



WHAT LESSON OBSERVATION DATA REVEAL ABOUT THE SKILLS OF LATVIAN CHEMISTRY TEACHERS TO ORGANIZE STUDENTS' SCIENTIFIC INQUIRY?

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Educational Reforms in Science and Mathematics in Latvia

2005

2008

2012...



Priorities of Contemporary Teaching and Learning Process in Science

- Students understanding about science
- **Scientific inquiry**
- Link with real life
- Contemporary teaching and learning strategies
- ICT usage



Impact on students' progress

Teachers - effect size is 0,47

Teaching - effect size is 0,43

(Hattie, 2012)



Research Focus

The research purpose was to examine Latvian chemistry teachers' skills to effectively organize students' scientific inquiry in the lessons.

Research questions

- Do chemistry teachers implement scientific inquiry in teaching-learning process?
- Do chemistry teachers have appropriate skills to effectively organize students' scientific inquiry in the lessons?
- What are the relationships, if any, among skills to effectively organize students' scientific inquiry by chemistry teachers with and without experience to analyze and reflect on their professional performance?

General Background of Research

- The case study of Latvian chemistry teachers' work experience in organizing students' scientific inquiry in the lessons;
- included 18 chemistry teachers from local schools;
- was conducted within the Project 'Sciences and math' from 2009 to 2011.

Description of research participants

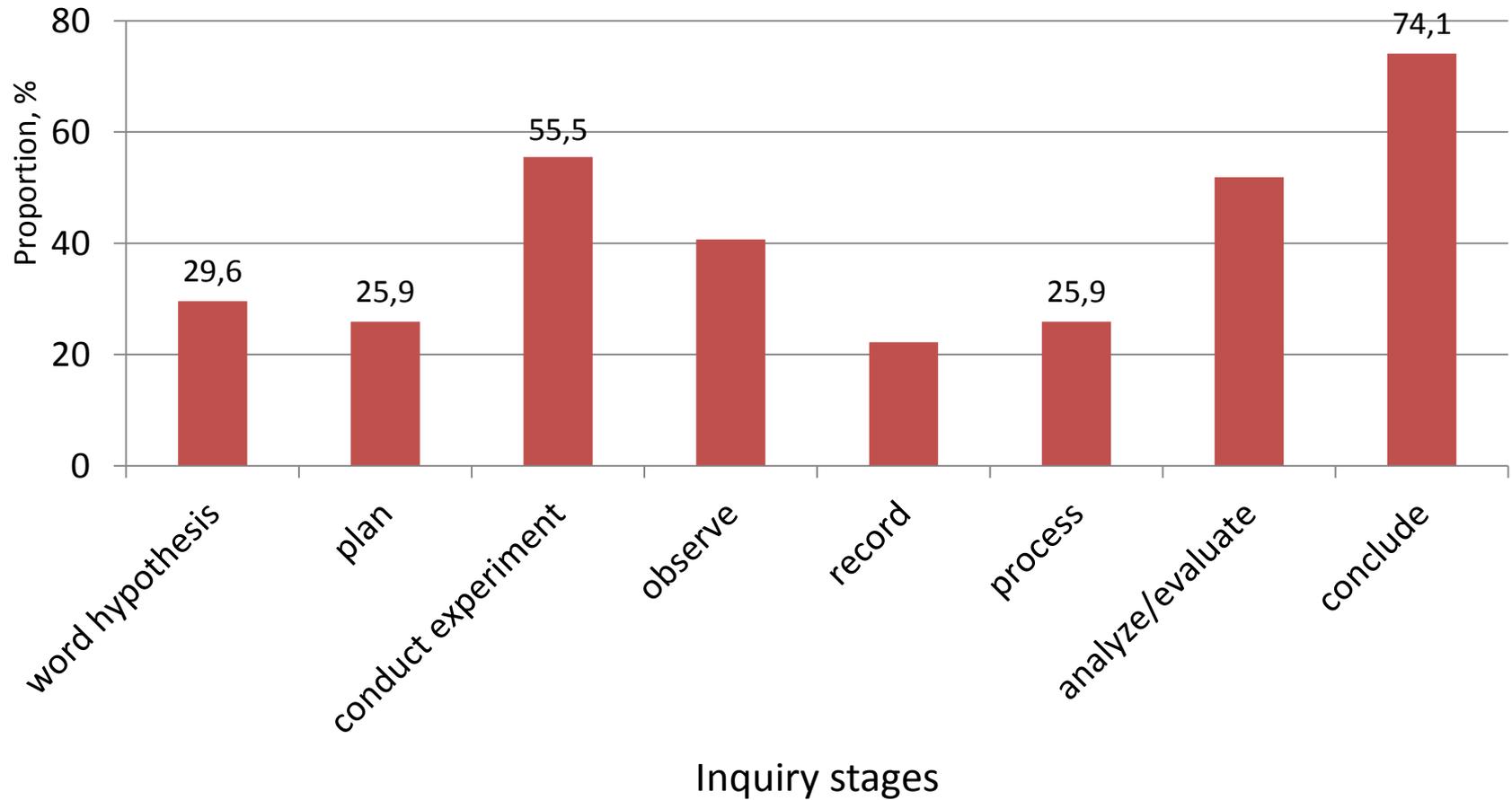
Criteria	Participants to the research (N=18)	
	Group A teachers (N=11)	Group B teachers (N=7)
Place of employment	Basic school	Secondary school
Teaches chemistry	Grades 8-9	Grades 8-12
Background of the chemistry teacher	2 teachers	6 teachers
Teaches second subject (biology, etc.)	9 teachers	2 teachers
Experience in organizing scientific inquiry before 2008	none	3 years
Experience to analyze and reflect on their professional performance, collaborate with others before 2008	none	3 years

Instrument and Procedures

- The instrument used in this study consists of a *lesson structured observation* and *experts' observation and analyses sheets*.
- The experts observed and analyzed *two chemistry lessons by each teacher*; a total of 36 lessons.
- Each lesson was observed by *two experts* – a chemistry and a different subject specialist.

Scientific inquiry stages in the observed lessons

(N=31)

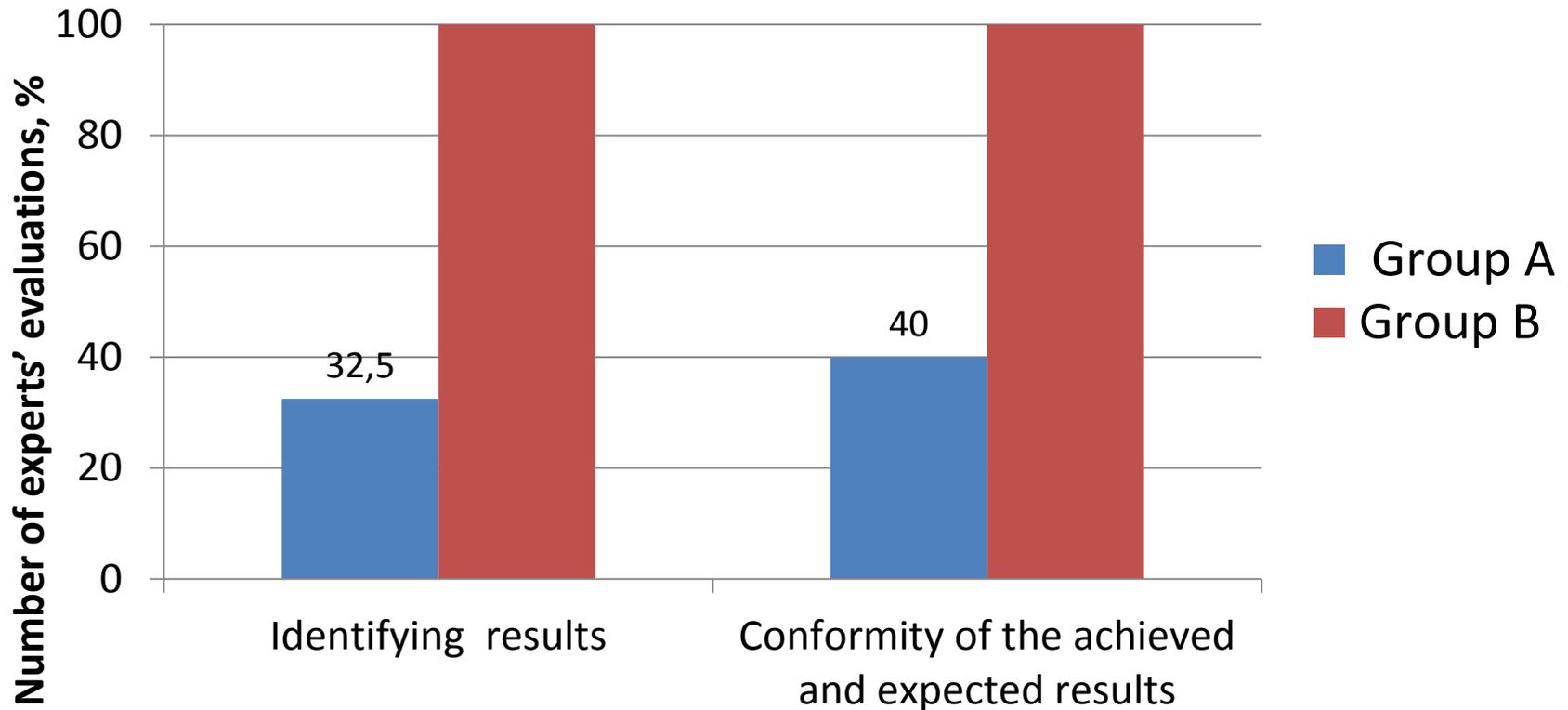


The experts' evaluation of Group A and Group B teachers' skills to organize student scientific inquiry

Based on the observation of 31 lessons the experts concluded that

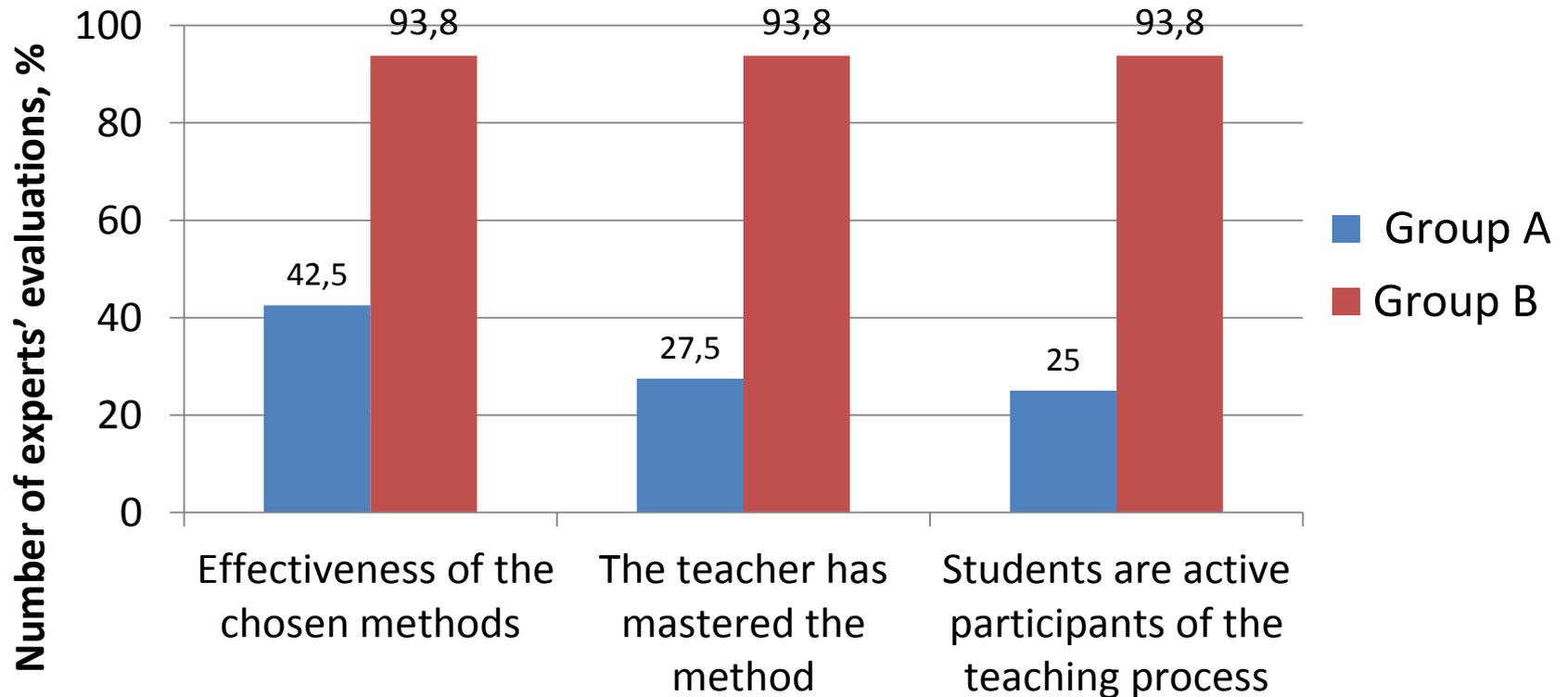
- *skills to plan lessons* – 66 % of the cases;
 - *to choose and apply an appropriate method in the lesson* – 49% of the cases;
 - *to organize student collaboration* – 58% of the cases;
 - *support student inquiry learning* – 46% of the cases.
-
- Skills of teachers of Group A and Group B to organize scientific inquiry teaching differed.

Group A and Group B teachers' skills to identify the **achievable results** and their conformity to the expected results



The skill that was identified and evaluated positively
(the skill is present)

Skills of teachers of Group A and Group B to use the teaching **method** effectively



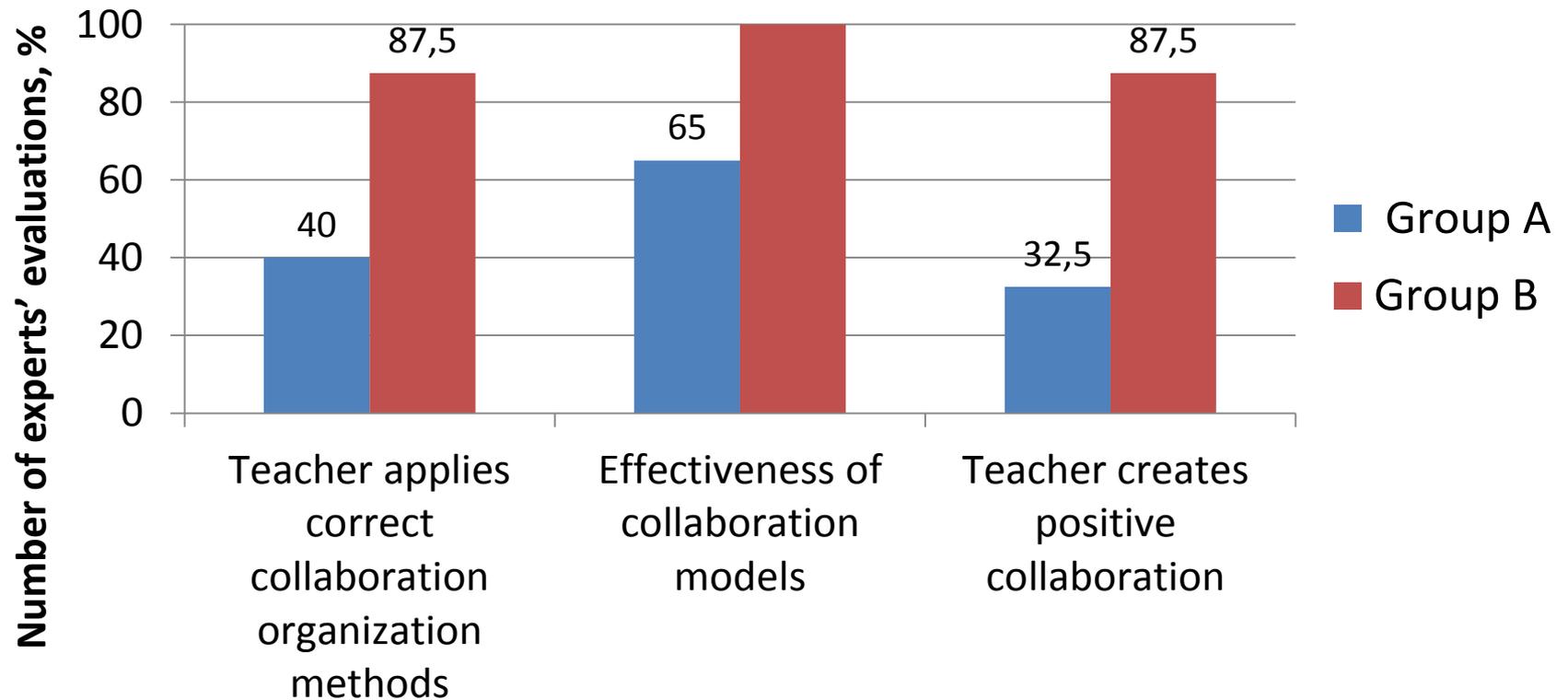
**The skill is identified and evaluated positively
(the skill is present)**

'The students took formal participation in the lesson. However, only few of them had intellectual involvement. The incentive was taken over by the teacher who did most of the talking, and students had no chance to think or work independently. Consequently student active participation in the lesson was very limited.'



(according to experts' evaluation)

Group A and Group B teachers' skills to effectively organize student **collaboration**



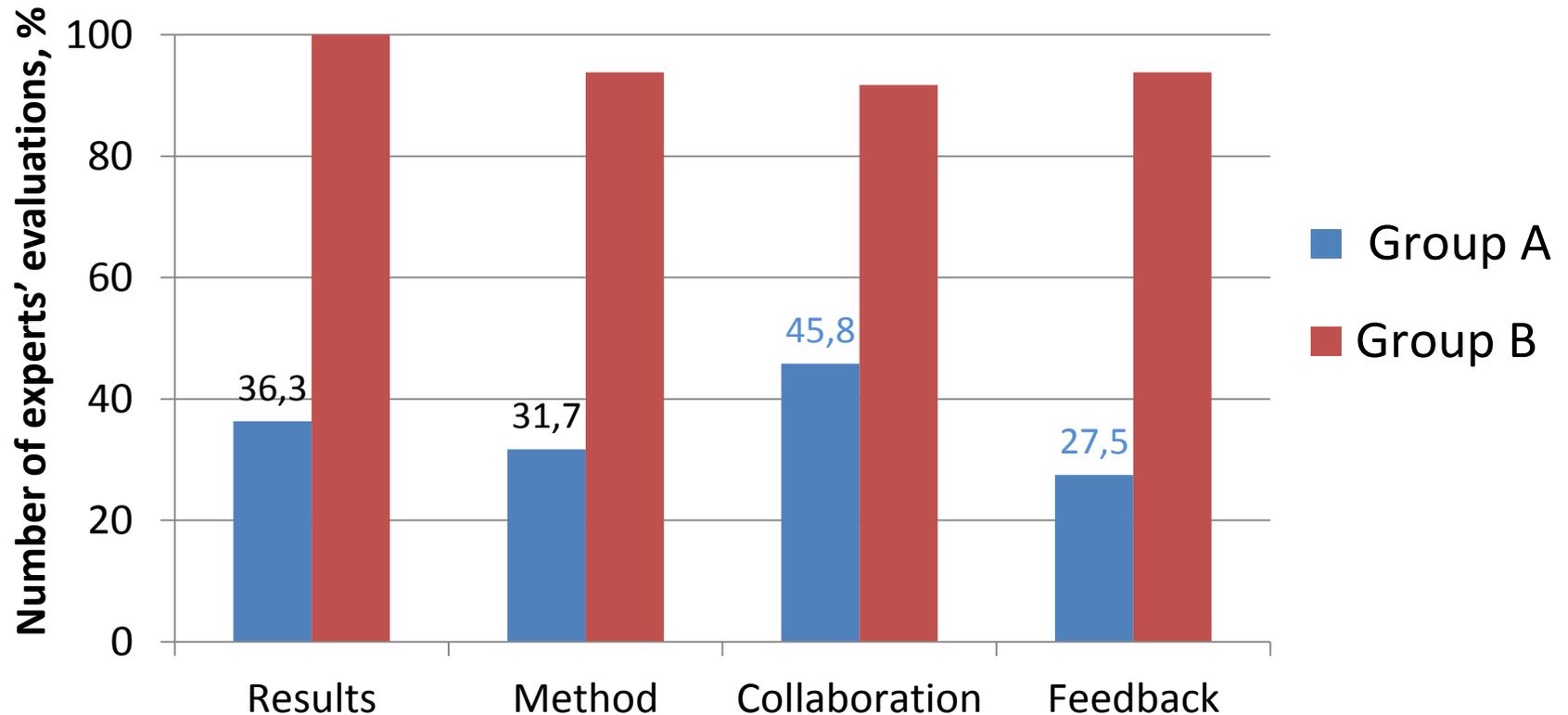
**The skill is identified and evaluated positively
(the skill is present)**

- *‘The teacher should master group work organizing principles and explain them to the students’.*
- *‘The teacher fails to encourage student discussion on group achievements’.*
- *‘Students were confused and had no understanding of what they were supposed to do.....there was no collaboration’.*
- *‘The teacher does not seem to know what results to expect from the students and how to lead the group work’.*



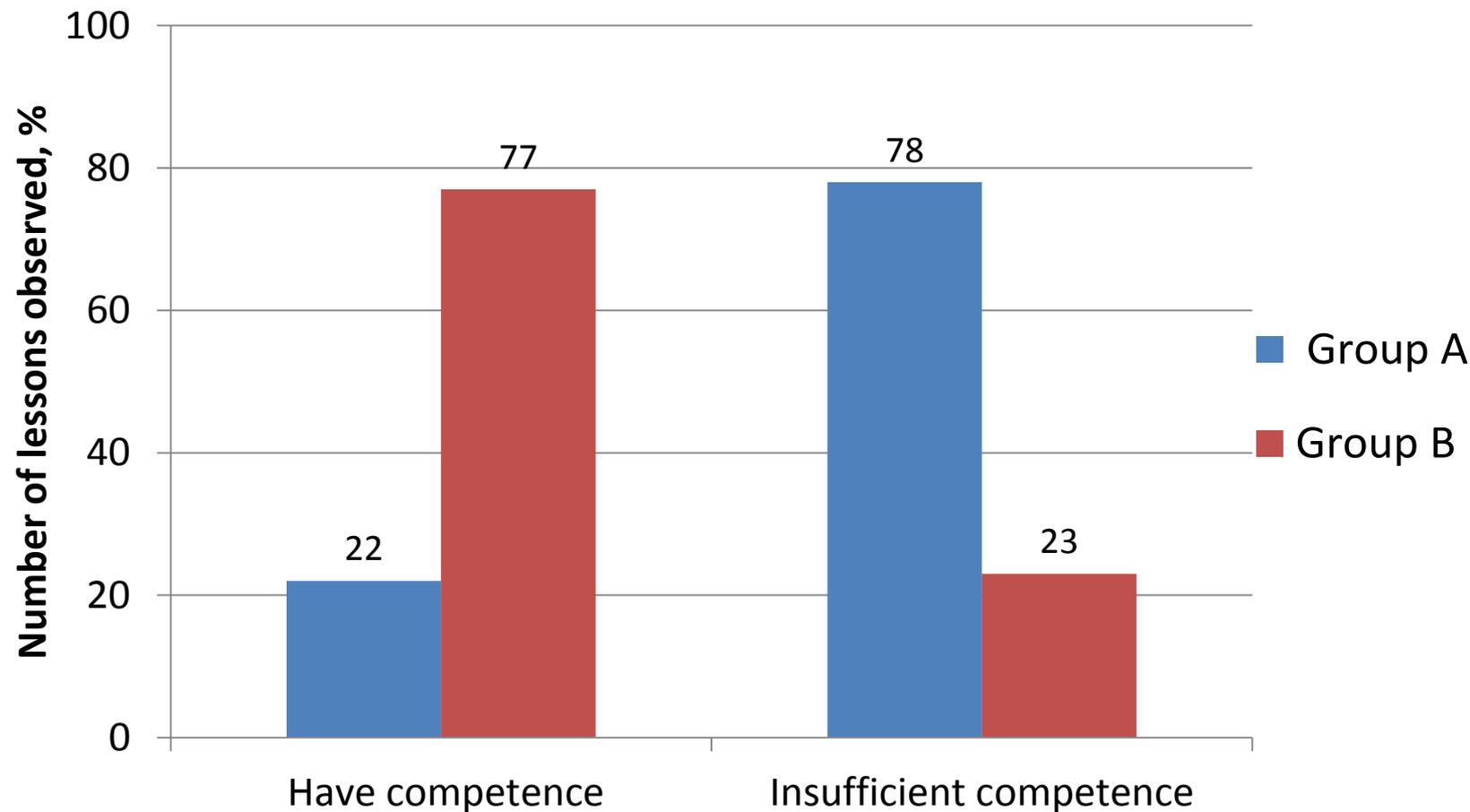
(according to experts' evaluation)

Group A and Group B teachers' skills to effectively organize scientific inquiry



**The skill is identified and evaluated positively
(the skill is present)**

Group A and Group B teachers' competence to organize student scientific inquiry



Conclusions

1. Chemistry teachers in Latvia are gradually implementing scientific inquiry in teaching at basic school.

2. An effective teaching of scientific inquiry to students is possible if teachers have the following skills:

- ability to identify the achievable results of scientific inquiry and their conformity to the expected results;
- effective use of the teaching method for the development of student scientific inquiry;
- effective organization of student collaboration during the scientific inquiry;
- effective communication of feedback on student scientific inquiry.

3. Teachers of Groups A and B have different levels of effectiveness of scientific inquiry organizing skills. While teachers of Group B have well-developed skills, Group A teachers' skills are quite limited. Group B teachers' experience comes from experience exchange seminars as well as the routine of analyzing and reflecting on their performance during lessons.

4. The contradiction between the actual situation in the classroom and Group A teachers' opinions confirms the idea that in order to develop effective scientific inquiry organization skills, teachers have to have analysis and reflection skills.

5. In this situation, innovative professional development models can successfully provide methodological support to effective Group A teachers' scientific inquiry organizing skills.

6. These models have to focus on teachers' complete immersion into the lesson and receiving appropriate feedback.

Thanks for your attention!

