THE 3P AND DEDEPRO MODELS AS RESEARCH HEURISTIC

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RESUMEN/ABSTRACT

There are different heuristics that study the teaching-learning process; in this investigation we will explore the confluence of Biggs' 3P model and the DEDEPRO model. These two complementary models offer us a framework for the analysis of teaching-learning situations with greater specificity and a better understanding of the structure of the research studies and the variables they study. In this manner, by incorporating both the general processes of teaching and learning, as well as the specific variables that are related to them, more or less analytical studies can be developed. Biggs adopted the 3P model to represent the student's perspective in the teaching-learning process. The ways students learn are explained through the interaction of three moments in time that become the components for which the model is named: 1) *Presage,* where we find student characteristics and characteristics of the learning context; 2) *Process*, referring to the way that learning tasks are undertaken; and 3) *Product*, which includes learning outcomes. All the components that make up this model (Presage-Process-Product) tend toward equilibrium, and a change in any of them affects the system as a whole. In complementary fashion, the *DEDEPRO model* has established the need to further specify, within the Biggs model, the moments of *Design* (planning), *Development* (execution) and *Product* (satisfaction and performance), in terms of both teaching and learning. The DEDEPRO model assumes personal self-regulation, and is interactive with regulation in teaching, thereby giving rise to different levels of performance and personal satisfaction. In an overall sense, both models give us the opportunity to organize our variables over the teaching-learning process. We would emphasize the joint structure of the two models in relation to the variables in this study: Personal self-regulation, Stressful context (Presage); Learning approaches, Coping strategies, Self-regulated learning and Regulatory teaching (Process-Development); and Performance and Satisfaction with the learning process (Product).

Palabras Clave: Biggs' 3P Model, DEDEPRO, Teaching-Learning process

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INTRODUCTION

In Higher Education, *teaching and learning processes* form part of a single binomial for the purpose of preparing university students and ensuring their success. Currently, higher education is undergoing changes due to the need for quality education, with a view to increased employment in the European Union. This has led to the creation of the *European Higher Education Area* (EHEA). This new system is based on teaching for competencies, meaning new demands for both students and teachers, and restructuring the teaching-learning process itself (Elliot & Dueck, 2007; Entwistle & Peterson, 2004). It becomes essential for students to have an active role in constructing their own learning, while the teacher becomes responsible for advising and assisting students throughout the process (De la Fuente & Justicia, 2007). This context of competency-based learning means greater formative knowledge requirements, whether conceptual (knowing), procedural (knowing how), or attitudinal (wanting to do). So it is that, within this new scenario, students have a bigger workload, they must be more responsible and they must be consistently more independent in their learning process. These changes affect how they ought to approach the educational situation, taking into account affective-motivational variables, cognitive variables and strategic variables alike. This new scenario can become a stressful context for students, due to its novelty and to the demands of competency-based learning (De la Fuente, Justicia, Canovas & Trianes, 2004).

It is within this teaching-learning context that we study the different variables that make up the present study, working from two different heuristics: Biggs' 3P Model (Presage, Process and Product) (Biggs, 2001) and the DEDEPRO Model (De la Fuente, 2011; De la Fuente & Justicia, 2007). The combination of these two models offers a framework for analyzing teaching-learning situations and for a better understanding of the structure of existing research and the variables that are being studied. Another reason for adopting both models is their complementary nature.

1. THE 3P AND DEDEPRO MODELS AS RESEARCH HEURISTICS
Biggs's 3P Model

Biggs developed different versions of 3P Model *(Presage-Process-Product)*, the last was improving in 2001 (Biggs, 2001), where the student's perspective of the teaching-learning process was represented. His efforts aim to represent and explain the teaching-learning process in the context in which it develops (Figure 1.1). The model was structured along three moments of time: presage, before learning is produced; process, during learning itself; and product, or the outcome of learning. These three times correspond to the three components for which the model is named (Biggs, 1993):

Presage or *prognostic:* Presage variables are variables associated with a time prior to beginning the teaching-learning process. These variables can be grouped into characteristics that depend on the students, and characteristics that depend on the teaching context.

Characteristics that depend on the students: These include prior knowledge and experiences, cognitive ability or skills, conceptions and usual ways of learning (approaches and styles), and motivational factors, such as expectations and values.

Characteristics that depend on the teaching context: These encompass both the teacher and the institutional system. Here we find objectives, assessment methods, teaching methods, classroom climate and institutional procedures.

These factors interact at the process level in order to determine the student's immediate activities related to learning, as these embody his or her approach.

Process: Refers to how learning tasks are undertaken, that is, the way that the student processes and carries out the task in a specific context. The main factor in this phase is determined by the learning activities that the student pursues. This moment is very important in the Biggs model

(1985, 2005), since it constantly points to the importance of what students do in order to learn. These activities that students carry out will depend on their reflection, including how they perceive themselves, and how they perceive the task and the context in which it takes place. Biggs (1985, 1987) calls this reflection "meta-learning"; it requires a certain amount of metacognition and con-stitutes the more or less conscious awareness and control over one's own learning. As a function of this, students may present different learning approaches in how they go about their activities. Biggs (2005) considers that the activities carried out when addressing tasks will be appropriate when they come from a *deep approach,* and inadequate when coming from a *surface approach*.

Figure 1. 3P Model of Teaching and Learning
Source: Taken from Biggs, (2005, p.38)
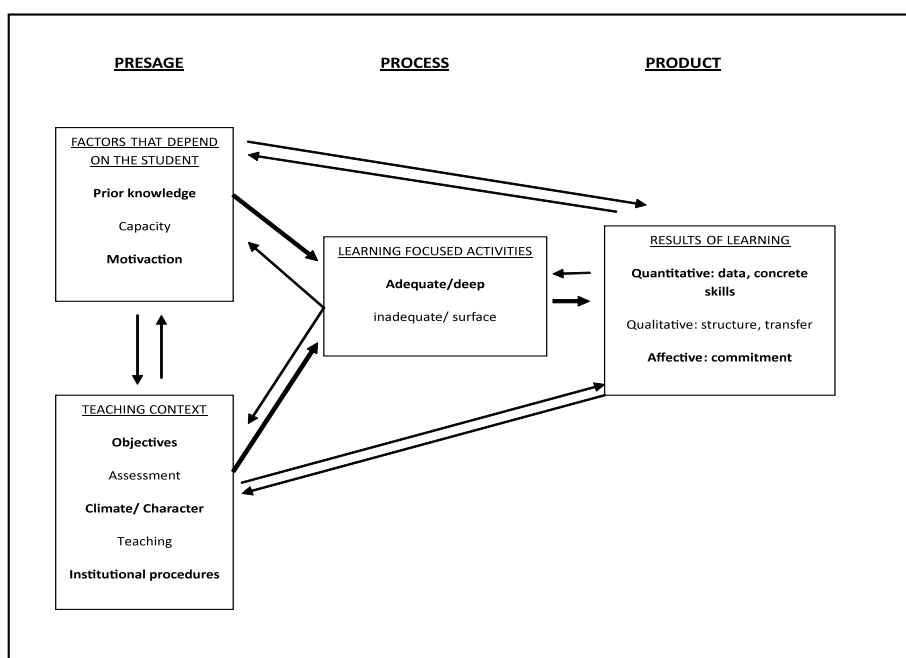
Product: This includes learning outcomes. When we speak of quality learning, we must keep in mind the nature of all kinds of outcomes. Three types stand out:

Quantitative: Quantity of information, data and concrete skills acquired.

Qualitative: Structure/Complexity of thought and transfer of the knowledge that has been devel-oped.

Affective: Satisfaction and commitment to the process on the student's part.

The result of learning is determined by many factors that interact among themselves. The general direction of the effects is indicated by thick arrows (Figure 1): Prognostic factors of the student and of teaching jointly determine the approach that a certain student will use on a given task, which in turn will determine the result. The thin arrows establish a connection of everything to everything, because the components constitute a system, according to Biggs (1993b).

The 3P model presents three elements that can influence the result of learning: a direct effect from the student-dependent factors, another direct effect from the teaching-dependent factors, and an interactive effect from the system as a whole. Each of these ways that learning is determined constitutes a theory of the *modus operandi* of teaching (Biggs, 2005):

Learning as a function of individual differences between the students (level 1).

Learning as a function of teaching (level 2).

Learning as the result of the students' activities, undertaken as a consequence of their perceptions and acquired knowledge and of the total teaching context (level 3).

These different "theories" of teaching are ordered as a function of their complexity and sophistication, hence the use of "levels". Teachers usually adopt these theories during their teaching career, with some teachers progressing to level 3, while others remain at lower levels (Biggs, 1996).

De la Fuente, Justicia and Berbén (2006) make contributions to Biggs' 3P model from an interactive perspective of the teaching-learning process, framed within the new context of the European Higher Education Area (EHEA), and thereby creating the DEDEPRO model: Design-Development-Product (De la Fuente, 2001; De la Fuente & Justicia, 2003, 2007; De la Fuente, Justicia & Berbén, 2006; De la Fuente & Martínez-Vicente, 2004; Justicia, De la Fuente & Berbén, 2007). They respond to two important limitations of the Biggs model (Biggs, 2001): 1) the interactive dimension of the teaching-learning process is only secondary, and 2) the model does not explicitly incorporate the dimension of regulatory teaching and self-regulated learning, two very important variables that are absent from the 3P model. The DEDEPRO model will be further explained in the following section.

DEDEPRO Model

From a more comprehensive perspective of teaching-learning processes, De la Fuente and colleagues (De la Fuente, 2001; De la Fuente & Justicia, 2000, 2007; De la Fuente & Martínez-Vicente, 2004) have proposed an interactive model of teaching-learning, called DEDEPRO, acronym for the phases of Design-Development-Product. Regulation of teaching and learning are assumed, and are expressed in the terms macro-regulation and micro-regulation (De la Fuente, Justicia & Berbén, 2006). This model seeks to integrate conceptual contributions from regulation, keeping in mind both the learning process and the teaching process (De la Fuente, Justicia, 2007). In essence, the model assumes that self-regulated learning should be connected to regulation in teaching. De la Fuente and Martínez (2004, pp. 541-542) have presented the advantages of this interactive approach for both students and teachers:

For *students*:

Access to the teacher's prior thinking is made available.

It anticipates difficulties that may appear, especially in the Design phase.

It develops strategic, conditional knowledge (often difficult for many students to attain), since there is dialogue and discussion about strategic learning decisions: the *why, what for, what, when, how* and *who of learning* and *learning assessment*, instead a single focus on what must be learned. In general, the use of these competencies allows students greater autonomy in meaningful, constructive learning, throughout their lifetime.

For the *teacher*:

It encourages them to follow a process of reflection and metacognitive awareness of the cognitive requirements of the teaching-learning process, by reaching suitable answers to the strategic decisions of teaching: the *why, what for, what, when, how* and *who* of *teaching* and *teaching assessment*.

It promotes anticipation of difficulties that may arise throughout the process and makes preparation of an orderly teaching sequence obligatory.

It helps to modify the possible erroneous and limiting conception of teachers that the teaching process is an independent activity and not interactive in a teaching-learning process.

It helps promote the regulated design of the teaching process, through promoting different strategies to encourage self-regulation in students: an initial assessment and process assessment, making the teaching objectives explicit, and planning for self-regulated educational action.

Develops self-regulation in the teacher in the design and development of the teaching process. On one hand, it helps in designing sequenced teaching activities as a process, and on the other hand, it helps regulate development (implementation) of the process designed, adjusting it to stay on track with the initial proposal.

It helps fill the proposed classroom teaching-learning methodology with cognitive content, avoiding the risk of a merely activistic approach.

The DEDEPRO model (De la Fuente & Justicia, 2007; De la Fuente, Justicia & Berbén, 2006) has appeared in the midst of a changing educational framework, where teaching-learning processes are evolving from a teaching- and teacher-centered perspective, to a different perspective that focuses on learning and the student (Fernández & Fernández, 2006). In this new environment the student needs strong autonomy and independence in order to learn while regulating his or her affective-motivational disposition and cognitive processes.

The DEDEPRO model adopts characteristics from Biggs' 3P Model (2001) and from the Zimmerman and Kintsantas model (1997). The DEDEPRO phases correspond to those established by Zimmerman (2002; p. 67) in self-regulated learning: "preparatory or design phase, execution or development phase and reflection or product phase". The main contributions of DEDEPRO to Biggs' 3P Model (2001) are:

Explicit inclusion of the influence of the teaching process at three moments (presage-process-product).

Division of the *process* phase into two interrelated phases, *design and development.*

Explicit recognition of the interactivity and interdependence of self-regulated learning and regulation of teaching.

The proposed DEDEPRO model establishes that "*self-regulated learning must unavoidably be connected with regulation of teaching, and any intervention must be designed based on this mutual relationship*" (De la Fuente & Justicia, 2007, p. 538). This situation takes shape in an alternative conception of the teaching and learning processes (De la Fuente & Martínez, 2004; De la Fuente, Justicia & Berbén, 2006), described below. This proposed regulation is unlike the traditional concept of regulating teaching in exclusion. It is not a type of regulation that is outside the student, often involving the education of learners who are not self-regulated themselves (Vermut, 1998; Vermut & Verloop, 1999). Regulation in the DEDEPRO model refers to a regulation that creates educational situations with potential for learning. The DEDEPRO proposal involves regulated learning and the encouragement of self-regulation.

The DEDEPRO revised model (De la Fuente, Justicia, Cano, Sander, Martínez & Pichardo, 2003) was proposed as an adaptation and clarification of the models from Biggs (1999; 2001; 2005) and Zimmerman (2000; 2002), including the presage-process-product structure and variables from Biggs (1999; 2001), and the assumptions and before-during-after phases from Zimmerman (2000; 2002). Based on these postulates, the creators of this model (De la Fuente & Justicia, 2007) propose four hypotheses or dimensions:

Dimension 1: Levels of regulated learning. Self-regulation of the learning process has two levels of regulation: *micro-regulation* and *macro-regulation* of learning (De la Fuente, Justicia & Berbén, 2006). *Micro-regulation of learning* is the process of learning involved in executing a specific learning task (e.g. solving a problem, composing an essay, memorizing a list of rivers, etc.).

Macro-regulation of learning can be considered self-regulation of the learning process, in a broad sense, over the duration of learning (e.g. degree program, single year, trimester). *Micro-regulation of learning* is the type and level of regulation that has generated the most research to date (De la Fuente & Justicia, 2010).

Dimension 2: Levels of regulated teaching. Regulation of the teaching process has two levels: *micro-regulation* and *macro-regulation* of teaching (De la Fuente, Justicia & Berbén, 2006). In *micro-regulation of teaching* one considers the variables of the instruction process that are carried out by the person teaching, with attention to execution of specific teaching tasks (e.g. teaching how to solve a problem, teaching how to write a letter, etc.). *Macro-regulation of teaching* is considered to be regulation of the teaching process, in a broad sense, over the duration of the process such as a plan of studies, whether multi-year, single year, etc. (De la Fuente & Justicia, 2010).

Dimension 3: Levels of interdependent, interactive regulation of teaching and learning. An interactive conception establishes the interdependent, interactive nature of the two processes, teaching and learning. This nature is reflected in the phases of presage-process-product. Especially in the development phase of process, there is a need for strategic decisions on the "why, what for, what, how, when, where, and who of learning and teaching, and the why, what for, how, when, where, and who of learning and teaching assessment", demonstrating their curriculum-related nature.

Dimension 4: Points of time in interactive regulation: DE-DE-PRO. This dimension is based on Zimmerman's self-regulation model (Zimmerman, Greenberg & Winstein, 1994; Zimmerman & Kintasas, 1997; Zimmerman, 2000, 2002), and includes the most meaningful and important phases of regulation, both in teaching (teacher) and in learning (student), namely: Design (the beginning and before execution itself); Development (during execution) and Product (at the end and after execution).

This new model takes into consideration some of the criticisms of the Biggs model (De la Fuente & Justicia, 2007; De la Fuente et al., 2006; Lonka, Olkinoura & Mäkinen, 2004; Pintrich, 2004; Vermunt & Verloop, 1999). Among the criticisms that are addressed in the new model are the findings and conclusions from Prosser and Trigwell (1999). More attention is given to the conception of teaching-learning and to perceptions of the learning environment. However, unlike Biggs' 3P Model, the DEDEPRO model gives a more contextual character to these variables, and therefore moves them from the presage moment to the process moment, specifically to the design and development phases, respectively. Vermunt (1998) also analyzed the conceptions of learning as learners' mental models. He analyzed the learning of university students, looking at their conceptions as well as their approaches and self-regulated learning. The studies carried out by Vermunt can be metaphorically considered a "bridge" between students' learning approaches and self-regulation. His findings offer us an orientation that consists of analyzing self-regulation together with learning approaches in the development of the teaching-learning process.

After mentioning some of the criticisms of the Biggs model, we would stress that the DEDEPRO model (Figure 1.2) explicitly includes the influence of the teaching process in both presage and process and also on the product. The influence of teaching at these three moments is to reinforce regulation for the furthering of self-regulated learning. On the other hand, the process moment is split into two interrelated phases: design and development. The *design* variables deal with preparation of learning behaviors, that is, being aware and planning the learning process; the *development* variables deal with control over the activities and execution of the learning process (self-regulated learning behaviors, strategies of self-regulation, self-assessment in the process of self-regulated teaching-learning); and finally, the product variables deal with closure of the learning behaviors (satisfaction with the learning and teaching, and performance). By distinguishing these two phases (design and development) we are able to include new variables and study the process more thor-

oughly, establishing a place for the strong influence of self-regulation and self-regulated learning. After presenting the DEDEPRO model along with its components, we offer a graphic presentation of where our study variables are positioned.

Figure 1.2. DEDEPRO Model in Higher Education
Source: Taken from De la Fuente, Justicia and Berbén (2006, p. 221)
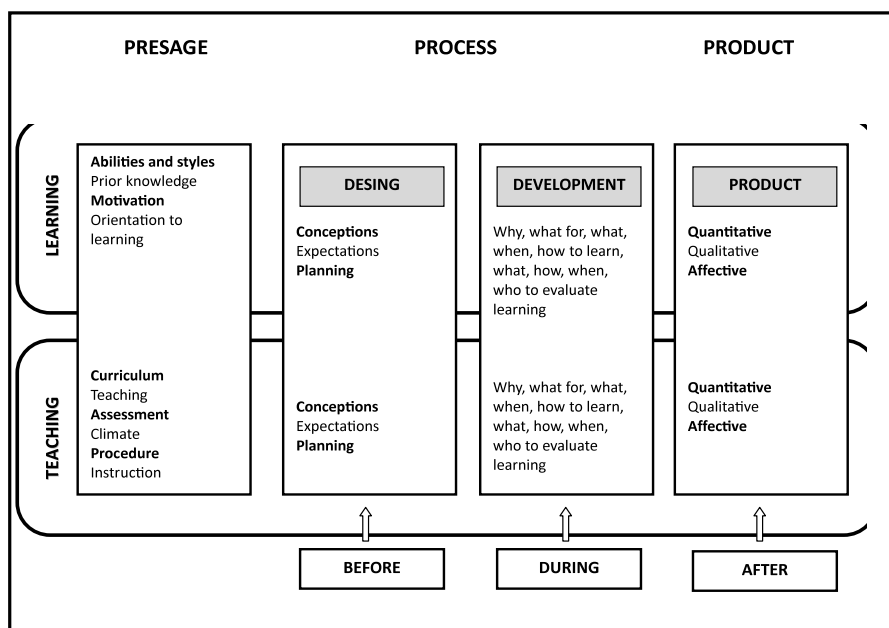
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