An investigation into Scottish teenagers’ information literacy and search skills.

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Introduction

- IL skills essential to effectively participate in our modern information society.

- Students introduced to concepts at school and given tasks that require these skills i.e. report writing* ¹

- It is not enough to provide information, education systems should ensure that today’s students are empowered to learn and to take their place in the learning society. ²

1. Eisenberg, 1990
2. Yu, 2006
‘... their apparent facility with computers disguises some worrying problems ... young people have a poor understanding of their information needs and thus find it difficult to develop effective search strategies’. ¹

pre-university students are unable to construct effective search queries. ²

and rarely employ effective search strategies or systemically plan how to find the information they need. ³

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2. Harrop, 2012
3. Coiro, 2007
Related Work cont.

- leading them often to simply cite/copy top-ranked resources without assessing their quality. ¹

- needs to be countered early on in a child's development as there are questions whether student information behaviours can be changed once they enter Higher Education. ²

- identifying actual behaviours and performance is imperative
  - ESOL Post graduates were unable to perceive their performance correctly, often judging high performance when the opposite was true. ³

1. Smith & Hepworth, 2007
2. Rowlands, 2008
3. Brazier & Harvey, 2017
Methodology


- Situated as a simulated work task
  - two research topics to write a report on, in reality they will not be required to write the report.

- use a bespoke search system to collect a small set of relevant documents for their chosen topic over a time-constrained period.
Methodology cont.

- Search system based on the TREC AQUAINT collection,
  - a large set of over a million documents from three large news agencies collected between 1996 and 2000

- Pre-defined search topics associated with it
  - Initial 15 topics > 4 topics selected by school representatives (librarian and 2 teachers)

- Relevance judgements are per-topic evaluations indicating which documents in the collection are relevant

- Participants fill in pre- and post-task questionnaires to self-assess various elements related to search
Before you begin the next search task shown at the bottom of the page ("tropical storms"), we would like to ask you a few quick questions about it. How much do you agree or disagree with the following? Don’t forget to click the submit button after you’ve filled out the form!

I know a lot about this topic already
Disagree ○ ○ ○ ○ ○ Agree

I am interested in this topic
Disagree ○ ○ ○ ○ ○ Agree

It is clear how to complete this task
Disagree ○ ○ ○ ○ ○ Agree

Overall, I think this will be a difficult task
Disagree ○ ○ ○ ○ ○ Agree

I think it will be difficult to find relevant documents for this task
Disagree ○ ○ ○ ○ ○ Agree

I think it will be difficult to decide when I have enough information to complete this task
Disagree ○ ○ ○ ○ ○ Agree

Submit

Current search task
tropical storms
What tropical storms (hurricanes and typhoons) have caused significant property damage and loss of life?
Found 43683 results (0.328 seconds)

☐ Check any you think are relevant

☐ (no title)
   Death toll from Tropical Storm Mitch increases to 306, officials say....

☑ Mitch brings disastrous floods; death toll rising
   TEGUCICALA, Honduras (A) - Tropical Storm Mitch sloshed into the heart of Honduras on Saturday, spreading death and destruction throughout the impoverished country already...

☑ Officials fear growing hunger in devastated Central America
   . As the official death count surged, Mitch re-formed Tuesday as a weak tropical storm in the Gulf of Mexico, though its 40 mph (65 kph) winds were a shadow of the 180 mph (290 kph) monster...

☑ China reports five killed by Babs
   SHANGHAI, China (A) - Tropical storm Babs killed five people in southeastern China and caused an estimated 480 million yuan (dlrs 58 million) in damage, the official Xinhua News...

☑ Tropical Storm Death Toll Increased to 304 in Vietnam
   HANOI, November 8 (Xinhua) -- The tropical storm hitting southern Vietnam Sunday and Monday has increased the death toll to 304, a Vietnamese official said today. ...
Now that you have completed the search task "Antarctica exploration", we would like to ask you a few questions about it. How much do you agree or disagree with the following: Don't forget to click the submit button after you've filled out the form!

Overall, I thought this was a difficult task  
Disagree ○ ○ ○ ○ ○ Agree

I found it difficult to choose good search keywords to find the right information  
Disagree ○ ○ ○ ○ ○ Agree

I found it difficult to find relevant information  
Disagree ○ ○ ○ ○ ○ Agree

I found it difficult to decide when I had found enough information  
Disagree ○ ○ ○ ○ ○ Agree

I felt I could trust the information I found  
Disagree ○ ○ ○ ○ ○ Agree

I felt I could understand the documents I read  
Disagree ○ ○ ○ ○ ○ Agree

Current search task  
*Wildlife Extinction*

The spotted owl episode in America highlighted U.S. efforts to prevent the extinction of wildlife species. What is not well known is the effort of other countries to prevent the demise of species native to their countries. What other countries have begun efforts to prevent such declines?
Study

- N = 60 (n = 57)
- 5 sessions
- Desktop PC’s

Demographics
- S3 students - 13/14 y.o.
- Students assigned unique ID for post discussion
- SIMD data

Experiment
- 2 x Tasks
- 10 min per task
- Possible to end early

Post Discussion
- n = 4 students
- Allocated by common task

Introduction to Study

Demonstration of Interface

Assigned Tasks (Automated)

347 - wildlife extinction;
353 - Antarctica exploration;
367 - piracy;
408 - tropical storms.
Topic #353: Antarctica exploration
Identify systematic explorations and scientific investigations of Antarctica, current or planned.

Users: cb?mdlhf  kdlm?lab  fmicgnkg  fnqjihf

cb?mdlhf issued the following query:

- south pole(0)
- south pole science study(1)

How did you come up with these queries?

Took words from the description and thought of similar words

kdlm?lab selected the following document:

- Bulgaria's Exploration Team Leaves for South Pole
SOFIA, January 9 (Xinhua) -- A 5-member polar prospecting team sent by Bulgaria's Academy of Science set out today for the South Pole, the Bulgarian Telegraph Agency (BTA) reported.
The team, headed by atmospheric physicist Hristo Pimpir...

What made you choose this document?

It's about a team of scientists going to the South Pole

fmicgnkg issued the following query(ies):

Findings

- SIMD
  - Median = 17.5. Range = 20 - 2 = 18

- Pre task
  - Topic understanding low (2.35)
  - Interest reasonably high (2.94)
  - Task clarity high (3.85)
  - Difficult finding documents, overall task and when enough docs found (2.71, 2.88 & 3.14)

- Querying Performance
  - Low performance (mean 0.05, median 0.008)
  - Median hits = 1,
  - 227 out of 600 queries had 0 relevant results.
  - Continued.....
Findings

- Task fatigue observed but no significant difference in performance
- By SIMD quartile (1st vs 4th) some interesting differences
Findings

- **Bookmarks and Reading**
  - 0.97 (36.3%) bookmarked and 1.6 (23%) documents read per query
  - Q4 read more relevant and non-relevant documents
  - Less bookmarked but more accurate
  - A result of more reading?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Total number</th>
<th>Of which relevant (ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bookmarked</td>
<td>read</td>
</tr>
<tr>
<td>347 – Wildlife extinction</td>
<td>1.78</td>
<td>2.02</td>
</tr>
<tr>
<td>353 – Antarctica exploration</td>
<td>0.64</td>
<td>1.08</td>
</tr>
<tr>
<td>367 – Piracy</td>
<td>0.84</td>
<td>1.54</td>
</tr>
<tr>
<td>408 – Tropical storms</td>
<td>1.11</td>
<td>2.02</td>
</tr>
</tbody>
</table>

Table 4: Bookmarked and read documents by topic

<table>
<thead>
<tr>
<th>Measure</th>
<th>Q1</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td># bookmarked</td>
<td>1.03</td>
<td>1.0</td>
</tr>
<tr>
<td># read</td>
<td>1.58</td>
<td>1.66</td>
</tr>
<tr>
<td># relevant bookmarked (ratio)</td>
<td>0.36 (0.35)</td>
<td>0.38 (0.38)</td>
</tr>
<tr>
<td># relevant read (ratio)</td>
<td>0.4 (0.26)</td>
<td>0.33 (0.2)</td>
</tr>
</tbody>
</table>

Table 5: Bookmarked and read documents by quartile
Findings

- **Task Time**
  - Median avg. 535s (8.92 minutes) per task. Min = 80s / Max = 884s
  - Spent less time on 2\textsuperscript{nd} task than first (461s vs 494.3s)
  - Quartiles were approx. equal (562s and 561s)

- **Query Formulation**
  - Longer, more specific queries result in significantly better performance
    - +1 query term increases 0.012 improvement in avg. precision ($p << 0.01$) and 0.42 extra hits ($p << 0.01$)
  - Pre-task interest has significant impact on the term ($p=0.04$) and character length ($p<<0.01$) of the queries submit for that topic.

- **Mistakes**
  - 118 out of 625 queries (18.89%)
  - An increase of 1 mistake has a -0.031 effect on avg. precision ($p<<0.01$).
Findings

- Off-topic Queries = 25 out of 625 (4%)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Q1</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mistakes</td>
<td>0.17</td>
<td>0.28</td>
</tr>
<tr>
<td>Advanced operators</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Off-topic</td>
<td>0.1</td>
<td>0.03</td>
</tr>
<tr>
<td>Query length (terms)</td>
<td>3.23</td>
<td>3.66</td>
</tr>
<tr>
<td>Query length (characters)</td>
<td>23.2</td>
<td>26</td>
</tr>
</tbody>
</table>

Table 7: Querying characteristics and mistakes by quartile
Findings

- **Post Task**
  - Perception of difficulty increased post task from 2.88 to 2.92
  - Trust and understanding of the information was quite high
  - Overall satisfaction was high
    - +1 in satisfaction increase avg. precision by 0.012 (p=0.030).
  - Pupils overestimate their abilities and identify when they perform poorly

- **Post task interview**
  - It was most relevant to the question
  - Probably contained relevant information
  - Based upon words from the question
  - Tried new things (nothing worked)
Conclusion

- Poor performance
  - Query quality
  - Identifying relevant information

- Participants felt they performed well or that the task was not especially difficult.
  - Lack of awareness of own performance and skills development

- Highlighted a reliance on assistive functionality
  - Found on web search but not in other systems environments

- Some differences between SIMD quartiles but performance was overall equally poor
  - Potential advantages does not appear to equate to success in learning
Impact

- Recommendations and guidelines for IL teaching.
- Inform professional practice.
- Feedback to participants (pamphlet) for reflective purposes.

Ongoing

- Academic Publications:
  - *Conference Paper submit for ISIC (the information behavior conference) 2018*
  - *Work beginning on query structure, reading level and search strategy.*
    - *European Conference on Information Retrieval 2019 paper*
Thank you!

Questions
References


References


