How Morocco’s Secondary School Students Classify Animals

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ABSTRACT

Bringing out the misconceptions is a primordial process in teaching and the learning of biology. This article aims to highlight Moroccan students’ alternative conceptions, regarding animal and to elicit their ability to classify some animals. Data was collected using the Animal Classification Test (ACT) distributed at the Moroccan secondary school at the Tangier-Tetouan regional Academy of Education And Training. The results obtained showed that students have real obstacles to classify even most known animals (goose, butterfly, crocodile, etc.). These obstacles are often misconceptions and were poorly treated and reformulated by the teaching-learning process. In fact, many students used “non-taxonomic” criteria, such as habitat and locomotion to classify animals even after learning the categories of the biological taxonomy. In addition, this article finds that high school students have almost the same alternative conceptions about animal classification as the intermediate secondary school. This result confirmed that alternative conceptions are more resistant to change and persist anchored on student’s mind even after teaching-learning sequences.

KEYWORDS
Animal Classification, Misconceptions, Secondary School, Taxonomic Criteria

INTRODUCTION

The study of pupils’ misconceptions became an essential subject in didactics of the biology. These misconceptions are also appointed representations, preconceptions or alternative conceptions (Gilbert and Watts, 1983). These notions are at the origin of obstacles for learning. Several studies showed that pupils(students) develop alternative conceptions before and during their school path (Driver, 1981; Bell, 1981; Bell and Barker, 1982). The alternative conceptions developed before and during the first school years and persist relatively unchanged in the adulthood; named alternative stable conceptions (Arnaudin and Mintzes, 1985). Other misconceptions are progressive alternative conceptions seem to give in more easily to the formal teaching and/or to the no scholar experiences. In this sense (Markle and Tieman, 1970) suggests that it is possible to define clearly concepts such as “insect” or “element” in terms of attributes which define them. A non-example is then all which excludes one or several of these attributes: treat a non-example as an example allows to post a misconception. The same argument developed by (Herron et al., 1977) showing difficulties to perceive the attributes.

Previous studies showed that the pupils develop often poorly structured alternative conceptions coming from the outside world and either from the school (Gilbert et al., 1982; Osborne et al., 1983) They are due to the inadequate construction of the concept, the cognitive deficiency either of a
bad teaching. In fact, the individuals generate their own alternative conceptions from an essential, inevitable and desirable feature of the personal experience (Kelly, 1955). They are immature, naive knowledge and less developed than a concept (Driver and Easley, 1978). In this sense, (Hewson, 1981) talked about preconceptions as being a reflection of the real status of own word for an individual person. Thus, these misconceptions are accessible by the verbal and not verbal person actions, often in answers to particular questions (Gilbert and Watts, 1983).

Other studies indicated that the pupils of the primary school until the secondary high school having a restricted vision according to the classification of animals (Trowbridge and Mintzes, 1985; 1988; Mintzes and Trowbridge, 1987; Braund, 1991). Besides, the pupils classified vertebrates in particular mammals better than invertebrates, and several alternative conceptions emerged during the distinction between them (Braund, 1998). Indeed, vertebrates are animals having heads and well-defined members; invertebrates possess soft or long bodies; the starfishes and the jellyfishes are fishes; the tortoises and the lizards are amphibians; frogs are reptiles and the penguins are mammals (Trowbridge and Mintzes, 1988; Braund, 1998; Yen et al., 2004). In addition, the penguin is badly classified most of the time as a mammal by the children between 12 years old and 15 years. The justifications used by the young children to classify the penguin as mammal are distributed between the covering of the body, the viviparity and the homeothermy (Trowbridge and Mintzes, 1988). The pupils, also, attribute the concept of amphibian to the tortoise as a descriptor of the lifestyle.

Identifying how the pupils classify animals by applying their own criteria and categories is essential. These personal classifications are more interesting and allow to improve the teaching-learning process of the biology by taking them into account during the planning and the management of the didactic situations. Nevertheless, if the teachers neglect these alternative conceptions, will be incapable to overcome the difficulties that the pupils have to understand and to apply the biological classification. These difficulties cannot be caused by an overdrawn generalization or a logical thought, but can be due to the conflict between the biological and the elementary and/or personal of the pupils (Kattmann, 2001). For that purpose, the performance of the pupils to classify a collection of animals, by basing itself on taxonomic criteria (acceptable biological criteria by scientific community), is poorly (Braund, 1991). This result indicates great difficulties met by the pupils, and who are due to alternative conceptions defined previously. Generally, the pupils seem to classify animals in a very restricted way, often classifying only known ground vertebrates, in particular those who are at home, in zoos or in farm (Trowbridge and Mintzes, 1988).

The didactic stake in the biological classification problem is situated in the construction, by the pupils, the taxonomic criteria which are not a priori given. Indeed, they knew the definitions by heart but could not apply them because of an inadequate conceptualization. It led to errors such as the emphasis that a snail was a reptile, even if they said that it does not possess vertebras by basing itself on the mode of locomotion (Ryman, 1974b). In this sense, the pupils use non-taxonomic criteria (not defined by the scientific community) to establish a classification of the animal kingdom. These classifications are often erroneous and not based on attributes and criteria defined well.

The ecological studies are increasingly numerous, thus, the knowledge of species and taxonomic categories becomes more and more important for biology teaching. It will produce no effect if the pupil’s misconceptions, relative to animal classification, keep being neglected. Previous searches indicated that the pupils, since the primary school at the university, having significant problems to classify several animals according to taxonomic criteria (Natadze, 1963; Ryman, 1974a; Trowbridge and Mintzes, 1985, 1988; Mintzes and Trowbridge, 1987; Braund, 1991, 1998; Kattmann, 2001).

The classification of living beings is an essential unity in biology curriculum and an integral part of the biological science. The study of the pupils’ misconceptions concerning the animal classification, in the Moroccan context, aims to highlight the difficulties met to the secondary school students to name and classify the animal species studied in the school curriculum. Our study aims to identify secondary school students’ conceptions regarding to animal classification and to know evolution

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