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9. SCIENCE AT FINNISH COMPULSORY SCHOOL

ABSTRACT

In order to ensure the reader understands the reasons for Finnish students’ high achievements in the PISA Scientific Literacy Assessment, this chapter describes the implementation of the national level science education policy through national and local level curriculum and teacher education. We highlight: (1) the science curriculum for compulsory schools and the Finnish approach to implement it through local level curriculum (2) the science teacher education programme, and (3) science teaching and learning at the school level and assessment. We argue that aims and content areas described in the National Core Curriculum for Basic Education 2004 are very compatible with the competencies described in the PISA 2006 framework. Further, we would like to emphasise that Finnish science teachers are academic professionals, masters in their subject with intermediate level studies in education.

Key words: PISA Scientific Literacy Assessment, science education policy, science curriculum, science teaching and learning, science teacher.

INTRODUCTION

Finnish students have obtained the highest score in the PISA 2003, 2006 and 2009 Scientific Literacy Assessment among the students in OECD countries. In the year 2000 Scientific Literacy Assessment, the Finnish students were third in the ranking. The average science score of the students have varied between 538 and 563 in the PISA scale (in the PISA scale the mean of all students in OECD countries is 500 and the standard deviation is 100). In 2006 science was the main topic in the PISA assessment. Therefore, there is specific information available in the PISA 2006 assessment data on students’ performance in science, attitudes and opinions about science education. For example, the percentage of students in the lower proficiency level (low achieving students) was in Finland 4.1% while it was 19.3% on average in OECD countries. At the two highest proficiency levels the percentage of Finnish students was 20.9% while it was 9% on average in OECD countries. Finland had the lowest standard deviation (SD = 81.4 score points) between students in well performing OECD countries. The science mean score was
562 for males and 565 for females in Finland. Although the girls’ score is higher, the difference is not statistically significant. (Lavonen, 2008).

After PISA 2006, Finnish science education scholars have put forward several explanations for Finnish students’ success. Pehkonen, Ahtee and Lavonen (2007) state that there exists no clear single explanation, but a combination of several factors might explain Finnish students’ PISA results. The following reasons seem to be the most agreed in Finland:

– A national level core curriculum and implementation process at the municipality level
– Science teaching is subject-oriented in the primary and lower secondary levels. Further, teaching aims to transmit the nature of science
– Teachers as autonomous and reflective academic experts

(Kupari, ReiniKainen, & Törnroos, 2007; Pehkonen, Ahtee & Lavonen, 2007; Kim, Lavonen & Ogawa, 2009).

The Finnish educational system is characterised by the devolution of decision power considering curriculum and assessment policy at the local level for ordinary teachers. Within the framework of the National Core Curriculum (FNBE, 2004) each municipality – or even one school – plans a local curriculum and collects assessment data for evaluating education. The design of the local curriculum is meaningful primarily because of the emphasis on the design process rather than the end product of the curriculum document. The local curriculum design process engages teachers in the development of schooling.

Based on previous introduction and speculations of student success in science it is appropriate to focus here on the science curriculum, science teachers and science teaching in the Finnish science classroom to get an overview of science education in Finland and to better understand the reasons for the students’ success in the PISA assessment. In detail, we believe that the following three viewpoints will help the reader understand science education in Finland as well as Finnish students’ PISA results.

1. A comparison of the Finnish science core curriculum for compulsory school and PISA 2006 Scientific Literacy Assessment framework (OECD 2007a; 2007b)

2. Analysis of school science teaching, learning and assessment applying the PISA 2006 School Questionnaire (OECD, 2005a) and the Student Questionnaire (OECD, 2005b) data.

3. Description of the science teachers and teacher education programme.