Inquiry-based learning and teaching: a large scale experimental study

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Inquiry-based learning has been criticised from a Cognitive Load Theory point of view (Kirschner, Sweller & Clark, 2006; Tobias & Duffy, 2009). Poor results obtained in the domain of inquiry-based learning as a mean to learn scientific knowledge support this criticism (Furtak et al. 2012; Minner, Levy & Century, 2010). These results also outline that it is possible to teach scientific inquiry as a goal, even if is not clear what it the best method to teach it. But the way these results has been obtained can be criticised too. On the one hand, small scales experimental studies suffer from their external validity: short time experiment, immediate post-test, etc. On the other hand, large scales studies are most of the time not based on randomly assigned groups, not actually controlled. In this study, our main aim is to answer these two kinds of weakness. We run a large scale experiment, with a large number of participants, randomly assigned to two experimental groups, pre-tested at the beginning of the academic year and post-tested at the end.

Method

3163 participants from grade 3, 4 and 5 in France participated to the experiment. They were randomly assigned to two groups: the first one corresponded to classes where the teachers (n=72) were volunteers trained during 80 hours to inquiry-based learning and teaching; the second one (n=62) corresponded to classes where the teachers were also volunteers but not trained. We observed what several training sessions and the science courses. A pre-test and a post-test was administrated in September (one week after the beginning of the academic year) and in May (one month before the end of the academic year). This test evaluated four types of knowledge: nature of science, knowledge and skills in science, attitude toward science and motivation, reasoning on scientific information and document. This test has been previously validated with a sample of 453 students.

The experiment was replicated with another sample (n=2747), on a second year.

Results of the two first years will be available at the conference.