

## The Didactic Transposition : Practices and Pedagogical Issues

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**ABSTRACT :** The didactic transposition is a central concept of didactics, the transformation of knowledge in order to teach it. During the didactic transposition, the knowledge learned is desynchronised and depersonalised in order to be programmed and published. To reason the didactic transposition, it is necessary to take into account the concepts : social practices of references, levels of formulation of a concept, student representations and conceptual frameworks.

**KEYWORDS:** Didactic transposition, Memory, Representations, Conceptual frameworks, social practices.

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### INTRODUCTION

The didactic slowly emerges in the educational field by forging its concepts, see its methodology. The concepts of representation, didactic transposition and didactic contract are central to the analysis of the didactic system. They are placed as explanatory to the relations between the three poles, knowledge, teaching and teacher, these concepts borrow largely from, other fields of knowledge, thus placing didactics as a borrower and as a reformer of pre-existing knowledge.

In this modest chapter, we will try to address the concept of didactic transposition, practices and pedagogical issues. Preparing a lesson is probably working on didactic transposition or rather in didactic transposition, it's long ago that didactic transposition has begun.

Knowledge content that has been designated as knowledge to be taught is therefore undergoing a set of adaptive transformations that will make it fit for place among teaching objects, It's the didactic transposition.

First, we will begin by approaching the definition of transposition knowing that it appeared in mathematical sciences for the first time. Then we list its characteristics, namely, de-syncretization, depersonalization, programmability and advertising.

To reason the didactic transposition taking into consideration the social practices of reference, the levels of formulation of a concept, the representations and the conceptual frames, The need to teach is still present in the construction of all knowledge. Finally, the didactic transposition remains a new concept to be clarified and studied further, so that the didactics is enriched in order to improve and facilitate learning.

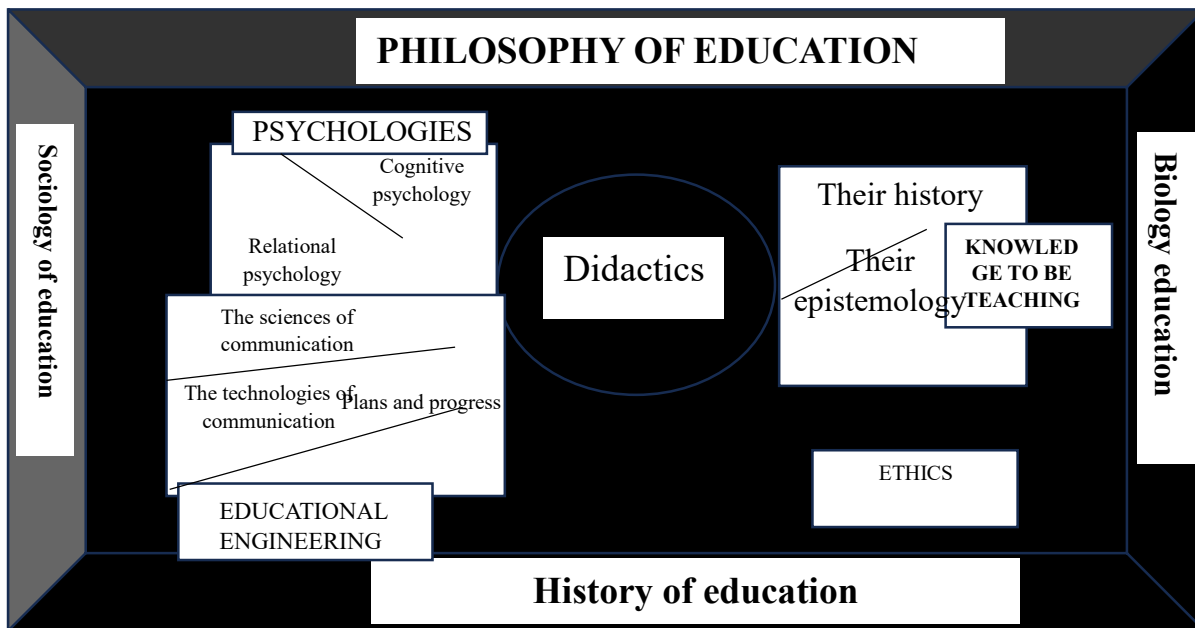


Figure 1. Fields of education sciences interested in the management of school learning

## I. What is didactic transposition?

### I.1. Origin of the concept

Chevallard and M.A. Johsua formalized it in an article on the mathematical notion of distance [1], they examined the transformations undergone by this concept between the time of its introduction in 1906, by Frechet [2], in “the knowledge learned” and its introduction in 1971 into the geometry program, about the right. This example shows that the designation of an element of knowledge as object of teaching changes the nature quite strongly, as far as the questions it solves and the network of relationships it maintains with other concepts are concerned. There is thus an “epistemology of schools” which can be distinguished from the epistemology in force in reference knowledge [3].

In biology, it was G. Rumelhard who indirectly introduced this concept of transposition by studying notions of genetics [4]. Whereas Mr. Develay [5] addressed it directly by taking the memory as an example.

### I.2. A few definitions

Y. Chevallard defined didactic transposition as “the work that makes an object of knowledge to be taught into an object of teaching” [6].

The transition from a specific knowledge content to a didactic version can be called didactic transposition, But the scientific study of the didactic transposition process assumes that this concept is taken into account as follows [7] :

Object of knowledge  $\longrightarrow$  Subject to be teach  $\longrightarrow$  Educational subject

According to Gilbert Arsac, the term didactic transposition refers to the set of transformations that a knowledge undergoes in order to be taught [8].

So the didactic transposition is a set of transformations that undergoes a learned knowledge in order to make it fit and adapted to be a content of knowledge destined for teaching.

I.3. Location of the didactic transposition in the didactic triangle

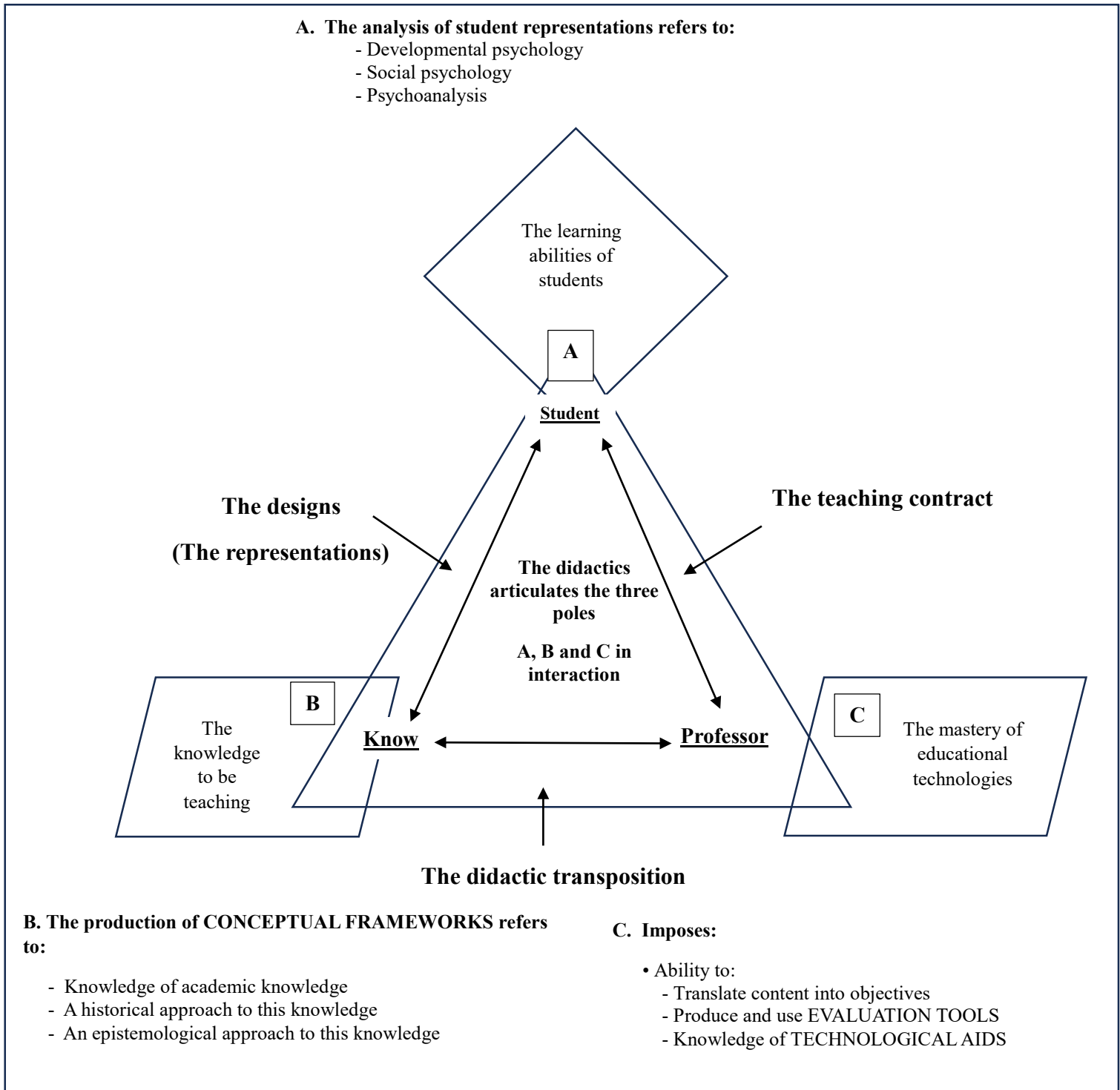


Figure 2. The educational triangle [9]

### I.4. The different stages of didactic transposition

M. Devellay [10] referred to didactic transposition in a much broader sense than the definition proposed by Yves Chevallard (Figure 3)

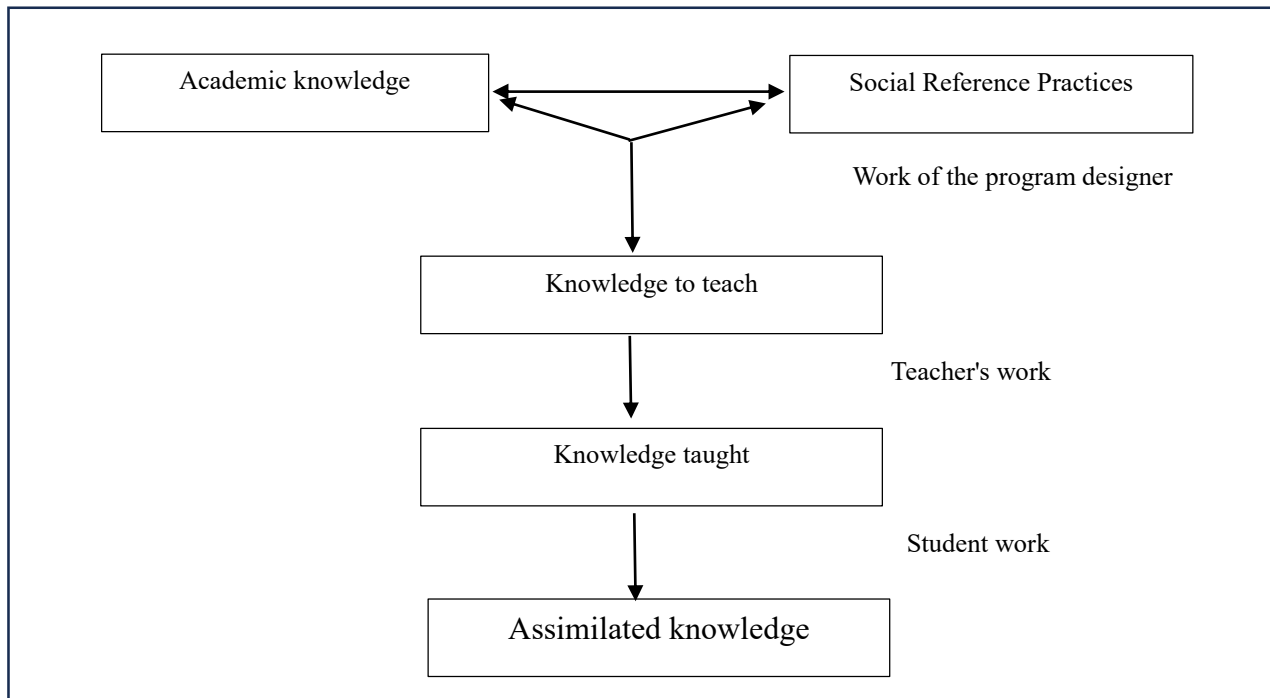


Figure 3. The different stages of didactic transposition [8]

M. Devellay [10] observed that the didactic transposition corresponds to the work which leads from a knowledge to teach (and added from the social reference practices) to stabilize a knowledge taught.

This knowledge to teach, whose soul is found in the official instructions accompanying the programmes, is not necessarily the knowledge taught. It is not enough for a decree that all teachers teach the same contents, give the same importance to all chapters of the programs.

Between teaching and learning, there is also a didactic work by each teacher which is inspired by existing textbooks, the supposed practices of colleagues, recommendations from the inspection bodies, the students' presumed competence, available material and convictions.

Between the knowledge taught and the knowledge assimilated by the student, there is a work of application, Diy, reinvestment or transfer.

### II. The characteristics of didactic transposition

Four constants seem to characterize the didactic transposition work: the desyncretization and depersonalization of scientific knowledge, to allow for the programmability and publicity of knowledge to be taught (Figure 4)

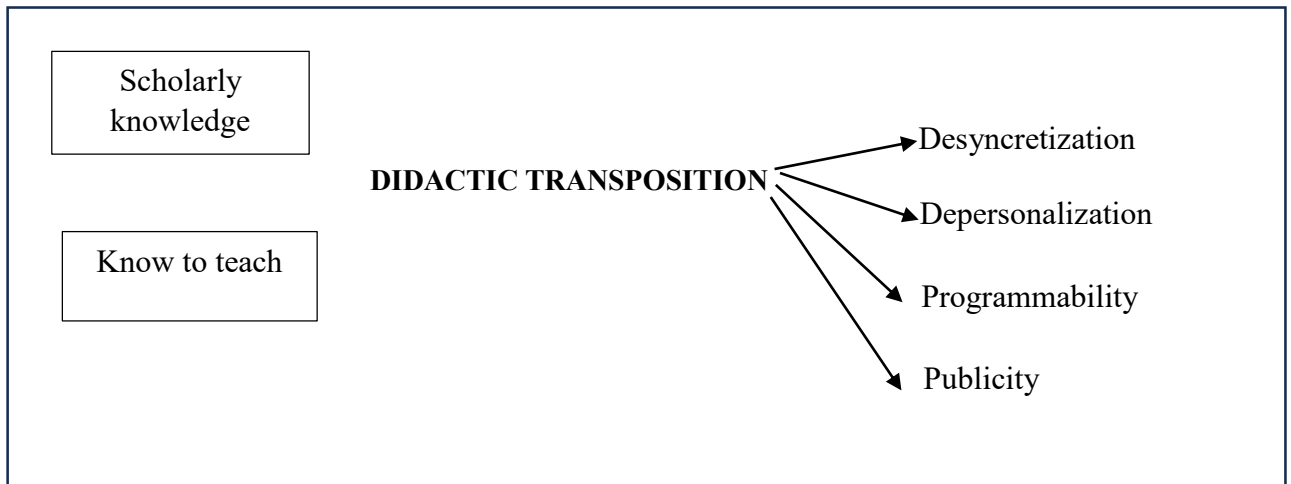


Figure 4. The characteristics of didactic transposition [11]

Michel Verret [12] writes:

1. The division of theoretical practice into delimited fields of knowledge leading to specialized learning practices, that is to say the de-syncretization of knowledge;
2. In each of these practices, the separation of knowledge and person, that is to say the depersonalization of knowledge;
3. The programming of learning and controls following reasoned sequences allowing a gradual acquisition of expertise, that is to say the programmability of knowledge acquisition. It assumes that the transmission:
  - ✓ The explicit definition in understanding and extension of knowledge to be transmitted, that is to say the publicity of knowledge;
  - ✓ The regulated control of learning following verification procedures allowing the certification of expertise, that is to say social control of learning.

### III. The impact of didactic transposition

#### III.1. Desyncretization and Depersonalization

The desyncretization and depersonalization of scholarly knowledge lead to ignoring the context and conditions of its emergence, to de-historicize it.

All knowledge is the answer to a given question, this question is sometimes complex, borrowing from various fields. The knowledge produced sometimes answers only part of the initial question. Often, the knowledge produced is a reconstruction after the fact.

All knowledge is the fruit of a research, ignoring the conditions of this research, it is to remove the tâtonnements, false tracks and the concrete situation from which this knowledge emerges.

Jean Bernard recalls, in “the blood of history” [13], that the study of blood is not only about physiology, biochemistry and medicine but also about anthropology, genetics and history.

There is a total absence of interdisciplinarity in the programmes to be taught at the secondary school: the study of the indoor environment or of immunology in terminal refer only to biochemistry or physiology. All knowledge is the fruit of research following a questioning, led to an era by a person, erase the person to retain only the result of his research, To de-personalize the production of knowledge is to refuse to evoke personal motivations, it is to place knowledge in an extratemporal situation, in a quasi-spiritual situation.

In biology: in school books, knowledge is rarely personalized. Thus, in the terminal biology books (J. Escalier collection in 1983), protein biosynthesis is developed without a single name of researcher being indicated.

### III.2. Programmability of knowledge

The programmability of knowledge is inherent in the school's function, which is to program, to consider the succession of contents, according to an order of increasing difficulties. This programmability of knowledge suggests that some concepts should be taught before or after other concepts, The logic of knowledge alone determines the succession of learning.

Example: Genetics appears in the knowledge to teach only in terminal, even if very early questions arise about it, the student in basic education, which asks the question: Why does the rabbit always give a rabbit? The programmes say he will have to wait a long time for an answer to his question.

### III.3. Publicity of knowledge

The publicity of knowledge implies that «since the knowledge to be transmitted is explicitly defined, there is a possibility of social and legal control of the students' learning».

- If the knowledge to be taught is specified by the curricula, the knowledge taught is the sole responsibility of the teacher;
- If there can be an advertising of the knowledge to teach, there is only exceptionally an advertising of the knowledge taught, However, the non-publication of the knowledge taught poses a problem for students.

## IV. Thinking through didactic transposition

It is to take into consideration the aims and requirements of society towards the subject to be taught, it is to avoid the effects of dogmatization, while exercising vigilance during the training.

Reference social practices, the levels of formulation of a concept, representations and conceptual frameworks, with other determinants, This should be taken into account during curriculum development.

### IV.1. Social Reference Practices

This term, borrowed from Jean-Louis Martinand [14], refers to various social activities (research, production, engineering, domestic and cultural activities). This term can be understood as a critique of didactic transposition, if it is limited to the «text know», without considering the corresponding activities. The idea of social reference practices allows us to think about the various characteristics of a reasoned transposition :

- The subject of work: is it the empirical field which constitutes the background of real or symbolic experience on which teaching will be based?

In biology: the social practices of reference for the student can be those of the gardener, the doctor, the botanist...

- The problem we wish to address: what is the question that we propose to have studied? Each empirical area on which teaching is based corresponds to the resolution of different problems ;
- Social attitudes and roles: what image of science and scientific activity is intended to be provided to students through the practices offered?
- The corresponding material and intellectual instruments ;
- Knowledge generated at the end of the activity that allows the problem to be addressed.

Scholastic knowledge and social practices are therefore at the origin of school knowledge, a double work allows this filiation (Figure 5) :

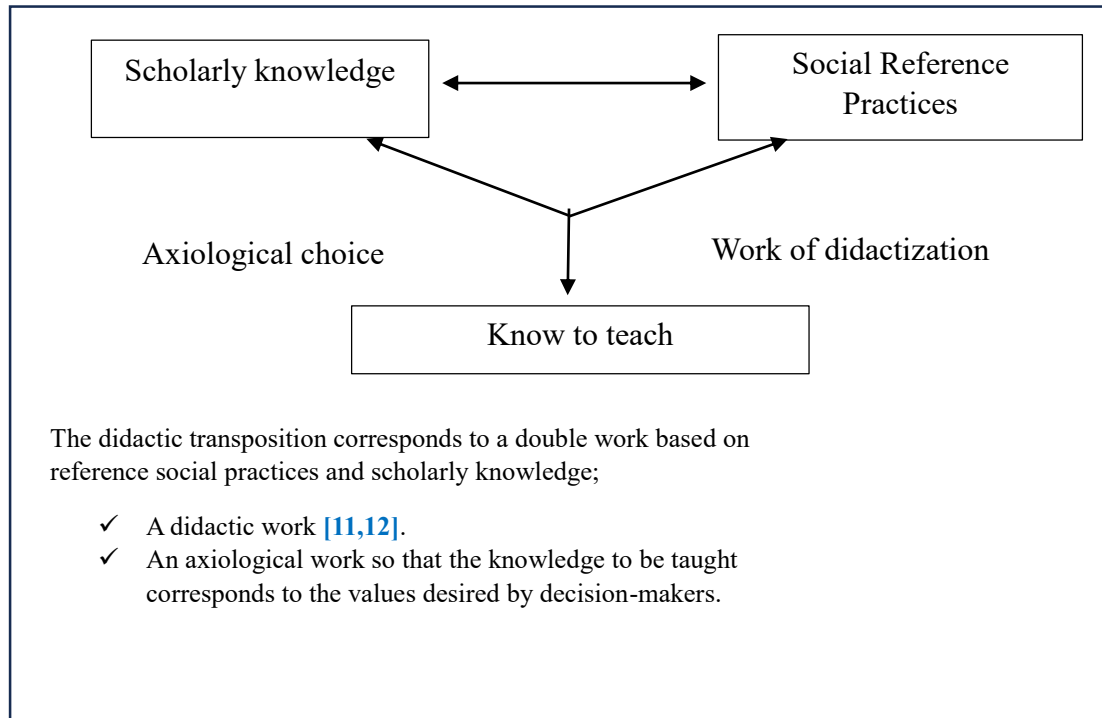


Figure 5. The didactic transposition [11].

On the one hand, a didactic work that it is desirable to de-personalize, that it does not de-synchronise knowledge and leads to a revised programmability in the sense of networking knowledge and not linear exposure, and that it also promotes the publicity of the knowledge to be taught and the knowledge taught.

On the other hand, a work of axiologisation, all academic knowledge corresponding to values claimed by decision-makers.

Values in education are most often attached to teaching methods, the methods allowing the appropriation of knowledge by the student and not only its reception, develop a critical spirit, a sense of common work...

The contents are bearers of value, these contents which refer to the origin, to a social demand bearing values, are sometimes left to be transformed into school knowledge.

### IV.2. Levels of concept formulation

One of the problems that arise on the didactic transposition, It is the adaptation of formulation of levels of a concept with the cognitive structures of the student according to the different stages of schooling.

The formulation of these levels of a concept gives statements that differ on several levels:

1. Linguistically: they differ in lexical complexity from greater to lesser (even regardless of terminology);
2. On the psychogenetic level: they can be prioritized according to the complexity of the logical-mathematical operations that their understanding implies (reversibility, reasoning, type of causality, modelling);
3. Epistemologically: each statement can be made to a problem, either explicit or implicit. When translating, make sure that scientific statements function as real concepts instead of using them as “blocks of knowledge” The Commission has already drawn up a list of the types of aid which can be applied in accordance with the rules.

The discontinuous nature of the construction of concepts must be illustrated with the ideas of epistemological obstacles and epistemological ruptures.

Thus, registers of formulation of concepts simultaneously allowed teachers to better identify their levels of demand and to implement strategies for didactic differentiation according to the students' levels.

Example in biology: we can define the concept of respiration as:

- Ventilation
- Gas exchange
- Oxidation-reduction mechanism

### IV.3. Conceptual frameworks

The conceptual frames are organized and distributed in the manner of a network or a frame that has multiple inputs and allows modulated paths.

1. It is a set of statements, all related to the same concept;
2. These statements are organized according to the logical links that appear when confronted: each preceding formulation constitutes for the following a condition of possibility of a pre-development required;
3. The whole is a focused network.

The usefulness of conceptual frames is twofold:

- It provides a benchmark that guides learning more effectively;
- It allows to organize as a structure, the school learning, it constitutes a reference table allowing to point out the acquisitions of the pupils.



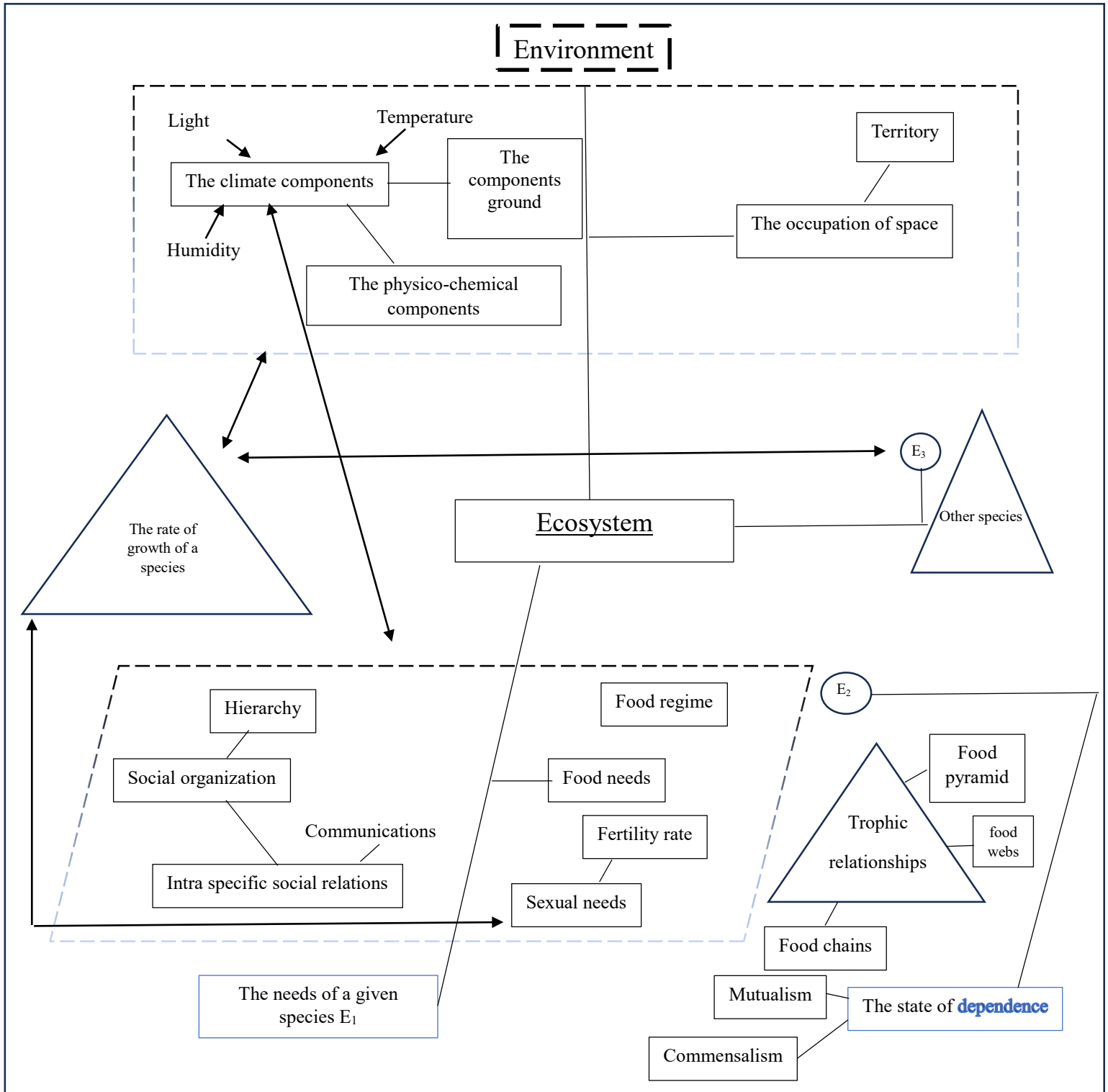


Figure 6. Example of conceptual frames in biology

#### IV.4. The Concept Representation

It is a nomadic concept that borrows from various fields of knowledge:

For D. Jodelet : The representation is “a form of knowledge, socially developed and shared, with a practical and common aim to construct a reality common to a social whole” [15].

For J. Piaget [16], it is “the world representation and moral judgment in the child” and four elements must be dissociated (Figure 7) :

- ✓ The real as perception gives it to see;
- ✓ The concept that targets the real ;
- ✓ The mental image that corresponds to the way in which the subject imagines the real in his absence ;
- ✓ The intermediate representation between the figurative function of thought producing mental images and the operative function of that same thought, producing concepts.

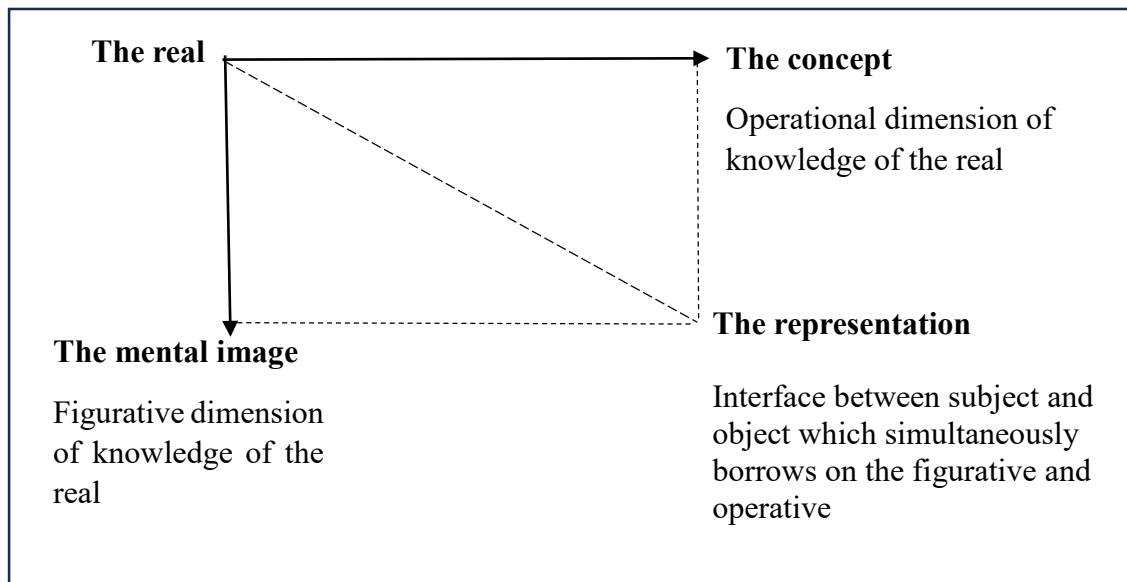


Figure 7. The four elements of the concept representation [17]

Jean Migne [18] defines representation as “the way in which a given individual, at a given time, in a given situation mobilizes his prior knowledge.”

Figure 8 shows the operation of the representations:

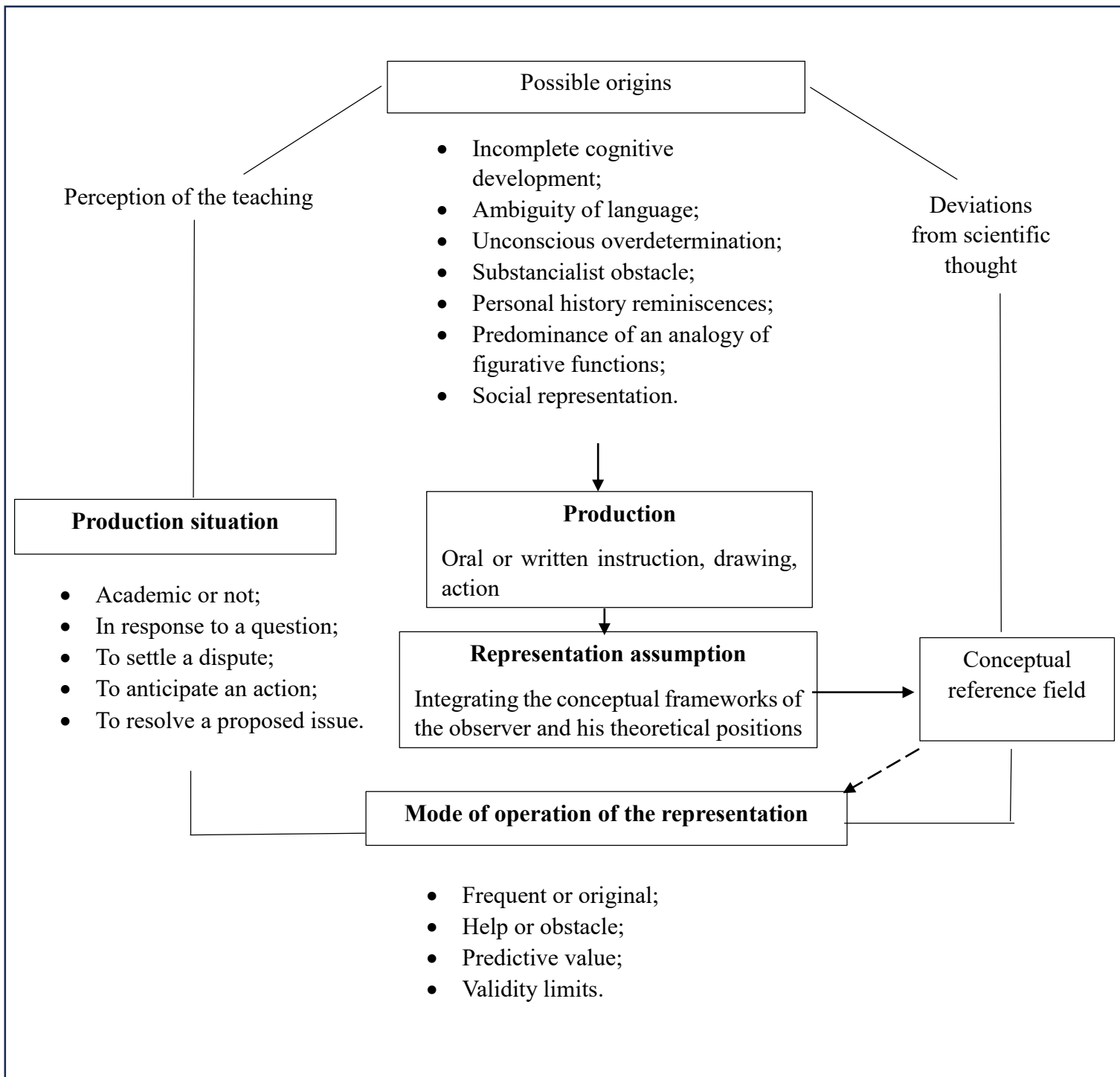


Figure 8. Mode of operation of representations

So during the didactic transposition, Representations must be approached as the explanatory system of the subject that is to be understood and analyzed in terms of obstacles or support point to reach the concept.

The representations, by their social dimension, are likely to correspond to the field of experience, information and behaviour of the social environment of the learner.

To reason the didactic transposition, it is necessary to take into account three main issues in the studies of representations:

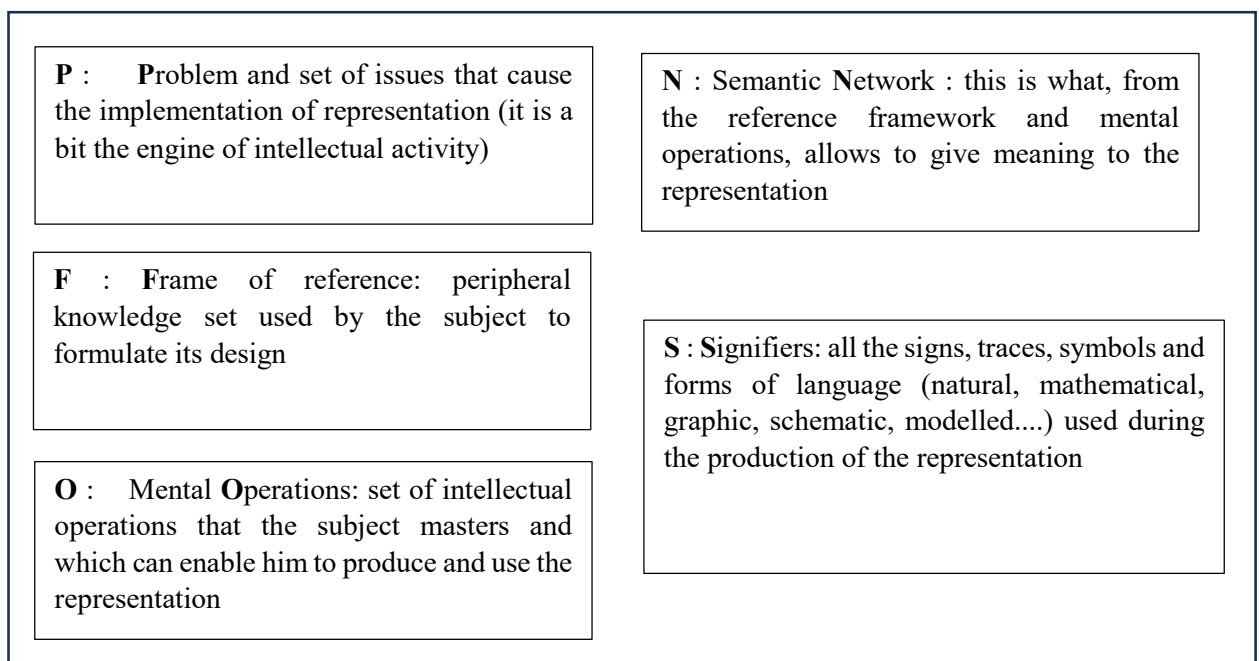
Aim at mapping representations: by questionnaire, interviews, drawings. It is a question of determining the most frequent pre-notional geography of students, useful to know the starting point of a teaching.

1. Search for causes and origins: through multi-reference guidelines:
  - Psychogenetic orientation;
  - Historical orientation;
  - Sociological orientation;
  - A psychoanalytical orientation.
2. Hope for an explanation: thinking of the representation as a point of balance of the cognitive structure of the individual at a given moment, in front of a well-contextualized situation.

According to Giordan [19], the development of a representation or design, The process of learning is a general one and requires the intervention of several components that he has modelled by the following equation:

$$\text{REPRESENTATION} = f(\text{P. F. O. N. S})$$

These different components work interdependently and are partially superimposed, as shown in the compartmentalized model (Figure 9) :



**CONCLUSION**

Figure 9. Components of a representation

Mastery of the knowledge is based on the level of concepts to be understood, the relationships that exist between them, the obstacles that these concepts have created, the ruptures that have affected them over the course of history as well as the knowledge and mastery of educational technologies (ability to set objectives, knowledge of assessment procedures, knowledge of computer and audio-visual teaching aids). The main fields of investigation for teaching are the following. The research areas open up as the didactic transposition is under development.

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