Conceptions of Learning, Approaches to Learning and Cognitive Development: Students Profiles in a Portuguese Higher Education Institution

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Abstract

In this paper we examine concepts referring to learning and teaching in higher education recognized in the literature as *study orientations*, *approaches to learning*, *study behaviours*, *approaches to studying* and *conceptions of learning*. We also explored students' cognitive development and academic success according to some indicators previously studied.

An investigation on this subject was developed with emphasis on contextual variables, as well as students' perceptions about the learning environment, as constructs that can influence the use of more deep or more superficial approaches to learning tasks, according to Entwistle's work.

The Portuguese version of the Approaches and Study Skills Inventory for Students – ASSIST (Valadas, Ribeiro Gonçalves & Faísca, 2009, 2010), as well as of the Parker Cognitive Development Inventory – PCDI (Ferreira & Bastos, 1995) were used to collect data concerning the approaches to studying, conceptions of learning, and levels of cognitive development in college students.

Comparative and correlational results from 566 Portuguese higher education students, from different scientific areas (Biological Sciences, Economics, Earth Sciences, Humanities and Social Sciences, Physical and Technological Sciences) and first and last years' graduation are presented. We also explored students' profiles resulting from cluster analysis. Results are consistent with the theory, although some particularities were found.

Keywords: Approaches to Studying; Conceptions of Learning; Portuguese Higher Education Students; Cognitive Development; Students profiles.

INTRODUCTION

Approaches to learning refer to the intentions students have facing a learning situation, as well as the corresponding strategies by which they achieve learning outcomes.

Although the key-concept of the work of Marton and his colleagues (Marton and Säljö 1976a, 1976b, 1997) referred to approaches to learning, these authors also considered a study approach that they described as the strategic approach (Entwistle and Ramsden, 1983). Entwistle and Ramsden (1983), when investigating the influence of assessment procedures in learning and studying, considered the necessity to introduce this additional category. The underlying motive was to achieve a higher level of performance, through the use of organised methods of study and time management. In the authors opinion it was clear that original interviews misplaced a crucial influence on learning—the one related to assessment—which justified the fact that the additional category of a strategic approach was designed as a study approach and not an approach to learning (Biggs 1987; Entwistle and Ramsden 1983). On the other hand, original research also demonstrated that students have implicit theories concerning the demands of the different courses and disciplines. This statement refers to the different teaching and assessment procedures that can be observed in specific scientific domains (Entwistle and Ramsden 1983; Ramsden, 1988). Strategic students seem to develop two focuses of interests: academic content (characteristic of a deep approach) and the demands of the evaluation system typically strategic (Entwistle, 2000).

Despite the fact that the distinction between deep and surface was the product of analyses concerning the meaning of a text, strategic and surface apathetic approaches (Tait and Entwistle, 1996) pointed out the way students behave in daily study situations. In this sense, the authors support that we cannot talk about individual differences, but descriptions of relations between the students and the learning tasks that they realise. In our investigation, we adopt Entwistle and Ramsden (1983), Entwistle, McCune and Walker (2001), and Biggs' (2001) perspectives. According to these authors, approaches to learning are not individual characteristics in a simplistic sense; they result from personal experience and are constructs influenced by teaching, assessment and learning context. To Entwistle et al. (2001) approaches to learning can be generalised, but they also require specificity considering the way they behave in different situations.

A second issue considered in this paper refers to the understanding of the development of young adults in the university context.

The concern about the contribution of cognitive development to understand the learning process is present in several studies in most recent years. These investigations have demonstrated the existence of individual differences in terms of acquisition of learning skills, depending on the level/stage of the student cognitive development.

On this subject, Woltz's (2003) consider that it seems clear that individuals differ in cognitive processes and these differences are related to some complex forms of learning. Also Zhang and Sternberg (2009) and Zhang and Watkins (2001) consider that cognitive styles assume particular relevance, not only to understand individual learning in diverse scientific domains, but also with regard to the nature of interactions between teacher and students, and behaviour in the classroom. According to these authors, at least some cognitive styles influence how students learn, how teachers teach, how they both interact and how educational and vocational choices are made and seem to have a special role (Zhang and Watkins, 2001). The cognitive styles seem to be, therefore, of particular importance not only as personal characteristics that interact with the moderating variables of learning but also with retention and knowledge transfer. These constructs also operate as predispositions to be monitored/supervised (Zhang and Watkins, 2001).

Despite considering these references relevant in the context of our investigation, we will only refer to the Model of Intellectual and Ethical Development of Perry (1970, 1981), built specifically for students in higher education. For this author, the student plays a role predominantly active in his/her own psychological development, which requires some personal effort, depending on the challenges and restraints facing. In his studies, Perry (1970, 1999) analyzed how the students understood what they were asked in terms of academic tasks, and found out that the most crucial factor that explained the results was the students' level of cognitive development.

METHOD

Sample

Data was collected in a public university located in the south of Portugal, with a student population of 2,161 students on the university sub-system. Considering the diversity of courses existing at the University (32) at the time of data collection, sampling procedure was based on the natural grouping in Faculties. Students that participated in the study attended courses from different areas: Humanities and Social Sciences, Natural Sciences (grouped in Biological and Earth Sciences), Physical and Technological Sciences. To

preserve heterogeneity, and also for theoretical reasons, we regarded the year and the course attended. Students from 1st and last years of college were included. In this sense a stratified proportional sampling was used, based on the scientific area and year of schooling. The variable year was thus coded in terms of graduate students (last years), as opposed to freshmen (1st year).

From a total of 626 students, we eliminated 60 for not responding to most of the questions. Eliminated subjects did not show any statistical association with subsamples defined by college and socio-demographic characteristics (gender, age, scientific area and year). Thus, missing values can be considered randomly distributed within subsamples.

The final sample comprised 566 students (218 males and 348 females), with ages between 18 and 48 years (Mean = 22.29; SD = 4.29. Mo = 21). Students were roughly equally distributed in the scientific areas: Humanities and Social Sciences (45.76%), Natural, Physical and Technological Sciences (54.24%).

Concerning the year of schooling, we observed superiority of last year's students (54.9%), compared with those attending the 1st year (45.1%).

The qui-square test revealed the existence of an association between the variables scientific area and year of schooling ($\chi^2 = 61.678$; df = 4; $p = 0.000$). This association results in a superior incidence of graduate students in Physical and Technological Sciences (PTS) courses and a higher percentage of freshmen in Economics.

Most of the students inquired (N = 348) are females (61.3%). Regarding the distribution of both sexes through the different scientific areas, we observed a significant association between these two variables ($\chi^2 = 67.208$; g.l. = 4; $p = 0.000$): in Humanities and Social Sciences there is a significantly higher proportion of female students, while in PTS male students are in majority; in the other colleges the incidence of each gender is balanced.

Instruments

In the present study we used the Portuguese version of the Approaches and Study Skills Inventory for Students – ASSIST (Tait, Entwistle and McCune, 1998; Valadas et al., 2010), the Parker Cognitive Development Inventory – PCDI (Ferreira & Bastos, 1995) and a socio-demographic data questionnaire.

The ASSIST (Tait et al. 1998) is the last in a line of inventories (ASI and RASI) designed to measure individual differences in approaches to learning in higher education students. The inventory consists of four sections (Valadas et al., 2009, 2010),

referring to: (what is learning?) – conceptions of learning, study approaches in three different dimensions or scales (deep, strategic and instrumental), preferences for different types of course and teaching, and a last section refers to academic work assessed in a scale ranging from 1 (rather badly) to 9 (very well). ASSIST application can be individual or collective and lasts from 25 to 45 min.

The PCDI refers to Perry's theory on cognitive development of college students which, throughout their training, go through different developmental positions (nine), grouped into three main levels or dimensions: 1) dualism/absolutism; 2) relativism; 3) commitment within relativism. The result for each subscale is, thus, given by the sum of the items needed to obtain scores for three dimensions (dualism/absolutism, relativism, and commitment within relativism). In this work we have chosen to use a shortened version, because we were only interested in the subjects related to education, particularly the importance it attaches to the educational objectives and also considering that it relates to the role of education and training - and career. We eliminated all the items that referred to religion, as well as those which referred exclusively to very specific professions (such as psychologist)[1]. The final version comprises a total of 87 items: the subscale education includes 50 items, the subscale Career the remaining 37. The PCDI can be applied individually or collectively, ranging from 20 to 30 minutes.

Procedure

Data was collected in the context of teaching lessons. Participation was on a voluntary basis and confidentiality of all the information collected was assured. We also guaranteed the dissemination of the results of this investigation.

The application of the instruments was performed in the 2nd semester in normal classroom situation. The time to read and complete the instruments ranged between 45 minutes and an hour.

It was our intention to go beyond a purely differential analysis. In this sense, we examined the relationship between cognitive development, approaches to studying, approaches to learning and preferences for different types of course and teaching. In this sense we used correlation analysis. Lindblom-Ylänne and Lonka (1999) and Long (2003) consider that the correlational methods are useful for finding general trends in groups with large dimensions. However, they do not allow us to identify different

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[1] The procedure was performed with the permission of the authors of the Portuguese version of the instrument.

patterns of relationships that may exist between sub-groups of the same sample (Meyer, 2000). According to Meyer, Parsons and Dunne (1990b) analysis based on sub-groups may, in fact, prove the existence of other groups of students with distinctive features. Thus, we chose to perform the cluster analysis as an alternative method. This method allowed you to group the subjects who responded to the items in a similar way, in order to obtain a better view of the study orchestrations as described by Lindblom-Ylänne and Lonka (1999). This is a multivariate statistical procedure to detect homogeneous groups of data (Pestana and Gageiro, 2003), and organize a set of entities (individuals or objects) for which detailed information is known (Pereira, 2004). According to Pestana and Gageiro (2003), this analysis is particularly useful when there is suspicion that the sample is not homogeneous. This procedure groups the subjects according to the information available, so that those who belong to a group are as similar as possible, and always more similar to elements of the same group than to the elements of the other groups. To this end, we used the k-means method, particularly suited for large sample size.

For the participants that have missing data items (less than 2% of the sample), the mean substitution procedure was used to replace missing values in a variable by the mean value for that variable. Data was analyzed by means of SPSS 16.0.

RESULTS

The correlational results presented below (Table 1) allow us to affirm the existence of relations between approaches of a more deep and strategic level, and higher cognitive development levels (Relativism and Commitment within Relativism). Participants, who scored higher on the relativistic dimension of cognitive development, also seemed to use more approaches to the study of deep nature. With respect to Commitment within Relativism, the results are similar to those for the relativistic dimension: students, who are situated, in terms of thought, at a more complex level of cognitive development, also demonstrate learning in a deeper and more meaningful way. Students who are more strategic are also more relativistic in terms of cognitive development; those who score higher on the Commitment within Relativism scale are those that seem to address the learning in a more strategic manner, in order to achieve excellence.

Table 1 – Correlation matrix between the ASSIST and PCDI (N = 556)[2]

ASSIST scales	PCDI dimensions		
	Dualism	Relativism	Commitment within Relativism
Deep Approach	-0.09*	0.44**	0.47**
Seeking meaning	-0.07	0.37**	0.36**
Relating ideas	-0.04	0.35**	0.39**
Use of evidence	-0.08	0.41**	0.48**
Interest in ideas	-0.10*	0.27**	0.29**
Surface apathetic approach	0.31**	-0.07	-0.06
Lack of purpose	0.12**	-0.09*	-0.10*
Unrelated memorising	0.33**	-0.12**	-0.08
Syllabus boundness	0.28**	-0.08	-0.09*
Fear of failure	0.18**	0.10*	0.12**
Strategic approach	0.11*	0.22**	0.30**
Organised study	0.07	0.11*	0.16**
Time management	0.09*	0.17**	0.22**
Alertness to assessment demands	0.18**	0.13**	0.21**
Achieving	0.07	0.13**	0.21**
Monitoring effectiveness	-0.00	0.32**	0.31**

** $p \leq 0.01$; * $p \leq 0.05$.

We also found negative correlations with statistical significance between the Surface Apathetic Approach and higher levels of cognitive development, as postulated conceptually – the scores in the Surface Apathetic Approach were positively and significantly correlated with the level of dualistic development and negatively with the relativism dimension (although in this case the correlations were of lower magnitude). Another general comment refers to the correlations that are beyond the standard, such as subscale *fear of failure* (which, although integrating the Surface scale, is positively correlated with the relativistic and Commitment within Relativism dimensions); the subscales *alertness to assessment demands* and *time management* (which, being strategic, are positively correlated with dualism and therefore, make the Strategic

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[2] For these analyses we only considered valid only subjects who responded to the two assessment tools of learning and cognitive development.

Approach to assume significant positive correlation, although in reduced amount, with the dualism).

In what concerns clusters analysis, the use of k-means procedure allowed us to obtain four different clusters. We proceed with the profiles of each cluster.

Cluster 1 (n=153) includes students with high scores on Deep Approach and Strategic Approach, and low in Surface Apathetic. It was designed as *transformative and meaningful orientation*. These students had study habits more oriented to the meaning and understanding. Their conceptions of learning were assumed as more constructivist in nature. The intention is to understand through effective conceptual analysis. In strategic terms, the student organizes time and distributes efforts. Attention is focused on the assessment evidences, striving to understand the preferences of the teacher.

Cluster 2 (n=136) includes students with mean levels in the Strategic Approach and Surface Apathetic Approach and low in Deep Approach. This cluster was designated by us of *dissonance in the study*, because it integrates combinations of orientations or scales and instrumentation in study habits. The authors refer to the inadequacy of typical relationships between orientations and scales, combining significant and reproductive orientations - indicating a disorganized study orientation and learning.

Cluster 3 (n=167) includes the largest number of students with mean scores in all approaches to learning - mixed instrumentation of the study.

Finally, Cluster 4 (n=100), related to *surface or reproductive learning*, includes students with low scores on the Deep and Strategic Approaches and high in Surface Apathetic Approach. Students are concerned essentially in completing tasks, which implies a low level of personal involvement. Routine behaviours and memorization without reflection are predominant, as well as the resolution of procedural problems. Learning is perceived as an external imposition.

Table 2 shows the comparison between clusters depending on the variables gender, year and scientific domain.

Table 2 – Results of the chi-square test by *gender*, *year* and *scientific domain*

		Cluster 1		Cluster 2		Cluster 3		Cluster 4		χ^2	p
		N	%	N	%	N	%	N	%		
Gender	Males	47	30.7	50	36.8	57	34.1	56	56.0	18.38	0.000*
	Femanes	106	69.3	86	63.2	110	65.9	44	44.0		
Year	Freshmen	68	44.4	66	48.5	71	42.5	45	45.0	1.12	0.772
	Graduate	85	55.6	70	51.5	96	57.5	55	55.0		
Scientific	HSS	58	37.9	24	17.6	44	26.3	17	17.0	33.03	0.001*
domain	BS	22	14.4	31	22.8	30	18.0	17	17.0		
	PTS	27	17.6	33	24.3	44	26.3	30	30.0		
	E	21	13.7	33	24.3	29	17.4	27	27.0		
	ES	25	16.3	15	11.0	20	12.0	9	9.0		

* $p < 0.05$.

The results of the chi-square test indicate differences between clusters based on gender ($\chi 2 = 18.38$, df = 3, $p = 0.000$) and scientific domain ($\chi 2 = 33.03$, df = 12, $p = 0.001$), but not in terms of year ($\chi 2 = 1.12$, df = 3, $p = 0.772$). Cluster 4 includes more male students than female, while in Cluster 1 a significantly higher percentage of girls is observed.

With regard to the scientific domain, we observe that Cluster 4 is made up mainly of students attending Economics and Physical and Technological (PTS) courses, Cluster 1 includes more students from Humanities and Social Sciences (HSS) and, finally, Cluster 3 shows a higher proportion of students either from HSS, or from PTS.

Male students who attend courses from Economics and PTS score higher in Cluster 4, which is characteristic of a superficial type of learning and reproductive orientation. In contrast, girls who study at HSS college revealed a transformative and meaningful type of learning.

In order to contribute to the explanation of the approaches to the level of cognitive development of students, analysis of variance was also carried out based on the clusters created (Table 3). It was our intention to ascertain whether the four groups had distinctive profiles in terms of their level of cognitive development.

Table 3 – Significance test between means on the PCDI by cluster (N = 555)[3]

Dimensions	Cluster 1 Mean	Cluster 2 Mean	Cluster 3 Mean	Cluster 4 Mean	F (3, 552)	p
Dualism/Absolutism	68.03	68.47	68.56	69.08	0.54	0.657
Relativism	90.85[a]	84.63[b]	89.29[a]	85.65[b]	27.73	0.000*
Commitment within Relativism	103.56[a]	96.73[b]	101.57[a]	96.72[b]	33.42	0.000*

* $p < 0.05$.

The results of the analysis of variance, together with the multiple comparison procedure (Tukey test) for the dimensions of cognitive development, showed the existence of significant differences in two of them. Although dualists students are those who integrate the Cluster 4, there were no significant differences between clusters (F = 0.54, p = 0.657). By contrast, Clusters 1 and 3 present significantly higher results in the dimensions of relativism and commitment within relativism than Clusters 2 and 4 (p = 0.000).

DISCUSSION/CONCLUSIONS

As postulated in conceptual terms, we found associations between approaches of a more deep and strategic level and the higher cognitive levels of development (Relativism and Commitment within Relativism). Students who seem to be more profound in the way they approach learning tasks, are standing in a relativistic dimension of cognitive development.

Similar to what Ramsden (1988a, 1988b) postulated, belonging to a specific scientific domain seems to be essential for the adoption of different approaches. The results showed that the fact that students attended courses from Humanities and Social Sciences is significant for the choice of deep and strategic approaches. Moreover, these students aim to understand and there is a strong interaction with the learning content. In a strategic perspective, they relate the new ideas with prior knowledge and concepts gained from everyday experience. The ultimate goal is to achieve better ranking, organizing, for that, study time and maximizing the effort (Entwistle, 1986). This refers to the ability to monitor the effectiveness (Entwistle et al., 2001) and a special attention given to the evaluation process (Vermunt, 1998, Pintrich and Garcia, 1994). These

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[3] Means marked with different letters (a, b, c, etc.) differ significantly at a significance level 0.05 (Tukey test).

students are also more capable to discern and use the distinctive aspects of the learning environment in which they are located (Meyer et al., 1990a, 1990b, Meyer, 1991), and also redefine the processes involved in differences in learning for each discipline, characteristic of deep learning strategies.

To Ramsden (2003), in the humanities area, a Deep Approach usually involves the construction of personal meanings (search for meaning) in accomplishing the task. Entwistle (1995) argued that in Humanities and Social Sciences in general, the individual cognitive constructions may reflect a much more significant personal experience than the so-called Natural Sciences. In contrast, the students from the Faculty of Physical and Technological and Economics showed significantly higher mean scores on Surface Apathetic Approach. Their study behaviour seems to be characterized by an absence of targets in terms of what they intend to attend at a specific course, as well as difficulties in understanding the material and a greater appreciation of the completion of the course programs by teachers. These students seem to make study tasks depend on syllabus-boundness. The option is for memorization of facts and concepts, without concern for understanding and reflection on them. The task is considered as an imposition from abroad and students with reproductive conceptions prefer transmissive teaching, where learning is directed to assessment requirements. Also, there is a lack of understanding and of purpose when studying, behind fear of failure.

Concerning the variable years attended, we know that students attending last year seem to be less objective in terms of enrolment rates. This data can be justified by the fact that they are finishing the graduation. This is a time of academic life that may arise as disruptive and characterized by difficult experiences. Moreover, these students also demonstrate more ability to manage time, which may suggest an individual's competence over the frequency of higher education. Instead, the freshmen had greater difficulties in understanding the material. We recall that the 1st year of attendance at a university has some special features, which are substantially different from the experiences of secondary education.

When we characterized the profiles for each cluster, we also found differences by scientific domain. Overall, students who attended courses in the area of Humanities and Social Sciences seem to have more meaningful study habits, assuming their conceptions of learning as constructivist in nature. In contrast, students integrating Cluster 4, which belong mainly to Physical and Technological Sciences and Economics, are mainly

concerned in completing tasks, which implies a low level of personal involvement. Routine behaviours and memorization without reflection are frequent in these cases, and learning is perceived as an external imposition.

The results according to the level of cognitive development showed distinctive profiles, but, contrary to what was expected, only in what concerns relativism and commitment within relativism. Students who strive to understand the preferences of the teacher (cluster 1), as well as those who choose mixed instrumentation of study (cluster 3), are those who reveal a commitment and personal involvement to academic context.

The results of cluster analysis presented seem, in fact, to contribute to the debate on the polarity of contrasting approaches to studying (Ramsden, 1984, Biggs, 1993, Entwistle, Tait & McCune, 2000; Long, 2003). A bipolar model was found (similar to that of Long, 2003), that includes students with high scores or on deep, on strategic or on surface apathetic scales. Thus, although it is clear that the same student uses different approaches in different situations, we can see trends for particular approaches, related to different subject/course requirements and previous educational experiences (Ramsden, 2003). As for Clusters 2 and 3, although consistent with those obtained in other investigations, they appear to be less informative and, probably, indicators of some mutability and instability. We can therefore speak of variability and consistency as the defining features of the construct.

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