

TOWARDS WEB 3.0 CONCEPT FOR COLLABORATIVE E-LEARNING

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Abstract: The goal of this paper is to define a concept based on Web 3.0 technologies to improve the learning experience and attempt to create a lifelong learning environment in people's daily routine. To achieve that, there was a need to analyze the current curves of the World Wide Web (WWW) in this field. The last few years a lot of interesting on-line services have been introduced to the public. On-line video conferencing, synchronous/asynchronous conversations, wikis and social networking are just a few of those technologies which changed the way people see and use the Internet. By using some of these services and combining them with most recent (and interesting) techniques like background customized search and live manipulation of content, it is possible to create a Web 3.0 application with smart, content-aware interface for educational purposes. An application like that will be able to be used both in the corporate and education sector.

1 INTRODUCTION

Nowadays, one of the hottest topics in education is the opportunities that Web 3.0 offers by handling the WWW as the largest information database humans have ever invented. People can access large amounts of information (e.g. news, research etc.) with just a few clicks of the mouse by using automated-personally configured search engines without even knowing it.

To get to this point the WWW had to be evolved from text-based static pages. More specifically the "first version" of the Web (Web 1.0) introduced great opportunities in open and distance learning. Basically it was the first time in human's history where the tutor could transfer educational content to the learner by using easy-to-access, visualized techniques.

Later, with the transformation of Web 1.0 to Web 2.0 the WWW gained a vast of new features and soon enough web-sites/applications like wikis, blogs and social networks became a part of most people's lives.

In education, the actual contribution of Web 2.0 lies in the learner's ability to be able to interact with web content. As a result it enables the learner to add

comments, reply or even change information created by his tutor, instead of passively reading it.

One step further from those technologies comes Web 3.0. This new "version" of the web has great potentials. One of its most important features is the ability to combine and integrate Web content and services to improve the end-user experience.

Inspired by the technologies that are being used in the Web 3.0, an educational concept was conceived and designed in order to use those techniques to achieve daily learning. The suggested web application will be using tutoring and collaborative techniques in a Web 3.0 environment which will have the features of synchronous, asynchronous and social learning.

The rest of this paper is structured as follows. In the second chapter, Web 1.0 and Web 2.0 technologies are being analyzed, as well as their contribution in education. In the third chapter the abilities of Web 3.0 and what they can contribute in the learning field is being presented. In chapter number four, this paper's concept is being described. Furthermore, possible ways of implementation, both in corporate and educational environments, are being discussed. In chapter five, as future work, technical details of ways that this concept can be

developed are being mentioned. To conclude, in the final chapter, the possible impact that an application like the presented one can have in education is being discussed.

2 ABOUT WEB 1.0 AND WEB 2.0 IN EDUCATION

Web 1.0 is the term used to refer to web in the form existing from 1990 to 2000 (O'Reilly, 2005). It allowed data sharing over the internet. The Web 1.0 was divided into working directories; practically everyone had their own space (Cormode and Krishnarthy, 2008). For educational purposes Web 1.0 provides the technology platforms which publish knowledge content. But the limitations on content creation limited the potential. The techno-centric nature of Web 1.0 could not satisfy educational needs. For that reason Web 1.0 educational usage was limited to publish content (Figure 1).

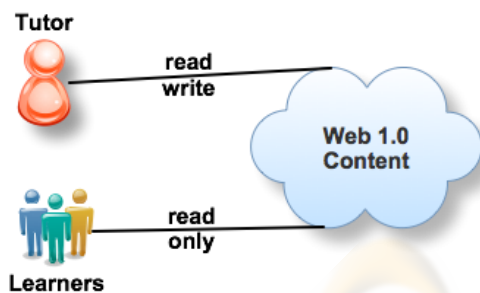


Figure 1: Web 1.0 capabilities in education.

“Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them” (Musser and O’Reilly, 2006). The read/write Web 2.0 consists of a set of new technologies that make the web more like a platform. With the evolution of Web 1.0 to Web 2.0, there was a transformation of the applications (Figure 2).

Transformation also affects the area of education. Applications like E-learning 2.0, Classroom 2.0 and Enterprise 2.0 appear (McAfee, 2006). These applications pay attention in the user’s ability to interact and manipulate the educational content (Figure 3).

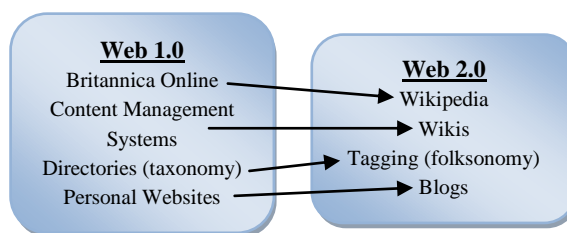


Figure 2: The evolution of the websites.

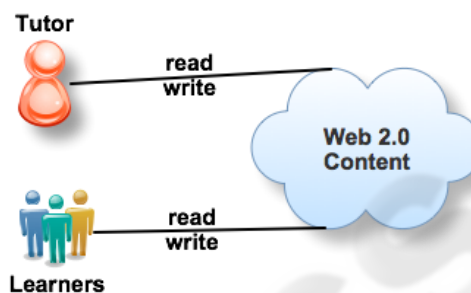


Figure 3: Web 2.0 capabilities in education.

3 ABOUT WEB 3.0 IN EDUCATION

Web 3.0 is the third stage of the web evolution (Figure 4), that is beginning now. In the common question of “what Web 3.0 is?” Tim Berners-Lee, inventor of the web gave the following comment: “I think maybe when you have got an overlay of scalable vector graphics - everything rippling and folding and looking misty-on Web 2.0 and access to a semantic web integrated across a huge space of data, you will have access to an unbelievable data resource” (Berners-Lee et. al, 2006).

In recent years, education concepts based on Intelligent Tutoring Systems (ITS) (Canales, 2007) and Web 3.0 technologies have been mentioned (Pan Tie-Jun et. al, 2009; Pahl, 2009). The rapid evolution of learning software, artificial intelligence and web technologies make ITS and Web 3.0 a viable option. Moreover, Web 3.0 offers more intelligent services and in addition to reading and writing content, user’s actions can initiate web processes (Figure 6), that can be possible with technologies like smart interfaces and intelligent agents.

4 PAPER’S CONCEPT

Our concept consists of a suggestion interface to

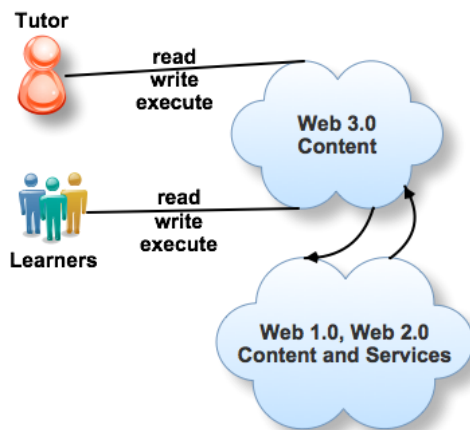


Figure 4: Web 3.0 capabilities in education.

improve the e-learning experience using Web 3.0 technologies. An interface like that can enhance collaborative learning with smart interfaces and auto-updated content depending on the topics of discussion. Its most important features can be:

- Synchronous/asynchronous and social content
- Wiki-enabled interface
- Customized background search

4.1 Synchronous/Asynchronous and Social Content

The web-site will contain on-line chat (both text and video) to enable communication between tutors and learners, as well as between learners. This way everyone can cooperate or answer questions between them.

This content can be live (synchronous), meaning that when a person interacts with the interface to add content, everyone is able to see the changes in real-time and there is no need to refresh the page in the browser. Also, the content can be asynchronous, meaning that if someone wasn't able to be on-line when a change took place, he will be able to review the changes any time he logs on the site.

To make this more understandable a usage example is presented (Figure 5). The tutor creates a new subject in the site and then he logs off. Then, some learners enter the site and see the new subject. One of the learners has a question to ask and submits it. The learners initiate a discussion, live, in attempt to solve the problem.

Then after a few hours the tutor logs in and sees the learners' conversation. He notices that the subject is too abstract and decides to change it so that it will be less confusing.

Then he notices that some learners are on-line at



Figure 5: Example of a low fidelity prototype using synchronous/asynchronous and social content.

the time and they start a video conference to solve their questions. After the video conference comes to an end, another learner logs in and sees the changed subject title and that he missed the video conference. This is not a problem because he can stream the video conference to his computer and see what he had missed.

4.2 Wiki-enabled Interface

Since the most common reference library in the world is wikipedia.org, it would be more than necessary to embed an interface which links an e-learning site with wikis (Figure 7). To do so, there are two possible ways.

The first way, and the most obvious one, is to let the tutors define which words of the text will be linked to wikis. This is practical but it makes the work of the tutors much more complicated.

The second way is to do this automatically. The text in the conversations can be processed and let the on-line application decide which words can be wiki-enabled.

In this part of the project instead of traditional wikis it might be useful to add visual wikis (Hirsch, 2009) to enrich the page's content. This feature will offer a more attractive interface for the end user.

4.3 Customized Background Search

The most important feature of this web application is the customized background search.

This could be a Google search Application Programming Interface (API) which performs searches to some default educational sites and the

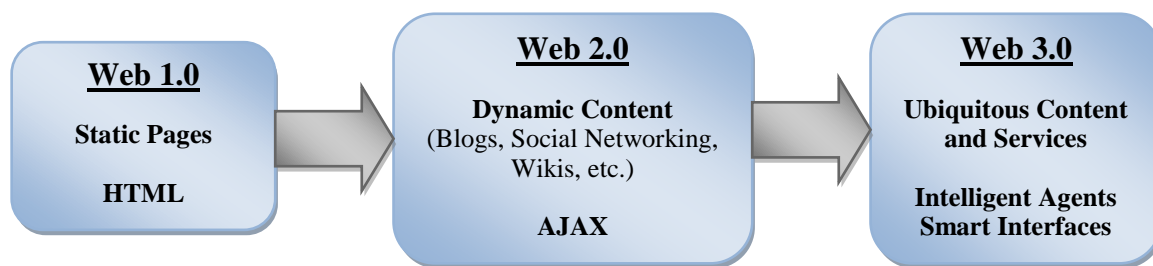


Figure 6: The evolution of content and technologies on the web.

Tutor: Title of an essay
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Figure 7: A hypothetical wiki-enabled interface.

tutor can also add more websites if he likes to. The interface of this search engine will be invisible and the arguments that are going to be used will be the content of the conversations as well as the subject titles. The top hits of the search results will be displayed in a reserved area in the web interface. Those results will vary depending on the content of the conversation. So for example if some people have a live discussion about a subject, automatically some web-sites will be suggested to them in real time as they communicate with each other.

Another way of implementing such a service is to use ontology mining techniques (Tao, 2007; Jang, 2005) in specific web sites. In the actual implementation of this concept both techniques will be tested and finally, the one returning the most appropriate results will be used.

This could be really useful for people who can't use search engines effectively and some results could be also helpful for easy access to related web-sites.

5 FUTURE WORK

For future work regarding this concept, there are going to be attempts of implementing it. At the beginning, there will be a need of a low fidelity implementation of the proposed system. This will be an assessment of the resulting enhancement in the educational process and lifelong characteristics (Sampson, 2009) induced by the usage of the proposed system.

One important factor, following a possibly low fidelity implementation of the proposed system, will be an assessment of the resulting enhancement in the

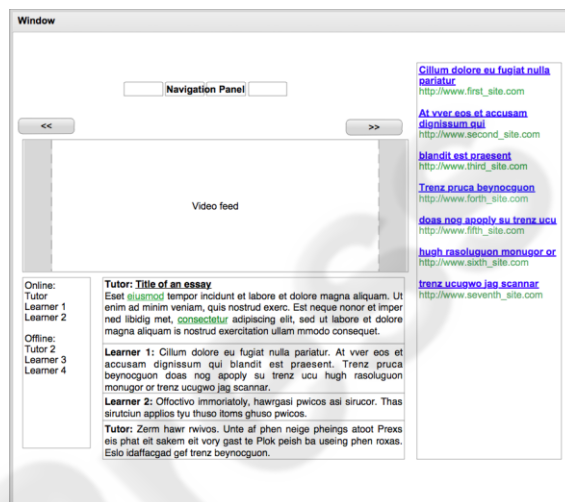


Figure 8: A low fidelity prototype of how the whole web-site could be. The search results are being displayed on the right.

educational process and lifelong characteristics (Sampson, 2009) induced by the usage of the proposed system. At first a desktop application will be developed for testing purposes. This technique will be used because the development is much easier by using the system's API's and frameworks to execute otherwise complicated actions. This concept will be evaluated in contrast with other effective learning environments in between-group experiments. If the evaluation results are negative, the application will be redesigned and redeveloped until positive feedback is received. In that case, a highest fidelity application will be developed in order to be ready in its web form.

Even though, today's web technologies enable personalization (Kabassi & Virvou, 2003), an attempt to increase it through interactivity will take place. This can be accomplished by using cameras and microphones in conjunction with gesture, facial and sound recognition algorithms (Vlamos, 2010). Those will extend the system capabilities by enabling emotional recognition in order to offer

more personalized feedback. In addition, profiling techniques based on the user's data (Lapatas and Stefanidakis, 2010) can be used to achieve more accurate personalization.

The web development can be achieved by using AJAX (Asynchronous JavaScript and XML) which provides all the necessary tools needed for the synchronous/asynchronous conversations and video conferences. As far as it concerns the wikis and the customized search, it is possible to be done using PHP's HTML DOM (Document Object Model); so we can manipulate the content of this site, use it as input for a wiki site or a customized Google search, return the results and finally process them to create some output.

This is just a first assumption of how this project can be implemented using today's technologies. When the actual development starts, the mentioned techniques will be subjected to change.

6 CONCLUSIONS

The goal of this concept is to introduce the user to lifelong learning. The daily usage of the application comes from its social characteristics and the adapted content which raises the interest. Using the combination of the features mentioned above, the system will be able to achieve a personalized interactivity with each user. The presented concept is an attempt to introduce an educational system which combines Web 3.0 technologies in order to achieve better personalization and usability. Furthermore, the social networking characteristics will contribute in gaining wide acceptance and satisfaction.

Moreover, technologies such as, Artificial Intelligence and the WWW have rapidly evolved over the last few years. Despite of this situation, educational concepts have not been developed. As a result there are a lot of potentials to take advantage of this growth. Summarizing, the proposed system could be a useful medium for rapid and accurate knowledge spread in academic and corporate section.

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