A Study of Digital Media Searching Systems

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Abstract: The purpose of this research is to design a framework for a Digital Media Searching System that can yield results in an expedient and accurate manner and with suitable content for the application to internet-based education at the basic, i.e., primary and secondary, level. The research methodology consisted of two steps. First, a questionnaire survey was conducted with 731 respondents. Data were scored on a 1 to 5 rating scale and analyzed using frequencies, percentages, means and standard deviations. The respondents reported experiencing moderate problems when using the existing digital media repositories ($\bar{x}$ = 3.25, S.D. = 0.9) and digital media as educational resources ($\bar{x}$ = 3.23, S.D. = 0.99), while the demands for both were rather high, namely the repositories ($\bar{x}$ = 4.09, S.D. = 0.85) and digital media ($\bar{x}$ = 4.07, S.D. = 0.95) respectively. Second, the researchers interviewed twenty-five experts during a focus group discussion from which a content analysis was done as part of defining a framework for a desirable searching system that would cater to their demands. Finally, eight specialists were asked to evaluate the new framework, which showed a high satisfaction level ($\bar{x}$ = 4.50, S.D. = 0.51).

Key words: Digital media, digital media searching system, internet.

1. Introduction

Digital technology now serves as a great teaching and learning tool in many countries, including Thailand. One notable example is the e-Learning platform which allows anyone to pursue their interests anywhere and anytime, granted there is internet access [1]. Its manifold and tailor-made nature enables the individual learner to study at their own pace, and thus contributes to expansion of educational opportunity and enables life-long learning. Such Web-based education fits well with the third and fourth goals and strategies of the National Education Plan for 2017-2033. The third strategy envisions the “development of the potentials of citizens in every walk of life and building a society that values lifelong learning, striving to equip the learners with skills and characteristics relevant to the twenty-first century through provision of educational resources, media and innovations that are of high quality and standard and readily accessible in every part of the country at any time.” The fourth strategy in the same national plan stipulates equality in the opportunity to access quality education for every age group, which can be enhanced through the application of digital technology together with an information system that monitors and evaluates individual performance [2], [3]. In effect, digital media, searching systems, repositories and the internet constitute key components in e-Learning [4]. Those armed with access to digital media will be able to pursue their intellectual curiosity without hindrance.
At present, there are two major methods one can employ when searching for educational resources available on the Web.

The first method is searching specific digital media repositories. The individual learner already knows the websites' names and has an expectation that they will provide materials relevant to their needs. Typically, the person will open a website and browse page by page until he/she finds the target materials, or else look in other websites that contain similar materials. The amount of time spent on searching depends on the type and features of the required digital media and the user's experience in Web navigation.

The second method uses Search Engines, such as Google, Yahoo, Firefox, and YouTube. Here, the individual does not first look at specific sites. Instead, a short string of keywords on the subject is input to the Search Engines which usually yield results ranging from hundreds of thousands to millions of entries, some providing relevant educational materials but many others not so. The individual learner must open and scan each entry until he/she finds the right materials, otherwise, new alternate keywords are used and the search repeated until the right materials are found. The amount of time spent in each search depends on the type and features of the required digital media and user's experience with the particular Search Engine[s].

In June 2017, the researchers conducted a survey of 'digital media repositories for basic education' in Thailand and identified at least ten websites that provide access to those repositories used by Thai students. Below is a list of the ten websites, run by either government or private organizations:

1) http://www.dlf.ac.th Distance Learning Foundation
2) http://edltv.thai.net E-Learning Content Development Program of Distance Education via Satellite
3) http://edltv.dlf.ac.th/primary/ E-Learning System of Distance Education via Satellite
4) http://www.dlit.ac.th Distance Learning Information Technology
5) http://www.etvthai.tv/Educational Television Ministry of Education (ETV)
6) http://www.ipst.ac.th Institute for the Promotion of Teaching Science and Technology
7) http://mooc.learn.in.th/main/ Open Online Media System
8) http://www.sahavicha.com/ SAHAVICHA.com
9) http://www.trueplookpanya.com/ TruePlookPanya:
10) https://www.mwit.ac.th/ Mahidol Wittayanusorn School (Public Organization)

The researchers also undertook a preliminary experiment using both methods to search for certain digital medias. The first method, looking up a specific website that accesses 'repositories for education', induced a throng of problems like not knowing which site accesses the required digital media, not finding the right materials in the specific websites, spending over half an hour and still not getting results, and demands for suggestions of which websites are worth searching.

The second experiment involved two series of searches using Google as the primary search engine. In the first series, eight keywords [in Thai language] pertaining to mathematics at the junior secondary level were used, namely, Powers, Trigonometry, Geometry, Percentage, Rule of Three, Least Common Denominator (LCD), Greatest Common Divisor (GCD), Decimal(s), and Fraction(s). In less than 0.5 second, Google yielded over 1,100,000 entries for each of the keywords. However, among the first thirty links the researchers identified only five websites out of the abovementioned ten, namely numbers 1,2,4,8, and 9. In the second series of experiments, the researchers used the same eight keywords but added "e-Learning' at the beginning. In less than one second, Google yielded over 130,000 links. Among the first thirty entries only six out of the abovementioned ten sites appeared, namely numbers 1,2,4,8,9, and 10. Both experiments thus showed how some of the existing 'digital media repositories for basic education' in Thailand might not be accessible via the Google search engine.

The preliminary experiment using two methods of Web searching sheds light on the common problems
faced by Thai students. The searches of specific repositories found variations of materials in both formats and quality. Some of the materials contained therein were not stored properly making it difficult or even impossible to access, resulting in the media not being used. [5] Moreover, most students may not know which of the existing media repositories for basic education are reliable and where to locate materials suitable for their needs. The time-consuming process and failures to locate the right resources could thus lead to boredom and lack of enthusiasm to pursue the search by oneself [6]. On the other hand, the second method of Web browsing via the Google Search Engine yielded over a million hits per one keyword, making it extremely time-consuming to identify the relevant materials one needs [7]. One possible factor is the existing digital medias are scattered through a myriad of repositories of different websites that run independent of one another instead of in collaboration as attention has been paid more to developing tools than on content and storage that will facilitate the teaching and learning process [8]. In light of the significance of digital media repositories for self-study [9], the researchers thus undertook a project to design a framework for a searching system that will enable an individual student to search the Web and get the desired materials in a speedy manner.

2. Research Objective

1) To investigate the current problems and demands involving digital media searching systems and repositories for basic education in Thailand.

2) To design a framework for a digital media searching system that accesses basic education materials.

3. Research Methodology

Step 1 – Investigate the current problems and demands involving digital media searching systems and repositories for basic education in Thailand

1) Study theories, concepts and past research on digital media, digital media repositories and searching systems for basic education.

2) Design a questionnaire on problems and demands for a digital media searching system and repository for basic education. The draft questionnaire was submitted for scrutiny by five specialists in the field of digital technology and education who assessed the Index of Item – Objective Congruence (IOC) value.

3) The questionnaire that passed the IOC criteria was then used to collect data from 731 respondents, namely 430 students attending 43 schools scattered across Thailand, 43 parents, 215 teachers and 43 school administrators. The size of sample population was determined based on the Taro Yamane Table (1967) which suggested 400 for a margin of error of 5 percent.

The 43 schools included in the study were chosen through a stratified sampling method: 30 schools under the Office of the Basic Education Commission (OBEC) that represent eighteen regional jurisdictions (15 ‘large’ schools having more than 200 students, and the other 15 ‘small’ schools with fewer than 200 students), two ‘demonstration schools’ (associated with universities that have Faculty of Education), four schools under the Bangkok Metropolitan Authority, three schools run by the Border Patrol Police Unit, and four schools run by the Rajaprajanugroh Foundation under Royal Patronage.

4) Collected data from the questionnaire survey were scored using a 1 to 5 rating scale and subsequently analyzed by looking at frequencies, percentages, means (\(\bar{x}\)) and standard deviations (S.D.).

5) Based on an analysis of the results, the first draft version of the framework for digital media searching system for basic education was completed.

Step 2 – Design a framework for a digital media searching system that accesses basic education materials
1) The draft framework for a digital media searching system for basic education was analyzed by a panel of twenty-five experts on digital technology and education during a focus group discussion, of which their input was applied to content analysis.

2) The final version of the framework for digital media searching system for basic education was assessed by eight experts.

4. Research Result

1) Based on data provided by 731 respondents, the researchers found the following:

- Problems concerning digital media searching systems, digital media repositories, and digital media for basic education
  a) Regarding the usage of digital media repositories for education, the respondents reported having experienced a moderate level of problems (\( \bar{x} = 3.25 \), S.D.=0.93). When broken down in details the respondents reported having a moderate level of problems with choosing keywords to use when doing Google searches (\( \bar{x} = 3.31 \), S.D.=0.95), and when looking up specific websites [considered to be repositories of educational resources] (\( \bar{x} = 3.20 \), S.D.=0.91). The respondents also reported getting too many results (\( \bar{x} = 3.41 \), S.D.= 0.98) and not knowing which digital media source is reliable due to name duplication (\( \bar{x} = 3.41 \), S.D.= 0.96), suggesting a high level of problems in browsing the Web. The respondents also complained about pop up advertisements while Web browsing \( (\bar{x} = 3.78, \text{ S.D.}= 0.98) \), which was rather high.
  b) Regarding the use of the digital media for education, the respondents reported a moderate level of problems \( \bar{x} = 3.23 \), S.D.= 0.99). When broken down into details, the problems concerned the respondents’ dislike of digital media that carry a lot of text \( \bar{x} = 3.31 \), S.D.= 1.0), and of videos that were more than ten-minutes long \( \bar{x} = 3.16 \), S.D.= 0.96).

- Demands for digital media searching system and repository for basic education
  a) Regarding the usage of digital media repository for education, overall there was a high demand \( \bar{x} = 4.09 \), S.D.=0.85). Broken down into details, there was a high demand for digital media that contains no latent advertisements \( \bar{x} = 4.18 \), S.D.=0.83), for expediency of Web searching \( \bar{x} = 4.17 \), S.D.=0.82), for the availability of digital media repositories catering to basic education at primary level (Grades 1-6) and junior secondary level (Grades 7-9) \( \bar{x} = 4.17 \), S.D.=0.85), for the availability of a searching system that can locate the right materials \( \bar{x} = 4.13 \), S.D.=0.80), for access to the relevant digital media \( \bar{x} = 4.10 \), S.D.=0.84), for digital media that fits with the individual subjects in the curriculum \( \bar{x} = 4.07 \), S.D.=0.94), and for the ability to use Keyword search and get the relevant materials \( \bar{x} = 3.90 \), S.D.=0.86).
  b) Regarding the use of educational digital media, the overall demand was quite high \( \bar{x} = 4.07 \), S.D.=0.95). When broken down into details, the respondents reported a high demand for digital media that shows how to do exercises and quizzes \( \bar{x} = 4.06 \), S.D.=0.85), for more video types than text-oriented digital media \( \bar{x} = 4.04 \), S.D.=0.89), and for videos that are no longer than ten minutes \( \bar{x} = 3.86 \), S.D.=0.96).

2) Framework for a Digital Media Searching System for Basic Education

- Conceptual framework for a searching system

Based on the results from the survey on problems and demands for a digital media searching system and repository for basic education, and interviews with twenty-five experts on digital technology and education through the focus group discussion, followed by a Content Analysis of the results, the researchers came up with a conceptual framework for a searching system (the “Edu Search Engine”) that would facilitate Web browsing in an accurate and speedy manner [10], as follow:
The searching system should have the following features: 1) it must be able to locate specific digital media that caters to basic education, 2) it must be able to analyze and remember the individual user’s patterns of searches, 3) it must be able to filter out improper materials so students cannot access them, 4) it must be able to monitor and evaluate the individual learner.

The searching system should have the following components: 1) it must provide access to the digital media repository for national basic education, 2) it must have an Edu-Search Engine that enables searches for specific digital media for basic education, and 3) it must provide digital media for education, and 4) its own administrative system.

- Guidelines for design/development of the Searching System

The Edu-Search Engine should link to the existing repositories as well as those to be produced in the future. (as depicted in Fig 1), and permitted users to retrieve resources via a Edu-Search Engine with following capability.

- The searching system (“Edu-Search Engine”) should be able to recognize the patterns of search of an individual user, to filter inappropriate materials and make them inaccessible for the students, and to follow up and evaluate the learner/user.
- It should integrate all existing digital media repositories for basic education in Thailand so the learner can access them immediately without having to memorize each website’s address.
- It should integrate the content in all digital medias for basic education so each and every subject covered meets the standard and is easy to access.
- The system should screen out sub-standard materials from the repositories.
- Improve the existing materials or develop new ones as ‘Interactive VDOs’ that are accessible via Smart Devices.
- There should be an agency that supervises and administers the digital media, repository, and searching system for basic education resources (the “Edu-Search Engine”), so that they can operate efficiently

3) Results of Evaluation of the “Edu-Search Engine”

In-depth interviews were conducted with eight experts who assessed the level of appropriateness of the components in the Searching System [the “Edu-Search Engine”], and the results were as follows:

<table>
<thead>
<tr>
<th>Design Components</th>
<th>x̅</th>
<th>S.D.</th>
<th>Level of Appropriateness*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help in locating specific materials</td>
<td>4.38</td>
<td>0.52</td>
<td>High</td>
</tr>
<tr>
<td>Can recognize users’ search patterns</td>
<td>4.50</td>
<td>0.53</td>
<td>Very High</td>
</tr>
<tr>
<td>Filter out inappropriate materials so students cannot access them</td>
<td>4.50</td>
<td>0.53</td>
<td>Very High</td>
</tr>
<tr>
<td>Can monitor and evaluate</td>
<td>4.63</td>
<td>0.52</td>
<td>Very High</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4.50</strong></td>
<td><strong>0.51</strong></td>
<td><strong>Very High</strong></td>
</tr>
</tbody>
</table>

*High refers to the values between 4.00-4.49.*

*Very High refers to the values higher than 4.50.*

According to Table 1, all eight experts agreed that the framework for searching system has a ‘Very High’ level of appropriateness (x̅=4.50, S.D.=0.51).
5. Conclusion

Digital technology plays an increasingly important role in students' learning and development in the twenty-first century [11]. The proliferation of digital content and platforms on the internet has substantially contributed to the process of learning, especially through the sharing and exchange of a variety of interactive digital learning resources between the educational community and the public and commercial content providers [12]. Typically, the learner can either look up specific web addresses that contain the digital media repositories, and browse page by page until he/she finds the target materials, or use Search Engines like Google, Yahoo, Firefox, or YouTube that may yield over a million hits per one keyword. Both methods may become extremely time-consuming and discourage young learners from pursuing their academic interests. However, the framework for the Edu-Search Engine proposed in this research will enable the learner to navigate the Internet and get the relevant materials in a short period of time. It thus offers a viable alternative to students aged between six and fourteen (Generations C, or Z, or
‘Gen-Z’), who are enrolled in primary and junior secondary levels, typically with few resources and short attention spans [13]. Being able to retrieve the right trustworthy materials quickly should help them to study and review in an efficient manner and thus enhance their education.

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References


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