Effects of Integrated Information Literacy Education on Undergraduate Engineering Students' Research Skills / Marja Talikka

ARBICON Conference Visiting Lappeenranta Academic Library

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Outline

Open your mind. LUT.
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- Facts about the mechanical engineering (constructional materials) course
- IL education content
- Analysis of the learning outcomes
- Students' and teachers' comments

Facts about the course

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- Master's course, in English
- 35 students, both foreign and Finnish
- No exam – students write a seminar paper in teams of 4 and prepare a poster
- Poster abstract also in German – advice from the German teacher
- IL teaching 2*2*45 minutes as part of the course lectures (28 45-minute lectures altogether)
- Students present their information retrieval process to the faculty teacher and the IL teacher → part of course evaluation, the two teacher graded the presentations together
- Poster grading also collaboratively (faculty teacher, IL teacher, German teacher)

More facts about the constructional materials course

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- Different constructional materials, their properties and use
- Latest results of materials research
- Materials selection based on functionality, production issues, costs, and environmental effects (sustainability)
- Future trends in materials research
- Metals and alloys, polymers, ceramic materials, composites, wood, nanomaterials
- Analytic and systematic materials selection
- Multi-language education
- Literature survey

IL lecture 1

- About one month after the course started
- Teams were built
- Topics were selected
- A few substance lectures were held so far

About the content of the IL lecture

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- Principles of information retrieval
  1. Information searching is not a set of smart tricks, it is a way of thinking
  2. The databases are not intelligent. What you think of as ’words’ are ’strings of characters’ to the databases (no actual meaning)
  3. Information retrieval is mathematics! Think in sets ☺
- General facts about databases and selecting sources
  1. Where do you find them?
  2. What do they contain?
- General issues about searchwords

Selecting searchwords - sample slide

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- Don’t write your topic in the search box

  → DO NOT TYPE ”different material solutions for airplane wings” → find the subsets
- Use truncation

  → Characters vary:

  Elsevier, AbiInform (ProQuest) → * and ?

  → polymer* finds polymer, polymeric, polymerisation, polymerise, polymerism, polymerization, polymerize…
- Spelling

  → color >< colour, polymerization >< polymerisation
- Synonyms: innovation - discovery, airplane - aircraft
- Use also the full concepts or part of it instead of just abbreviations

  →MIPS = Material Input Per Service

  But also: Microprocessor without Interlocked Pipeline Stages!

In AbiInform (ProQuest) there is a so called Thesaurus in which you can find terms.

Other content, presenting databases

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- Google Scholar
- Finna and e-books
- ProQuest
- Science Direct
- Scopus
- ISI JCR

- Not a list of tricks but operational principles: where to find the ’help’, what search features you can look for
- Scopus analyzing tool

Lecture 2

- About one month after the first lecture
- Teams have started their work and the first information searches have been done. The first search problems have occured

Content

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- More about the content of databases
- Revision of the use of searchwords
- How to find fulltexts
- How to evaluate search results

Evaluating results / finding peer reviewed articles – sample slide

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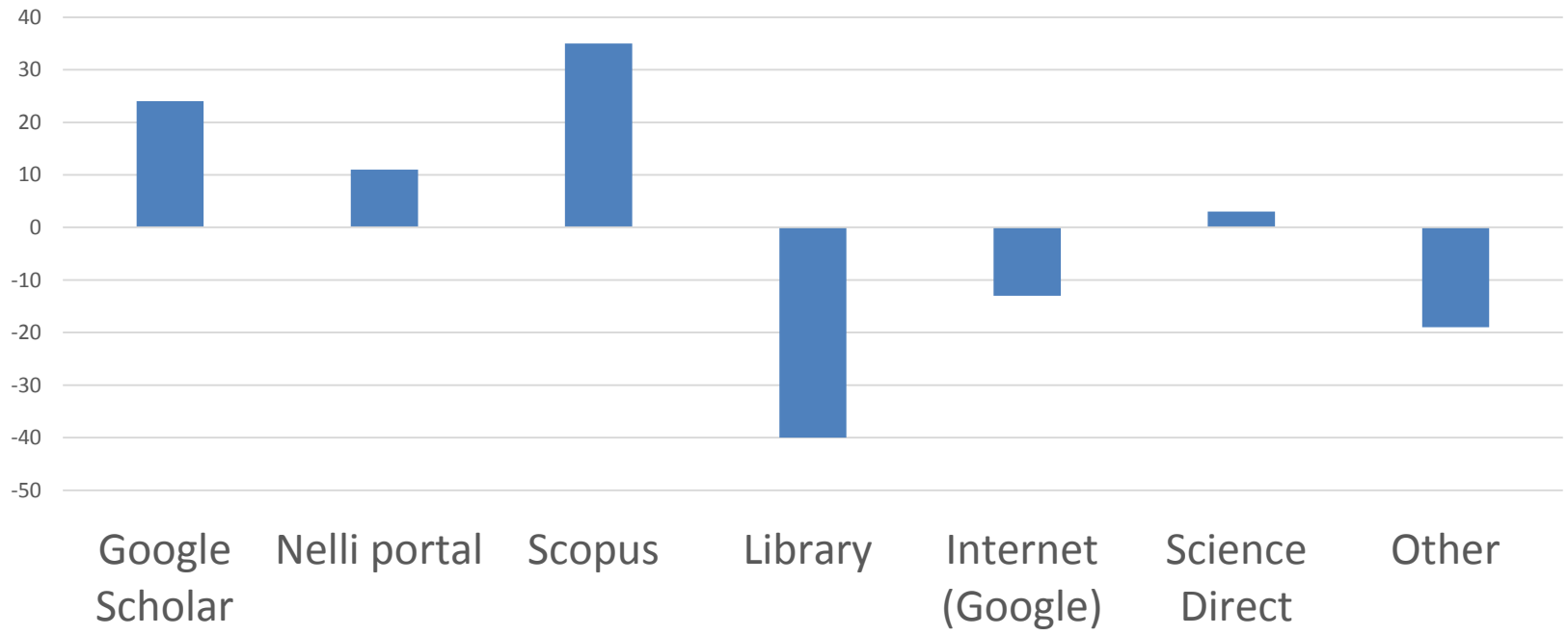
- In AbiInform and EBSCO → limit to peer reviewed / scholarly articles
- In Emerald, IEEExplore, and Science Direct articles are peer reviewed

- Have a look at the number of citations to the article (Google Scholar)
- Sort the reference list by cited-by-number (Scopus)

- If you need to know the scientific level of a journal → see Journal Citation Reports (JCR)
- In Scopus you can also compare journals by viewing their SJR, IPP, and SNIP values

Analysis of the learning outcomes

Change in using information sources



Changes in searching techniques after IL education

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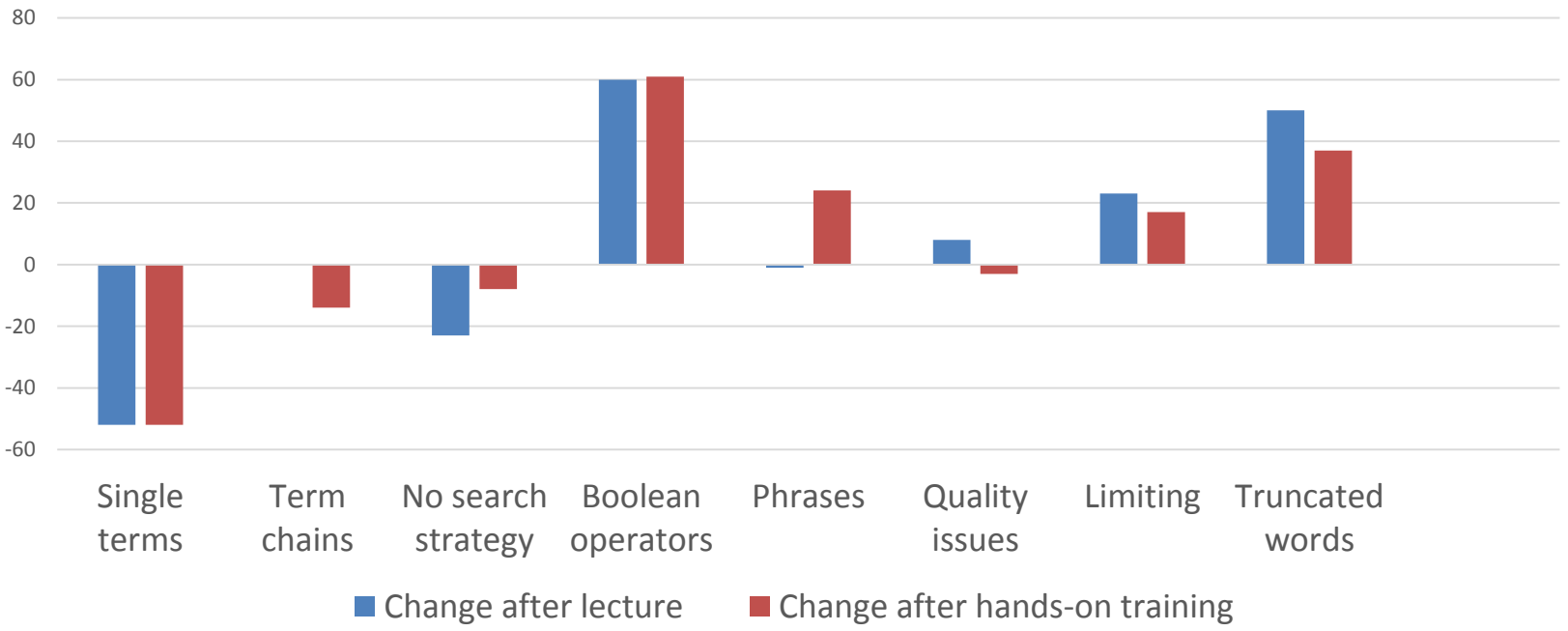

Development in students' research questions

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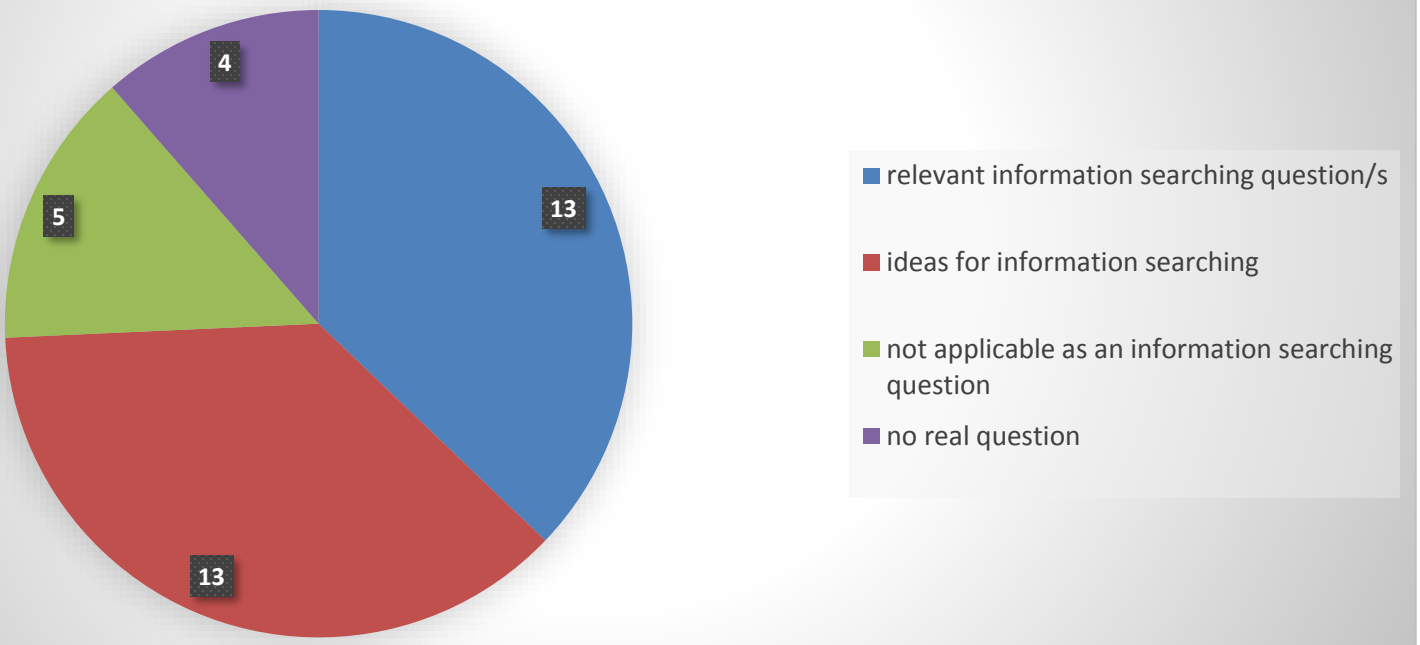
- At first, students' research questions dealt with facts and selection and properties of material (what / what kind of material is most suitable in the particular environment)
- After IL education the focus was more on sustainability properties of materials (comparisons which materials are the most environmental -friendly, what are the advantages of using the chosen materials)
- Development towards deeper understanding of the topic is evident

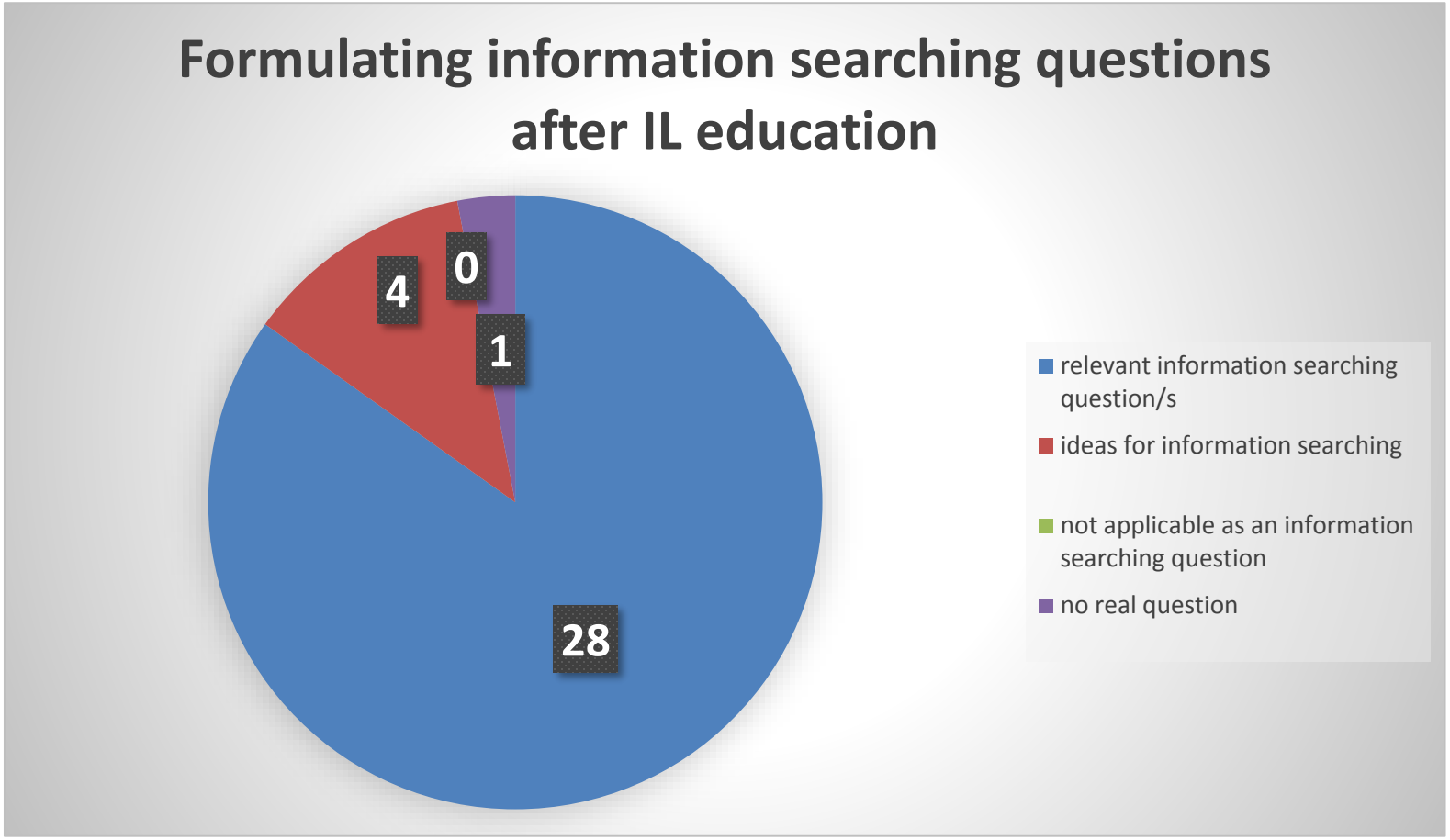
Development of search questions

- Before IL education students' information search questions dealt with filling information gaps and general understanding of the topic
- After IL education the questions focused more on detailed observation of the application and on analyzing the details
- After completing the seminar work the information search questions show how students 'discuss' the matter via the used information sources. Information searching focuses on finding sources for this discussion (pro's and con's)

Another way of analyzing information search questions

Formulating information searching questions before IL education




Formulating information searching questions after IL education
4
0
1
28
relevant information searching question/s
ideas for information searching
not applicable as an information searching question
no real question

Students' and teachers' opinions

Good about IL education, summary of students feedback

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- The majority of student comments were positive
- There was enough education and the topics were important and useful
- ” I heard about more than one searching tool for the first time. From my opinion it was enough information.”
- Combining searchwords
- Evaluation of results

Development succestions, summary of students' feedback

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- Hands-on training requested
- Some students felt that the two lectures were too much alike → a lecture and hands-on training would perhaps work better
- IL education earlier in their curriculum (international students come to the Master's programs, they need IL education at the very beginning of their studies in Finland)
- More feedback from the IL educator about the searches!
- One student wished there would be more info about searching books

Substance teacher's opinions

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1. Information searching focuses on the right things from the beginning (no trial and error) to find answers to the research problem and research questions
2. IL educaton covers not just English language sources. Students find German and French documents, too
3. Successful IL education helps in understanding the deepness of the research problem and different aspects connected to it
4. Overlapping issues in substance and IL education are avoided if teaching is properly integrated (e.g. recognizing strong sources, best databases, use of abbreviations etc.)
5. Students get an independent and objective evaluation of their information search from the IL educator as part of the overall evaluation of the course
6. Students get tools to comparing sources and to improving the quality of their research

Substance teacher’s ’minuses’

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- Preparing the weekly schedule took a little more time
- Evaluation (grading) requires three teachers’ cooperation
- On a yearly basis updating the material requires active work from three teachers

Own thoughts

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- Integrated IL education is motivating and meaningful to both teachers and students
- It requires trust between teachers and ability to collaborate
- The IL educator must be at least somewhat aware of the substance
- ’Teaching packages’ can and must be used to save time
- Demands a little courage and open-mindedness but it is very rewarding!