EUROPEAN EDUCATIONAL RESEARCH ASSOCIATION

The influence on teaching and assessment practices from national tests and grading in Science in Y6

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Conference:ECER 2016, Leading Education: The Distinct Contributions of Educational Research and Researchers

Network:03. Curriculum Innovation

Format:Paper

Session Information

03 SES 02 A, Curriculum and Student Performance Measurement

Paper Session

Time:2016-08-23
15:15-16:45

Room:NM-A106

Chair:Wilmad Kuiper

Contribution

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In this paper we survey different approaches to teaching in Swedish Science Education. This means the purpose is to map and investigate patterns in teachers' views of what constitutes "good" Science Education in the middle years of compulsory school in Sweden, in a context where these views are potentially at stake. The background for our interest in studying approaches to teaching is that a new curriculum has been established and applies in Sweden from 2011. New to this curriculum is that standardized control of student achievements are introduced in more subjects and at lower ages than before. National tests in Physics, Chemistry and Biology became mandatory in Y6 in 2013 along with marking of pupils from and including Y6. Notably for teachers in Y6 is that they could be educated and working either in a Y4-6-classteacher system, or in a Y6-9-subject specialist teacher system. Standardized testing has been proven in many cases to create norms about what types of teaching and what types of teacher are considered to be accurate (e.g. Au 2009, Stobart 2008). Some researchers argue that standardized testing tends to narrow teachers instructional practice, both concerning content and methods, while others mean that, depending for instance on how the tests are designed, tests could also increase teachers teaching repertoires in different ways (Au 2009).

What the main contents of teaching in different subjects should be is a question that is and ought to be problematized. Different policies for what contents teaching should include and how it should be conducted shapes different presuppositions for teaching and for what the pupils have opportunity learn (cf. Fensham, 2009). Analysing Science syllabuses and Science

textbooks, Roberts (1994) (in North America) and Östman (1995) (in Sweden) found different patterns concerning 'curriculum emphases' in Science Education: correct explanation, structure of science, solid foundation, scientific skill development, self as explainer, everyday coping and science, technology and decisions. The curriculum emphases can be connected to Roberts' (2007) two main visions (I & II) in western societies of how science education should be conducted in order to make the pupils scientific literate. Vision I is described as science reproducing its own products of concepts, laws, theories and methods. In Vision II it is accentuated that education must include facts of the subject but it must also include knowledge and skills that make the pupils able to use scientific knowledge in practical, existential, moral and political contexts. Even though teachers are working to meet the same goals in the Science curriculum, emphasis in teaching can be made differently.

There is reason to believe that the introduction of grades and national tests can change these teachers' perceptions of what counts as good science instruction, and effective teaching and assessment practice. However, it is not certain that all teachers' instruction is affected in the same way.

If teachers aligning with different visions of teaching understand a reform in different ways, this will have consequences for how policy makers need to work to effectively implement reforms. Through knowledge of different approaches to teaching, we have the possibility to better understand teachers' reactions to new elements in teaching.

Method

A questionnaire was developed using research of curriculum emphases and visions in science education and curriculum emphases (e.g. Roberts 2007) to explicate different aspects of content. The questionnaire contained background questions along with questions of selection of methods for teaching, the teacher's views of science and the aim of science teaching and assessment but also questions of their opinions about the new directives of testing and grading.
Of Sweden's 2523 schools covering Y6, 1348 schools were selected. These schools were distributed across the country and different sized schools with different operating forms were studied. A web-based questionnaire was sent to 1924 teachers and contained 103 questions/positions. The primary form of questioning was through closed-form response alternatives. A number of free text response alternatives were also included. The response number after three remainders was 830 (43%), including 34 no-thank answers.
The answers were analysed with SPSS both for descriptions and classification (using cluster analysis: hierarchical, Ward's method, Euclidean distance), the aim being to detect a variety of patterns within the material (Sjöquist et al., 2010). Within the cluster analysis, the clustering was based on answers to eight specific statements/variables (the most important and most characteristic of teaching in Science) and four clusters were created.
From a first step in the cluster analyses, four different teacher profiles in relation to different views on science emerged. Nevertheless, to a great extent teachers teaching Y6 in Sweden represent a homogenous group. This conclusion was drawn since there were no strong similarities or differences between the groups, and no clear pattern in the relationship between views of teaching science and reforms.
In a second step, the clustering was based specifically on answers to statements about national tests. In this analysis, two distinct clusters were made, where one group contained teachers that are more positive to the tests. Group 1 consists of 532 teachers and group 2 of 231, where Y4-6-teacher have higher representation in group 1. Subsequent analyses were made by comparing how teachers in these two groups answered to all questions.

Expected Outcomes

In the comparisons between group 1 and group 2, the results also are rather homogenous. Common features that stand out, are for example the valuation of: teaching in whole class and group work in pairs, to give students an understanding of the relationships in nature and the world around us and to relate to students' questions and experiences.
Generally, we can see a positive approach to tests, grades and the new curriculum. There is an acceptance towards being "controlled" and guided. For many teachers, national testing has meant that teaching has evolved to make students more aware of their own learning. Many teachers seem to believe that the tests helped to make the subject content more clear. Many use matrices, support materials, etc. from the Swedish National Agency for Education, which they have not done before, but many also believe that tests and grading criteria changed and control their teaching. The items where the largest differences are seen in changes in teaching after the reform includes to argue scientifically, to evaluate investigations, to plan investigations and to use concepts models and theories. This is found at higher levels in group 1, teachers for years 1-6, with a teacher education that includes less depth subject content.
We can conclude that many teachers emphasis a positive approach to reforms even though there is a group of teachers that also stress a clear criticism of the new system. We will discuss this from the point of view of who is the the professional: is it someone who acts in line with management expectations or in line with values connected to the profession?

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