

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

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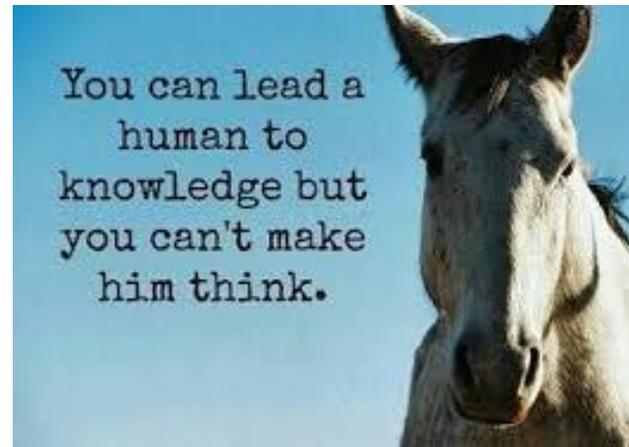
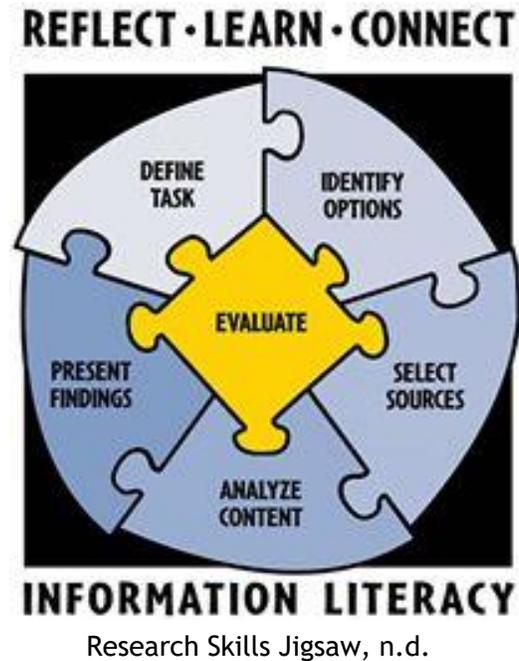
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Introduction

- ▶ 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



77english.com, 2016

1. Eisenberg, 1990
2. Yu, 2006

Related Work

- ▶ ‘... 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

1. Nicolas, Rowlands & Huntington, 2008, p.12
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

- ▶ A mixed method analysis of secondary school-aged children's information gathering behaviour and their own self-assessment.
- ▶ 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](#)

TEGUCIGALA, Honduras (A) _ **Tropical Storm** Mitch slogged 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. ...

Current search task

tropical storms

What tropical storms (hurricanes and typhoons) have caused significant property damage and loss of life?

New topic, please >



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

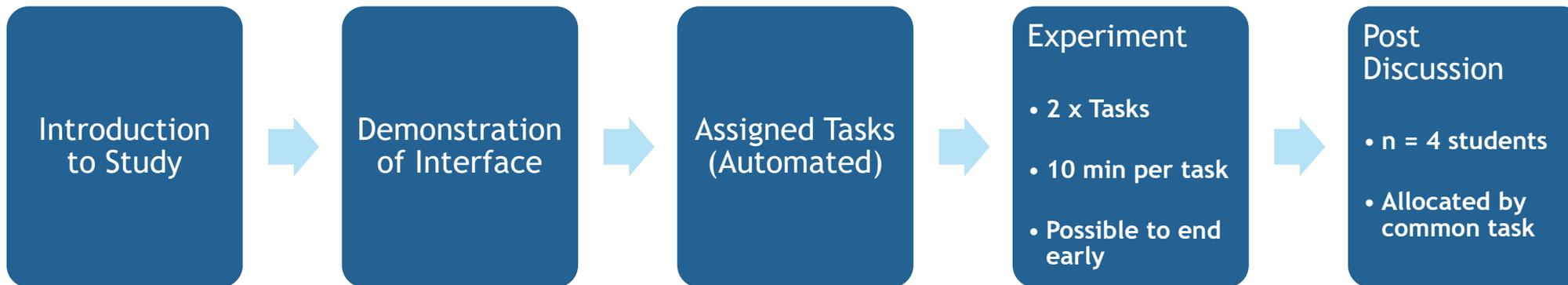
Current search task

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
 - ▶ 53 students - 13/14 y.o.
 - ▶ Students assigned unique ID for post discussion
 - ▶ SIMD data
- ▶ 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* *fnojiihf*

cb?mdlhf issued the following query:

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

Took words from the description and thought of similar words

How did you come up with these queries?

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...

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

What made you choose this document?

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

Topic	Average Precision			Hits		
	Median	Mean	SD	Median	Mean	SD
347 – Wildlife extinction	0.05	0.08	0.69	3	2.54	1.87
353 – Antarctica exploration	0.00	0.009	0.02	0	0.38	0.73
367 – Piracy	0.02	0.07	0.1	1	2	2.36
408 – Tropical storms	0.02	0.06	0.07	1	2.12	1.92

Table 1: Average precision by topic

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

Topic	Q1	Q4
347 – Wildlife extinction	0.03	0.105
353 – Antarctica exploration	0.011	0.013
367 – Piracy	0.062	0.08
408 – Tropical storms	0.064	0.058

Table 3: Average precision by quartiles across topics

Findings

▶ Bookmarks and Reading

- ▶ 0.97 (36.3%) bookmarked and 1.6 (23%) documents read per query

Topic	Total number		Of which relevant (ratio)	
	bookmarked	read	bookmarked	Read
347 – Wildlife extinction	1.78	2.02	0.54 (0.3)	0.69 (0.34)
353 – Antarctica exploration	0.64	1.08	0.07 (0.11)	0.07 (0.07)
367 – Piracy	0.84	1.54	0.53 (0.63)	0.49 (0.32)
408 – Tropical storms	1.11	2.02	0.38 (0.43)	0.42 (0.21)

Table 4: Bookmarked and read documents by topic

▶ Q4 read more relevant and non-relevant documents

- ▶ Less bookmarked but more accurate
- ▶ A result of more reading?

Measure	Q1	Q4
# bookmarked	1.03	1.0
# read	1.58	1.66
# relevant bookmarked (ratio)	0.36 (0.35)	0.38 (0.38)
# relevant read (ratio)	0.4 (0.26)	0.33 (0.2)

Table 5: Bookmarked and read documents by quartile

Findings

▶ Task Time

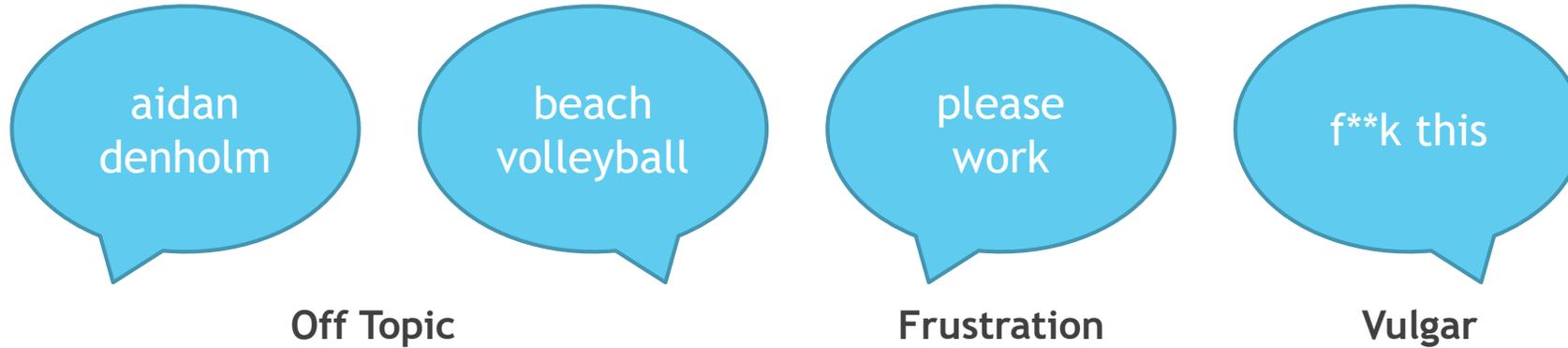
- ▶ Median avg. 535s (8.92 minutes) per task. Min = 80s / Max = 884s
- ▶ Spent less time on 2nd task than first (461s vs 494.3s)
- ▶ Quartiles were approx. equal (562s and 561s)

▶ Query Formulation

- ▶ Longer, more specific queries result in significantly better performance
 - ▶ +1 query term increases 0.012 improvement in avg. precision ($p \ll 0.01$) and 0.42 extra hits ($p \ll 0.01$)
- ▶ Pre-task interest has significant impact on the term ($p=0.04$) and character length ($p \ll 0.01$) 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 ($p \ll 0.01$).

Findings

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



Measure	Q1	Q4
Mistakes	0.17	0.28
Advanced operators	0.01	0
Off-topic	0.1	0.03
Query length (terms)	3.23	3.66
Query length (characters)	23.2	26

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 **?**
? **?**

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