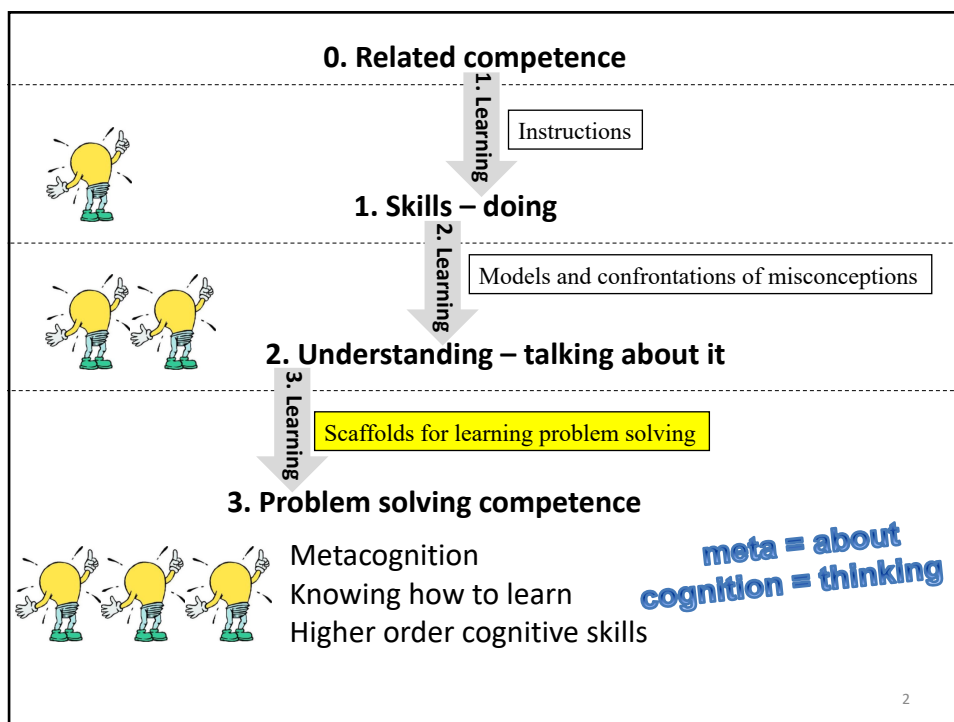# Learning to learn

- Aim
  - To be able to design activities where people can become better learners of IT
  - Input for Assignment 2
- Core literature:
  - Textbook chapter 5
- Additional literature
  - Grigoreanu et.al.(2012). End-user debugging strategies: A sensemaking perspective
  - Novick, Elizalde & Bean (2007) Toward a more accurate view of when and how people seek help with computer applications.

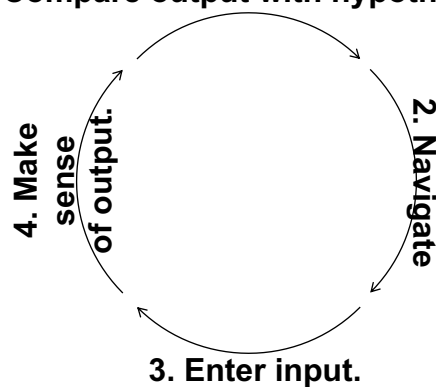Write down 1-3 ways in which you solve IT use problems.

1

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0. Related competence

1. Learning

Instructions

1. Skills – doing

2. Learning

Models and confrontations of misconceptions

2. Understanding – talking about it

3. Learning

Scaffolds for learning problem solving

3. Problem solving competence

Metacognition
Knowing how to learn
Higher order cognitive skills

meta = about
cognition = thinking

2

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Categories of problem solving methods

1. Research cycle
2. Stages of the research cycle
3. Strategies for iteration
4. Innovative research cycles

3

Research cycle

1. Generate hypothesis and plan input.
5. Compare output with hypothesis

4. Make sense of output.

2. Navigate

3. Enter input.

1. Research cycle

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Two types of problem solving

1. Generate hypothesis and plan input.
5. Compare output with hypothesis.

4. Make sense of output.

2. Navigate.

3. Enter input.

Experimentation

1. Generate hypothesis and plan input.
5. Compare output with hypothesis.

4. Make sense of output.

2. Navigate.

3. Enter input.

Troubleshooting

- Triggered from understanding
- It can do this, can it do that?

- Triggered from unexpected result
- How can I fix it?

1. Research cycle

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Debug spreadsheets

2. Understanding

1. Skill

2. Detect suspicious formulas
6. Compare output with expected

1. Erroneous Output
5. Output of new formula

3. Where to change

Trial and **success**

4. Enter changed formula

2. Guess what can be wrong
6. Compare output with expected

1. Erroneous Output
5. Output of new formula

3. Where to change

Trial and **error**

4. Enter changed formula

1. Research cycle

Grigoreanu et.al.(2012)

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Guiding precise observation

This worked last time, why did the computer do something else now?

No worries. Start over again. Go slowly and observe precisely what you are typing.

You know, I often mistype myself. That is normally the reason why surprising things happen on the screen.

Trainer refering to own mistakes

→ Learner understands that he is not stupid

4. Make sense of output.

3. Enter input.

2. Stages of the research cycle

7

Information search – Interpreting search results

comments pdf

Web   Images   News   Videos   More ▾   Search tools

About 1,320,000,000 results (0.27 seconds)

A file

Non-commercial

Date

[PDF] How to Add Comments to a PDF with Adobe Reader - A.F…
www.afrita.org/freetools/adding_pdf_comments.pdf ▾
Jan 6, 2007 - How to Add Comments to a PDF with Adobe Reader. The format-specific, bookmarked PDF versions of the Multiple Primaries and Histology …

PDF Comments | Collaborate and Share PDF | Foxit Reader
www.foxitsoftware.com/Secure_PDF_Reader/collaborate-share.php ▾
The best PDF Reader. Foxit Reader allows users to collaborate (through powerful annotation capabilities) and share PDF documents with co-works and friends.

Another pdf reader

[PDF] Comment in a PDF file with Acrobat XI - Adobe
www.adobe.com.../pdfs/adobe-acrobat-xi-comment-in-a-pdf-file-tutoria... ▾
Adobe Acrobat XI Quick start guide. Comment in a PDF file with Adobe® Acrobat® XI. Review documents with a complete set of familiar commenting tools, …

From software producer

An introductory tutorial to the software

4. Make sense of output.

2. Navigate.

2. Stages of the research cycle

8
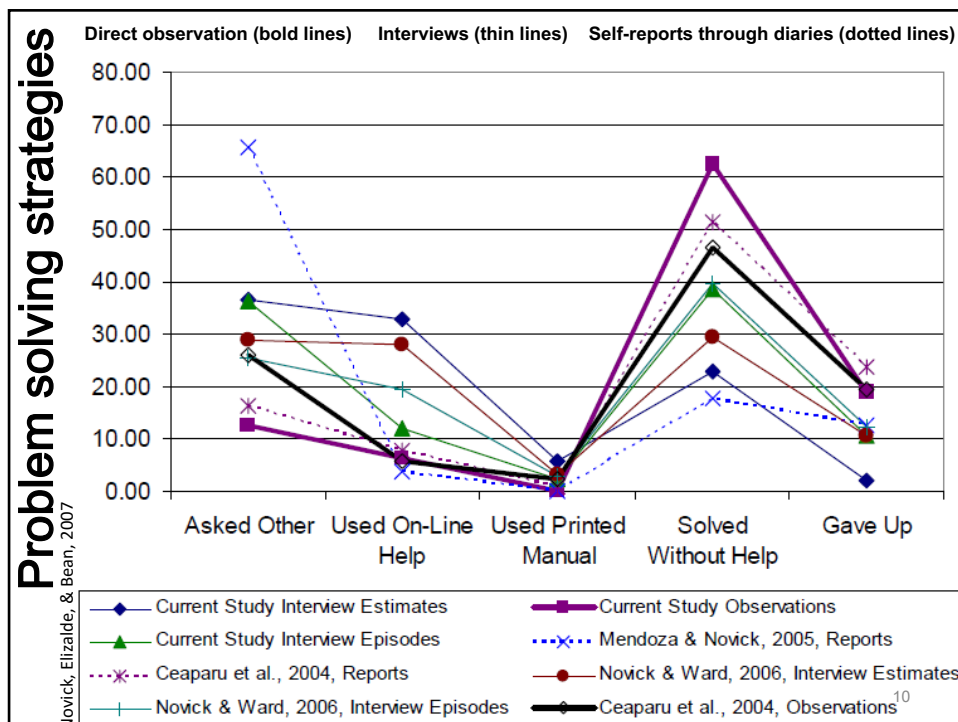
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Efficiency in problem solving

- **Inefficient**
  - Trial-and-error
  - Consulting documentation
- **More efficient**
  - Switching between trial-and-error and documentation
    Andrade, et al., 2009

Reviewing training material is **twice** as successful as searching for help
Novick et al 2009

→ **Same material in training and documentation**

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Problem solving strategies

Novick, Elizalde, & Bean, 2007

Direct observation (bold lines)   Interviews (thin lines)   Self-reports through diaries (dotted lines)

- Current Study Interview Estimates
- Current Study Observations
- Current Study Interview Episodes
- Mendoza & Novick, 2005, Reports
- Ceaparu et al., 2004, Reports
- Novick & Ward, 2006, Interview Estimates
- Novick & Ward, 2006, Interview Episodes
- Ceaparu et al., 2004, Observations

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Guideline for Experimental control – One change at a time

The general way of improving charts

1. Make **one** change at a time:
   a. Ill-structured chart → change Series, Category, Filter.
   b. Values of Categories and Filters → change Organisation units or Periods.
   c. Values which the graph displays → change Indicators, Data elements or Reporting rates.
   d. Title, trend lines, target lines, axis etc. → change Options
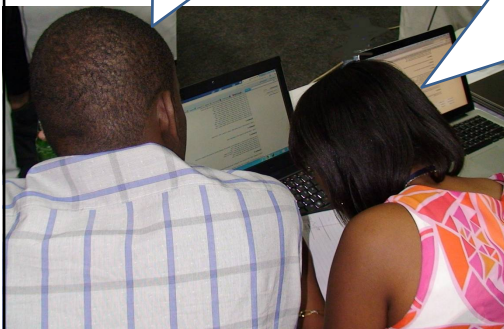2. Click **Update**
3. Repeat

1. Plan input.

2. Stages of the research cycle

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Guiding to improve self-efficacy

- Strength of one's belief in one's own ability to complete tasks and reach goals

I never get this right. I give up

Let's try. I find the edit button there. ... No. Too small number. We need to divide by 100 000 and not 100. Edit again. There it says percentage. What are the other options? Per100k, does that mean 100000? ... Save ... Calculate ... Yessss.

Watching a peer struggle and succeed is the best way of strengthening self efficacy

3. Enter input.

2. Stages of the research cycle

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Pair working learners

- Improves understanding
- Enhances self-efficacy
  - Improving problem solving competence
- Prepares for continued conversation after training

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Guiding for generating hypotheses

Now I have opened each picture in the editor, adjusted its size to the standard and saved it again. There must be an easier way

Normally, when you repeat the same over and over again, there is some function in the computer which can do it. We just need to find it.

1. Generate hypotheses.
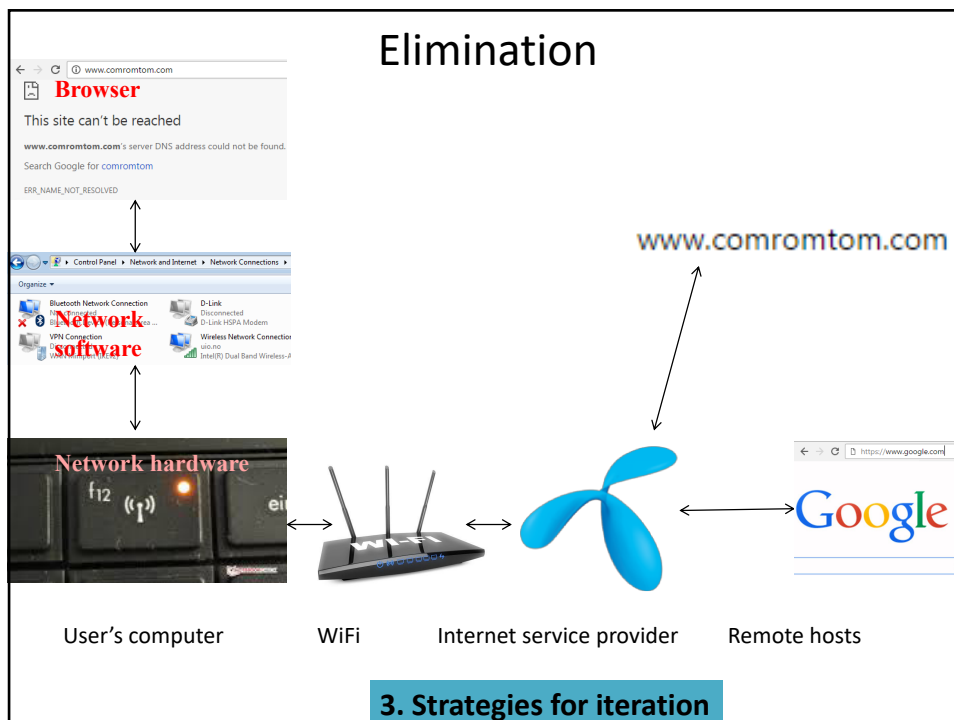
2. Stages of the research cycle

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Guiding backtracking

3. Strategies for iteration

Elimination

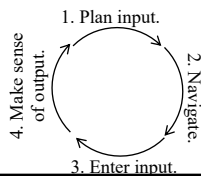User's computer   WiFi   Internet service provider   Remote hosts

3. Strategies for iteration

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Guiding giving feedback

Emmanuel, you have to tell the customers that we no longer respond to e-mails to individual staff members. They have to use the web-portal, such that we can track all requests.

- Consistent, repeated feedback make people change behaviour

1. Plan input.
2. Navigate.
3. Enter input.
4. Make sense of output.

3. Strategies for iteration

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Workaround

That web-shop requires me to fill a field called State, but Benin is not divided into states. Since this address data is probably going to be glued to the package, I'd better not mislead the post office. Just let me repeat the city name Cotonou.
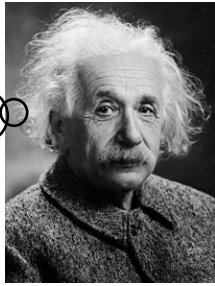

4. Innovative research cycles

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Understanding generation of IT use understanding

1. Plan input.
5. Compare output with hypothesis
4. Make sense of output.
2. Navigate.
3. Enter input.

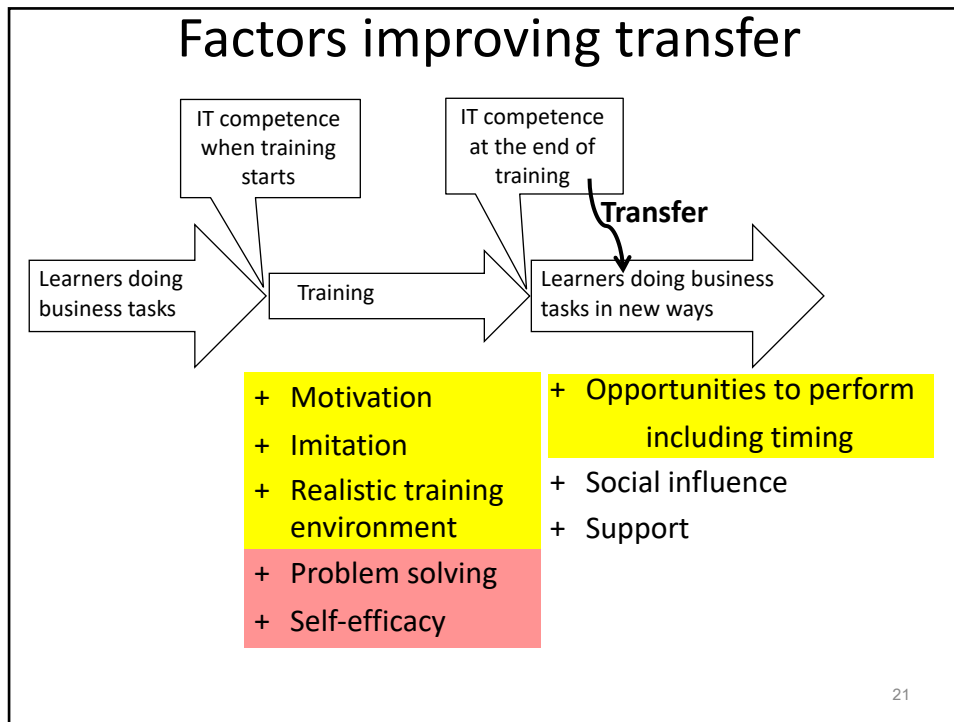Aha! This is what I did. Now, I understand how I can come to new understanding of IT use!

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Area		Problem solving methods
Research cycle		Exploration
		Experimentation
		Troubleshooting
Stages of the research cycle	Generate hypotheses	Observing repetitive use
		Mediate hypotheses
	Navigate	Systematic interface browsing
	Enter input	Self-efficacy
		Input checks
	Enter input and make sense of output	Precise observation
	Navigate and make sense of output	Information search and help seeking
Strategies for iteration		Backtracking
		Elimination
		Changing work routines
Innovative research cycles		Customizing
		Installing new software
		Introducing new devices
		Workaround
		Mutual learning

20

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Factors improving transfer

IT competence when training starts

IT competence at the end of training

Transfer

Learners doing business tasks

Training

Learners doing business tasks in new ways

+ Motivation
+ Imitation
+ Realistic training environment
+ Problem solving
+ Self-efficacy

+ Opportunities to perform including timing
+ Social influence
+ Support

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Training module for problem solving

Training activities and scaffolds

Learning outcomes

20% 1. Introduction

– Discuss needs for problem solving
– Present a problem solving approach

Vague understanding of problem solving approach

60%

2. Practicals

– Provide problem assignments
– Monitor and guide trainees' learning

Skills in applying the problem solving approach

20%

3. Summary

– Discuss problem solving approach with learners

Understanding of the problem solving approach

22

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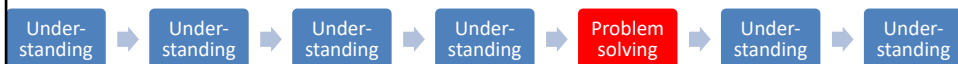# Understanding before problem solving

•Module for understanding

1. Introduction to Styles
2. Practicing Styles
3. Summary of Styles

•Module for problem solving

1. Introduction to Window browsing strategies
2. Practicing Window browsing strategy on Styles
3. Discussing Window browsing strategy

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Several modules

Under-standing → Under-standing → Under-standing → Under-standing → Problem solving → Under-standing → Under-standing

4. Train users so that they can solve problems and learn on their own.

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