



## CHARACTERIZATION OF TEACHING AND LEARNING STYLES IN GEOGRAPHY: A STEP TOWARDS THEIR INCLUSION IN SECONDARY CLASSROOMS

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**RESUMO:** Este artigo constitui um resumo das principais contribuições de uma tese de doutoramento que tem como foco principal a compreensão dos processos de influência educacional; isto é, as práticas que permitem aos professores e outros agentes educacionais ajudarem de forma adequada os alunos. Especificamente, trata-se de um estudo que procura definir os estilos de aprendizagem e de ensino como um aspeto decisivo nesses processos de influência e, portanto, na avaliação dos alunos e do seu desempenho. Destacando a necessidade de transferir para as práticas de sala de aula e tomando como referência teórica o ciclo de aprendizagem experiencial, o procedimento de pesquisa metodológica é abordado a partir de um desenho misto e estruturado segundo o modelo de pesquisa avaliativa do CIPP de um programa educacional de geografia. Os participantes são professores e alunos de 10 escolas secundárias em Múrcia (Espanha), incluindo um grupo de 23 alunos que receberam a implementação da sequência educacional definida cuja avaliação, análise e discussão levaram a uma série de conclusões que orientarão futuros projetos educacionais, através de atividades de aprendizagem e avaliação, de acordo com o estilo de aprendizagem dos alunos.

**Palavras-chave:** Educação Geográfica; Ensino secundário; Estilos de aprendizagem

**ABSTRACT:** This paper constitutes a summary of the main contributions of a PhD thesis focused on the understanding of the processes of educational influence; that is to say, the practices that allow teachers and other educational agents to help, in an adjusted way, the students. Specifically, this is a study that attempt to define the learning and teaching styles as a decisive aspect in these processes of influence and, therefore, in the evaluation of the students and their performance. Highlighting the necessity to transfer our results to classroom practices and taking as a theoretical reference the cycle of experiential learning, the methodological research procedure is approached from a mixed design and structured according to the CIPP model of evaluative research of an educational geography program. The participants are teachers and students from 10 secondary schools in Murcia (Spain), including a group of 23 students who received the implementation of the defined educational sequence whose evaluation, analysis and discussion have led a series of conclusions that will guide future educational designs, through the learning and assessment activities, according to the learning style of the students.

**Keywords:** Geography education; Secondary education; Learning styles

## INTRODUCTION

What influence do learning and teaching styles have on learning outcomes derived from the educational proposals of geography? The justification of this research problem is given hereafter by the growing interest of education for the individualization of teaching-learning process, but also by the few geographical studies linked to teaching and learning styles. In addition, studies that evaluate educational interventions or methodological approaches are considered as a response to offering an improved relation to the learning results they produce, justifying our aim to reach empirical results connected to the application of learning styles through an educational sequence.

The recent and high impact scientific publications lead to identify five principal trends in the current debate about teaching and learning styles:

1. Theoretical and empirical basis of the relevance of learning or teaching styles diagnosis as a starting point for concreting more effective educational practices (Cols, 2011, Martínez Geijo, 2008, Northon-Gámiz, 2011; Pulido, De la Torre-Cruz, Luque & Palomo, 2009; Renés & Martínez, 2015; Trevellin Colenci, 2011) or promoting autonomy in learning (González Clavero, 2011).
2. Research focused on the implications of teaching or learning styles on the students' academic performance (Adeyemi, 2010; Díaz-Serrano & Miralles, 2016; Egel, 2009; Gallego & Nevot, 2008; Sotillo Delgado, 2012), but also on group-classroom (Valencia & López, 2012); other inquiries in this topic deals with the effect that accommodation of teaching styles or methodologies to the learning style may have on the students' performance in educational processes (Dinçol, Temel, Oskay, Erdogan & Yilmaz, 2011; Rogowsky, Calhoun & Tallal, 2015; Tulbure, 2011).
3. Research that analyzes the teaching and learning styles of preservice teachers (Cózar-Gutiérrez, De Moya-Martínez, Hernández-Bravo & Hernández-Bravo, 2016; De Moya, Hernández, Hernández & Cózar, 2011; Egel, 2009; Ulaş, Sevim & Tan, 2012).
4. Studies that attempt to introduce contextual variables in the construction of learning styles, such as stylistic teaching preferences (Zhang, Sternberg & Fan, 2013), the learning styles promoted by educational systems in the European Higher Education Area (Pulido, De la Torre-Cruz, Luque & Palomo, 2009) or individual and contextual factors that could affect the learning style (Joy & Kolb, 2009; Monroy & Hernández, 2014).
5. Reports that declare critical positions and evidences in favor of scientific status and the usefulness of learning styles diagnosis (Pashler, McDaniel, Rohrer & Bjork, 2009; Sternberg, Grigorenko & Zhang, 2008) or against these (An & Carr, 2017; Cuevas, 2015; Willingham, Hughes & Dobolyi, 2015).

Attending to the most immediate scientific research of our investigation problem, it is important to highlight those studies that concur in the context or the educational focus on Social Sciences or Geography (Esteban, Ruiz & Cerezo, 1996; Hervás Avilés, 2008; Hervás & Miralles, 2004; Martínez Geijo, 2007; Renés, Arellano & Martínez Geijo, 2015; Ros, Cacheiro & Santiago, 2017; Serrano Pastor, 1994); at the same time, there are few empirical experiences focused on the analysis of educational strategies according to learning styles and, therefore, they become very important (Rogowsky, Calhoun & Tallal, 2014; Tulbure, 2011); specially, when this work aims to respond to one of the fields that remain to be explored in the application of the learning styles theory: an exploration of the most appropriate evaluation approach from each subject for the contents or tasks that must be learned (Alonso García, 2008).

### 1. LEARNING AND TEACHING STYLES: CONCEPTUAL FRAMEWORK

The scientific literature on learning styles is very broad and includes different positions when it comes to understanding learning behaviors. It is possible to consider the existence of different theoretical families of learning styles (Figure 1); in this study are highlighted those who understand styles as flexible and stable preferences for information processing.

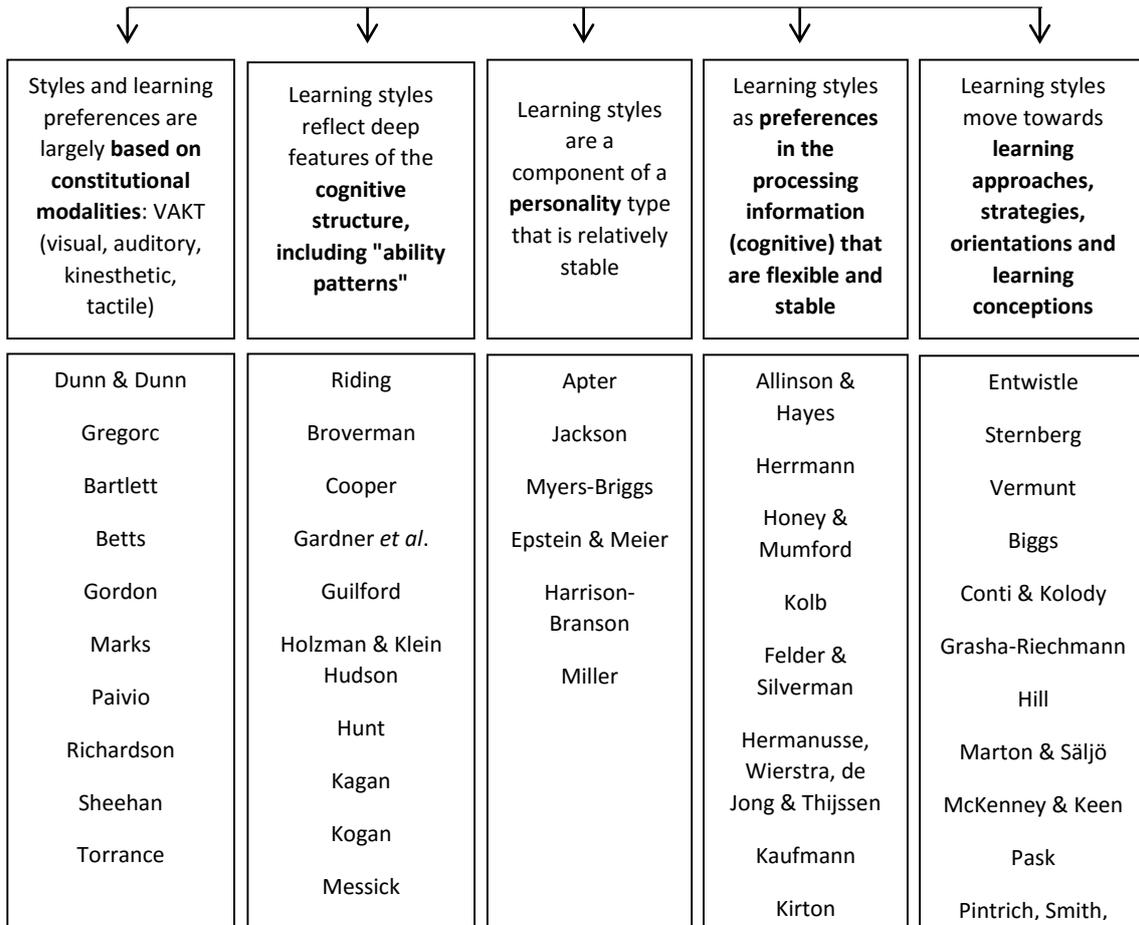


Figure 1 - Theoretical families of learning styles, expanded from Coffield *et al.* (2004, p.19).

In this regard, the models of Kolb (1984)<sup>1</sup> and Honey and Mumford (1988)<sup>2</sup> become the basis and the origin of the concretion of the stylistic theory in questionnaires accessible to teachers and applicable to the classroom. Based on these referents, it is described the learning styles model of Alonso, Gallego and Honey (1999), on which this work is based for the diagnosis of learning styles. For these authors, the factors of learning styles include three groups of features:

- Cognitive features, including dependence or independence-field, conceptualization and categorization, reflexivity *versus* impulsivity and sensory modalities.

<sup>1</sup> Learning is the process whereby knowledge is created through transformation of experience (Kolb, 1984, p. 38). From this premise, this author creates four cyclical phases that are necessary to achieve learning and that are associated with four different learning styles that he diagnoses with the Learning Styles Inventory (LSI). *It conceives of individuals' learning processes as differing along two dimensions: preferred mode of perception (concrete to abstract) and preferred mode of processing (active experimentation to reflective observations) [and] classifies individuals into four types on the basis of their position along these two dimensions: divergers (...), assimilators (...), convergers (...), and accommodators (...)* (Pashler *et al.*, 2009, p.107).

<sup>2</sup> Proposed as an alternative for Kolb's Learning Style Inventory, the Honey and Mumford's Learning Style Questionnaire identifies also four learning types: activists, theorists, pragmatists and reflectors. In addition, they attach to their questionnaire some descriptions of the learning styles (Honey & Mumford, 1988): Activists involve themselves in immediate experiences and they usually act first, considering the consequences afterwards; Reflectors like to stand back to ponder experiences, collecting data, both first hand and from others, and thinking about it before coming to any conclusion; Theorists adapt and integrate observations into coherent theories, analyzing step by step and prizing rationality and logic; Pragmatists are keen on trying out ideas or theories to see if they work in practice, taking the first opportunity to experiment, making practical decisions and solving problems.

- Affective features, such as persistence, responsibility, motivation, expectations or locus of control.
- Physiological features: feeding preferences, health or brain differences according to gender.

Furthermore, this model supports the experiential learning cycle in four stages; each individual will feel more comfortable in one of these stages, according to their preferences, when information is being perceived and processed (Alonso, Gallego & Honey, 1999). Depending on that, each person will configure their preferred learning style (Figure 2).

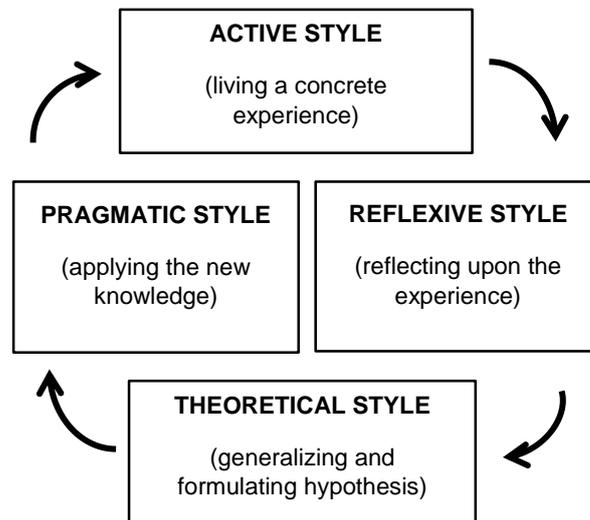


Figure 2 - Experience-based learning styles, according to Alonso, Gallego & Honey.

The model of teaching styles arises from the budget of Honey and Mumford (1988), which indicates that teacher performs his tasks in consonance with his own learning style; from this seed, Martínez Geijo (2007) constructs a model of teaching styles and a diagnosis questionnaire categorizing corresponding teaching behaviors with each learning style, according to the following taxonomy: Open, Formal, Structured and Functional. The matching between learning styles (Alonso, Gallego & Honey, 1999) and teaching styles defined by Martínez Geijo (2007) is shown in Table 1.

Table 1 - Matching between learning styles and teaching styles

Learning styles	Teaching styles
Active	Open
Reflexive	Formal
Theoretical	Structured
Pragmatic	Functional

## 2. BASE FOR THE DESIGN OF TEACHING METHODOLOGIES OF GEOGRAPHY THROUGH THE LEARNING AND TEACHING STYLES

The teaching methodology must organize the disciplinary contents, in this case geographical, and concretely materialize them. According to Souto González (1999), the teacher must decide how to organize the contents in relation to the methodology throughout a formative unit, at which point he should seek practical coherence with the scientific postulates. This last level of didactic concretion materializes in the learning activities, on which relapses the spatiotemporal sequencing of the teaching process, namely the discourse action, the contents and the material resources necessary for its implementation. In addition, supporting the assessment questions' model of Trepát (2011, 2012), according to which the evaluation activities are one of the three major blocks of teaching action, along with the programming, design and implementation of learning activities.

By concentrating on the reflection about the components of an educational methodology of Geography, placing learning activities at the center of instructive action, it is proposed a model of categorization of these in six typologies:

1. Basic induction.
2. Concept formation.
3. Graphic organization of information.
4. Cooperation or cooperative learning.
5. Dynamic activity.
6. Application or inquiry based on collecting and disseminating information

Regarding the assessment activities, focusing on the written tests that predominate in the summative evaluations, is adopted the perspective of Trepát (2011, 2012) who says that the ideal is to combine different formats, which are usually open-label or objective correction tests, as well as introducing the capacities or degrees of knowledge intrinsically to the resolution of the questions, based on Bloom's taxonomy: information, comprehension, application, analysis, summarizing and assessment. Figure 3 shows the model of evaluation activities adopted.

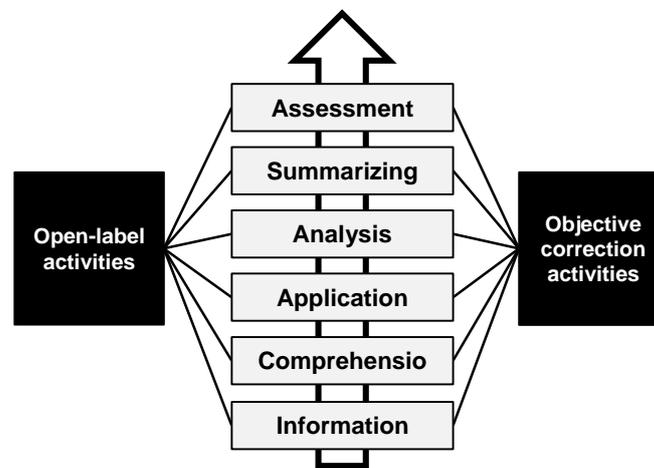


Figure 3 - Categorization of evaluation activities, according Trepát (2011, 2012).

Finally, the scientific literature offers educational guidelines responding to different learning styles; this study takes these into consideration in order to formulate two hypothetical models that link each type of learning and assessment activity to a preferred learning style.

### 3. EMPIRICAL FRAMEWORK

The general aim of this study is to discover and understand the influence of the learning and teaching styles on the results produced by an implemented program devised for geography education in the third grade of compulsory Secondary Education. This general purpose is defined in 15 specific objectives, associated to inquiry hypotheses (when it is necessary), such as: to describe the learning styles of the students; to discover the relationship between them and the academic performance in Geography; to determine the inference of the matching between the learning styles and the teaching styles on the academic performance in Geography; to devise an educational program, entitled "La sostenibilidad como vía de desarrollo" (*Sustainability as a means of development*) or assessing the learning acquired in each type of activity and analyzing the results attending to the learning styles.

The research methodology is based on the program evaluation theory of Stufflebeam & Shinkfield (1987), considering this as the ideal procedure to make the evaluation of the teaching practice compatible with the research and giving each other coherence and rigor. In this manner, the study is structured in

four phases, according to the CIPP model: context, input, process and product evaluation. Lukas & Santiago (2009) define each stage of this program evaluation:

1. Context evaluation: definition and analysis of the circumstances surrounding the educational program.
2. Input evaluation: identification of the optimal way, considering the available resources, to achieve the goals of the educational program.
3. Process evaluation: checking the congruence between the designed program and the results that derive from the actual application of it.
4. Product evaluation: information about the effects produced by the program, in order to make final decisions that serve to give continuity to it, modify it or discard it.

It is used a mixed design (Figure 4) that assume the combination of quantitative and qualitative research methodologies, but also integrating own procedures for ensuring the operability of the different evaluative stages to meet the educational needs that the program *Sustainability as a means of development* tries to respond.

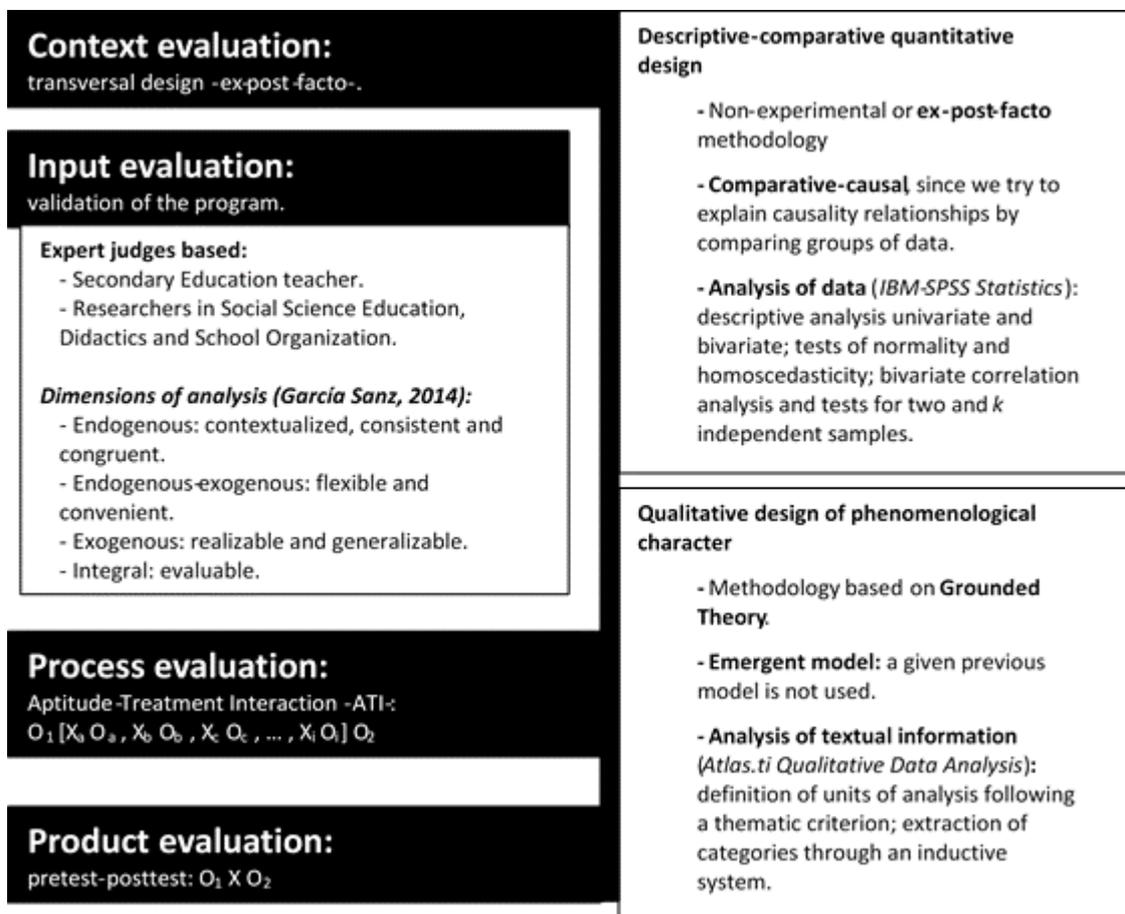


Figure 4 - Methodological synthesis of the mixed research approach.

In respect of the context and characteristics of the students and teachers of the municipality of Murcia (Spain) that participates in the research: on the one hand, in the study of context evaluation, 10 educational centers participate and a totally of 483 students of the third grade of Compulsory Secondary Education and 21 teachers of Geography and History; on the other hand, the input, process and product evaluations realize with a group of 23 students of a Secondary public school located in a district around the city of Murcia.

#### 4. MAIN CONCLUSIONS AND IMPLICATIONS

The analysis and discussion of the results led to a series of direct conclusions; the main are given below:

1. The learning profile of the participating students in the municipality of Murcia shows a prevalence of Reflexive and Theoretical styles in which the female students outscored the males.
2. Students seem to obtain higher grades in their learning of geographical contents when their learning style profile shows higher scores for Reflexive and Theoretical styles than for Active styles.
3. The teaching profile of the participating teachers in Secondary Education shows generally balanced scores among the four polarities - Open, Formal, Structured and Functional – although they do appear to be slightly more formal and functional. Gender, age, years of experience and ownership of the center of education do not seem to determine their teaching styles.
4. The grades of a Geography student are better when the student and the Geography and History teacher have a firm preference for Reflexive and Formal styles, respectively.
5. The learning styles do not prove to be good predictors of self-perceived levels of learning and satisfaction in the various types of learning activities used in the teaching syllabus of our program. We have not been able to establish the levels of satisfaction or learning that students perceive for the different activities according to their learning styles.
6. The master class produces better performances the higher the score for Reflexive style in our students' learning profiles. In contrast, the dynamic and socializing activity of dramatization produces worse performances, the higher the score for Reflexive style.
7. The theoretical and hypothetical model of this PhD thesis, which seeks to determine which learning activities favor better performances according to the learning style, returns contradictory results. Among these we can highlight that individualized basic induction (memorizing) produces worse performances when the score for the Theoretical style is higher. Similarly, it is incongruent that the socializing activities of cooperation (brainstorming and discussion forums) and dynamic activities (group presentation by the students) produce worse learning results the more active our students are.
8. The performance of the students is lower in objectively scored assessment tests the higher the scores in Active and Pragmatic styles in their learning profiles.
9. The performance of the students in assessment activities related to cognitive mastery of understanding is higher, the higher the score for the Reflexive style in the learning profile. In contrast, the Active style hinders performance when measured according to cognitive capacity.
10. A high score for the Theoretical style lowers our students' performance in assessment questions that require the application of knowledge. This same inverse relationship is produced between the Reflexive style and assessment activities based on the cognitive domain synthesis.
11. The performance of students participating in the educational program "*La sostenibilidad como vía de desarrollo*" (Sustainability as a means of development) improves the higher their scores are for the Reflexive style and the lower they are for the Active style. This result coincides with the overall behavior of students in Murcia in terms of performance in the subject of Geography.

#### 5. PRACTICAL EDUCATIONAL IMPLICATIONS

Our study has not returned empirical results that can point to generalizable guidelines for a methodological integration of learning styles through activities, which is quite common in educational research. The scarcity of statistically significant results, especially in relation to the learning activities models should not, we believe, mean renouncing the empirical procedure proposed, nor the didactic transposition of learning styles via the categorizing of activities. Nevertheless, we do believe that the design of a training unit that adjusts to the methodological reality that reigns in today's school culture is

too conservative and reproduces too much of the current educational model which favors reflexive and theory students. This circumstance may be at the root of the relative success of our initial assessments, process and product to find teaching orientations to incorporate the learning styles in Secondary Education.

We usually teach through formally structured activities based on readings, case studies or books, and forget that learning can happen through experiences, and can be unconscious. This is because learning based on acquisition of concepts is more familiar to us than experience-based learning (Honey & Mumford, 1988). However, the familiar is not universal and, to judge by our empirical experience, it may not be possible with traditional teaching molds to provide an educational response that adjusts to active or pragmatic students who, as Gallego (2013) states are prone to failing under the current educational system. The design of activities for active or pragmatic learning may mean a drastic breakaway from those methodological molds, combining traditional learning resources and spaces with other learning spaces outside the classroom which will allow a complete and drastic move away from the student role that is based on static tasks.

Possibly the key, didactically, to attend to different learning styles lies in taking experiential learning as the cornerstone for some learning activities that cover the four stages, as was done by Healey & Jenkins (2000) and Healey, Kneale & Bradbeer (2005) for university students of Geography, in which consecutive tasks were used that involved a specific experience (Active style), a reflexive observation (Reflexive style), an abstract conceptualization (Theoretical) and an active experiment (Pragmatic), in line with the proposals in Figure 4 of the theoretical framework. This no easy task because the learning resources and spaces in operation in secondary Education centers do not favor hands-on activities.

Furthermore, if the aim to break away from the methodological molds is successful, it will be necessary to respond to the current interest of Geography education in superimposing the development of spatial thinking skills in geographical thinking tasks in order to bestow the discipline with added value. An important part of this line of research is the study by Lee & Bednarz (2012), whose eight geographical aspects that are associated with spatial thinking skills constitute a solid starting point. The study concludes that there is a need to reformulate the spatial skills and their geographical expression in the questions that test them. The authors find disconnects between some factors of spatial thinking and the geography question that seeks to assess them, and they point to the existence of different styles among participants as underpinning them. But, what if spatial thinking were to be assessed through active hands-on activities? The incorporation of the different learning styles in activities that allow spatial thinking to be worked on and assessed may be the key to obtaining a good control mechanism of spatial-geographical thinking components and skills, while at the same time specifying an educational response that is adapted to the different learning style profiles.

## 6. PRACTICAL RESEARCH IMPLICATIONS

The relation between the theory of learning styles and the analysis tools used to measure them is weak (Monroy Hernández, 2013), which means that for research in this line one has to draw on existing questionnaires and analyze their reliability in order to consolidate their applicability and the theories which sustain them. This PhD thesis advocates the model by Alonso Gallego & Honey (1999) along with other associated tools: CHAEA-Junior (Sotillo Delgado, 2012, 2014), for diagnosing learning styles in Primary and Secondary Education, and CEE (Martínez Geijo, 2007; Renes, Echeverry, Chiang, Rangel & Geijo, 2013), for teaching styles. The internal consistency analysis of them show that could be deficient for learning styles diagnosis. a moderate and a high internal consistency, respectively. In the case of a recently created questionnaire, it is necessary to achieve studies that increase the sample of students diagnosed with it, in order to consolidate it or to claim definitively the reliability improvements that our data would justify.

Our evaluative research used a short teaching experience with no longitudinal replications which was implemented in a single group with a single teacher. The conclusions reached, especially those deriving from the process and product evaluation stages, do not, therefore, seek or afford any characterization of a population. Rather, they provide an empirical experience that requires further studies. Moreover, it is not appropriate to draw general conclusions based on a single study and more studies are important to identify, evaluate and document the impacts of approaches and interventions (Day, 2012). This thesis is subjected to some initial limitations: it is an incipient PhD thesis that researches the teaching of Social and in the context in which it can be applied, without any pre-existing human and material resources and subject to the time constraints of the academic program in which it has been developed.

In short, the value of this PhD thesis lies in its value as an experience that can point to trends and describe the research procedure followed; in its being a proposal that may be continued in future studies that use larger samples in broader educational programs and with greater statistical and analytical capacity. In the meantime, it does respond to the urgent need put forward by Day (2012, p.22):

In general, there is a pressing need for studies that specifically recognize the fact that any intervention or approach is likely to have both positive and negative effects on a broad range of possible learning outcomes.

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