



datateams

Using data to improve the quality of education



University of Twente Education day
October 27, 2016

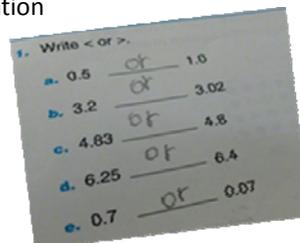
Kim Schildkamp & Cindy Poortman
UNIVERSITEIT TWENTE.



datateams

Data-based decision making

- The use of data to improve education (Schildkamp & Kuiper, 2010)
 - Systematically collecting
 - Analyzing and interpreting data
 - Using this information to improve education





True or false?

- Boys are better in mathematics than girls



False!

- Research in 86 countries
 - Mainly in Western countries: boys slightly better
 - However, caused by social and cultural factors
 - In most countries no differences
 - In some countries girls better
- Girls do **not** perform worse in mathematics
- Sources: *Kane & Mertz (2012)*, *Everett & Madora (2011)*, *Stoet & Geary (2012)*, *Wei et al (2012)*



True or false?

- Students have different learning styles to which you need to adapt your instruction



False!

- No scientific evidence
- No effects if teachers take into account different learning styles
- It is a waste of time and effort to adapt instruction to learning styles
- Sources: *Coffield et al (2004), Corbelis (2012), Geake (2008), Hattie (2009)*



True or false?

- Data-based decision making can lead to increased student achievement

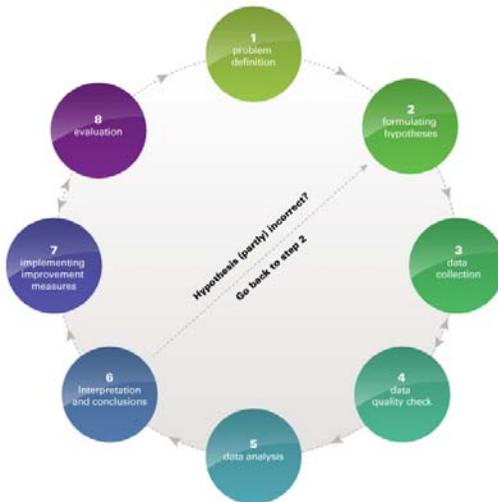


True!

- Data can pinpoint strengths and weaknesses of your education
- Based on data improve weaknesses
 - Combination with experience
- Improved education for students
- Increased student achievement
- Sources: *Campbell & Levin (2009), Carlson et al (2011); McNaughton et al (2012), Poortman & Schildkamp (2016)*



The datateam[®] procedure



- Team 6-8 people
- Educational problem: low student achievement
- Goals: professional development and school improvement
- Coach guides them through the eight steps
- Data analysis courses



Step 1: Problem definition

- Identify a current problem in the school
 - School-wide or subject-specific
- Prove that you have a problem
 - Collect data on current situation and desired situation
 - Three cohorts/years
- Example:
 - Current situation: '25% of our students is failing module x'
 - Desired situation: 'Next year no more than 15% of our students is failing, the year after that no more than 10%.'



Assignment step 1 problem definition

- In groups of 3/4
- Think of a problem with a certain course or module you would like to address
- Why do you think this is a problem?
- How can you confirm that this is a problem?

- 5 minutes



Step 2: Formulating hypothesis

- Brainstorm possible causes
 - Ask colleagues for input
 - Make a list
- Choose a hypothesis
 - Based on criteria, such as: what can we influence as teachers? Which hypothesis do a lot of colleagues believe to be true? What is, according to the literature, a possible cause?
- Formulate a hypothesis
 - Concrete
 - Measurable



Assignment step 2 hypotheses

- In groups of 2-4
- Think of a problem with a certain course or module you would like to address
- Write down possible causes of this problem
- Try to make these possible causes measurable

- 5 minutes



Learning results

Student

Prior knowledge

Metacognitive skills
(learning how to learn)

Motivation

School

Curriculum coherence

School culture

Student care

Effective learning time

Teacher

Feedback

Quality of instruction

Classroom management

Pedagogical climate

Managing differences
between students

Assessment

High expectations towards
students



Step 3: Data collection

- Available data
- Existing instruments
- Quantitative and qualitative

- Examples:
 - Student achievement data
 - Surveys: module evaluation, motivation
 - Classroom observations
 - Student interviews, teacher interviews



Step 4: Data quality check

- Reliability and validity of the data
- Crucial step: not all available data are reliable and/or valid!

- Examples:
 - Only few students have filled out the survey
 - Validity problems with survey
 - Data of one year only
 - Missing data



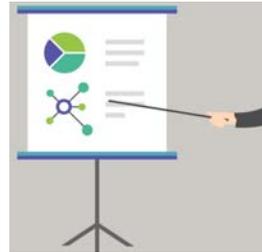


Step 5: Data analysis

- Qualitative and quantitative
- From simple to complex
- Extra support: course data analysis

- Examples:

- Mean, standard deviation
- Percentages
- Comparing two groups: t-test
- Qualitative analyses of interviews and observations

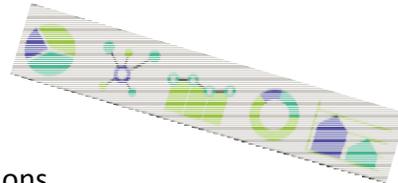


Step 6: Interpretation and conclusions

- Is our hypothesis rejected or confirmed?
 - Rejected: go back/ further to step 2
 - Accepted: continue with step 7

- Example of 32 data teams:

- 33 hypotheses: accepted
- 45 hypotheses: rejected
- 13 (qualitative) research questions
- 13 hypotheses: no conclusion due to limitations of the dataset





Assignment step 4 to 6

- Problem: 29% of students is failing module x.
- Hypothesis: failing students are less motivated than students that pass.
- Complete steps 4-5-6 (10 minutes):
 - Quality of the data (step 4)
 - Data analysis (step 5)
 - Interpretation and conclusion (step 6)



Results assignment step 4-5-6

- Quality:
 - Insufficient
 - “I am motivated to attend the lectures”
 - Different people will have different definitions for motivation
 - Validity issue
- Hypothesis cannot be accepted
- Back to step 3: Collect new data on motivation



Step 7: Implementing measures

- Develop an action plan:
 - Smart goals
 - Task division and deadlines
 - Means
- Monitoring progress: how, who, which data?



Step 8: Evaluation (process)

- Process evaluation
 - Have the measures been implemented the way we want?
 - Have the measures been implemented by everyone?
- Example process evaluation:
 - Measure: start every lecture with a short repetition of the topics in module x that students find difficult in the form of a quiz
 - Interview students: this is boring, start to detest quizzes!
 - Adjust measures: repeat quiz less frequently



Step 8: Evaluation (effect)

- Effect evaluation:
 - Has the problem been solved?
 - Did we reach our goal as stated in step 1?
- Example effect evaluation:
 - Did our measure(s) results in increased achievement for module x?
 - Check: Next year no more than 15% of our students is failing



Research results

- How do data teams function?
- What are the effects of data teams?
- Results are based on three studies conducted in the Netherlands (Schildkamp, Handelzalts, & Poortman, 2015; Schildkamp & Poortman, 2015; Hubers, Schildkamp, Poortman, & Pieters, 2016) and one study in Sweden (Schildkamp, Smit, & Blossing, 2016)

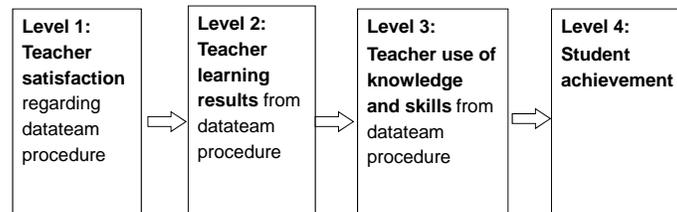


Data team functioning

- Difficult to make a measurable hypothesis
- Several rounds of hypotheses: first hypotheses often wrong
- Often external attribution: problem is caused by primary schools, by policy etc.
- However, this is necessary: need to create trust; practice with the eight step procedure; learning starts when you make mistakes; shows the importance of data
- From external to internal attribution



Effects



Framework of effects from teacher satisfaction to increased student achievement (based on: Kirkpatrick, 1996; Guskey, 1988; Desimone, 2009; Desimone, Smith & Phillips, 2013)



Effects

Effects level	Instrument(s)
Level 1: satisfaction	<ul style="list-style-type: none">• Satisfied about support, process and progress• 'good'; 'fun'
Level 2: knowledge, skills, attitudes	<ul style="list-style-type: none">• Knowledge and skills increased significantly• 'learnt how to use calculations in Excel'; what + how of qualitative analysis; 'you really need evidence'
Level 3: use of learning	<ul style="list-style-type: none">• Data use for instruction: e.g., prepare students better for particular exam questions (explanation and practice)
Level 4: student achievement	<ul style="list-style-type: none">• Seven out of thirteen schools solved problem: Significant increase in student achievement



Conclusion and discussion

- Data teams knowledge and skills: from 'intuition-based decision making' to 'data-based decision making'
- Change in school culture: "You want to take decisions based on assumptions, that is not the way we work here anymore"
- Support schools in solving problems and reaching goals
- Increased student learning



Thank you for your attention!

- For the Dutch speaking people:
- Zie ook het boek: *'De datateam® methode: een concrete aanpak voor onderwijsverbetering'*
 - een toelichting op datagebruik
 - een hoofdstuk per stap
 - casussen met nog meer voorbeelden
 - aandacht voor inbedding in de organisatie
- More information: www.datateams.nl
- Contact: c.l.poortman@utwente.nl or k.schildkamp@utwente.nl

