



**LATVIJAS  
UNIVERSITĀTE**  
ANNO 1919



# **WHAT LESSON OBSERVATION REVEALS ABOUT MEANINGFUL USE OF ICT IN THE SCIENCE SUBJECTS: EXPERIENCE FROM LATVIA**

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# School A

/country, small upper secondary/

- *108 computers*
- *6 smart boards*
- *18 document cameras*
- *1 set of clickers*
- *55 tablets*
- *...*

... use teachers to satisfy their needs

/Mission Possible, stories of impact, 15.06.2015./

# ICT Development in Education

1997

2005

2015



# ICT age in school ...



# ICT materials

[www.dzm.lv](http://www.dzm.lv)

E - learning materials for students

E - learning materials for visualization of learning process

Extension of role of ICT experiments

Visual materials for teachers

Educational films

Materials for interactive whiteboard

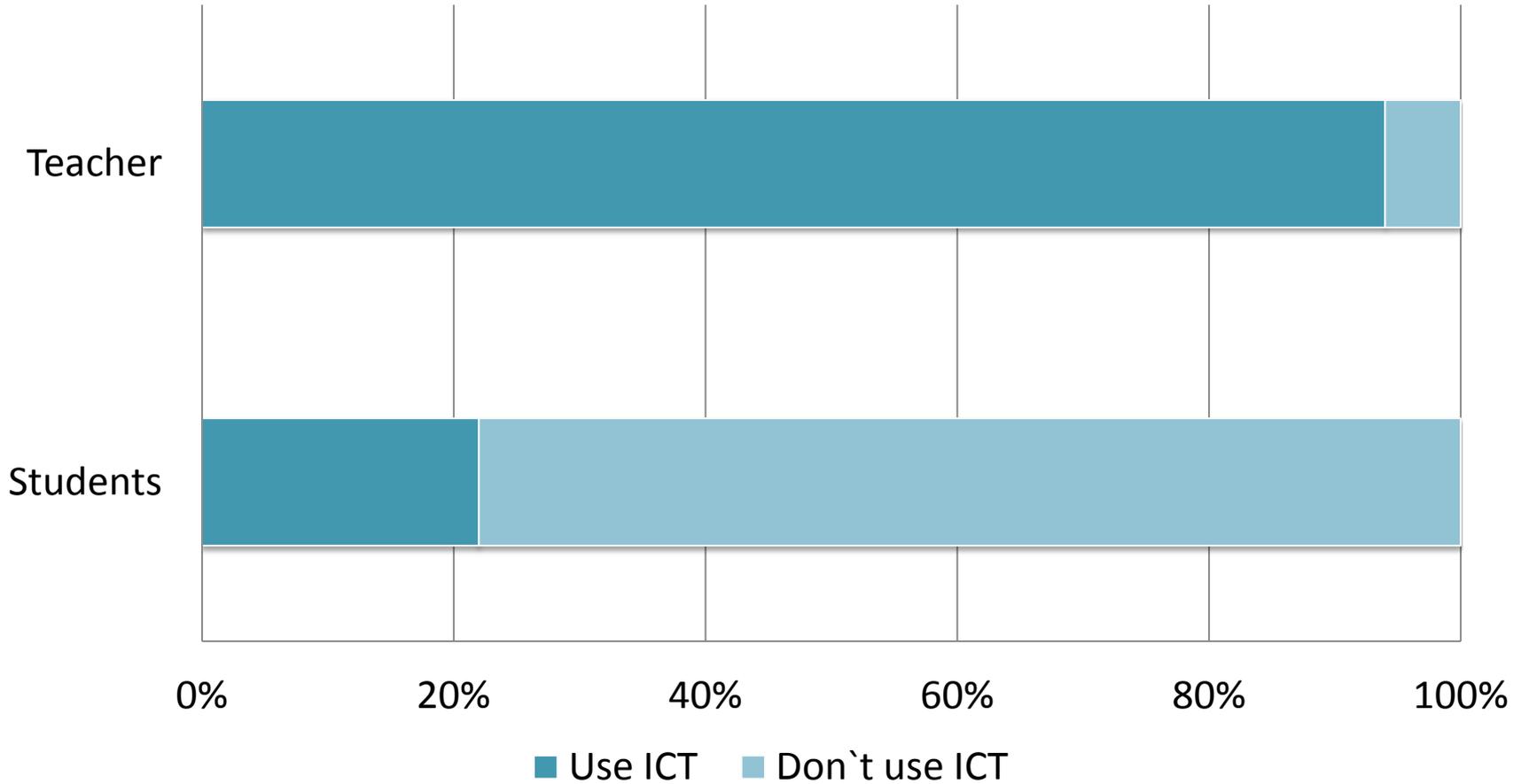
# Different studies show:

- The availability of technology does not automatically ensure to change of teacher`s pedagogical approach (Campbell & Martin, 2010)
- The use of ICT promotes improving of students learning outcomes only when teacher have the knowledge about the efficient and meaningful use of ICT in teaching/learning process (Ertmer & Ottenbreit-Leftwitch, 2010)

# Research questions

- What ICT tools are used by teachers and students?
- How meaningful are the ICT tools in the science teaching/learning process?
- What information teachers do continuing professional development course developers obtain?

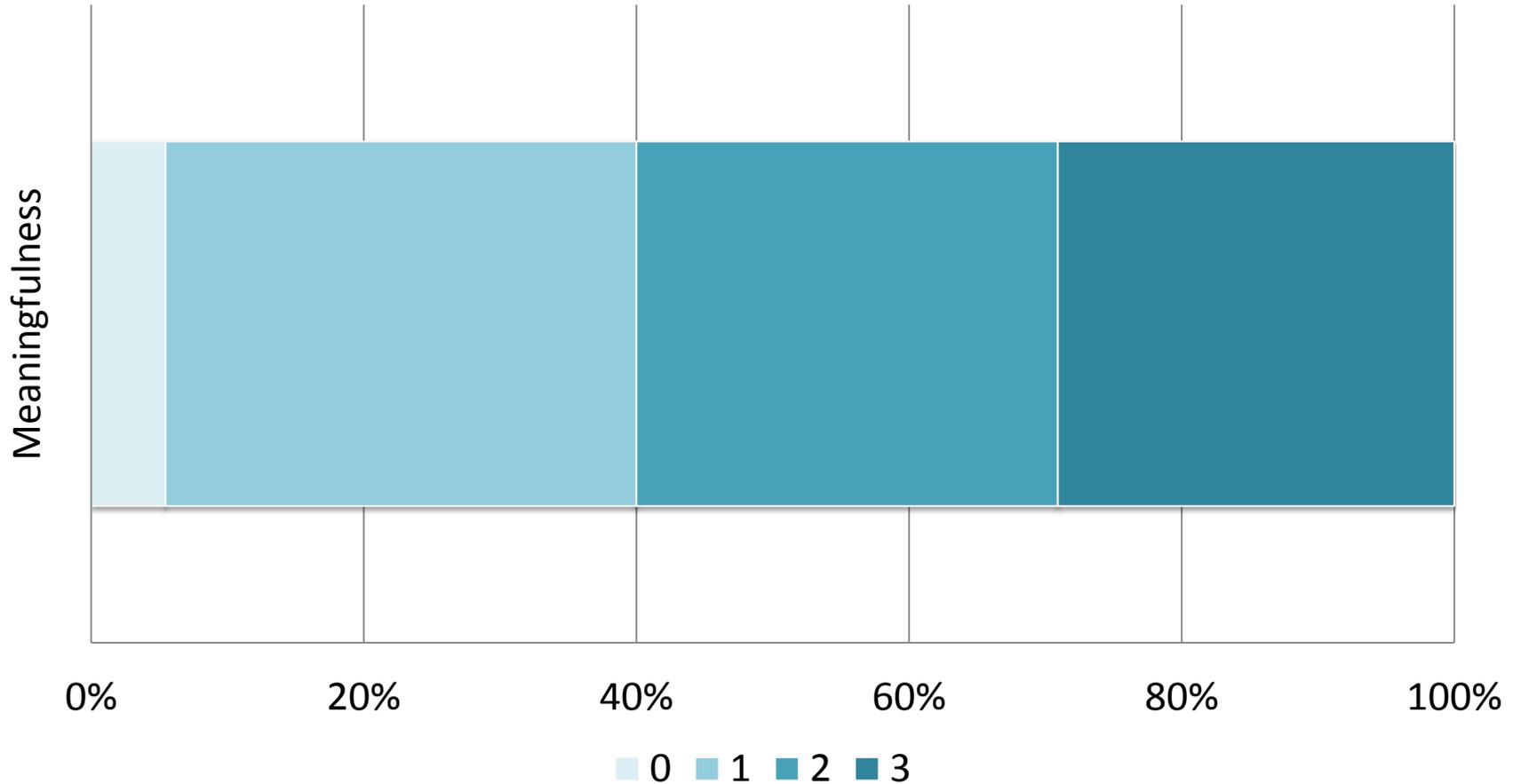
# The use of ICT tools in science lessons



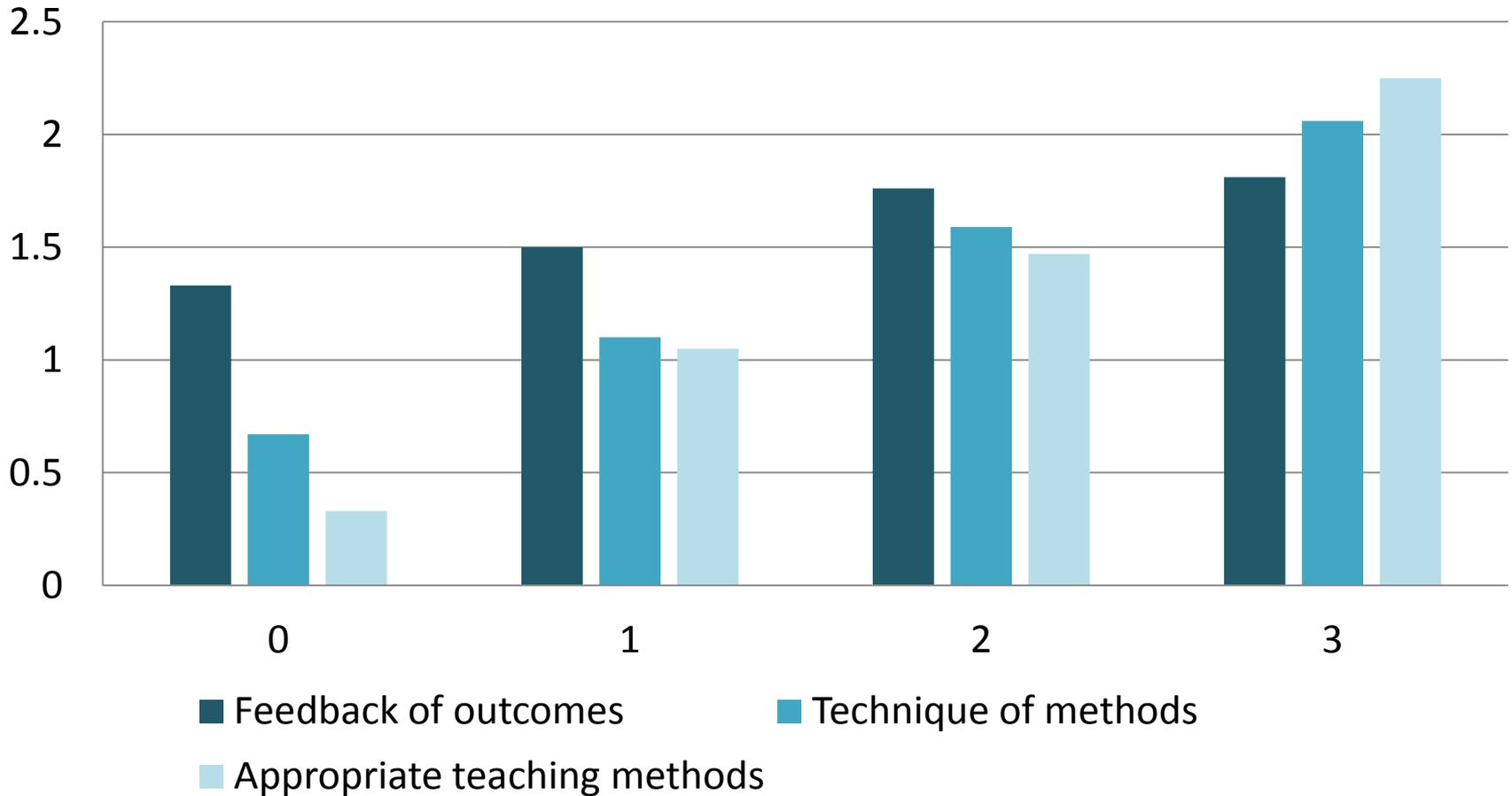
# The ICT tools used by teachers and students during science lessons

ICT tools	Used by teachers	Used by students
Computer	45 %	37 %
Interactive whiteboard	34 %	18 %
Web camera	9 %	-
Data camera	12 %	9 %
Sensors and data loggers	-	18 %
Mobile phone	-	18 %

# Meaningfulness of ICT tools in observed science lessons



# The correlation between the usage of ICT and implemented teaching methods



# Technical skills of ICT application

- *The teacher uses a computer and projector to demonstrate tasks.*
- *The teacher demonstrates an interactive CD (video and solves problems). She demonstrates animation about cells and tissues. Students have no particular assignment during the demonstration. All they do is watch.*
- *Projector is used only to show the correct answers.*
- *The teacher used Project materials for interactive board and called students to come to the board. Students presented their work using data camera. The screen was displaying a proof that could be followed opening it step by step. The goal of the lesson was lost among the practical engagement with technologies.*
- *The teacher projected a work sheet but there was no follow up.*
- *The teacher announces the possibility to use the interactive board and goes on saying that she will do it. However, the interactive board equipment is not used. The teacher draws with a mouse and computer.*

# ICT as effective means to achieve the planned learning outcome

- *If acquiring practical skills (work with a sensor) is the learning outcome, students should work individually.*
- *Objection against the content of the presented animation.*
- *The purpose of the lesson is left behind the scene. Several wrongs in the presentation. []. The volume of planned activities is impossible for one lesson. []. No teaching, just galloping across the learning material...*
- *Although the students were rushed to solve the problems on the work sheet, the majority did not manage to complete everything. IT and the interactive board (writing) were used by the teacher alone.*
- *The teacher uses data camera to complement her explanations and to enable the students to make sure they have solved the problems correctly.*
- *The teacher models one problem on the screen and writes the correct answers. No IT used to prevent confusion. Computers serve for mechanical data entry into Excel sheets.*

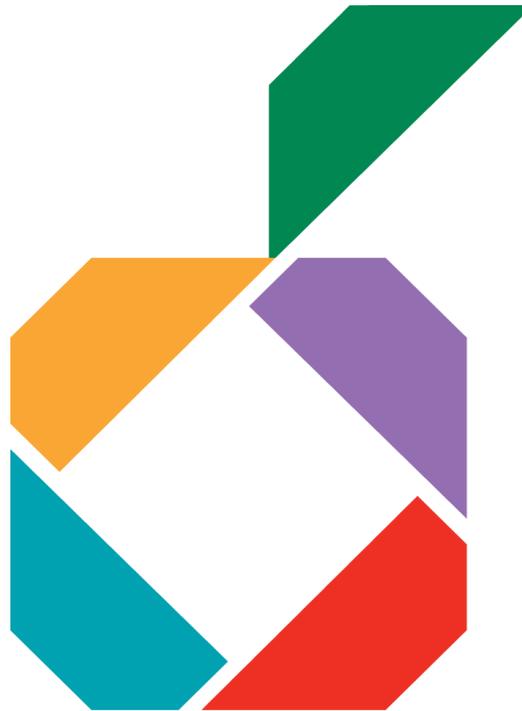
The challenge for teachers is to be more open for the new learning strategies and give to students clearer and focused tasks to open the way to the variety of solutions for the usage of different ICT tools in order to reach planned outcomes.

# Content of Teachers` CPD Courses

Students' skills that have to be developed within the digital competence	Content of CPD courses for teachers	
	Knowledge and practical skills to be mastered by teachers	Teaching/learning strategies of meaningful use of ICT
Searching, collecting and processing of information	Practical skills: 1) to search for information using key words in different data bases; 2) to collect and process information according to the tasks.	How to plan and implement lessons according to the planned outcomes by meaningful application of ICT in learning process
Evaluation and applying of information	Knowledge of evaluating online information, and knowledge of authorization to use information for different purposes.	
Use of Internet services	Practical skills for operating in social networks, collaborating in shared files, operating in digital environment, and for communication.	
Creating of information	Practical skills, knowledge and specific subject teaching/learning strategies to operate with, for example, data logger and sensors software for data logging and processing; interactive whiteboard software for creating different tasks etc.	
Presenting of information	Practical skills and knowledge for structuring information, selecting key information, using presentation software.	
Creativity and innovation support	Basic skills for operating with image and video processing software. Knowledge of different software for creativity and innovation development (audio, animation, visual programming software etc.	

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**THANK YOU FOR  
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