**4. Initial Study**

In this section we detail the results of an initial study conducted for validating the performance of Yum. Yum is more than a search engine for children, instead, it is an enhanced web search environment that incorporates features oriented to facilitate and foster the learning. Therefore, in this initial assessment we focus on demonstrating the need and effectiveness this environment.

We examine YouUnderstoodMe as well as a number of popular search engines oriented to children: Kiddle \footnote{ <http://www.kiddle.co/>}, KidRex \footnote{http://www.kidrex.org/}, SafeSearchKids \footnote{ <http://www.safesearchkids.com/>} and Gogoolingans \footnote{<http://www.gogooligans.com>}. Given that recent studies conducted by Bilal et al. \cite{bil13} show that children tend to prefer popular search engines, such as Google or Bing, to perform their information-seeking tasks, even if these engines target a more general audience, thus, we also include Google in our analysis.

Due to the lack of benchmark datasets available for evaluating search-related tools focused on young users, we collected our own sample of queries written by children, which we denoted ChildrenQS (Children query sample). This sample includes 300 unique queries written by 50 children between the ages of 6 and 13. In creating ChildrenQS, we asked various K-12 teachers in the Idaho (USA) area to propose their students an information discovery task for which the students had to create queries.

We submitted YY queries (randomly-sampled from ChildrenQS.) to each of the search engines considered in this study and proceeded to examine them in terms of both retrieved results and overall user experience from a child perspective. Results of this study can be seen in Table XX. Further details on each fact considered can be seen below.

**Inability to retrieve resources.** Children are known to struggle when composing queries, often creating queries that are too long and in a natural language form, as opposed to succinct keyword queries search engines usually expect [Dru09]. Based on our assessment using queries in ChildrenQS, we observed that for a XX% of children queries other search engines do not retrieve any results, due to their inability to properly handle this type of queries. In a more in-depth analysis we discovered that YY% of the queries that only YUM could handle were queries containing more that YY terms, demonstrating the validity of using a children oriented search intent strategy.

**Readability.** Thereadability level of resources retrieved in response to a child query is also a relevant aspect to explore to quantify the success of a search from a child perspective, since retrieving too complex documents can lead a child to frustration due to the inability to understand what has been retrieved. In order to measure this, we computed the average readability level of the top-N results retrieved for YY queries in ChildrenQS for each tested query. Given that "children are known to systematically go through retrieved resources and rarely judge retrieved information sources" [r15] we computed the readability scores reported in Table Y based on the top-3 documents retrieved in response to each query. For measuring the readability level of the retrieved resources, we selected Flesch\cite{fle48} readability formula as it is considered an standard nationwide\cite{gru80} . Note that YUM enables the selection of the target grade level wanted for the retrieved documents, assuring the results to be of the selected grade level. Therefore, we only computed readability for other systems. As shown in Table XX, resources retrieved by other search engines are in average higher than 10, being around 15 grade level in some cases.

**General experience.** The quality of a search engine is not only determined by its retrieved results, instead the general search environment is also important. Hereby, we highlight the most noticeable issues that arose during our study process. We observed that the presence of ads was recurrent among the search engines considered in this study. These ads were usually unnoticed among the retrieved documents and more importantly, sometimes advertising non adequate products for children. As an example we found ads that referred to drug rehabilitation programs or anti-aging products. Platform adaptability was also an issue for some of the search engines, since they showed poor support for small screens, such as the ones from phones or tablets, making it hard for a child to use the same system in all platforms. This supposes significant drawback, given that 71% of children usually access the internet through a tablet [tabletRef]. Finally, none of the search engines oriented to children showed any support for local searches, such as in libraries or school catalogs. We find this sources of information vital for children, since most of the information they for academic purposes is usually condensed there. YUM currently meets the three criteria described, by containing no ads, being adaptable to smaller screens and supporting diverse types of searches.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | YUM | Google | Kiddle | KidRex | Safe Search Kids | Gogooligans |
| **Unable to retrieve** |  |  |  |  |  | 42% Cannot handle questions |
| Average readability(Flesh/Spache) | Chosen for the user | 12.4 | 12.8 | 10.6 | 15.6 | 11.6 |
| Non adequate contents | None | Ads non for children | Ads related to submitted query | None | Non filtered ads | Filtered ads |
| Mobile friendly? | Yes | Yes | Yes | No | Poor adaptation | No |
| Can search on local/school libraries? | Yes | Yes | No explicit support | No explicit support | No explicit support | Can search in selective reference sites |
| Query suggestions | Yes | Yes, but for general audience | No | No | No | Yes |

In this initial assessment we focused on features that can intrude in the search experience. For every analyzed criteria YUM was the system that intruded less in the search process for children, enhancing the search experience and easing the learning process that can take place as a results of information-discovery tasks.

@inproceedings{Dru09,

title={How children search the internet with keyword interfaces},

author={Druin, Allison and Foss, Elizabeth and Hatley, Leshell and Golub, Evan and Guha, Mona Leigh and Fails, Jerry and Hutchinson, Hilary},

booktitle={SIGCHI},

pages={89--96},

year={2009},

organization={ACM}

}

@article{bil13,

title={Comparing google's readability of search results to the flesch readability formulae: A preliminary analysis on children's search queries},

author={Bilal, Dania},

journal={Proceedings of the American Society for Information Science and Technology},

volume={50},

number={1},

pages={1--9},

year={2013},

publisher={Wiley Online Library}

}

@article{gru80,

title={On the readability of surgical consent forms},

author={Grundner, TM},

journal={New England Journal of Medicine},

volume={302},

number={16},

pages={900--902},

year={1980},

publisher={Mass Medical Soc}

}

Tablets and internet: <http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/media-use-attitudes-14/Childrens_2014_Report.pdf>

Children and Parents: Media Use and Attitudes Report Ofcom 2014

The ability to handle long natural language queries, the retrieval of documents adequate to children reading skills and the child friendly and adaptable environment, make YouUnderstoodMe and unique system in the area of search engines for children. Furthermore, the search engine is not everything YouUnderstoodMe has to offer, incorporating features such as student tracking that can enhance the learning experience. All this features, make searching as learning a continuous but pleasant (ameno?) for the education of children, allowing them to integrate in the information society at early stages, while also improving their reading skills at the same time.