

Part 5

Learning and Teaching Styles

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LEARNING STYLES AND DISCIPLINARY FIELDS: IS THERE A RELATIONSHIP?

Abstract

Having knowledge about students' learning styles allows the teachers to improve their expertise in order to supply suitable support and challenge in learning environments. This paper presents the initial results of a research project that aims at investigating the relationship between university students' learning styles and disciplinary fields. This study is being conducted at the University of Aveiro, in Portugal. The Learning Styles Inventory was administered to a sample of 186 students from different academic backgrounds. The overall results do not confirm the association, previously established by Kolb, between learning styles and disciplines. Actually, almost all students possess the accommodating style as dominant. Implications of these findings are discussed and topics for further research are proposed.

Introduction

Given the diversity of nowadays student population, being aware and understanding student differences in the classroom is of crucial importance. At this point we are investigating the learning styles of university students following different degree programs, in order to conceive and implement diverse teaching and learning strategies according to students' learning styles and disciplinary fields. This does not mean that our intention is to accommodate students' learning styles by moulding teaching strategies to students' preferences. Actually, we contend that this aspect is as important as the intentional mismatch between learners' styles and teaching activities, in order to optimise students' abilities.

The research reported here analyses the learning styles of university students in different disciplinary fields. The sample includes 186 Portuguese students from education, languages, biology, biochemistry, biotechnology and multimedia. Students filled the Kolb's Learning Style Inventory (1999). This study aimed at investigating the relationship between students' learning styles and their disciplinary fields. Having in mind the relationships previously reported by Kolb (1981, 1984) the findings were discussed.

Thus, the main aims of this study are as follows: (i) to identify and characterise Kolb's learning styles of students from different disciplinary fields, and (ii) to investigate the association between Kolb's learning styles and disciplines.

Literature review

Kolb's experiential learning theory and learning styles

Kolb's theory is called 'experiential learning' to emphasize the central role that experience plays in the learning process. It is based on the notion that understanding is not an inflexible element of thought but is formed and re-formed through experience.

According to the ELT, learning is cyclical and requires four kinds of abilities: concrete experience (CE), reflective observation (RO), abstract conceptualisation (AC) and active experimentation (AE). Immediate or concrete experiences are the basis for observations and reflections. These reflections are assimilated and distilled into abstract concepts from which new implications for action can be drawn. These implications can be actively tested and serve as guides in creating new experiences (Kolb, 1984). The cycle may be initiated at any point, but the stages are then thought to be followed in sequence.

There are two primary axes that lie behind the cycle: an 'abstract-concrete' dimension and an 'active-reflective' dimension. The ways students perceive or grasp experience ranges from immersing themselves in the experience using their senses, feelings and knowledge in a concrete way (CE), to thinking abstractly about matters, using logic and reason (AC). Having perceived the experience, students need then to understand it through transforming it. Here individuals differ in their preference for doing so, either through active experimentation (AE) or by watching and reflective observation (RO) (Fielding, 1994; Kolb & Kolb, 2005; Yeganeh & Kolb, 2009).

Based on the learners' preferences on the two dimensions – 'abstract-concrete' and 'active-reflective' – Kolb identifies four learning styles with specific characteristics: accommodating, diverging, assimilating and converging. Each learning style presents its own strengths and weaknesses. Whether a learning style is favourable or not depends mainly on the demands of the learning context (Desmedt, 2004).

Accommodators grasp information concretely (CE) and process it through experimentation (AE). They are called accommodators because they easily adapt to new situations and apply knowledge in new ways. The major strengths of this learning style are: problem-solving, using intuition in trial and error situations, trying new experiences, taking risks and adapting to change (Kolb, 1984; Kolb & Kolb, 2005). Accommodators are also known as 'doers' because they feel comfortable in getting involved in experiences and in carrying out plans. According to Kolb (2000), these learners are sometimes perceived as impatient and pushy.

Divergers perceive information through concrete experience (CE) and process it reflectively (RO). These learners are called divergers because they do extremely well at viewing an event from several perspectives and at generating different ideas. They prefer to work in groups, to brainstorm, to imagine implications and to share ideas (Kolb, 1976, 1984). Because of their great sense of creativity these learners are also known as 'creators'.

Assimilators grasp information through abstraction (AC) and process it through reflection (RO). They learn preferentially by watching and thinking. These students are called assimilators because they have the ability to assimilate diverse data and incorporate it into integrated whole, creating easily theoretical models (Kolb, 1981). This is the reason why they are also called as ‘planners’. They prefer to learn alone and appreciate traditional lectures (Kolb, 1984).

Convergers perceive information abstractly (AC) and process it through experimentation (AE). They are called convergers because they have the ability to converge rapidly to get to a conclusion (Kolb, 1981). These learners prefer to comprehend an idea from the theoretical point of view without taking into account related examples. The strengths of this learning style are making decisions, defining problems and reasoning deductively. Individuals favouring this style have been nicknamed ‘decision makers’ due to their ability in applying ideas in a practical way.

Kolb's learning styles and disciplinary differences

Kolb (1981, 1984, 1999) suggests that it is possible to cluster disciplines based on students’ predominant learning styles. This author proposes that the relationship between students’ learning styles and their academic field results from two processes: *selection* and/or *socialisation*. Selection is the process by which a student chooses an academic discipline consistent with its preferred learning style. While socialisation refers to a student’s learning styles being further moulded to suit the learning norms of a disciplinary area once in it. Thus, different academic fields would favour different learning styles.

Kolb (1981, 1984) supports the division of disciplinary fields into a fourfold typology that leads to four quadrants with diverse characteristics. Similarly to learning styles, these disciplinary quadrants are defined according to the amount of concrete vs. abstract and reflective vs. active abilities required in each one: “*In the abstract-reflective quadrant are clustered the natural sciences and mathematics, while the abstract-active quadrant includes the science-based professions, most notably the engineering fields. The concrete-active quadrant encompasses what might be called the social professions, such as education, social work and law. The concrete-reflective quadrant includes the humanities and social sciences*” (Kolb, 1981, p. 243).

The Present Study

This research study investigates the preferred learning styles of Portuguese students. Following prior studies (Erlich, 2009; Desmedt, 2004; Kolb, 1976, 1984), students were selected from diverse disciplinary fields: natural sciences (biology, biochemistry), science-based professions (biotechnology), social professions (education), and humanities (languages and multimedia). Previous studies revealed that learners from specific academic disciplines adopt different learning styles (Kolb, 1984). So, *do Portuguese students possess learning styles matching their academic areas?* More specifically:

- Portuguese learners studying in natural sciences will prefer abstract and reflective learning modes, also known as the assimilating learning style?

- Portuguese learners studying in science-based professions will prefer abstractive and active learning modes, also known as the converging learning style?
- Portuguese learners studying in social professions will prefer concrete and active learning modes, also known as the accommodating learning style?
- Portuguese learners studying in humanities will prefer reflective and concrete learning modes, also known as the diverging learning style?

Methods

Participants

The participants involved in this study were 186 students (128 females, or 68,8%; and 58 males; or 31,2%) at the University of Aveiro, in Portugal. The students' age ranged from 17 to 41 (mean=21 years; SD=3,8).

There were 57 language students (30,6%), 48 biology students (25,8%), 27 students of biotechnology (14,5%), 23 students of multimedia (12,4%), 20 students of biochemistry (10,7%), and 11 students of elementary education (5,9%). Sixty-nine students were freshmen (37,1%), 64 were sophomore (34,4%), 28 were junior (15,1%) and 25 were senior students (13,4%).

Kolb's Learning Style Inventory and procedure

Kolb's LSI is one of the most prominent and extensively disseminated instruments used to determine individual learning preferences. LSI is organised into 12 groups of statements, four statements per group, with one statement in every group corresponding to one of the stages of the learning cycle (feeling, reflecting, thinking and doing). Within each group, students must rank from 4 ("best describes you") to 1 ("least like you") the four statements according to their own preferences.

Results and discussion

Students' preferred learning style scores were defined by calculating individuals four scales scores (CE, RO, AC and AE), and two combined scores (AC-CE and AE-RO) as suggested by Kolb (1999). Then, the population average of these two dimensions were calculated and used as the cut-off point on the learning style graph. Katz (1988) suggests these adjustments to the x-axis (AE-RO) and y-axis (AC-CE) as a means of balance out cultural bias for one orientation over another. After adjusting the intersection point to the Portuguese sample, students' learning styles were determined by plotting learners' combined scores along the two dimensions of the graph.

The dominant learning style of each academic discipline was determined by taking the students' individual scores, belonging to the same disciplinary field, and then calculating the mean and standard deviation scores. Afterwards, these data were used to determine the AC-CE and AE-RO scores. These group learning style scores were then plotted along the Kolb's grid.

In general, students from different backgrounds (languages, multimedia, biology, biochemistry and biotechnology) do not seem to possess different learning styles. Since the sample of education students is smaller, it is not possible to determine which learning style is dominant, or even if there is a dominant learning style. So, we have calculated the means of the composite values (AC-CE and AE-

RO) of the six disciplines, in order to allow a better comparison between the dominant learning styles of the different disciplinary fields.

Even if the position of each discipline is placed in a different spot in the grid, mean values of AC-CE and AE-RO plotted in Kolb's grid point out that individuals studying biotechnology, multimedia, biochemistry, biology and languages typically possess an assimilator learning style. This learning style reflects a preference for concreteness over abstraction and a preference for action over reflection.

Education students do not have a predominant learning style. These students show a preference for the accommodating and diverging learning styles. Students with this kind of learning preferences are also known as "*northerners*" (Abbey, Hunt & Weiser, 1985, p. 485). It is possible to state that these students use concrete experience as their preferred learning mode to perceive information. However, they do not possess a dominant learning mode to process information.

According to Kolb's distribution of disciplines: language and multimedia students should possess a diverging learning style; biology and biochemistry students should be assimilators; biotechnology students should prefer a converging learning style; and elementary education should be accommodators. However, none of these relationships between learning styles and disciplinary fields was found in our sample. Actually, all disciplines (except education) revealed a preference for the accommodating style. In our sample, the majority are 1st and 2nd year students (n=133; 71,5%), so maybe these students are not sufficiently embedded in the spirit of their discipline yet. Consequently, they may still not have a learning style matching their academic field. Probably this will be achieved later, along their academic life.

Conclusions, limitations and further research

This research study did not allow us to confirm the associations between disciplines and learning styles found by Kolb (1981, 1984). Education students in this study do not possess a dominant learning style. These students showed to have what Abbey et al. (1985, p. 486) named a "*three-mode pattern*", where one of the learning modes is underdeveloped. In this case, it was abstract conceptualisation that summed a weak score. According to Kolb (1984) it was expected that these students had an accommodating dominant style.

All the other disciplines were associated to an accommodating learning style. However, as reported by Kolb: language and multimedia students should possess a diverging learning style; biology and biochemistry students should be assimilators; and biotechnology students should prefer a converging learning style.

Yet, even if all multimedia, languages, biology, biochemistry and biotechnology possess the same learning style, we can advance that these students hold different 'degrees' of accommodating style. For instance, biotechnology students have a stronger accommodative style than biology students.

This study has several limitations, one of them related to the sample size. One of our aims is to conduct a similar study with a larger sample (more students from each discipline and, if possible, include students from other disciplines and from other Portuguese universities) to confirm (or not) and expand the results obtained in this study. We also would like to analyse the effect of gender, age and year of study on learning style. In what concerns age and year of study, we believe that a longitudinal

study would be the most adequate. Furthermore, we also would like to investigate the influence of culture on Portuguese students' learning styles.

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