10 years of research in Information problem solving

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This talk

- Overview of results of studies conducted at CELSTEC on information problem solving (IPS)
- State-of-the-art concerning research in IPS.
Information problem solving

- Skills, knowledge and attitude to
  - define the information need;
  - identify sources;
  - judge and select relevant information from the sources;
  - organize the information found;
  - present the information into a coherent product;
  - construct knowledge.

(Brand-Gruwel & Stadtler, 2011; Brand-Gruwel & Gerjets, 2008; Brand-Gruwel, Wopereis, & Vermetten, 2005).
Research in IPS

- The process of IPS.
- Instructional design to foster IPS.
The process of IPS
Unraveling the IPS-process


2005: the Expert-Novice study
Participants: expert-novice study

- Experts:
  - 5 PhD students in the field of Educational Technology in their final year

- Novices:
  - 5 Psychology freshmen from the University of Maastricht
Set up: expert-novice study

Task:
• write in 90 minutes an article for a consumers magazine (± 400 words) about food that is out of date and use MS Word and Internet

Instrument to analyze the thinking aloud protocols:
• for development a inductive-deductive method was used
• three columns were scored simultaneously
  • main skills
  • sub skills
  • regulation
Information Problem Solving
a skill decomposition

- Orientation on task
- Orientation on time
- Monitoring / steering
- Evaluate process
- Evaluate product

- Define information problem
- Search information
- Scan information
- Process information
- Organise and present information

- Read task
- Internet skills
- Internet skills
- Read info
- Formulate problem

- Concretise problem
- Derive search terms
- Scan site
- Elaborate on content
- Outline the product

- Activate prior knowledge
- Judge search results
- Elaborate on content
- Judge processed info
- Structure the product

- Clarify task requirements
- Judge scanned info
- Judge processed info
- Elaborate on content
- Elaborate on content

Significant difference: experts spend more time on this sub skill
Significant difference: experts do this more often
Process of evaluating sources and information


2009: Students‘ evaluation behavior (secondary education)
set up: evaluation behavior study

- Participants: 23 students from secondary education

- Tasks: 12 tasks: 4 science / 4 geo. / 4 language
  - example: Young people use MSN and SMS a lot. Does this have an influence on their language proficiency?

- Procedure: each student accomplished 2 tasks while thinking aloud (30 per task)
Results: evaluation behavior study

• Students do not evaluate in a sophisticated way
  – Sources are hardly evaluated on usability and reliability
  – Information is being judged on the connection to the task, the amount of information and the language
Process of evaluation and role of prior knowledge


2011: evaluation behavior of novices and experts in a domain
Set up: evaluation and prior knowledge

- **Participants:**
  - 20 psychology students (freshmen) (12 men and 8 women; age M = 20.2, SD = 4.07)
  - 17 psychology teachers (University) (7 men and 10 women; age M = 39.5, SD = 12.33)

- **Task:**
  - Two tasks (reliability of human memory and altruism)
  - Each task had a Google-like result page (SERP) with 17 links
  - select and prioritize information and finally rank the best five sites in 10 minutes
Procedure: evaluation and prior knowledge
Results: evaluation and prior knowledge

- The domain experts do evaluate the reliability of the sites significantly more often than the novices.
- The novices used more superficial criteria for evaluation (statements like: this seems ok, or that may be useful).
- The selected sites of the experts were of a higher quality and a relation with the use of sophisticated criteria.

- Data of the eye-movements will be analyzed together with Yvonne Kammerer (KMRC-Tübingen).
Instruction in IPS

What is the problem?
Instruction: becoming a critical web searcher


2010: Effect of embedded instruction to foster critical web searching
Embedded instruction

• Setting:
  – 15 lessons
  – IPS embedded in history class
  – Focus on evaluation of sources and information

• Tasks:
  – Role play: Treaty of Versailles
  – Cartoon about Hitler
  – Game in with events had to be set in chronological order
Instruction: Process worksheets

<table>
<thead>
<tr>
<th>Address</th>
<th>Judgement</th>
<th>Use?</th>
</tr>
</thead>
</table>
| **Example**
http://members.lycos.nl/oorlogstijd/index.html | This is a private site of an 18 year old girl. Not that much text. No references. Not reliable. Author is not a known person. | No |
Instruction: Reader
Instruction: mindap and discussion
Effects

RTL 4
Instruction: Results

• Students become more critical regarding the evaluation of web sites
  – More use of criteria like:
    • Author
    • Organization behind the site
    • Type of site ....

• Students of the experimental condition performed significantly better on the history exam than the students of the control condition
Future research: PhD-students

Milou de Smet: Students’ use of electronic outline tools for writing and learning.

Johan van Strien: Multiple document comprehension: effects of instruction on students’ comprehension of hypertext.

Jaap Walhout (RdMC): Adaptive Instruction to foster students’ information problem solving skills: learning to organize digital information.

Jimmy Frèrejean: The integration of the lifelong learning skill ‘Information problem solving’ into higher education: Effects of different types of feedback and guidance.
Suffering from Information Overload?

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