

A Web-based Tool for Learning Extensible HyperText Markup Language

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Abstract: - Learning web publishing skills, specifically Extensible Hypertext Markup Language (XHTML), in a face-to-face classroom environment is difficult if predominated by chalk and talk instruction. This problem is exasperated further when the knowledge of the learners in the classroom vary. Learning XHTML on the Web appears to be a more effective practice since learners are able to build on existing knowledge through experimentation, at their own pace. In this paper, a new web-based tool for learning XHTML 1.0, called XHTMLLearn, is described. XHTML examples, organized by the level of difficulty of understanding the XHTML tags, are used to demonstrate the syntax and use of tags, as well as to provide a basis for experimentation. This experimentation is completed in three steps, load, edit and view. These steps may be repeated any number of times, using one or more XHTML examples. Automatic XHTML 1.0 validation with feedback helps to reinforce the learner's understanding of the use of XHTML. Multimedia tutorials are provided for each HTML example. Associated with each of these tutorials are a discussion and a quiz. In order to demonstrate the usefulness of this new tool a comparison is made with the popular HTML Try-it Editor (maintained by www.w3schools.com).

Key-Words: - Web-based education, XHTMLLearn, XHTML 1.0, learning HTML, web publishing

1 Introduction

Learning web publishing skills, specifically Extensible Hypertext Markup Language (XHTML), in a face-to-face classroom environment is difficult if predominated by chalk and talk instruction. This problem is exasperated further when the knowledge of the learners in the classroom vary. Learning XHTML effectively therefore requires an environment where learners can: learn at their own pace, build on existing knowledge, are free to experiment, are given immediate feedback of successes or failures and can find solutions to problems that they encounter.

This approach is based on the shared elements of a humanist orientation and the behaviorist paradigm [1]:

1. "Learning should focus on practical problem solving [1]"
2. "Learners enter a teaching learning setting with a wide range of skills ...[1]"
3. The environment should allow self-paced learning
4. Continuous assessment of progress is vital
5. Previous experience impacts future learning.

A web-based XHTML learning tool seems to satisfy all of the above requirements since learners:

are able to access the Internet at any time and for as long as they want; can build on existing knowledge; can experiment as much as they want to; can be provided with instantaneous feedback; and can be given access to online resources, helping them to quickly solve problems that they encounter.

The World Wide Web (WWW) is viewed as an effective medium for the increasing of knowledge and skill since it is easy to use and provides access to a large repository of information [2]. In addition, "there is growing evidence that feedback processes have a positive impact on student learning and attitudes [3]." This evidence supports the hypothesis that the creation of a web based tool with integrated assessment and visual feedback can effectively help in the learning of XHTML.

In this paper a web-based tool, called XHTMLLearn, for learning XHTML 1.0 is described. This tool is based on the learning by example paradigm, which is taken from the philosophy of Case Based Reasoning [4]. The learner first selects their level of experience, which will be either beginner, elementary, intermediate, advanced or expert. The tool then allows the learner to load an XHTML 1.0 example, corresponding to their level of experience, and they are able to edit, validate,

save or view the corresponding web page. Multimedia tutorials and a full description of the example help to support the learning process. Collaboration with other learners is achieved through discussion of tutorials and a wiki.

The remaining sections of this paper are organized as follows. In section 2, some of the characteristics of HTML editors are discussed. In section 3 the motivation for the creation of this tool is presented. In section 4, the features, design and technology used to build XHTMLEarn is described. In section 5, an example of the tool is presented. In session 6, the features of the tool are compared with the Try-it Editor maintained by www.w3schools.com. And finally in section 7 the paper is concluded.

2 HTML Editors

Several tools have been created to assist in the creation of web pages. These tools range from simple text editors such as Microsoft NotePad and TextPad, to more sophisticated What You See is What You Get (WYSIWYG) editors including Macromedia Dreamweaver, Microsoft FrontPage and Adobe PageMill.

The more sophisticated HTML editors allow users to create web pages from templates and generate HTML code automatically. The users therefore do not need to learn HTML unless a problem occurs. Although these tools often increase the productivity of web site creation, the automatically generated HTML code is often difficult to decipher. These tools are therefore not designed with the learning of HTML in mind, rather the rapid production of web pages.

3 The Motivation for the Creation of XHTMLEarn

Over the past three years the author has been responsible for the teaching of web technologies (which included HTML/XHTML) to hundreds of learners including undergraduate students, postgraduate students, and faculty members.

In the undergraduate classrooms the method of instruction used was chalk and talk; while in the postgraduate classrooms and faculty workshops, which were equipped with computers, chalk and talk instruction was immediately followed by computer-based activities.

Despite achieving some degree of success using both of these methods, the author recognized that computer-based instruction was more effective in

helping the student understand how to use HTML/XHTML, since they were able to experiment and receive immediate visual feedback, in the form of a web page. If the feedback was positive, that is a correctly rendered web page then the learner expressed satisfaction [3].

In faculty workshops, faculty members, from all the Faculties across the university (that is law, social sciences, pure and applied sciences, medicine and the arts), learnt HTML/XHTML in order to create e-portfolios [5][6]. In some of these sessions the HTML Try-it Editor, maintained by www.w3schools.com, was used and proved to be effective in introducing faculty to HTML/XHTML. However, this editor was not integrated into the other tools needed to create the e-portfolios.

This rich experience has taught the author many crucial lessons about learning HTML/XHTML; whether the learner has a technical background or not. Some of these lessons are summarized below:

1. HTML/XHTML coding skills are easier learnt when the learner actually practices coding and receives immediate visual feedback.
2. Using templates greatly reduces the learning curve when learning HTML/XHTML.
3. Using Web editors such as Dreamweaver can prove to be problematic for non technical individuals since these tools often generate cryptic HTML code which is difficult to decipher.
4. Most web pages can be created using a subset of the available HTML/XHTML tags and a template. This reduces the number of tags the learner has to remember.
5. A "cheat sheet" of HTML/XHTML tags, with basic descriptions and examples of use helps learners to create web pages more easily.
6. Learning HTML/XHTML can be fun and gratifying due to the immediate visual feedback provided.
7. Different students learn at different speeds.
8. In most cases, once a student is given the syntax of an HTML tag and the basic rules of creating a web page they are able to master the use of the tag through experimentation.

This experience impressed upon the author the need to create an environment where learners could acquire XHTML skills, in their own time, at their own pace. This would either supplement classroom learning, or stand on its own [9]. The fusion of these experiences resulted in the XHTMLEarn tool.

The features, design, and technology used to create the XHTMLLearn tool are described in the next section.

4 The Features, Design and Technology of the XHTMLLearn Tool

4.1 The features of XHTMLLearn

The features of XHTMLLearn help the learner understand XHTML. These features are described in the following sections.

4.1.1 Loading, editing, saving, validating and viewing web pages

XHTMLLearn allows the learner to load an XHTML example and edit it, or to create an example from scratch and view the corresponding web page. The learner may then choose to save the example so that they can reuse it in the future.

XHTML examples are organized in five levels of difficulty or experience. These levels are beginners, elementary, intermediate, advanced and expert.

Beginner level examples are based on simple XHTML tags which are easy to learn and understand. An example is the bold `` tag.

The elementary level examples may contain beginner level tags, as well as slightly more complicate tags such as the tags associated with lists (ordered, unordered and definition) (see Table 1). At this level, knowledge of attributes is not expected.

The intermediate level examples may contain elementary level tags as well as tags which require the use of attributes, such as the anchor `<a>` tag — the use of this tag is complicated by the need to understand URLs, and protocols such as `http` and `mailto`.

The advanced level examples may contain intermediate level tags as well as more complicated tags such as the table `<table>` tag. In order to use this tag effectively the learner must understand headers, footers, table rows, table columns, rowspans and colspans and how to nest tables.

Finally, expert level examples may contain any XHTML tag, but specifically includes tags which access resources that are often stored on the server. Examples of these tags include forms and objects.

A subset of the XHTML 1.0 tags and their associated level are presented in Table 1.

XHTML 1.0 code validation is integrated into the XHTMLLearn tool, and it helps learners use the markup language correctly. This is especially important for individuals who may have learnt

earlier versions of HTML, such as HTML 4.01 and are unaccustomed to the stricter rules of XHTML 1.0. When an XHTML document has failed validation the learner is reminded of the rules and syntax of XHTML 1.0 documents and can even choose to have XHTMLLearn correct the code.

Table 1. User level of experience and associated XHTML tags

Level	Examples of Tags
Beginner	<code></code> , <code><i></code> , <code><h1></code> , <code><div></code> , <code><p></code>
Elementary	<code></code> , <code></code> , <code></code> <code><dl></code> , <code><dt></code> , <code><dd></code>
Intermediate	<code><a></code> , <code></code>
Advanced	<code><table></code> <code><map></code> <code><area></code>
Expert	<code><form></code> , <code><object></code>

Validation is performed automatically for all learners who are not beginners. This approach is justified since it gives the beginner an opportunity to become comfortable with the tool and basic HTML before having to learn the strict rules of XHTML.

4.1.2 Tutorials and Discussions

Tutorials and discussions help the learner to understand how individual tags are used and how to write good web pages. In addition, they help the learner comprehend the strict rules of XHTML 1.0. Allowing a discussion to be a part of each tutorial is intended to help build a learning community.

4.1.3 XHTML Quizzes

Assessment is an integral part of learning and as a result this tool utilizes assessment extensively to reinforce the learner’s knowledge. Assessments, in the form of quizzes are provided with every XHTML 1.0 example, which not only test the use of the tags presented in the example, but also logical extensions to these examples which the learner should have discovered through experimentation.

Assessment comes in two forms, multiple choice (true/false and select one from a list) and short answer. The short answer type questions forces the user to practice writing the XHTML 1.0 syntax which is often peculiar to beginners; for example, the “/” in closing tags and the use of attributes.

4.1.4 Wiki

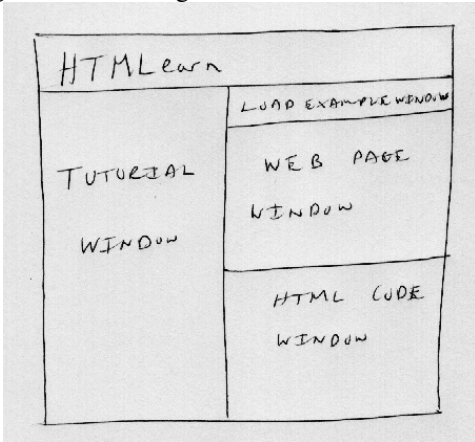
To create a truly collaborative environment

which fosters learning, user input is essential. A new method of sharing information in online communities is through a wiki which are web pages which can be modified by any member of a given community. This allows learners to create additional tutorials, as well as share examples and create links to additional resources, thereby extending the usefulness of XHTMLearn.

4.2 The Design of XHTMLearn

The user interface design of XHTMLearn comprises of a tutorial window, an HTML code input window, a web page window and a load example window; as illustrated in Figure 1.

Figure 1. The Design of the XHTMLearn Interface



All tutorials for the XHTMLearn tool are displayed in the tutorial window. In the HTML code and the View Web page windows the learner edits XHTML and displays the corresponding web page, respectively. Finally, in the load example window, the learner selects the level of experience and the XHTML example that they want to experiment with.

4.3 The Technology of XHTMLearn

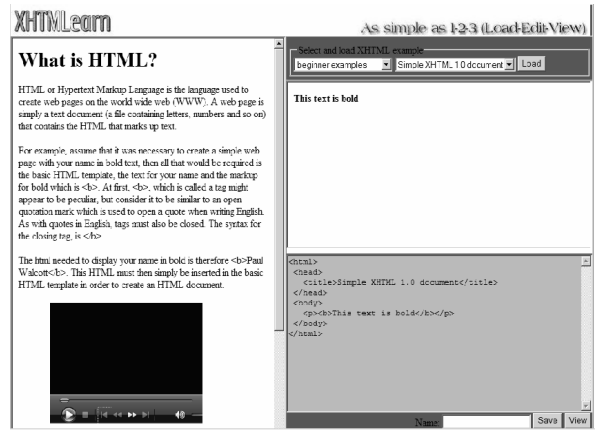
The XHTMLearn tool was built using XML and PHP 5, with web pages coded in HTML. The tool also utilizes the HTML Tidy library from PHP 5 to validate and correct learner's XHTML [7] and the Question Markup Language for marking up assessments [8].

5 Results

When XHTMLearn is first loaded a welcome message is displayed which provides instructions on the use of the XHTML tool. At this point the user

must select a level of experience and an XHTML example. In Figure 2 and example of a beginner who has selected a basic XHTML example is illustrated. At this point the strictness of XHTML is not enforced which allows the learner to get to know the tool.

Figure 2. A screenshot of the XHTMLearn tool during a beginner session.



In the bottom right window is the HTML code showing the use of the paragraph tag. When the user clicked on the view button the corresponding web page was displayed.

The tutorial associated with this example is in the window to the left. Part of this tutorial includes a video on the difference between the Internet and the World Wide Web.

The learner is then able to select a new example, or save the existing example using the interface.

6 Discussion

Although many HTML editors, such as Microsoft FrontPage and Dreamweaver are extremely popular their function is to assist in the rapid creation and publishing of web pages. This is typically achieved through the use of predefined templates and WYSIWYG interfaces. Although these tools are useful, they do not have the specific purpose of helping the user learn HTML.

One tool however, whose specific purpose is to assist in the learning of HTML is the Try-it Editor, maintained by www.w3schools.com. This editor is used to supplement the extensive HTML (and other web languages) tutorial provided. The learning approach used by www.w3schools.com is that the tool serves as an "add on" to the rich HTML tutorial resource. Users of this site may choose to experiment with the editor, or may decide to ignore

it all together.

The learning philosophy used by XHTMLEarn is however different. The approach is more one of learning by example. The learner is provided with an example that they can experiment with, and multimedia tutorials are provided to guide and complement the experimentation (learning).

An 8-point comparison of these two tools is presented in Table 2. This comparison demonstrates that the XHTMLEarn tool has more features than the Try-it editor and provides collaboration through the discussions and a wiki. This makes XHTMLEarn a very powerful and useful XHTML 1.0 learning tool.

Table 2. A comparison between XHTMLEarn and the TryIt Editor

Feature	XHTMLEarn	TryIt Editor
Enter HTML and display web page on the same interface	Yes	Yes
XHTML 1.0 compliant	Yes	No
HTML Quiz	extensive	Only one
Collaborative discussions of examples	Yes	No
Code validation and correction	Yes	No
HTML tutorials	Yes	Yes
Description of examples	Yes	Yes
Learners can extend tool	Yes	No

7 Conclusion

In this paper a web-based tool for learning XHTML 1.0, called XHTMLEarn, was presented. This tool provides the learner with the ability to see XHTML 1.0 code and the rendered web page side-by-side; and to edit the code and receive immediate visual feedback in the form of an updated web page. The learner is able to build on their own knowledge by selecting XHTML 1.0 examples that they understand, modifying them and saving them as new examples. Through a learning community, solutions to problem may be quickly identified; in addition, new XHTML 1.0 examples and tutorials may be shared.

XHTMLEarn was compared with the TryIt Editor maintained by www.w3schools.com. It was shown that XHTMLEarn has many more features which help users learn XHTML 1.0.

It has also been shown that this tool greatly improves the accessibility of knowledge of XHTML and has the potential to create a learning community.

In the future, XHTMLEarn will serve as the learning and creation environment for a new

XHTML-based e-portfolio environment. This will be accomplished simply by providing XHTML templates for each e-portfolio page in XHTMLEarn and allowing learners to learn XHTML while creating their e-portfolios.

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