# EPISTEMOLOGICAL THOUGHT AND ROLE-PLAYING: IMPACT ON PRE-SERVICE TEACHERS' OPINIONS ON MOBILE PHONE RISKS

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ABSTRACT

The purpose of this case study was to evaluate the changes in opinion of a group of future teachers on the danger of mobile telephones. The opinions were determined before and after epistemological work and role-playing in a form of a legal suit. This activity was part of pre-service teachers' initial training in a one-week module dedicated to prepare them to lead debates on controversial scientific issues. The fifteen participants were future physical science and biology teachers. A comparison of pre- and post-test evaluations revealed that these pre-service teachers were less sure of the risk involved in using mobile telephones following the activity and that the role-playing affected their epistemological interpretation of the research results.

## 1. INTRODUCTION

The need for scientific education has been emphasised in several countries. It has been recommended, for example, that students should be prepared in the scientific culture they need in order to make informed decisions on scientific issues. In France, science teaching should enable students to *"take part in citizens' choices concerning issues that involve science"* (Bulletin Officiel, 1999).

Various authors have suggested introducing case studies on current controversies in science teaching for the purpose of educating citizens (Grace & Ratcliffe, 2002; Kortland, 2001; Lewis & Leach, 2001; Ryder 2001). Some of them justify this scientific education for action (Jenkins, 1994; Osborne, 1997; Zoller, 1982; Désautels et al., 1995), while others have argued that it is important to train students to understand the nature of science (Millar & Wynne, 1988; Sadler et al. 2002). We agree with these positions and consider that the teaching of socio-scientific issues is crucial as there are many controversial scientific developments at the present time. Such issues concern, for instance, questions raised by biotechnology, BSE, food safety, the greenhouse effect, mobile telephones, and the ecological and economic repercussions of agricultural practices.

As emphasised by Legardez et Alpe (2001), these issues are socially relevant for three reasons:



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- they are controversial and lead to debates on the production of scientific knowledge;
- they are controversial and lead to debates in which the actors in the didactic situation, students and teachers, cannot avoid being involved since such issues are crucial in the social and media environments they experience;
- they are controversial in the classroom, but teachers do not feel capable of dealing with them.

These issues are characterised by a lack of consensus among researchers, particularly on health risks and environmental impact. In our opinion, the challenge is to train informed people in research methods, applications, and their possible repercussions, so that they are capable of taking rational decisions in cases where facts are uncertain and of participating in debates. We consider ourselves to be participants in the educational trend of studying the interactions between science, technology and society. The teaching of controversial issues helps to educate people for citizenship, and therefore it is important to exploit situations in which the declarations of various researchers, institutions and journalists are debated and examined for educational purposes (Kolstø, 2001; Simonneaux, 2001). Teaching of these issues places uncertainty and risk at the centre of the teaching-learning process. Moreover, this *frontier science*, also known as *science-in-the-making*, shows how scientific research is integrated into social and commercial activity (Aikenhead, 1994; Jenkins, 1992). These are disturbing situations since the dominant trend is to consider science as an authority which cannot be discussed.

Science and technology teachers feel responsible for teaching facts, but at the same time, they do not think they have the required competence to deal with social and ethical questions or to manage debates. The main result from a large scale survey done in England and Wales is summed up as follows: “half of all science teachers interviewed feel that teaching science should be 'value free' ” (Levinson & Turner, 2001). However, these issues provide lively discussions in the classroom and are increasingly introduced in science teaching programs. During the implementation of the new programs in French agricultural teaching curricula, teachers are advised to give particular attention to raising their students' social awareness as citizens. Concerning the teaching options put forward, debates are particularly recommended (Ministère de l’Agriculture et de la Pêche, 2000). Thus, teachers are being called upon to commit themselves to pedagogical practices with which they are not familiar and which are based on controversial scientific issues involving economic, political, environmental, cultural and ethical aspects. In a previous study (Albe & Simonneaux, 2002) on the declared intentions of teachers with respect to the teaching of controversial scientific issues, we showed that, *a priori*, teachers were not necessarily reluctant to deal with social problems related to the development of techno-sciences, but that this brought into question their epistemology and teaching practices.

The teaching of controversial scientific issues is thus a complex phenomenon. We think that one way to study this process is to enquire into science teachers' opinions in the context of a socio-scientific issue characterised by uncertainty and controversy. In this paper, we have investigated two research aims. One is to ascertain how the opinions of future science teachers on the danger of mobile