What lesson observation data reveal about the changes in teaching science and mathematics

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INTRODUCTION

Government resolutions (2006) undertaken in Latvia to mark a course towards promoting students' competencies, continued in new state education policy resolutions (2014).

Lesson observation is a powerful tool in revealing whether the reforms are entering the classroom or whether they are still 'behind the door'. The research what was initiated during piloting of the new curriculum (2009-2011) indicated that changes, such as implementation of scientific inquiry approach, were being implemented in lessons very hesitantly (Volkinsteine, Namsone & Cakane, 2014).

This research poses following questions:

1.What do lesson observations reveal about the students' higher order cognitive activity, development of learning skills and collaboration in science and mathematics lessons?

2. Do teachers demonstrate the necessary skills to organize students learning according to criteria selected?

METHODOLOGY

In total 97 lessons covering physics, chemistry, biology, science and mathematics (grades 5-12; 96% teachers from employed) were observed and analyzed in 10 schools (all) from one municipality representing all school types.

The observations were carried out by specially trained experts from the Centre for Science and Mathematics Education, each with 10-15 years of experience.

The experts used specially developed observation sheet for transcript and analysis. Each lesson was analyzed by each expert who observing the lesson according to the specified criteria using a Likert scale 0-3.

The following criteria were set: **use of HOCS, collaboration, learning outcomes, feedback, teaching methods appropriate, methods technique and collaboration mode professional.** SOLO taxonomy was used for more thorough analysis of cognitive activity.

The numerical data were processed using R 3.1.2. software. Experts comments were coded. Content analysis used.

RESULTS

The lesson observations reveal that only 27% of the lessons indicated the use of HOCS at an acceptable level (2-3 in scale). The dominant description by experts of the study process characterizes the lessons as cognitive low.

Charts 1 and 2 summarize the results according to the criteria for students' learning approach analyses.

Successful student collaboration was observed in 56% of the lessons.

In 55% of the lessons teachers failed to communicate the learning outcomes or make sure that students had understood what they were supposed to learn.

The use of formative assessment techniques was observed in 54% of lessons. However the experts reveal that while the teacher did receive information about students' learning, the teacher failed to communicate feedback that would help the students to improve their performance.

Chart 3 shows the data about teachers' skills to organize studies according to the criteria – appropriateness of methods used to achieve the goal, the technique of the methods and collaboration.

FIGURES

Chart 1. Results according to criteria for student's learning approach analysis (% of observed lesson)
Field of criteria: aspects of mastering skills

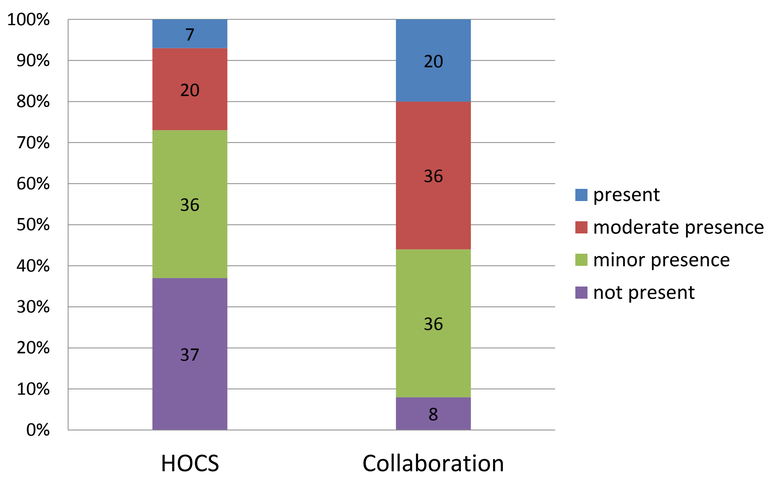


Chart 2. Results according to criteria for student's learning approach analysis (% of observed lesson)
Field of criteria: learning organization

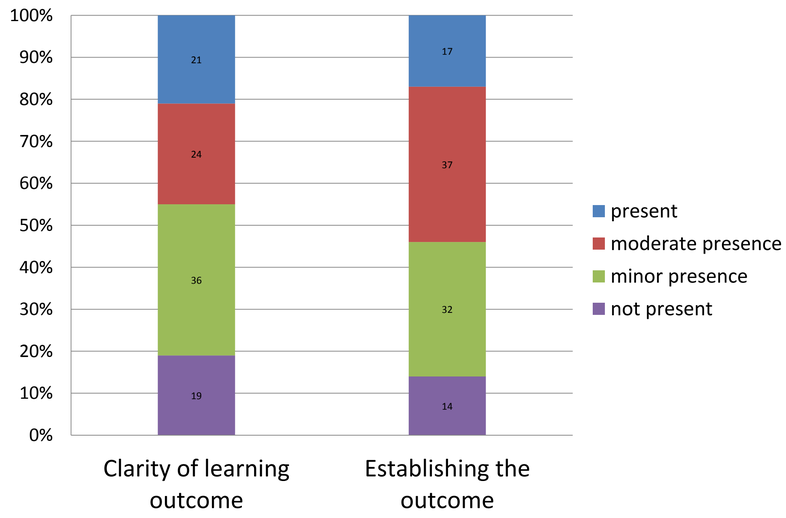
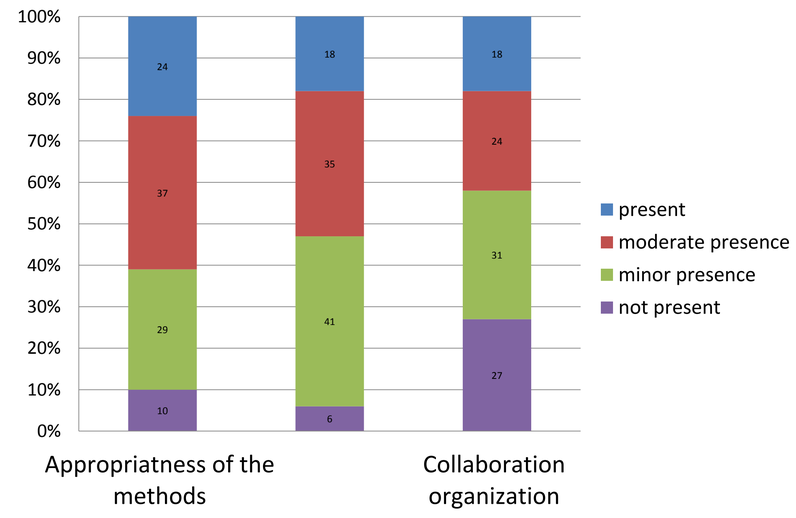


Chart 3. Results according to the criteria for analyses of teacher's skills
(% of the observed lessons)



DISCUSSION AND CONCLUSIONS

There is a tendency that quite frequently teaching in the classroom is performed as transmitting information with including separate elements of new learning aspects.

This corresponds to research which shows (Olson, 2003) teachers feel more comfortable with traditional teaching mode characterized historically for East (Pavlova, Pitt, 2003).

The number of teachers who chose the most efficient method to reach the outcomes outnumbered those who did not. This gives the impression that they succeed in teaching largely working on LOCS. This is evidenced by deepened research of the learning outcomes set in lessons (according to SOLO taxonomy).

There are indications of a huge gap between the priorities described in the education policy resolutions from 2006 and the reality in the classroom in 2013.

There are grounded explanation why teachers lack the necessary skills. The education policy provided the set of the new curriculum materials for every school and organized in-service training (36 or 72 hours).

If the teacher has never before had formal knowledge and practical training how to master these skills they have no practical knowledge (van Driel, Beijard & Verloop, 2001). **There is an urgent need for teacher CPD in a different mode.**

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