THE REPRESENTATIONS OF STUDENTS, AS A MEANS OF PRACTICAL KNOWLEDGE, AND THE LEARNING OF SCIENTIFIC KNOWLEDGE AT SCHOOL

MARY RANGEL

Universidade Federal Fluminense
and Universidade do Estado do Rio de Janeiro, Brazil

Abstract: This study deals with different concepts of representation, emphasizing the perspective of Social Psychology for the aid it can give to the understanding of the importance of considering, in teaching, concepts and images formed by the student in his daily life. This importance happens in order to facilitate and also to surpass perceptions, and finds theoretical support in epistemological and didactic discussions of the teaching-learning process.

The analysis of the relationship between the representations of students and the learning of scientific knowledge in school incorporates some aspects of the discussion of the meaning of social representation in the formation of concepts and images that express common sense practical knowledge and its relationship with scientific knowledge.

With this in mind, the present study deals with different conceptions of representation, highlighting the Social Psychology point of view, due to what it can add to the understanding of the importance of taking into consideration, in the actual teaching situation, the concepts and images formed by the students in their daily life. This is important in promoting, as well as surpassing, their perceptions, and it is theoretically based upon epistemological and didactic discussions of the teaching-learning process.

CONCEPTS OF SOCIAL REPRESENTATION

In understanding social representation, one can highlight some points that are particularly polemical: the relative indefiniteness; the diversity of notions, according to the perspective and field of study; the non-equivalence, as stated by Moscovici (1978), to ideology, myth and social imaginary.

As regards to the indefiniteness, it is interesting to notice what Moscovici (1978) states: "although the reality of social representations is easy to apprehend, the concept is not" (p. 41). Confirming Moscovici (1978), Ibánez (1988) records the diversity of factors that influence representations, and considers it inconvenient to have a definition.

> In effect, the type of social reality that the concept of social representation indicates is well tied by a group of elements of very different nature: cognitive processes, social introductions, affective factors, value systems... that should fit, simultaneously, the conceptual instrument used to make it clear. It is easy to understand that we should not risk, in these circumstances, to suggest a clear, precise, and concise definition of social representations... Definitions have never been a very interesting procedure to account for a concept or a social phenomenon, but in this case we have not even tried it (p. 32-33)."

Thus, social representation – while practical, common sense knowledge – does not have a definition, in the strict sense of the term, whether in Moscovici (1978; 1981; 1984) or in the authors that discuss it from his presuppositions, as Jodelet (1976; 1989), Vala (1986), Gilly (1980), Ibánez (1988), Mugny & Perez (1988), Spink (Org. 1993), De Rosa (1993; 1994), Duveen (1993; 1994), Sá (1993; 1995).

In Social Psychology investigations, one can find references to the understanding of representations in Moscovici, emphasizing – as in the research by Leme, Bussab and Otta (1988) – the formation and spreading of concepts which circulate in "daily life".

> Social representation is a set of concepts, explanations and statements that originate in daily life, in the course of individual communications (Moscovici, apud Leme, Bussab, Otta, 1988, p. 30).

This same understanding can be found in authors such as Jodelet (1989), in whom one can notice the emphasis on the notion of practical knowledge shared by social groups.

> Social representation... is a form of knowledge, socially elaborated and shared, that has a practical view and helps the construction of a reality common to a social whole. (p. 36)

However, it is wise to caution that the study of social representation offers a possible approximation (and evidently, not the only one) to the question of practical, common sense knowledge. In this regard, it is also worth emphasizing that this approximation, in Moscovici (1978) – specially through the analysis of the relationship between social representation and scientific knowledge – brings with it meaningful elements concerning its application in the teaching-learning process.

Still in what regards the understanding of social representation, it is important to discuss some theoretical information.

One can thus point at the interconnection between concept and image in expressing representations. Concept and image are presented as "two sides" of the same "sheet of paper" (Moscovici, 1978). When an image is formed, there is the objectification (concretion) of concepts. As Ibánez says (1988) *"images help people form a less abstract view of the represented object" (p. 48).*

Together with the objectification mechanism, there comes the tying or anchorage. Through this mechanism, new information is assimilated (or adapted) according to the representations of subjects and, therefore, with the concepts and images already formed and consolidated.

Objectification and anchorage are mechanisms of formation and also of preservation of the representations.

The non-equivalence to myth is one of the points brought out by Moscovici (1978). To classify representations as non-mythologic means, according to the author, disqualifying them because they do not reach the degree of rationality and conscience of the elites.

It is also interesting to consider the principle that the representations correspond to the needs and practices of groups, which allows one to conclude that they are not, necessarily, distorting reality and circulating ideology.

However, one needs to consider that the relationship between ideology and representation refers to complex issues that are formulated from the concept itself of ideology, including different elements, such as those relating to organic ideology and its implications in social formation of knowledge. These implications are further studied, for instance, by Baczko (1985) and Ansart (1977), that have a Marxist point of view in the study of social representations.

Thus, from perspectives such as those sponsored by Baczko (1985), representations are associated to "imaginary productions" such as "answers given by societies to their unbalance, to their tensions inside their social structures, and to their occasional violent threats..." (p. 308).

One arrives at the conclusion that *in dealing with social representation, it is necessary to recognize the diversity of notions, according to perspectives and fields of study.*

In discussing this diversity, Spink (1993) observes that, in the Social Sciences, the influence of context (material, economic, functional) is emphasized in the formation of representations, and one can notice little preoccupation with cognitive processes. In this field (in which the Marxist point of view is emphasized) representation is associated with ideology.

In Cognitive Psychology, however, the emphasis is on the cognition process. In this perspective, little attention is paid to the affective and social components of the representations.

In Social Psychology, one takes into consideration social, cognitive, affective, psychological and cultural factors of the representation, identifying it as practical knowledge in which concepts and images are formed and circulated (through interaction and social communication) that reflect facts and are reflected in the actions.

In the domain of Social Psychology, formulations about representations begin with Moscovici in the early sixties, starting from the notion of "collective representation" in Durkheim (1967). From the "collective representation" in Durkheim to the social representation in Moscovici, its understanding has developed, surpassing the limitations of a reproduction and advancing the possibilities of re-elaborating concepts in practice, in the concrete daily situations. *In this perspective, one can thus find subsidies for the analysis of the relationship between the concepts and the images formed by students (in their practice, in their daily life) and the learning of scientific knowledge in school.*

RELATIONSHIP BETWEEN SOCIAL REPRESENTATION AND SCIENTIFIC KNOWLEDGE

The relationship between social representation and scientific knowledge was one of the points that Moscovici (1978) emphasized very much in his study about the

representation of Psychoanalysis. The examination of this relationship, in this study, allows one to notice some aspects, as presented below.

One understands in Moscovici (1978) that social representation means, for the subjects, a way of understanding and "dominating" the knowledge that "affect" them (p. 21). This understanding and this "domination" become necessary, when one considers the "amount" of knowledge that is "strange" to the experience, to the situations lived in daily life.

It is noticed that representations also constitute a form of perception and interpretation of scientific knowledge, a way of making it become "familiar".

Moving on with the examination, one notices in Moscovici (1978) that the representation of scientific knowledge implies the re-elaboration of this knowledge in practice, in the *personal experience of the subject.* It is within this meaning that one has the *penetration of science* in the *laboratory of the society.* This re-elaboration – which is also associated with the recreation – is typical of the *movement in which scientific discoveries are socialized.*

When speaking of the representation of "scientific knowledge", Moscovici (1978) explains that he is not dealing with the vulgarization, but rather with the "popularization" of this knowledge.

Aiming at observing the "popularization of scientific knowledge" in a teaching-learning situation, an "exercise" was carried out in order to perceive concepts and images formed by students (spontaneously, without the influence of any theoretical studies) about "electricity".

The technique of word association (Bardin, 1979) was used with a group of 250 first and second year students in secondary government schools in the city of Niterói (State of Rio de Janeiro, Brazil). These students (who had not yet started studying theoretical concepts of electricity) were asked to write words that came to their mind (according to their experience, their daily life) in relation to this "object" of scientific knowledge.

The analysis of the results obtained in this exercise, as regards the concepts and images shared by the group (considering those mentioned by the absolute majority of subjects), has revealed the following concepts and images: light, heat, expensive (referring to cost), shock, cold, lightning, darkness, fear. These concepts and images (although research on representations was, obviously, not the aim, since it would require a broader study) help one to understand how "the implementation" in "daily life" comes about, that is, how the "popularization" of scientific knowledge happens.

The situation exemplified also encompasses the reference by Moscovici (1978) to the importance of the realization, through the study of conceptions formed in daily life, of the problems faced by society.

It can thus be understood that practical knowledge (its formation and concepts) brings with it an abundance of data for the building up of scientific knowledge, taking into consideration the social interest that guides this building up.

An exchange has been established in the relationship between scientific knowledge and practical knowledge, and in this exchange both are modified.

"This spread of scientific knowledge has been conceived, many times, as an 'imitation' of the elite who knows by the masses who ignore. We are closer to the truth when we see an exchange there thanks to which experiences and theories are modified qualitatively both in their reach as well as in their content" (Moscovici, 1978, p. 28).

These reflections endorse the importance of the consideration due to the *subject* to whom scientific knowledge is aimed at; and this consideration – specially in school – leads one into observing his interests and his means, conditions, possibilities of understanding and/or application of this knowledge

Science will be *absent* from the universe of these subjects if it eliminates them, that is, if they are not allowed, somehow (in some respect) to *recognize* themselves in it. In such case, scientific knowledge will be absent from the universe of the subjects and will have an *outside* nature for them, because it really does not belong to them but rather to the *specialist.* Thus, there is particular significance in the idea that representing is, for the subject, an attempt to reach the knowledge, bringing it to their *"inside universe":*

> "The notion of representation still eludes us. However, we come close to it in two ways. First, when we state with precision its nature of psychic process that is able to make familiar, place, and make present in our inside universe that which is found within a certain distance of us, that which is, in a certain manner, absent" (Moscovici, 1978, p. 62).

The relationship between representations and science becomes clear, therefore, in Moscovici (1978) through the understanding that, when they represent, subjects bring scientific knowledge into their world, into their communication process, into their experience. It is in this meaning (through representation) that popular knowledge of scientific knowledge happens. It is also in this meaning that one can reflect about the relationship between the representations of students (the concepts and images formed in their daily life) and the learning of cientific knowledge in school.

The Concepts and Images Formed Regularly by Students and the Learning of Scientific Knowledge in School

In order to consider the possibilities of didactic use of the concepts and images formed, regularly, by students, perceiving them as elements of reference to the learning of scientific knowledge in school, one needs to consider the relationship between school knowledge and scientific knowledge. One of the perspectives of this relationship points at the understanding of school knowledge as a way or organizing and systematizing (in the curriculum) scientific knowledge, taking into consideration the students' learning circumstances and the socio-political goals of the teaching.

When dealing with learning, it is interesting to stress the idea that one of the roles of the didactic process is to make theoretical knowledge available and to deal with it in a way that it is meaningful to students.

This way, the consideration of the concepts and images formed by students in practice, in their "daily life" experiences, may shed some light on the directing of new notions (since, in principle, those were absent from their "interior universe"), contributing to the goal of making them more readily available and dealing with them in a more meaningful way to these students.

On the other hand, one needs to take into consideration the surpassing of practical knowledge, putting the concepts and images that students bring with them from their own experience through a critical examination with views to their surpassing. It is within this

meaning (surpassing) that these concepts and images constitute important references in the teaching-learning process.

The concepts formed in everyday life thus bring into the teaching process elements (from the experience and interest of the students) that are appropriate to the explanations and exemplification of new notions and to the theoretical reconstruction of previous practices. It is with this interest that the teaching of the theoretical concepts regarding electricity can be substantiated by the practical knowledge about it, establishing meaningful relationships with concepts and images previously formed by students.

In this respect, it is worth remembering the meaning of the anchorage mechanism and of the exchanges that are established between the objects already represented by students and the (new) objects of school knowledge.

> "... in order to go into the universe of an individual or group, the object enters into a series of relationships and articulations with other objects that are found there, and it assumes the properties of those objects and adds their own to it" (Moscovici, 1978, p. 63).

Other than the anchorage mechanism, one can also consider, in the teaching process, the objectification mechanism, observing the actualization of concepts into images and the possibilities of, with their aid, making abstract notions clearer.

Considering, once more, the example of electricity one can also notice that the mention of concepts and images such as *expensive* (high cost) and *darkness* (lack thereof) offers the teacher the opportunity of broader reflections that can (and should) reach social, economical, and political questions related to this "object" from Physics in its relationship with the society at which it is aimed (in its principle and its use).

The attention paid to the practical knowledge of students finds support in the didactic principle that recommends the qualification of their experiences, their ways of understanding, their language, and the (real) situations in their daily lives. This didactic principle is present in studies that are related to the teaching-learning process due to technical-pedagogical questions, such as Nérici's (1980) and Schmitiz's (1980), and in those that establish this relationship by extending the meaning of this process by means of its socio-political dimension, such as the ones carried out by Libâneo (1990), Veiga (Org., 1994) e Rays (Coord., 1990).

We stress, therefore, the idea that one should start from the representations of students – *and break them up* – stimulating and facilitating a more elaborate understanding of knowledge. Thus, one surpasses the practical, common sense knowledge, aiming at moving forward towards "more critical and disciplined forms of knowledge."

> "Thus, the school is, basically, the institution where, starting from a subject that knows something through common knowledge, through experience, and through living with it daily, one tries to enlarge and develop more critical and more organized forms of knowledge" (Frigotto, 1993, recording)

These considerations assert that one should *think the practical knowledge of the student* – the concepts and images formed and consolidated in practice, in "daily life" – *as an important reference to the act of teaching and learning, whether in the sense of facilitating learning or in the sense of surpassing concepts.*

The importance attached to the practical knowledge of students, confirmed by means of epistemological analyses, observing that *"the understanding of the world – as knowledge – happens in both simple, day-to-day situations and in complex situations in*

*scientific laboratorie*s" (Luckesi et al., 1990, p. 51). One should also notice that Libâneo (1990), when commenting on Lefebvre, discusses the principle that *"all knowledge, before reaching theoretical knowledge, begins by the practical experience"* (p. 216).

Moscovivi (1978) states that *"... the transformation of indirect knowledge into direct knowledge constitutes the only way that we can approach the exterior universe"* and Marques (1990) calls our attention to the fact that *"the face-to-face of the educational relationship does not happen in thoughts abstracted from their vital context..."* (p. 165).

So, be it in the study of social representation (in the aspects related to the formation of practical knowledge), be it in the didactic discussion (from different perspectives, such as those of Nérici's, 1980 and Veiga's, 1994), or be it in the epistemological discussions of the teaching-learning process (in Frigotto, 1993, Luckesi et al., 1984, Marques, 1990, Libâneo, 1990), one can find questions that argue in favor of the didactic use of the concepts and images formed by students in their daily life, understanding them as the "starting point" for the learning of scientific knowledge in school. On gathering theoretical elements regarding this understanding, resorting to the study of social representation, it is expected that this text can stimulate the attention to this kind of study, leading to the debate (and the criticism) of the possibilities of applying its elements of reference to the teaching and the research in education.

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Mary Rangel
Rua Aymorés 99
24360-360 São Francisco
Niterói, RJ
Brazil