The use of Web technologies is increasingly becoming a relevant aspect for children education [Kni14], both because it enhances the class environment and introduces children, from early stages of their lives, into today's information society [S10]. K-12[[1]](#footnote-1) students use the internet on a daily basis to locate materials that can help them with different academic tasks, from finding information for a class presentation to discovering the meaning of a new word. For this purpose, they often turn to search engines to retrieve materials that can satisfy their information needs, including news articles, books, or term definitions [Kni14].

If conducted correctly, those information discovery tasks can lead to more than just finding a fact to answer the question proposed by the teacher. They can lead to an enriching experience where the student will not only find what he is looking for, but will also discover new vocabulary and grammatical structures, that can lead to the improvement of his reading skills. For making this a reality, two conditions need to take place: (1) The search engine needs to understand what the child is looking for and (2) the retrieved resources need be adequate to the child in terms of complexity.

The first condition is hardly met by popular search engines, given the fact that search engines are designed to satisfy interests to a general audience, not specifically for niche users [S11], such as K-12 students. This usually leads search engines to wrongly capture the intent of a query written by a child, well because the child wrote a long natural language query and the search engine is not capable of determining which is its main content, or well because the query contained two meanings, and the search engine captured the one that was more adult oriented.

Furthermore,

even when they retrieve materials with relevant information for their needs, it is not certain that young users will be able to comprehend the retrieved text. Unlike average users, K-12 students have varied reading abilities, a fact that is usually overlooked by popular search engines. As a result, students can often get discouraged when they try to read retrieved contents that are outside their comprehension level, whether being too easy or too difficult for them to understand. Therefore, providing K-12 students with tools they can use to seek for adequate materials they can actually understand is imperative since reading is an important skill in the academic environment, a competence that can be critical for students' educational opportunities and their careers [P41]. As reported by Lennon and Burdick [P32], reading for learning takes place when the reader comprehends 75% of a text. This represents an appropriate balance that allows the reader to positively understand the text, while also finding challenges in the reading process that will motivate him to improve his skills [P32].

To address aforementioned issues related to information seeking process through search engines and to foster reading for learning, work presented in this paper is based on a web environment designed to help both students and instructors in the process of finding online adequate search results. ***Y****ou****U****nderstood.****m****e* (*YUm*) represents the environment that takes advantage of search engines to adopt them to children to only show results K-12 students can comprehend. The main goal of *YUm* is to use a number of features and functionalities to enhance information seeking process which aids to children comprehension of retrieved materials. Together with readability formulas, search engine, a search intent module [SIGIR16], and query recommendation tool [RecSys16], *YUm* makes the task of information retrieval process effective and efficient. The environment provides the student with a personal account which keeps track of the current readability level together with a feedback given by students on previously read materials, e.g. if it was too easy, too hard, or of satisfying difficulty. Besides students, teachers are also stakeholders of *Yum*, since they have information related to current reading capabilities of each student and their change in time. These capabilities enable *Yum* to make predictions regarding the future reading abilities of each student, which is incorporated in speeding-up the process of identifying adequate materials for both students and educators. Furthermore, the presented environment will not only filter documents retrieved by search engine, but it can also be applied on local resources, such schools' library catalogs, and thus become easily customized to specific educational programs.

The novelty of Yum lays on how a seach engine is enhanced in order to create an environment which will not only serve the student for discovering information, but will also facilitate the the improvement of his reading skills while doing so. *Yum* ties literacy of children with information discovery tasks employed in the school. To the best of our knowledge, the proposed environment is the first one that tackles the issue of reading material retrieval as a whole. Starting from the assessment of an individual student's reading ability, and ending with the retrieval of adequate materials, all features and functionalities work in cooperation to improve the way in which online reading materials are located. One of the important contributions of this work is that *YUm* builds relationship between teachers and students, where teachers can follow the changes in readability levels among the students and further foster the learning process.

Besides describing the initial design of *YUm*, in this paper we discuss the findings of the initial analysis conducted to measure its performance comparing to similar available search engines and identify the need for such environment. We also identified need for further enhancements of the proposed environment and problems to handle in the future.

Related Work

@article{Kni14,

title={Finding knowledge--what is it to ‘know’when we search?},

author={Knight, Simon},

year={2014},

publisher={Institute of Network Cultures}

}

1. K-12 refers to the publicly-supported school grades prior to college in the education systems from the United States of America, Canada and other countries. [↑](#footnote-ref-1)