

Culturally equipped for SSIs? How do teachers and students in mono- and multi-cultural schools handle work with complex issues?

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Abstract

Socio-scientific issues (SSI) are said to be vehicles for raising students' interest in science, but also for strengthening generic skills such as team-work, problem-solving and media literacy. At the same time these skills are presumptions for successful work with SSIs. How well equipped are students from homes with foreign backgrounds and low socio-economic status for working with SSIs? They often have lower grades in science subjects. Authentic media texts may constrict bilingual students and it is pointed out that students from families with low socio-economic status are advantaged by strict framing. The purpose is to compare how teachers and students in mono- and multi-cultural schools work with and experience SSIs. The paper will discuss a) teachers' role taking in the classroom; b) how the students experience and deal with autonomous group work; c) to what degree and how the students use sources other than textbooks. Data from a quantitative and a qualitative study is presented and compared in the paper. Secondary school classes have worked with SSI-tasks. The quantitative study involves questionnaires from 1614 students. The qualitative study involves classroom observations from one mono- and one multicultural school.

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Synopsis

Background

Socio-scientific issues (SSIs) are said to be vehicles, not only for raising students' interest in science, but also for strengthening generic skills as team-work, problem-solving and media literacy. At the same time these skills are a presumption for successful work with SSIs (Jarman & McClune 2007; Ratcliffe & Grace 2003). How well equipped are students from homes with a non-Swedish ethnic background and low socio-economic status for working with SSIs? Earlier studies (Skolverket 2007, Lee & Luykx 2007, Parszyk 1999) indicate that immigrant students are less likely to benefit from engaging with SSIs. They often have lower grades in science subjects and come from homes with low use of Swedish mass media. Authentic media texts may constrict bilingual students. It has also been pointed out that students from families with low socio-economic status (SES) are advantaged by strict framing (Bernstein 2003).

Purpose

The purpose of this paper is to compare how teachers and students in mono- and multi-cultural schools work with and experience SSIs. Focus is on teachers' roles, student-autonomous group work, and use of sources other than textbooks.

Methods

Data from a quantitative and a qualitative study is presented in the paper. Secondary school classes (school years 6-9) have worked with SSI-tasks, produced by researchers, for a minimum of 5 hours. In the quantitative study five different tasks were used (Ekborg et al 2009), in the qualitative study a SSI about food and health was used.

The quantitative study involves 1614 students from 70 classes. The data is collected from questionnaires. In this study, the measure used to estimate the degree of 'multiculturality' is the percentage of the students entitled to mother tongue tuition. To examine the links between the students' experiences of working with SSIs and their attitudes to school science with the degree of multiculturalism in each school, the questionnaire data were subjected to partial least squares projections to latent structures (PLS), a regression extension of principal component analysis (PCA).

The qualitative study involves two classes from different schools. All students in school A have a non-Swedish ethnic background, and the school is situated in an urban area with high ethnic diversity, low SES and low educational level. In school B all the students have a Swedish-ethnic background and the school is situated in a village with low ethnic diversity, high SES and high educational level. The qualitative data consist of classroom observations (12 lessons, six from each school, and 32 recorded discussions from 8 different groups).

Results

Teachers' role and students' view on knowledge and learning

Questionnaires:

Judging from the PLS models and the VIP values for the individual questionnaire items prior to the SSI work, pupils from multicultural schools (to a relatively high extent) expressed that science is about learning facts and the teacher is the source of knowledge and should provide

appropriate guidance. They also reported that the teacher normally talks most of the time. Students in multi-cultural schools also thought, to a higher extent than in mono-cultural, that they had too much discussion in science class.

Observations:

In both classes the work was entirely planned by the teachers. The transparency for the students was low, e.g. they were not informed about expected learning outcomes. The agenda was hidden for the students, but it was to some extent articulated by the teachers themselves. For the teacher at school A the goal was normative, e.g. changing the students' habits concerning food, drugs and sleep. She had a supervising role during the project. For the teacher at school B the main aim was to use the task to cover and assess a certain part in science curriculum, an aim also known by the students. The teacher described herself as a coach. None of the teachers mentioned generic skills, such as critical thinking for the students.

Experiences of and dealing with the work form:

Questionnaires:

The students in the multicultural schools found the discussions interesting, and that their opinions were considered important by their peers. Given this, it was somewhat surprising that they also found the lack of single correct answers that is inherent in SSIs: s frustrating.

Observations:

At both schools students worked in small groups. The students didn't get instructions on why they should work together, or on how they could use each other as resources. They had problems interpreting the written task; instead they followed the teachers' verbal instructions and asked questions as soon as they were uncertain.

At school A the task was to either read articles or watch films and TV-programs and summarise information from these sources. The students did what the teacher told them to do. The work was shared between the students, each of them doing their part. The task for the students at school B was to find information on the web about health issues connected to the documentary "Supersize me". They started without any clear instructions, which was noted in the students' confusion. Rather soon after the introductory lesson, students required lectures and clearer goals. This had direct consequences. The teaching became focused on central concepts, and the teacher introduced each lesson.

Use of sources other than textbooks

Questionnaires:

The pupils in multi-cultural schools used the internet to a lesser extent than pupils in more mono-cultural schools, and more often found the information they encountered too difficult to be useful. On the other hand, pupils from multi-cultural schools more often reported that they had invested considerable effort in judging the reliability of information.

Observations:

The sources students used at school A were chosen by the teacher, whose criteria was authentic texts representing different values. The students were supposed to read them critically, which they didn't. They used them rather as a textbook. Their evaluation of media reporting was on a general level, not connected to the texts and films they were working with. Students at school B changed strategy and moved from web retrieval to facts in textbook. The textbook and the teacher were the only reliable sources.

Conclusions and implications:

Despite information from the researchers on aims and work forms for SSIs, the teachers observed in the qualitative study tended to fall into old habits, e.g. science content is the primary learning goal and their roles are dispensers of knowledge (Ratcliffe et al 2005) and supervisors. The normative approach to health issues in the multicultural school is also noteworthy.

We notice that students are ill-prepared to work autonomously. Students from mono-cultural schools express to a higher degree that they feel comfortable with autonomous work. But observations at school B revealed that also these students needed better framing. We interpret these differences between the studies as a matter of understanding cultural school codes; students at mono-cultural schools know to a higher degree that they are supposed to say that they work autonomously. But they are not used to it in science classes (Ratcliffe et al 2005). One implication of this study is to look into how SSIs can be framed in a way that students don't become either limited or confused.

Noteworthy is that the differences between the classes seem to be smaller due to their actions than to statements in the questionnaires. But it is striking that the teachers' roletaking in the classroom correspond better with the discourse of mono-cultural classes as non-authoritarian in their view on knowledge and multi-cultural classes as the opposite, than with how their students act in the classroom.

In the questionnaires the biggest difference between mono- and multi-cultural schools was the use of internet. But the observations show that all students are ill-prepared to use sources other than textbooks in science. They have limited skills in information retrieval and critical thinking. Instead they judge information as reliable if it comes from the teacher or is similar to textbooks. One implication of the study is therefore that skills such as critical thinking and information retrieval must be focused in the classroom. Students, regardless of ethnic background, have difficulties with these parts of the work. They are not suitable equipped for the work form.

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