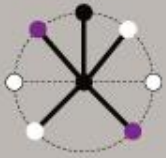


# From “intuition”- to “data”-based decision making in Dutch secondary schools

Sweden, September 11

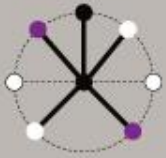
*Kim Schildkamp, Maaïke Smit &  
Cindy Poortman*





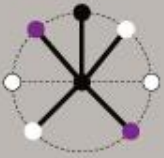
# Today we would like to ...

- ...explain the data team concept
- ...let you experience working in a 'data team'
- ...discuss our research results
- ...discuss opportunities in your own practice



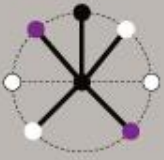
# Data-based decision making

- The use of data, such as assessment results, to improve education (Schildkamp & Kuiper, 2010)
  - Systematically
  - Analyze and interpret data
  - Use this information to improve education



# Data

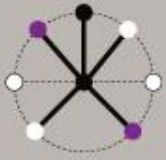
- Input, process and output data:
  - Output data combined with input data can often pinpoint the problem
- However, mostly you need process data to determine the cause of the problem
- Examples of data: demographic data, classroom observations, student surveys, parent interviews, assessment results



# True or false?

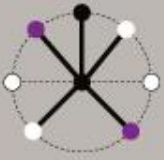
- Boys are better in mathematics than girls





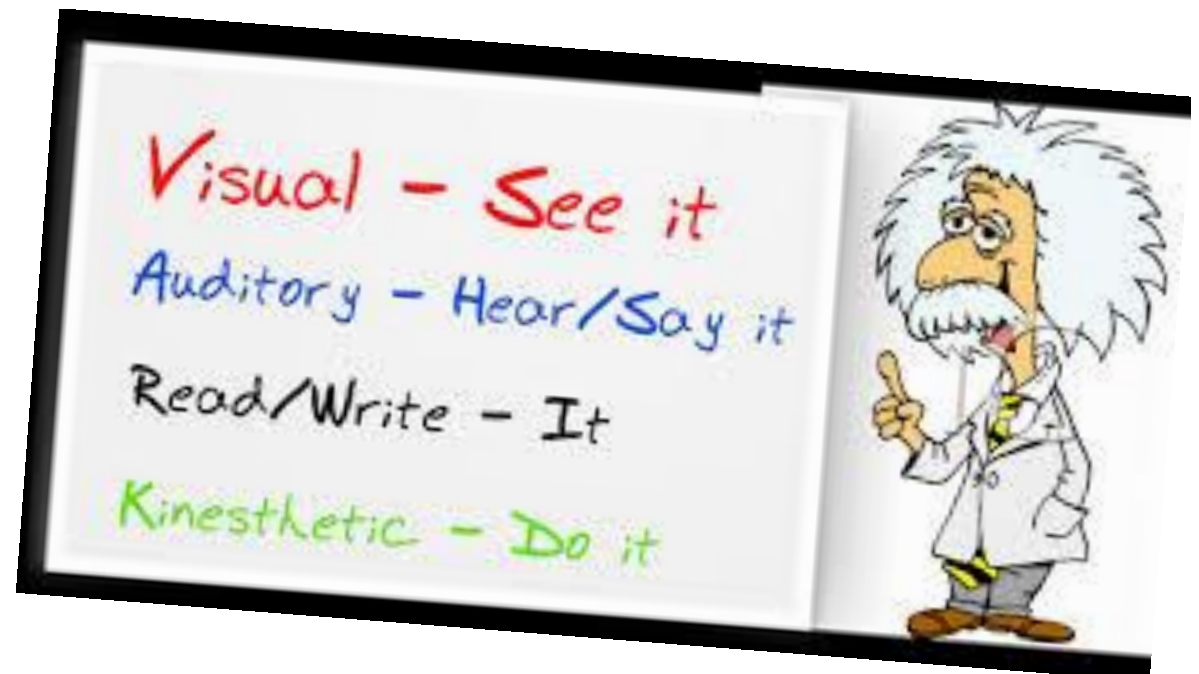
# False!

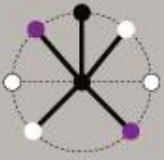
- Research in 86 countries
  - Mainly in Western countries: boys slightly better
  - However, caused by social and cultural factors
  - In most countries no differences
  - In some countries girls better
- Girls are **not** worse in mathematics
- Sources: *Kane & Mertz (2012)*, *Everett & Madora (2011)*,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



## True or false?

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

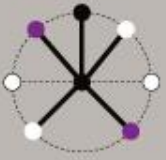




# False!

- 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)*

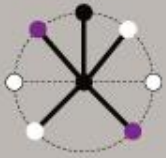




## True or false?

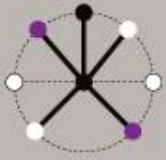
- Data-based decision making can lead to increased student achievement





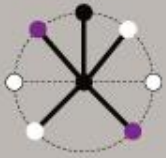
# True!

- Data can pinpoint strengths and weaknesses of your education
- Based on data improve weaknesses
  - Combination with experience
- Improved education for students
- Increased student achievements
- Sources: *Campbell & Levin (2009), Carlson et al (2011); McNaughton et al (2012), Datateam project (2013)*



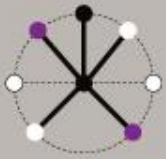
# How we often solve problems?





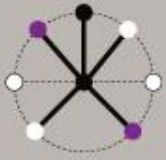
# Why data-based decision making?

- Gut feeling and intuition not always correct
- Not (only) intuition and gut feeling, but informed decision making
- Are we reaching our goals?
- Can lead to school improvement (e.g. Carlson, Borman, & Robinson, 2011)
- However, little use

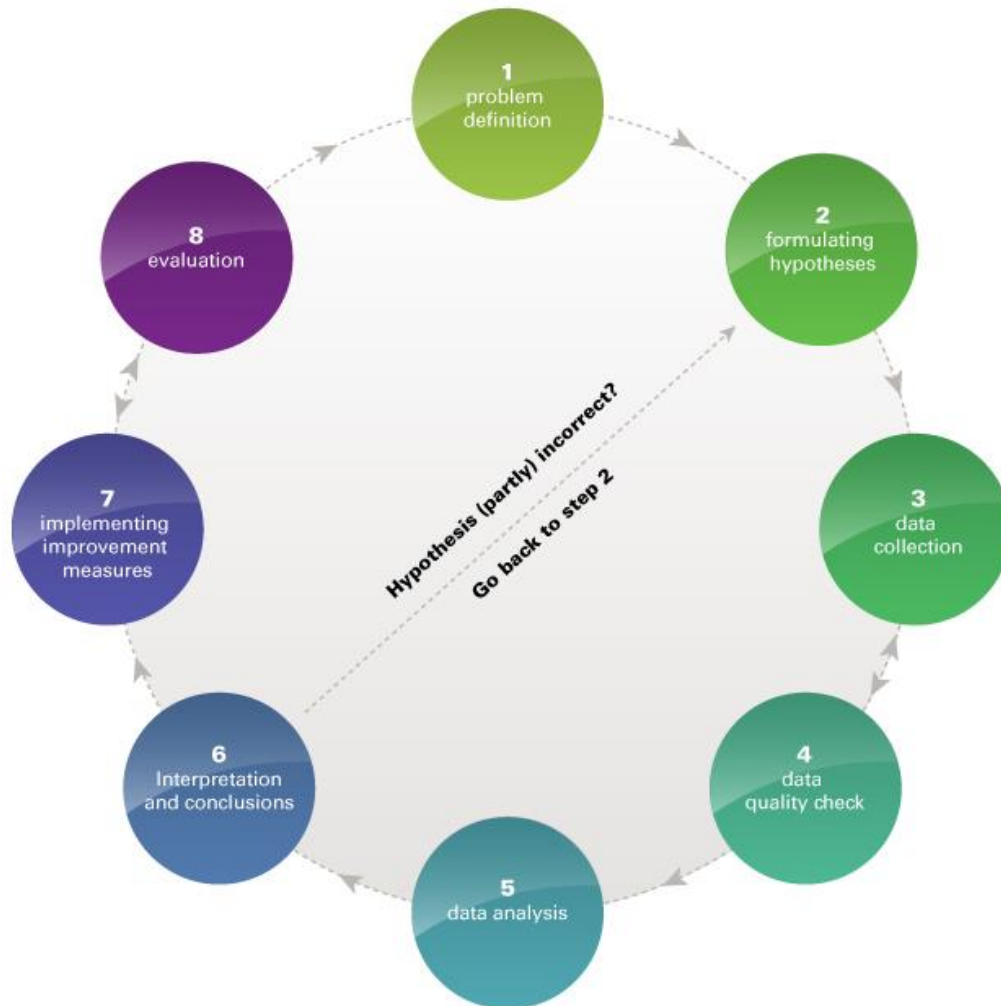


# Too many data: where to start?

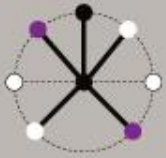




## Datateam<sup>®</sup> procedure

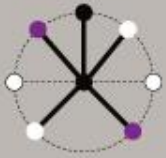


- Teams 6-8 teachers and school leaders
- Educational problem: grade repetition, low student achievement
- Goals: professionalization and school improvement
- Trainer guides them through the eight steps



# Our project

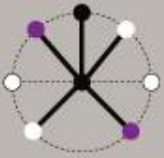
- Started with a small pilot: 5 schools
- Growing: currently more than 40 schools
- Research focussing on: functioning, influencing factors, knowledge creation and sharing, social networks, sustainability
- Intervention; two years of support, 10/12 meetings per year, manual with work sheets, data analysis course, conference, knowledge sharing meetings



# Step 1: Problem definition

- Identify a current problem in the school
  - School-wide
  - Subject-specific
- Proof that you have a problem
  - Collect data on current situation and desired situation (e.g. goal)
  - Three cohorts





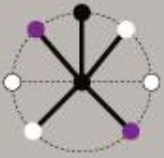
# Example problem definition

- Current situation:

e.g. '45% of our students is failing math'

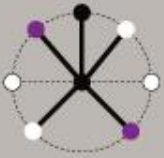
- Desired situation:

'Next year no more than 30% of our students is failing, the year after that no more than 15%.'



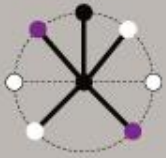
# Assignment problem definition

- Work in groups; a data team
- Assignment 1:
  - Think of a problem in your school you would like to address
  - Why do you think this is a problem?
  - How can you confirm or 'proof' that this is a problem?



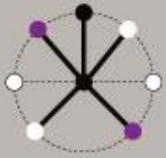
## Step 2: Formulating hypotheses

- Two types hypotheses:
  - Exploring: for which group, gender, or subject does this problem exist? The main aim of this type is to further specify and narrow down the problem
  - Explaining: possible causes of the problem
- Make it measurable!



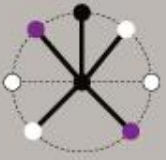
# Examples of hypotheses

- Students that graduated on time have a significantly lower number of missed classes than students that did not graduate on time.
- Students that fail the 4<sup>th</sup> year have fewer study skills than students that pass the 4<sup>th</sup> year.
- The percentage of students that fail their first or second year differs for the various primary schools they came from.
- The grades for English in year 3 and 4 have a low correlation.
- In the subject of math in year 1 and 2, students score significantly lower on 'percentage' assignments than they do on other assignments.
- Teachers give more feedback concerning results than concerning the process.
- What do students that failed class 4 say about why they failed? What in their opinion is the role of school, of home, and of themselves?



# Assignment hypotheses

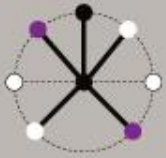
- What do you think causes the problem of *'45% of our 9<sup>th</sup> students is failing mathematics?'*
- In groups of two write down possible causes of this problem on a sticky note and put it on the wall.



## Step 3: Data collection

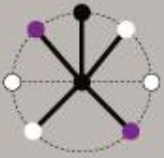
- Available data
- Existing instruments
- Input, output and process data
- Quantitative and qualitative





# Examples of collected data

- Student achievement data
- Surveys: motivation, feedback, curriculum coherence
- Classroom observations
- Student interviews, teacher interviews

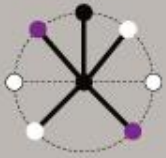


## Step 4: Data quality check

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

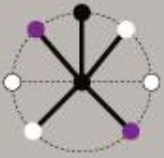






# Examples of data quality check

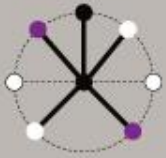
- Validity problems with survey
- Missing data
- Wrong respondents
- Data of one year only
- Quality of the conducted interviews, socially desirable answers



## Step 5: Data analysis

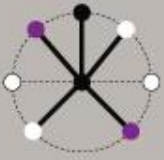
- Qualitative and quantitative
- From simple to complex  
(descriptive, statistical analysis)
- Extra support needed:  
course data analysis





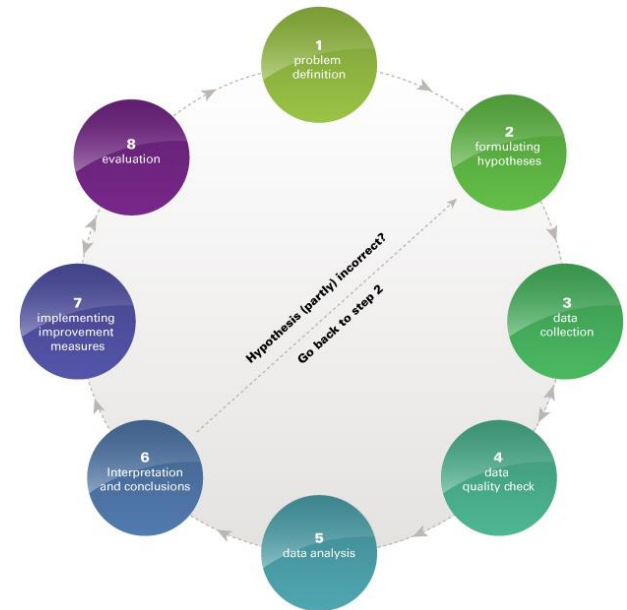
# Examples data analysis

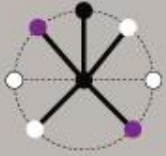
- Average, standard deviation
- Percentages
- Comparing two groups: t-test
- Qualitative analyses of interviews and observations



# Step 6: Interpretation and conclusions

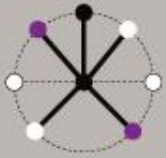
- Is our hypothesis rejected or confirmed?
  - Rejected: go back/ further to step 2 (happens often!)
  - Accepted: continue with step 7





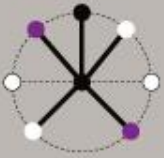
# Overview conclusions

- An analysis of 32 data teams in the Netherlands (2012-2014) shows that:
  - 33 hypotheses were accepted
  - 45 hypotheses were rejected
  - 13 hypotheses: no conclusion due to limitations of the dataset
  - 13 (qualitative) research questions were studied



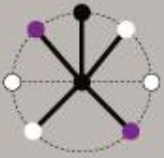
## Assignment step 4 to 6

- Problem: 29% of students in the ninth grade fail to qualify for upper secondary school.
- Hypothesis: failing students are less motivated than students that pass.
- Complete together steps 4-5-6:
  - Quality of the data (step 4)
  - Data analysis (step 5)
  - Interpretation and conclusion (step 6)



# Results assignment step 4-5-6

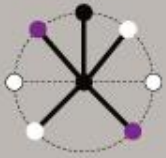
- Quality:
  - Insufficient
  - 'I am motivated to go to school'
  - Different people will have different definitions for motivation
  - Validity issue
- Hypothesis cannot be accepted
- Back to step 3: Collect new data on motivation



## Step 7: Implementing measures

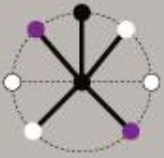
- Develop an action plan:
  - Smart goals
  - Task division
  - Deadlines
  - Means
- Monitoring progress: how, who, which data?





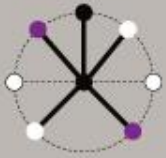
# Examples implemented measures

- Action plan feedback in the classroom
- Curriculum development teams
- Early detection of failing students
- Counselling of students
- Repetition of percentages in the classroom
- Online practice programs



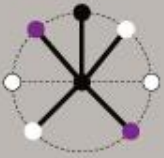
# Step 8: Evaluation

- Process evaluation
  - Are the measures implemented the way we want?
  - Are the measures implemented by everyone?
- Effect evaluation:
  - Is the problem solved: did we reach our goal as stated in step 1?



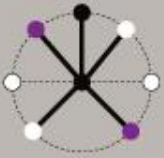
# Examples evaluation

- Measure: start every lesson with a short repetition of percentages in the form of a quiz
  - Proces evaluation: interview students
  - Results: starting every lesson this way is boring, start to detest percentages!
  - Adjust measures: repeat percentages only once a week
- Effect evaluation: increase student achievement



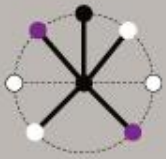
# Research results

- How do data teams function?
- Which factors influence the functioning of data teams?
- What are the effects of data teams?

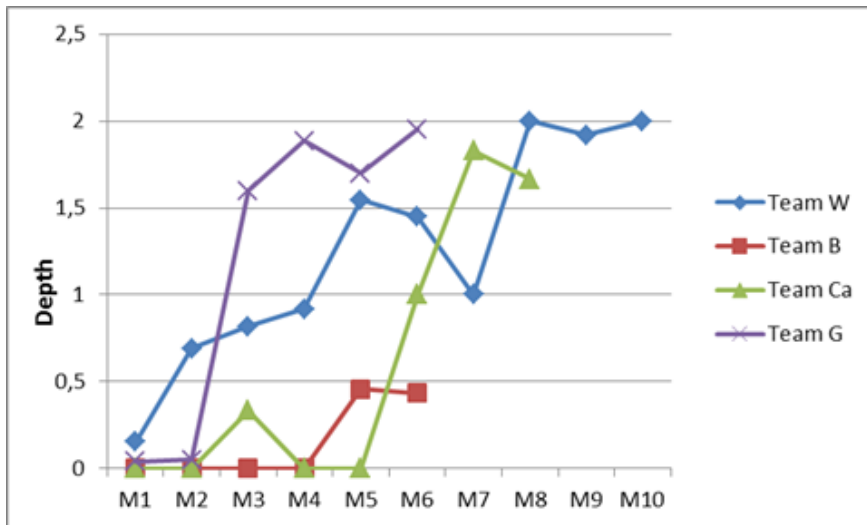


# Data team functioning

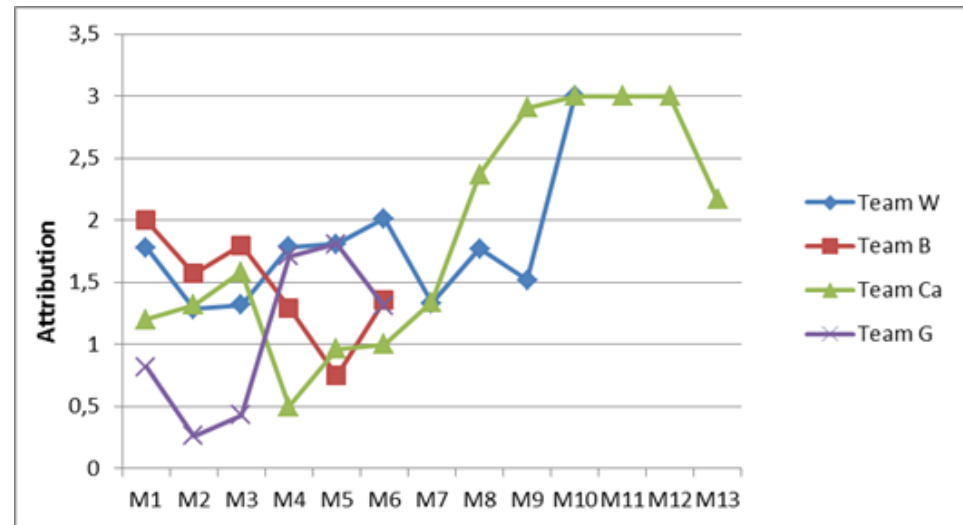
- Difficult to make a measurable hypothesis
- From intuition and gut feeling to data
- Several rounds of hypotheses: first hypotheses always wrong
- Often external attribution: problem is caused by primary schools, by policy etc.
- However, this is necessary:
  - Need to create trust
  - Practice with the eight step procedure
  - Learning starts when you make mistakes
  - Shows the importance of data
- From external to internal attribution



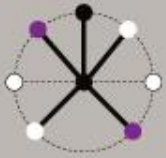
# Data team functioning



Depth of inquiry

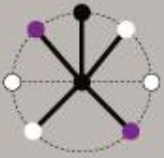


Attribution



# Influencing factors

- Leadership: time, enthusiasm, role model
- Collaboration inside and outside the data team
- Voluntary participation
- Shared problem and goals
- Structured procedure
- Support

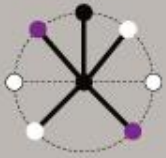


# Effects: teacher satisfaction

- Teacher satisfaction questionnaire: respondents satisfied to very satisfied about support ( $M = 4.50^*$ ) and materials ( $M = 4.14$ )
  - interviews: Data team guidelines provided extra support, e.g.: *'it's very valuable'*; *'it's good to have the steps on paper'*
- Teacher satisfaction questionnaire: neutral to satisfied about completing the steps ( $M = 3.88$ ) and the process in their data team ( $M = 3.96$ )
  - interviews: both positive responses, e.g.: *'fun'*; however, also frustration with slowness of progress, e.g.: *'I would like to see more momentum'* (in the meetings).

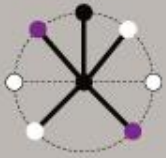
\* = 5-point Likert scale





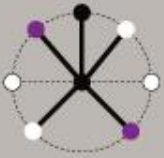
## Effects: teacher learning results

- Knowledge test: data team members scored significantly higher on posttest ( $M = 10.4$ ) for knowledge than pretest ( $M = 9.4$ ;  $d = 0.32$ ).
- Data use questionnaire: gain score for knowledge and skills scales significantly higher for data team members ( $M = 0.10$ ) than for control group teachers ( $M = -0.06$ ;  $d = 0.62$ )
- Interviews: teachers learnt, for example, how to use a questionnaire to collect data and how to be critical towards colleagues. They also learnt about what qualitative data analysis is.
- E.g.: *'to talk about education with colleagues in the data team, and develop new insights (...) into why we do things'*.



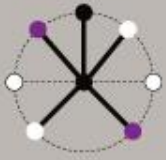
## Effects: teachers use of knowledge and skills

- Data use questionnaire:
  - gain scores for ‘collaboration’ significantly higher for data team schools ( $M = 0.13$ ) than control group schools ( $M = 0.02$ ,  $d = 0.52$ ).
  - gain scores for ‘data use for accountability’ and ‘data use for school improvement’ higher for data team members, however, not significant.
- Interviews also show teachers using data and specifically collaborating with colleagues in data use, e.g.:
  - *‘I use data with my colleagues from the same department’, ‘but also with my group of students’; (...) we used to be talking ‘on an island’: now we will also share our findings with colleagues.*



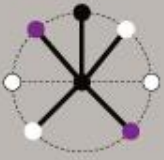
# Effects: students

- Some evidence that it can lead to increased student achievement
  - Improvement in final examination results English
  - Improvement in mathematics achievement lower grades of secondary education
  - Less grade repetition in lower grades of secondary education
- However, we need to analyze this further



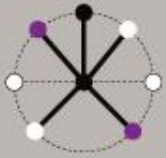
# Conclusion

- If certain factors are in place the datateam procedure can lead to:
  1. Professional development:
    - Data use
    - Learning by collaborating
  2. School improvement:
    - Increased mathematic achievement
    - Less grade repetition



# Discussion

- What problems exist in your municipality/ organization/school for which you could use a data team?



datateams

# Thank you for your attention!

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