



KTH Information and  
Communication Technology

# Research Methodology and Scientific Writing / II2202

## 2011

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# **Topics**

**Research Methodology**

**Scientific writing**

**Investigation - Quantitative and Qualitative  
methods**

# Learning Outcomes

- The student should be able to:
  - explain and apply techniques for research methodology and scientific writing to prepare the writing of a scientific report.
  - perform investigation using methods, explain and take position on the results as well as summarize related work.
  - apply the knowledge in scientific writing and research methodology and use the knowledge to write a scientific report.

# The course

- **Goal:**
  - Design a project plan
  - Apply and Discuss qualitative and quantitative methods
  - Perform data analyses on collected material
  - Communicate the work, in written and verbal form
  - Reason, Discuss and Argument for the work

# Tasks

- Establish a project plan
- Perform data collection, with different methods + describe + argue the method
  - Analyse collected material
  - Present data collection and data analysis
- Write report about selected topic
  - Present the work in a report
  - Discuss the scientific soundness
- Review a report and write opposition

# Course outline

- **Lectures**
- **Mandatory seminars:**
  - Project plan
  - Methods with data collection and data analysis
  - Report including opposition

# Grading

- **Assignments – handed in material (in time):**
  - Project plan for an investigation, P/F
  - Method for the investigation (discussion about choice of method, selection of participants) P/F
  - Report (about the investigation within computer science) + scientific writing, A-F
  - Opposition, A-F
- **3 Mandatory seminars, P/F**

# Assignment – Investigation - Part 1

- Is performed during the whole course
- Carried out in a group of 2 students
- Choose a topic that will be evaluated
- Design and present a problem (write project plan - max 600 words)
- Choose a method
- Specify the data collection process, attendees / delegates
- *Present the result at seminar 1*



## Assignment – Part 2

- Find attendees that are participating in the investigation - if personal contact - decide time and place
- Observe that the method affects the number of participants - but - the investigation must be viable during the course
- Use appropriate / useful method for the investigation
- Prepare and start the investigation
- Write method description (max 1000 words)
- *Present result at seminar 2*

## Assignment – Part 3

- In accordance with chosen method:
  - Create questionnaire, Interview questions, Observations or other selected data collection method
- Perform evaluation:
  - Analyse collect material
  - Document evaluation in a report
  - Present evaluation in report – max 1200 words
- Review other student's report (opposition) – max 600 words
- *Present result and opposition at seminar 3*

# Information

- **Bilda – information at:**

[http://www.kth.se/student/studok/studiedokumentation-mina-sidor-1.1938?l=en\\_UK](http://www.kth.se/student/studok/studiedokumentation-mina-sidor-1.1938?l=en_UK)

- **Fetch material: Slides, templates**

- Hand in assignments,
- Last version of the schedule,
- Find out changes
- Communication

Problems: Contact Bilda, see login site

- **Daisy** (<http://daisy.ict.kth.se/login.jspa>)

- Select a group for labs and seminars
- Problems: Contact Daisy group, see login site

- **Homepage:** <http://www.ict.kth.se/courses/II2202/>

# Information

- Bilda <https://bilda.kth.se>

Welcome to the BILDA-system, the KTH-tool for netbased, flexible learning

Log in to BILDA



[Click this image to use your KTH.SE account to log in.](#)

[If you don't have a KT](#)

# Information

## KTHs inloggningstjänst

Tjänsten du besökte kräver inloggning. Efter inloggning skickas du tillbaka till den webbapplikation som önskar verifiera din identitet.

Om du har glömt ditt lösenord eller har andra problem, kontakta din lokala helpdesk.

**Logga in på kth.se**

Användarnamn (kth.se-konto):

Lösenord:

[Logga in på KTH »](#)

Senast ändrad : 2010-05-24

 [Skriv ut](#)

# Information

## II2202 (H11) Research Methodology and Scientific Writing

- 📁 Senaste nytt
- 📁 **Översikt**
- 📁 Innehåll
- 📄 Dokument
- ?? Vanliga frågor

## Kommunikation

- 👤 Medlemmar
- 📌 Anslagstavla

## Översikt

### Funktion

#### Aktivitetens startside

Läraren bestämmer vilken sida som ska vara aktiv sida i *Innehåll* som är aktivitetens startside.

#### Innehåll

När du klickar på *Innehåll* kommer en ny menystrukturerat för denna aktivitet. Läraren skriver ofta ins

#### Dokument

Här hittar du dina egna uppladdade dokument, ak

# Information

 **II2202 (H11) Research Methodology and Scientific Writing**

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 Senaste nytt

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 Översikt

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 **Innehåll**

-  **Welcome**
-  Project plan

◀ Föregående ▶ Nästa

## Innehåll

Welcome

Project plan

# Information

Startsida > Mina aktiviteter > II2202 (H11) Research Methodol... > **Innehåll**

## II2202 (H11) Research Methodology and Scientific Writing

📁 Senaste nytt

📁 Översikt

📁 Innehåll

• Welcome

• **Project plan**

• Late project plans

◀ Föregående ▶ Nästa 🔍 Sök ⛶ Maximera innehållet

Upload your project proposals here. You must use .doc or .docx format. The name of your document should be your own names. Use a wide right margin (150 points or 7 cm). Include the word count at the end of the document.

**Maxpoäng: 1**

**Deadline: 12 sep 2011 23:59**, 15 dagar kvar till deadline



## Course literature

Getting It Right: R&D Methods for Science and Engineering  
by Peter Bock

Publisher: Academic Press; 1 edition (September 13, 2001)

# ISBN-10: 0121088529

# ISBN-13: 978-0121088521

\$78.28

The Craft of Research, 2nd edition (Chicago Guides to Writing,  
Editing, and Publishing) by Wayne C. Booth, Gregory G.  
Colomb, and Joseph M. Williams

Publisher: University Of Chicago Press; 1 edition (March 2003)

# ISBN-10: 0226065685

# ISBN-13: 978-0226065687

\$15.40

## Course literature

Writing for Computer Science by Justin Zobel

Publisher: Springer; 2nd edition (April 27, 2004)

# ISBN-10: 1852338024

# ISBN-13: 978-1852338022

\$26.03

Scientific Writing and Communication: Papers, Proposals, and  
Presentations by Angelika H. Hofmann

Publisher: Oxford University Press, USA (December 16, 2009)

# ISBN-10: 0195390059

# ISBN-13: 978-0195390056

\$26.69

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## **First assignment**

Find someone to work with!

Think about an area for the  
investigation!

# Project plan

An investigation

Write a project plan

Template in Bilda

Two students per group

Not one and *absolutely not* three!

# Project plan content

## Background

- *Describe the background for chosen area that is going to be investigated*

## Problem statement

- *Describe the problem(s) that have been found in the area described in the background*

## Problem

- *State a clear and concise problem that is going to be investigated*

# Project plan content

## Hypothesis

- *State a hypothesis that you think would be the outcome of your investigation*

## Goal

- *Explain the goal(s), objective(s) and/or the result(s) of your investigation*

## Tasks

- *Describe the tasks and sub tasks that are necessary to complete the work*

# Project plan content

## Method

- *Describe and explain the research and investigation methods that will be used for the project*

## Milestone chart (time schedule )

- *Give a detailed schedule of how the project will be carried out – preferable a graph*
- **Reference(s)**
- **Appendix (Optional )**

# Research Methodology

What is research?

How can we be sure of what we know?

From where did we get our knowledge?

Can we believe our knowledge?



# Research

Search for knowledge, establish novel facts, solve new or existing problems, prove new ideas, develop new theories

*Is the systematic process of collecting and analyzing information to increase understanding of the phenomenon under study.*

*Is the function of the researcher to contribute to the understanding of the phenomenon to communicate that understanding to others*

**How?**

# Research Methodology

Use methodologies:

- a guideline for solving a problem
- specific components such as phases, tasks, methods, techniques and tools

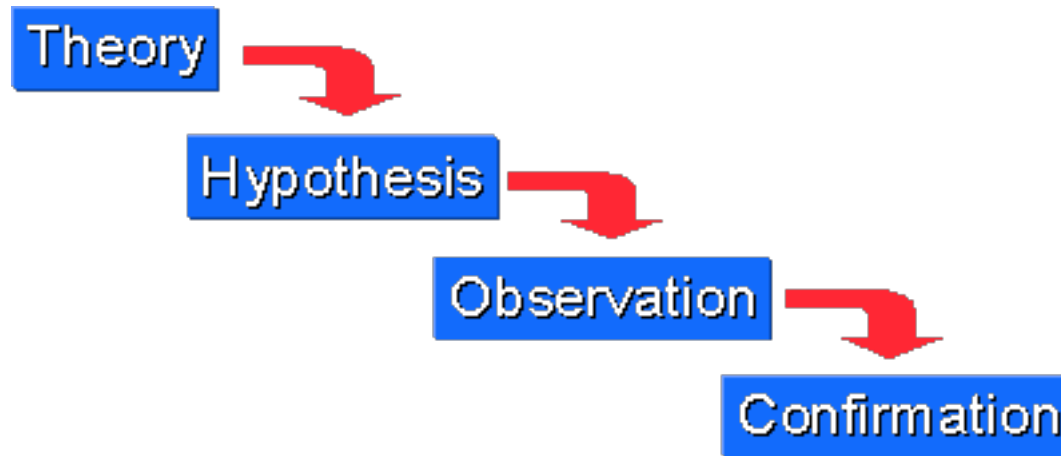
Many methodologies, most commonly used:

Deductive

Inductive

# Research Methodology

Deductive - "top-down" approach

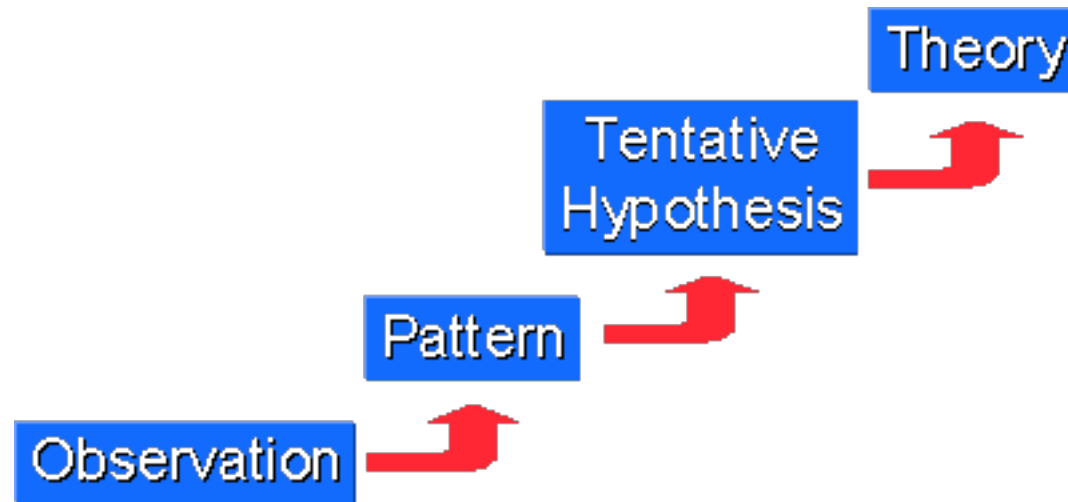


Is narrow in nature and concerned with testing or confirming hypotheses

Source: <http://www.socialresearchmethods.net/kb/dedind.php>

# Research Methodology

Inductive - "bottom up" approach



Is an open-ended and exploratory methodology

Source: <http://www.socialresearchmethods.net/kb/dedind.php>

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# Methods

Why learn methods?

# Methods

Why learn methods?

- > Because it is necessary to interpret / understand:
  - result of investigation/research/study
  - affects of a study
  - problems with investigations

## Methods - Example

- **Researchers have developed an algorithm that controls the data on the Internet for data centres where electricity costs are currently lower. This can reduce electricity costs by as much as 40 percent.**

[CS 20090825]

## Methods - Example

- This means that data-intensive companies like Amazon, Microsoft and Google could save millions of dollars annually in electricity costs.



## Methods - Example

- The Study:

The researchers, who are active at MIT, Carnegie Mellon University and Akamai network company, in their study calculates that the cost of electricity could decrease by as much as 40 percent.

## Methods - Example

The algorithm does *not necessary* mean that the electricity consumption, by itself decrease, which means that it *does not, automatically* decreases the companies environmental impact. According to the researchers **the algorithm can be adapted** to be used even for this purpose, by passing traffic to environmentally friendly data centre.

-> Is the algorithm useful or not?

# Methods

Why learn methods?

Which investigation can you believe in?

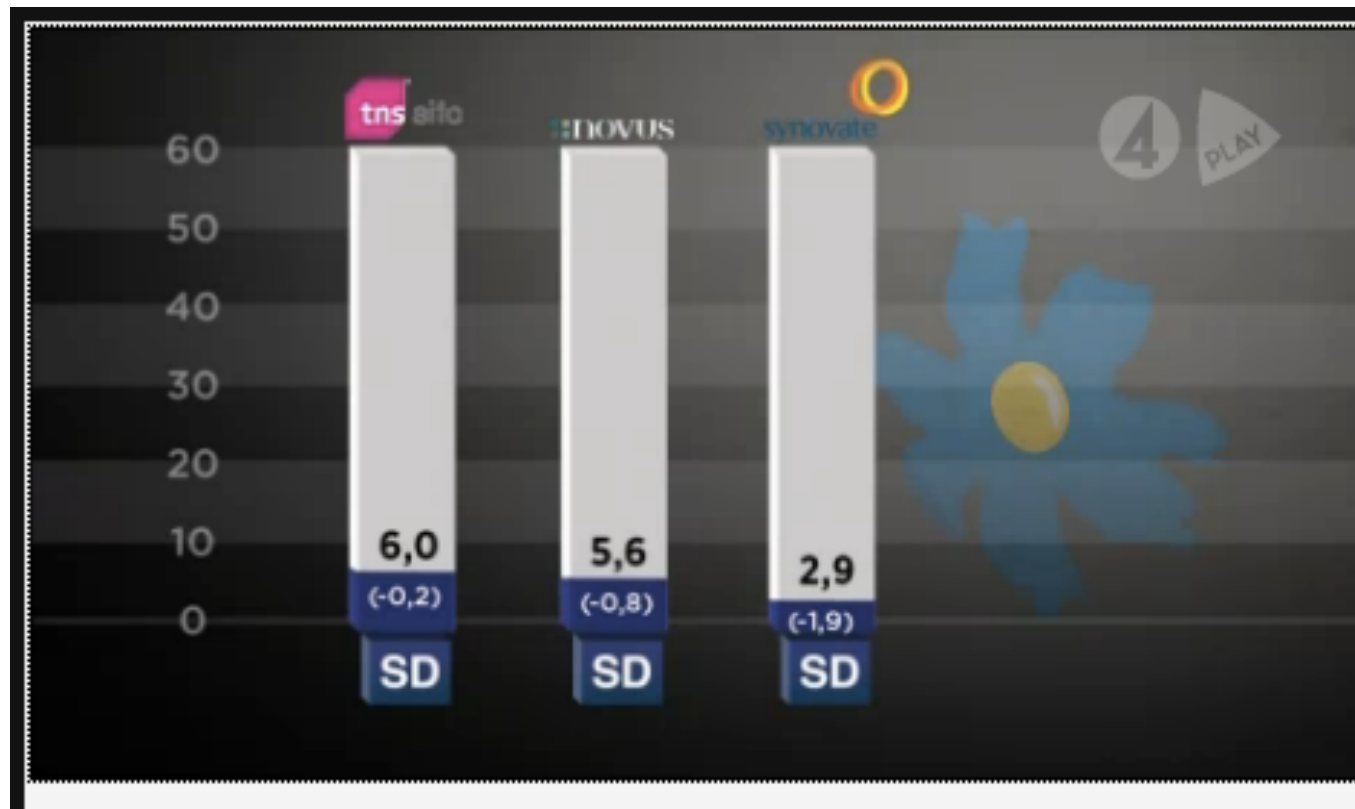
## Methods – Example 2

**The Swedish democrats are “here to stay”**

[TV4, 20110827]

## Methods - Example 2

- There are big differences in the outcome of the opinion surveys (voting for the party)



## Methods - Example 2

The Study:

Sifo, Novus and Synovates

- Slightly different measuring period
- Is this significant?
- 6.0 % of 9 Milj = 540 000 people
- 5.6 % of 9 Milj = 504 000 people
- 2.9 % of 9 Milj = 261 000 people

## Methods - Example 2

Conclusion:

The limit for becoming a member in the government is 4% (360 000)

-> Will the party be in the government or not?

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# Methods

Why learn methods?

Which investigation can you believe in?

Who can you trust?



## Methods – Example 3

*Contents in articles, see:*

- “I do not even read the quotes after an interview. I do not care if I get misquoted in the newspaper, said Tännsjö, adding that he has no problem with someone making changes in his books and give them out again in his name.”

[CS 20100828]

-> **Can we trust articles and books?**

# Methods

Why a Method-course?

Who can you trust?

- > Learn about methods to
  - avoid being “errant” (or misled)
  - not “mislead” others

# Quantitative methods

- Emphasize numbers -> represents figures/numbers/values, levels on theoretic notions
- Strong evidence for how a phenomenon works, requires a large number of samples, generalising
- Study large sized populations / environments,
- Study a subject/problem for a large set of people/organisations
- What can be done in computer systems?

# Qualitative methods

- Understand people - what they say / what they do / Why they do something in a certain manner
- Context dependent-> understand context for decisions, acts and motivations / explain reasons
- Study social and cultural phenomena, study one subject/problem in depth
- What can be done in computer systems?

# Triangulation

- Combine a quantitative method with a qualitative method
- Study same subject/area for different perspectives -  
> gives “a complete picture”
- What can be done in computer systems?

## To discuss

Which quantitative methods exist?

Which qualitative methods exist?

Which situations requires either a quantitative method or a qualitative method?

-> Relate to your own experience