Digital Tools in Education

On Usage, Effects and the Role of the Teacher

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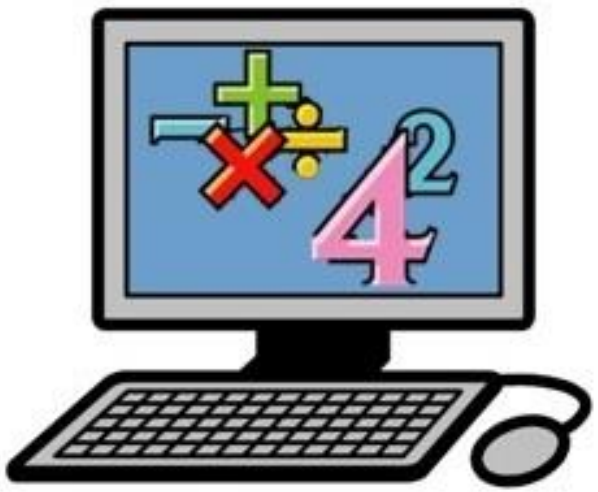
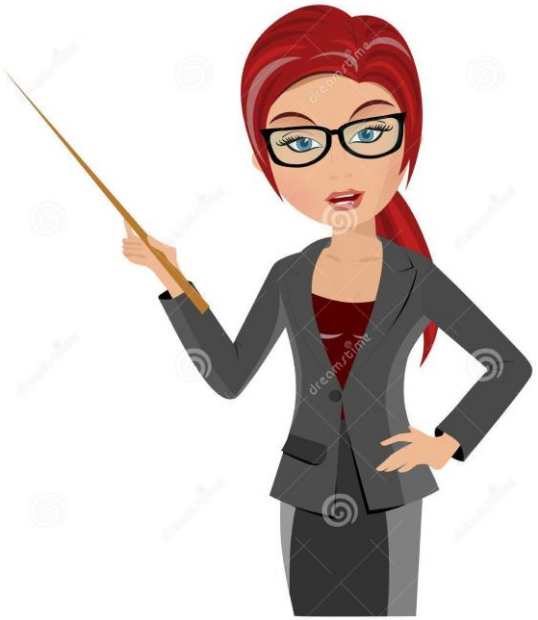
Why this study?

- How to achieve highest possible student performance?
- What role can Information and Communications Technology (ICT) play?

Research Questions





What is ICT in education?

- ICT in education generally refers to everything that involves technology in education:
- Devices
  - Computers, tablets, smart phones, interactive whiteboards
- Software
  - Educational games, digital learning tools, other applications online

ICT is believed to

- Make life-long-learning easier
- Contribute to individual enhancement (and increase employability and productivity)
- Enhance digital competence
- Complement and facilitate in teaching process
- Help with individual differentiation

ICT in education

- Some evidence in literature of positive effects
- Although OECD did not see relation between ICT presence and student performance (PISA 2012)
- Most schools have access to ICT
- So why no relation with student performance?

Effective use of ICT

- **ICT use needs to be effective (it is a tool, not a goal):**
- Clear pedagogical/didactical focus
- Knowledge on ICT (know benefits + how to use it)
- Common support
- Facilitation of schools, managers and teachers
  - For training and usage

Aim of this report

- To contribute to the debate on which types of ICT use in education have proven to be effective
  - Earlier international research
  - Dutch experiments
- Bring research and practice closer together
  - Applicability of findings and recommendations

Conclusions from earlier research

Conclusions from earlier research

- General investments (no specific purpose) → mixed results, at best.
- (Small) positive effects of computer assisted instruction vs. traditional classroom learning
- Positive effects of specific digital learning tools
  - In developing countries
  - For mathematics
  - But not for language training (mother tongue)

Conclusions earlier research

- Effectiveness of ICT in education highly dependent on how it is used and which (pedagogical) purpose it is intended to serve
- Cost-effectiveness is rarely studied
- Barriers to technological change
  - Internal beliefs,
  - Lack of time, knowledge or training

Conclusions from Dutch experiments

Experiments in the Netherlands

- 8 different randomized experiments on ICT
- in secondary education in the Netherlands
- between 2012 and 2015

Conclusions from Dutch experiments

- **Digital adaptive practice tools:**
- Positive effects for mathematics and some aspects of language
- Individualization is effective

Conclusions from Dutch experiments

- Most effective for instructions that are easy to automate
- Effects differ across domains
- Effects differ across performance levels

Conclusions from Dutch experiments

- **Other types of ICT:**
- In-class-level differentiation through use of hardware is effective
- Digital tests are effective
- Digital feedback is effective

Conclusions from Dutch experiments

- **Overall:**
- Effects are often dependent on the teacher
- Parental involvement is important

Conclusions from Dutch experiments

Effectiveness of ICT in education depends on how it is used and the pedagogical purpose of the digital tool!

Recommendations

Recommendations school level

- Deliberate choice and introduction of ICT tools
- Continuous training for professional development
- Bottom-up approach

Recommendations national level

- More evidence about effects of digital tools
- National knowledge system/infrastructure
  - Disseminate knowledge on how to use ICT (devices)
  - Communication of research results
  - Stimulate research and provide guidance on effective use
- Integrating ICT in teacher education and in educational plans

Recommendations general level

- Focus on effective practice
- Do not underestimate the role of the human factor

Thank you for your attention!

Questions?