes behavioral, cognitive, affective and social components (Coopersmith, 1967; Murasko, 2007). It is important to make a distinction between global self-esteem, and its

specific representations (Harter, 1999). Individuals see themselves from the perspective of others and integrate these perceptions in their self-concept (Sciangula & Morry, 2009). So, an important representation of the concept is social self-esteem.

Relating self-esteem with the self-image, and highlighting the evaluative component of the concept, has shown that high and low self-esteem depends on the comparison between the self-image (impression that we have of ourselves) and the ideal I (image of how we could or should be), and that self-esteem is high or low depending on the gap direction (Lovell, 1979). The self-esteem is not only formed through experience but once formed it then determines experience. “When people care deeply about not reaching their ideal, eventually they feel failures and begin to dislike themselves. This is what is usually meant by low self-esteem” (Lawrence, 2000a, p. 6).

Self-esteem comes from the childhood (Lamborn, Mounts, Steinberg, & Dornbush, 1991). Some authors concluded that self-esteem diminishes in the middle childhood to adolescence and increases gradually from that age (Zaff & Hair, 2003). So, it is safe to say that young people in high school age have generally low self-esteem.

Self-esteem has a major influence in the daily life. Research indicates that high self-esteem is associated with active social implication; oppositely, low self-esteem is a debilitating condition (Campbell, 1990). People with low self-esteem, have also lack of confidence in themselves so they are reluctant to take risks either personally or in the learning of a new skill, for example (Lawrence, 2000a). Individuals with low self-esteem have an overall history of feeling rejected in their relationship with others (DeHart, Pelham, & Murray, 2004) since they report feelings of not being likable and attractive, make bad impressions on people and have failed relationships (Baumeister, Campbell, Kruger, & Vohs, 2003).

Young people with low self-esteem are not sociable and are unpopular between their peers; they don't trust their opinions and judgments and are less sure of their self-perceptions (Campbell, 1990). In educational contexts, students with low self-esteem don't involve themselves in discussions in class and in formal groups and usually have no wish for being in leadership roles (Coopersmith, 1967; Rosenberg, 1965). Low self-esteem people also usually lack assertion. The student with a distorted self-image is particularly difficult to teach (Lawrence, 2000b). In line with this we propose the following hypotheses:

H1: Low social self-esteem leads to less teacher-student interaction.

H2: Low social self-esteem leads to less student-student interaction.

Self-esteem is argued to influence behavior in different ways (Gecas, 1989). More specifically, it has been empirically associated with greater academic achievement in childhood and adolescence (Keltikangas-Jarvinen, 1992; Liu, Kaplan, & Risser, 1992). This construct is recognized today to be a major factor in learning outcomes. The research indicates that self-esteem and intellectual attainments are inextricably linked, with both affecting and influencing each other. “It is not possible to separate the emotions from the intellect” (Lawrence, 2000a, p. *xiii*).

Research has consistently shown a positive correlation between the way people value themselves and the level of their academic attainments. Namely, those with high self-esteem, who feel confident, generally achieve more, while those who have lack of confidence in themselves and low self-esteem, achieve less (Lawrence, 2000a). Thus, low social self-esteem influences learning performance.

H3: Low social self-esteem leads to less learning performance.

## 2.2 Teacher-student interaction

The learning process is essentially interactive and dialectic, wherein student and teacher's language combine as a unique communicational process (Rivilla, 1989). To get students to become involved and gain their interest in the learning process often requires interaction skills from teacher in his relationship with students (Hay, Hodgkinson, Peltier, & Drago, 2004). One of the most important responsibilities for instructors is to interact in positive ways with students (Benbunan-Fich, Lozada, Pirog, Priluck, & Wiesenblit, 2001); Faranda & Clark, 2004). Previous research has shown that there is an association between positive teacher-student relationship and learning (Cornelius-White, 2007; Hay et al., 2004). A positive teacher-student interaction creates a nonthreatening environment enhancing learning outcomes (Abrantes, Seabra, & Lages, 2007).

Teacher-student interactions are influenced in part by the ease with which communication takes place, the degree to which students feel free to ask questions and express their views, and how accessible and responsible faculty are to information-related problems (Marks, Sibley, & Arbough, 2005; Peltier, Drago, & Schibrowsky, 2003; Peltier, Schibrowsky, & Drago, 2007). The learning environment must allow for individuals to express doubt, to explore

uncertainties, and to become aware of internal and external contradictions (Boud, Keog, & Walker, 1985; Peltier et al., 2005).

From this viewpoint, teacher-student interaction can be evaluated by students as depending on the extent to which the instructor encourages students to express opinion, is receptive to new ideas and points of view, gives students the opportunity to ask questions and stimulates class discussion (Paswan & Young, 2002).

### *2.3 Student-student interaction*

Classroom interactions have been viewed as an important learning opportunity (Peltier et al., 2007). Student-student interaction supports and motivates students to achieve a higher cognitive level and to find a personal meaning for learning (Dempsey, Halton, & Murphy, 2001). These interactions may occur in the classroom and beyond, through traditional or Web exchanges (Abrantes et al., 2007; Hay et al., 2004; Peltier et al., 2003).

Educational research has shown that student participation and involvement in classroom plays a major role inasmuch as student learning is concerned (Lowman & Mathie, 1993; Webster & Hackley, 1997). Student-student interactions will assist the transition to a higher-order learning process and reflection-oriented transformations through vision sharing (Van Woerkom, 2004) coproduction outcomes (Biggs, Kember, & Leung, 2001), analyzing and comparing one's response to others (Thorpe, 2001), and enhancing team leadership skills (Brown & Posner, 2001).

Student-student interaction can be evaluated by students in terms of the way in which they are given the opportunity to learn from each other, and also if they are encouraged to contribute, making their interaction with the peers an important learning component (Hay et al., 2004).

Empirical research shows that a high level of teacher-student interaction leads to increased student interest overall (Paswan & Young, 2002). Moreover, students tend to prefer instructional methods that are more interactive (Abrantes et al., 2007). Thus, we proposed that teacher-student interaction positively affects student-student interaction.

H4: A higher degree of teacher-student interaction leads to a higher student-student interaction.

Pedagogical interaction has an important influence in determining overall teaching effectiveness (Grunenwald & Ackerman, 1986; Paswan & Young, 2002). Previous research has shown that teacher-student interactions significantly impact classroom rapport and the perceived quality of learning experience (Hay et al., 2004), particularly when interpersonal relationships are cultivated (Lowman & Mathie, 1993), instructors provide feedback (Marsh, 1987), and interactions between the instructor and students are emphasized (Peltier et al., 2007). The interaction encourages engagement and discussion in classroom, and also promotes an active learning that influences students' ratings of instruction in a positive manner (Boex, 2000; Abrantes et al., 2007). As a result, teacher-student interaction positively affects learning performance.

H5: A higher degree of teacher-student interaction leads to a higher level of learning performance.

The perceived quality of student-student interaction has a positive influence on the perceived quality of the learning experience (Peltier et al., 2003). The research suggests that student-student interaction enriches learning outcomes (Hay et al., 2004; Topping, 1996). Educators and learning environments are perceived to be most effective when students are proactive and engaged, and also when teachers and students actively engage and coproduce what is learned (see Faranda & Clarke, 2004; Paswan & Young, 2002; Peltier et al., 2003; Young, 2005; Young et al., 2003). When interaction between students increases the level of learning performance is also enhanced.

H6: A higher degree of student-student interaction leads to a higher level of learning performance.

Communication among students and between students and teachers affects students' involvement in the learning process and thus enhances learning performance. Learning performance is commonly associated with a more positive attitude toward the environment, namely courses and teachers (Dunn, Giannitti, Murray, & Rossi, 1990; Duke, 2002). When students have more positive attitudes toward learning and instruction they are more likely to get a higher academic achievement. This allows us to propose the following hypothesis.

H7: A higher level of learning performance leads to a higher degree of academic achievement.

### 3. Model development

Bearing in mind the literature review in the area discussed above, we devise the conceptual model that presents the major determinants of academic achievement (see Fig. 1). Our model incorporates three components: a personal factor (low social self-esteem); two contextual factors (teacher-student interaction and student-student interaction); and two learning outcomes (learning performance and academic achievement). To sum up the model briefly, low social self-esteem has a negative influence upon teacher-student interaction and student-student interaction and also upon learning performance; teacher-student interaction has a positive influence on student-student interaction; together they influence learning performance positively, which in turn affects academic achievement directly and positively.

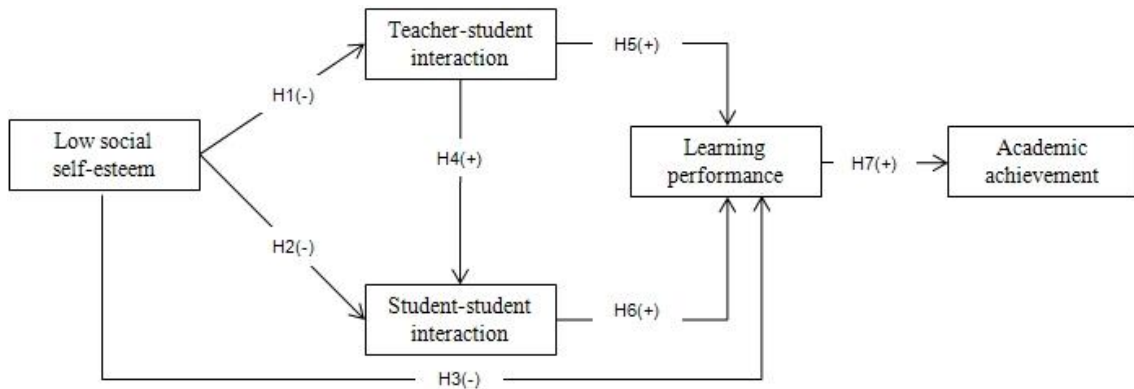


Fig. 1 - Conceptual framework

### 4. Method

#### 4.1 Data collection and sample

Data were gathered from a representative sample of 1986 high school students from eighteen schools from the centre region of Portugal. The largest school provided 375 completed questionnaires, and the smallest completed 28. The average mean of respondents by school was 110. Of the total number of respondents, 38.5% were male, and 61.5% were female, aged between 14 and 22, and attending different levels of secondary education; 21.2% of the students had failed at least once, 36% studied less than an hour per day, whereas 45% studied one to two hours, and 8% studied between three to five hours.

#### 4.2 Survey instrument

The study included measures used in prior research to develop an initial version of the instrument. People knowledgeable of the nature of the concepts of the measures then discussed these measures in order to provide revisions to the instrument. After that, a pretest was taken by a small sample of high students to verify reliability of the factors through Cronbach's alpha. The pretest results helped further refine the questionnaire (for a list of constructs, items, reliabilities and their sources, see Appendix A). Teachers of eighteen different schools then delivered final questionnaires to the students to complete in class at the end of the 2010 school year.

## 5. Results

A confirmatory factor analysis assessed the validity of the measures, using full-information maximum likelihood estimation procedures in LISREL 8.54 software. Although the chi-square for this model is significant ( $\chi^2=1052.15$ ,  $df=179$ ,  $p<0.00$ ), the fit indexes reveal a good model. The other generic adequacy measures are NFI=0.97, PNFI=0.83, CFI=0.98, IFI=0.98, IFI=0.98, and RMSEA=0.05. The large and significant standardized loadings of each item on its intended construct provide evidence of convergent validity (average loading is 0.75). All possible pairs of constructs passed discriminant validity test (Fornell & Larcker, 1981) (see Appendix A).

The final structural model has a chi-square of 1059.48 ( $df=182$ ,  $p<0.00$ ), and the fit indexes suggest a good fit on the model to the data (NFI=0.97, PNFI=0.84, CFI=0.98, IFI=0.98, and RMSEA=0.049). The estimation results for the structural paths appear in Fig. 2. The results confirm all 7 hypotheses.

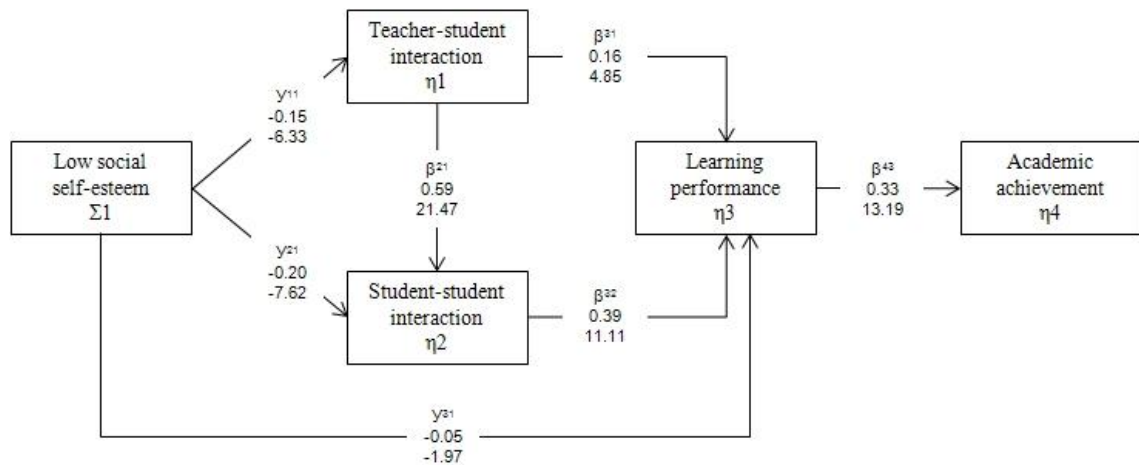


Fig. 2 - Summary of significant relationships

Values in upper rows are completely standardized estimates. Values in lower rows are t-values.

\* $p<0.05$ , \*\* $p<0.01$  (two tailed tests)

The findings reveal that academic achievement is directly influenced by learning performance and indirectly affected by all the other variables. A positive and significant relationship exists between learning performance and academic achievement. The students who evaluate their learning performance more positively in terms of the overall knowledge gained, understanding and skills developed, and their desire to learn more, are more likely to get a higher level of academic achievement.

The student-student interaction has the greatest impact on learning performance. This confirms the expectation that students learn more when they are involved in the classroom and positively interact with their peers (Lowman & Mathie, 1993; Webster & Hackley, 1997). Through interaction students gain better understanding of the knowledge and become more committed to further learning (Hay et al., 2004). This result is consistent with the self-regulating learning theory that posits the importance of student participation in the construction of their own knowledge.

Teacher-student interaction is strongly related with student-student and learning performance. A positive relationship between teacher and students significantly impacts classroom rapport and learning experience (Hay et al., 2004). Students appreciate interactive methods (Abrantes et al., 2007), and generally want and need access to the instructor, many times in a one-to-one environment, to ask questions and voice concerns (Hay et al., 2004). The teacher must create a learning in which open discussion is facilitated, allowing individuals to express doubt with concern to what is being learned and affording the opportunity to raise points of discussion (Thorpe, 2001).

Teacher-student interaction also influences learning performance. There is an association between teacher-student interaction and students' self-evaluation of the learning outcomes. If students have a strong and open

relationship with their instructors, they will invest more in the learning process (Abrantes et al., 2007). This highlights the teacher responsibility to interact in positive ways with students (Benbunan-Fich et al., 2001; Cornelius-White, 2007; Faranda & Clark, 2004) in order to create an effective learning environment (Hay et al., 2004; Peltier et al., 2007).

Low social self-esteem has a negative influence on student-student interaction and teacher-student interaction. This confirms the expectation that in educational contexts students with low self-esteem are less participative in class activities that involve personal interaction (Coopersmith, 1967; Rosenberg, 1965). Also, it seems to be more difficult to teach them (Lawrence, 2000b). At the end, this also does reflect itself in a lesser learning performance.

## 6. Conclusion

The findings provide useful information for teachers and school managers, revealing the importance of an interactive learning environment inasmuch as academic achievement is concerned. Students should have the opportunity to interact and learn with colleagues, making interaction with peers an important learning component; and teachers should encourage students to express their opinion, be receptive to new ideas and points of view, give students the opportunity to ask questions and stimulate class discussion.

The factors that this study addresses highlight the importance of an effective communication upon the learning process. First, teachers and school managers should consider students' evaluation of their learning performance because this has a direct impact on their academic achievement. Second, teachers must be learning facilitators, encouraging student interaction in the classroom and student participation in the construction of knowledge. Third, teachers must create an open and empathic learning environment, because this enhances interaction between students and also enhances students' learning performance. Finally, teachers must pay attention to personal factors, like low social self-esteem, that diminishes pedagogical interaction and negatively influences learning performance, and thus has indirectly, a significant, negative impact on academic achievement.

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**Appendix A - Constructs, scale items and reliabilities**

Constructs, scale items and reliabilities		Std. coefficients	T-values
<b>Low social self-esteem</b>			
(Scale 1 = Strongly disagree / 5 = Strongly agree)			
LSESTEEM – <b>Self-esteem</b> <sup>1</sup> ( $\alpha=.832$ , $\rho_{vc(n)}=.50$ , $\rho=.83$ )			
V1	I often feel sad because I have nobody to talk at school.	0.63	28.85
V2	When I have to say things in front of other colleagues, I usually feel foolish.	0.70	32.99
V3	When I want to tell a teacher something, I usually feel foolish.	0.73	34.62
V4	I often have to find new friends because my old friends don't speak with me.	0.75	35.92
V5	I usually feel foolish when I talk with my parents.	0.73	34.83
<sup>1</sup> Adapted from Lawrence, 1981.			
<b>Teacher-student interaction</b>			
(Scale 1 = Strongly disagree / 5 = Strongly agree)			
TSTUDENT – <b>Teacher-student interaction</b> <sup>2</sup> ( $\alpha=.856$ , $\rho_{vc(n)}=.60$ , $\rho=.86$ )			
V6	Instructor encourages student to express opinion.	0.84	43.90
V7	Instructor is receptive to new ideas and others' views.	0.82	42.02
V8	Students have the opportunity to ask questions.	0.75	37.34
V9	Instructor generally stimulates class discussion.	0.68	32.81
<sup>2</sup> Adapted from Paswan & Young, 2002.			
<b>Student-student interaction</b>			
(Scale 1 = Strongly disagree / 5 = Strongly agree)			
SSTUDENT – <b>Student-student interaction</b> <sup>3</sup> ( $\alpha=.827$ , $\rho_{vc(n)}=.55$ , $\rho=.83$ )			
V10	The course provides an opportunity to learn from other students.	0.72	34.67
V11	Student interaction is an important learning component of this course.	0.77	37.74
V12	I have sufficient opportunity to interact with other students on this course.	0.77	37.81
V13	Each student is encouraged to contribute to class learning.	0.70	33.21
<sup>3</sup> Adapted from Hay et al., 2004.			
<b>Learning performance</b>			
(Scale 1 = Extremely low / 5 = Extremely high)			
LPERFORMANCE – <b>Learning performance</b> <sup>4</sup> ( $\alpha=.875$ , $\rho_{vc(n)}=.55$ , $\rho=.88$ )			
V14	The knowledge you gained.	0.76	38.29
V15	The skills you developed.	0.83	43.81
V16	The effort you expended.	0.62	29.35
V17	Your ability to apply the knowledge you gained.	0.76	38.44
V18	Your desire to learn more about this subject.	0.69	33.52
V19	Your understanding of this subject.	0.77	38.72
<sup>4</sup> Adapted from Young et al., 2003.			
<b>Academic achievement</b>			
(Ratio Scale)			
AACHIEVEMENT – <b>Academic achievement</b> <sup>5</sup> ( $\alpha=.95$ , $\rho_{vc(n)}=.90$ , $\rho=.95$ )			
v20	Classification obtained in the 1st period in the discipline.	0.94	42.27
v21	Classification obtained in the 2nd period in the discipline.	0.96	43.37
<sup>5</sup> Adapted from Young et al., 2003.			
Notes: $\alpha$ = Internal reliability (Cronbach, 1951)			
$\rho_{vc(n)}$ = (Fornell & Larcker, 1981)			
$\rho$ = Composit Reliability (Bagozzi, 1980)			