How computers can help teachers to produce cultural sensitive web-based learning material

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ABSTRACT
The use of the Internet as a supportive tool for learning process made easier the transposition of geographical barriers in education, bringing some challenges to Distance Learning, such as the development of web-based learning material, whose content will be explored by learners from different places and cultures. Therefore, it is interesting to think of providing tools which support teachers to deal with those challenges. Cognitor is an authoring tool that helps teachers to develop web based learning material, aiming to support teachers to develop learning content which can integrate learners from different culture background, during the learning process, and which can be easily understood, through the use of common sense knowledge, i.e. the knowledge shared by people inserted into the same cultural context. This paper presents a usability test on Cognitor and discusses some preliminary results from it, pointing to the relevance of the tool to help teachers with their tasks.

Categories and Subject Descriptors
K.3.1 Computer Uses in Education
H.5 Information Interfaces and Presentation

General Terms
Design, Human Factors, Standardization.

Author Keywords
Common sense, E-learning, Patterns, Framework.

INTRODUCTION
The increasingly use of computers by students in their daily tasks, at home, with friends or at the library, has made teachers face with some new challenges, since most of these teachers neither are proficient in using computers nor used to the new educational approaches which computers have made available, specifically e-Learning. Also, the Internet facilities to deliver content have to be taken into account, the reason why it is likely to think of producing learning content to be published on it. It is important to provide tools to support the generation of web-based content, especially because teachers are not expected to know how to design hyper documents in order to elaborate the content they want to teach. It is necessary to think about several issues for the transposition of learning material from the paper-based to the computer-based world and the development of new teaching techniques to allow students, sometimes distant from teachers, to learn efficiently. It happens especially with teachers in developing countries, the main focus of this research.

Nowadays, authoring tools for designing and publishing web content, aiming at decreasing the need for learning specific programming languages to edit web pages so that anyone can easily produce web content, can be found. However, in order to support teachers effectively in their tasks of generating quality and contextualized learning material, those tools like CMSs (Content Management Systems) are not enough to offer teachers support on reaching pedagogical issues, especially those related to the content contextualization to the learning target group with whom teachers are going to interact.

Because of the globalization of the Internet access, teachers can interact with learners from different culture with different needs. Common sense knowledge can tell teachers about the learners’ reality so that they can fit the learning process to that reality. Moreover computers can make this kind of knowledge available to teachers [1][2][15]. In this context, common sense knowledge can be considered as a kind of non-expert knowledge that describes the culture of a certain social group in a certain age [2][17]. Having this in mind, a framework called Cognitor, a common sense-aided authoring tool for producing web-based content, is under development, intending to allow teachers to follow the HCI and Pedagogical Patterns from Cog-Learn Pattern Language that aims to guide teachers in producing learning material for e-Learning [3][4].

This paper is organized as follows: section 2 presents Cognitor and the theory behind it; section 3 shows a comparison between Cognitor and other web-based learning material authoring tools; section 4 describes a
As learning material [26]. As these elements are related to process. In addition to that, using cognitive operators like strategies, learners can get better results in the learning highlighted text. According to Gagné, by using cognitive to make their student pay special attention to the pedagogical and HCI practices, Cog-Learn formalize some of them as Hybrid Pedagogical and HCI Patterns.

Concerning the Theory of Patterns, Cognitor allows teachers to easily follow the Patterns expressed in Cog-Learn [2]. Cog-Learn is a Pattern Language proposed to support teachers with the design of learning material to be published on web-based learning environments. Patterns have emerged as a way to map design knowledge related to a specific context and then to suggest designers common solutions for recurrent problems of the context. A Pattern usually exists within a Pattern Language and it is usually related to others Patterns [12][14].

In the case of Cog-Learn, it assembles: (i) Pedagogical Patterns, based on practices identified in attendance lectures; (ii) HCI patterns, based on Web design practices, which go over the interaction and layout of the learning material; and (iii) Hybrid Pedagogical and HCI Patterns, acquired from practices of inserting cognitive operators [26] in learning material.

Cognitive operators are elements used by teachers in order to make their learners use cognitive strategies during the learning process. These strategies, according to Gagné [24], are internally organized processes which learners use to drive their learning. For example, to highlight a piece of text in learning material is a cognitive strategy usually used by learners to help themselves recognize the important parts of the learning material easier [26]. When teachers highlight a piece of text in the learning material they are elaborating, they are using a cognitive operator in an effort to make their student pay special attention to the highlighted text. According to Gagné, by using cognitive strategies, learners can get better results in the learning process. In addition to that, using cognitive operators like the one previous mentioned has already been proved to improve the usability of hyper documents which are used as learning material [26]. As these elements are related to pedagogical and HCI practices, Cog-Learn formalize some of them as Hybrid Pedagogical and HCI Patterns.

COGNITOR – A COMMON SENSE-AIDED LEARNING MATERIAL EDITOR

Cognitor [9] is an authoring tool, based on the e-Learning Pattern Language Cog-Learn. Its main objective is to support teachers in designing and editing quality learning material to be delivered electronically to students on the Internet or on CD/DVD. It aims to facilitate the development of accessible and usable learning material, which complies with issues from Pattern and Learning Theories, giving teachers access to common sense knowledge in order to make them able to contextualize their learning materials to their learners’ needs [16].

In this way, it is expected that teachers has the necessary support to prepare learning materials which can promote effective learning and stimulate learners to engage themselves in the learning process. Figure 1 in the next page shows the main interface of Cognitor. As it can be noticed in the figure, the tool is divided in six great areas, which are quick described in the following.

A – Planning and Organization Area: Using the options of this area, teachers can define a new organization (sequence of pages and topics) for the learning material, choose one previously defined or even change an existent organization.

B – Media Insertion and Content Publication Toolbars: The media insertion and content publication tool bar allows the addition of media objects such as audio, video, animation and images. Furthermore it makes possible to manipulate actions performed during the object creation/edition, such as redo, undo, cut, paste, copy, find and replace. Teachers can also save their materials using the functionalities available in this tool and also export them in SCORM [25] or HTML format. More details about exporting the learning content is given further ahead in this section.

C – Page Edition Area: In this area teachers can see the material which they are editing and also insert new media. There they can edit the body of the pages of the learning content, typing the wished text or inserting several different media through the toolbar B.

D – Interaction Design Area: In this area the teacher can create a page template to apply on the material as a whole. The idea of configuring the class initial environment corresponds to solutions for common problems found in

usability test in which users have composed an hyper document using Cognitor to be used as learning material and discusses its results; finally, section 5 presents the conclusions remarks and points to some future works concerning the tool.
HCI analysis context which were formalized as Patterns and compose the Cog-Learn Pattern Language.

**E - Media Properties:** In this area it is possible to change the properties (height, weight, colors, fonts, etc.) which were set up to each type of media inserted in the Page Edition Area. The changes are automatically updated in the page which the teacher is editing.

**F - Object Control Area:** This area allows visualizing the number of objects of a page, enabling the edition of their properties and making possible the fulfillment of metadata related to each object. The metadata are important to describe the properties and behavior of each object inserted into a page and, in this way, they make possible to know, for instance, the objective of the insertion of a proper picture in the learning object and the data about the author of the picture.

In order to start editing an instructional material, teachers can open a document previously created or to create a new document. In the case of a new document, teachers should define the learning material organization using tools available in the area A. One of those tools is the implementation of the Cog-Learn Knowledge View Pattern [3], which supports the planning and the automatic generation of learning material navigational structure, by using the technique of Concept Map, proposed by Novak [18]. For that purpose, teachers should (i) enter into the system the Concepts which they want to approach in their learning material and organize them hierarchically; (ii) name the natural relations between concepts, i.e. the relations mapped from the hierarchy previously defined; and (iii) establish and name any other relation between concepts, which they consider important to the content understanding and exploration (See [16] for more information on the process of generating a Concept Map in Cognitor, using the Knowledge View Pattern).

When the teacher chooses to use the Knowledge View pattern, Cognitor offers the common sense support to provide him with information about the facts that are considered common sense in the domain that s/he is thinking of. So the teacher can complete the Concept list based on that information, decreasing the time on planning the material organization.

Figure 2 depicts the first step of Cognitor Knowledge View Pattern tool, in which teachers are supposed to enter into the system the concepts which they want to approach in the content. In the example, the teacher entered the concept “Health” (“Saúde”, in Portuguese), and the system suggested in the box on the right concepts such as “sick person” (“pessoa doente”), “place” (“lugar”), “drug” (“remédio”). Teachers can select one of the suggestions from common sense knowledge and click on the button “<< Include”, select a concept in the list of concepts on the right and perform a search in the common sense knowledge base for related concepts through the button “Search >>”, or...
even add another concept that is not in the common sense concepts suggestion list.

After defining the content organization structure, teachers should edit the pages related to each concept in the structure using the areas B, C, E and F. As soon as they finish editing the pages they should export the material so that learners can explore it in a web browser or in a learning environment. The material can be exported in HTML, to be played in a web browser, or in the SCORM format, to be played in any learning environment which supports this format, such as Moodle [23], Atutor [5] and Blackboard [7]. It is worth pointing out that teachers do not have to program anything in HTML, the content pages and the links among them are automatically generated by the tool, based on the organization structure previously defined by the teacher.

It is also possible to save the material elaborated for further modifications using Cognitor. In this case Cognitor saves the learning material on the local file system in the SCORM format [25]. In this case, it is generated a XML manifest for each learning material containing the information about its organization, each page which composes it and each media inserted on the pages [16].

COMPARISON BETWEEN COGNITOR AND OTHER LEARNING MATERIAL EDITORS

Being aware of the importance of knowing other tools which have the same purpose of Cognitor, the Web was searched for tools which aims to support teachers to produce learning material in hyper document format and the facilities that each of them offer were compared. The comparison was based on the features which W3C recommends that web page authoring tools have [28]. It was also considered for the comparison if the tools support the creation of Concept Maps, to be used as the learning material navigation structure, and the creation of learning objects, through the insertion of metadata. Table 1 presents the relation of the features found in each authoring tool analyzed.

As it can be noticed in Table 1, only 34% of the tools which claim to be web-based learning material authoring tools have their own editor. It means that only 34% of those tools are really authoring tools, since the others do not support content generation or edition. Those tools which do not have their own editor work as content organizer and aggregator, i.e. teachers can define which learning objects should be available in the learning material however they cannot edit the content of the learning objects in the tool. The learning objects should be generated in other tools and then added and organized in the tool as a sequence of learning objects which will be published as learning material.

Another important issue that can be verified in Table 1 is that all the analyzed tools support the edition of Concept Maps. The Concept Map tool works as a support to teachers to organize the learning objects which are part of the learning material and to define the navigational logic which is going to be used to explore the learning content. Previous studies have already shown the usefulness of using Concept Map as the learning material navigation index to achieve good results in the learning process, since it is an artifact based on Learning Theories [4][26].

Notwithstanding the support to generate Concept Maps present in the tools, only 50% of them give teachers support in the selection of concepts which are going to be approached in the material. This feature is very important to make easier the teacher’s job of organizing the learning material, since they bring out related concepts so that teachers do not forget important topics which should be approached in the learning material. This feature makes the Concept Map edition more effective since teachers are likely to remember faster the concepts for their Concept Maps. CMap Tools [8] and Inspiration [13] use their own dictionaries to retrieve and suggest related concepts to teachers as they insert a new concept in the Concept Map they are elaborating. Cognitor uses the common sense knowledge base of the Open Mind Common Sense no
Brasil (OMCS-Br), which has been developed since 2005 through a collaborative approach where any person who knows Portuguese can enter facts in natural language in the site of the Project (http://www.sensocomum.ufscar.br). As it was mentioned before, this kind of knowledge has already been proved to be very useful for reaching pedagogical issues and contextualizing the learning process to the learners’ reality and culture, helping teachers to deal with the challenges brought by computer-aided education era, previous mentioned.

Finally, only 33% of the tools allow inserting metadata to the learning objects edited in the tool or added to the learning material, i.e. inserting data which describe the learning objects in the learning material and the learning material itself. This is another important feature which web-based authoring tools should comply with, especially to allow learning objects to be stored in and, after that, retrieved from a learning object repository. This is special important to collaborative development of learning material.

It can be conclude, therefore, that Cognitor complies with the majority of the features established by W3C for web page authoring tools, as well as features considered important in learning material tools such as the support to create Concept Maps, the help with selecting concepts for the Concept Map under development, and the description of the learning objects through metadata. The only feature missing in Cognitor of the ones considered for the comparison is the collaborative edition of learning material. This is a feature which is going to be implemented soon in the tool.

Next section presents a user test on using Cognitor to edit learning material, in which it is possible to better understand the process of edition and its result.

COGNITOR IN USE – USER TEST
In order to assess the support given by Cognitor for teachers to design and edit web-based learning material, a usability test was performed, according to the guidelines, presented by Nielsen [19].

Nine test users were selected whose profile was in conformance with the Cognitor target group. As it can be noticed in Figure 3, the majority of them was between 22 and 26 years old (about 78%) and was undergraduate students (about 44.5%) or Master students (about 44.5%). The most of them (about 78%) are students who eventually have to prepare small lectures for their course disciplines and that intend to get into academic practices in the future. One of them is teacher in a State University in Brazil.

Another interesting issue of the test users’ profile is that kind of 66.5% of them had never designed or edited a web-based learning material, what complies with the target group which Cognitor intends to support: teachers who have little experience in producing this type of material.

The following sub-sections describe the stages of the test performed and present its results.

**Preparation**

The test preparation started with the definition of its purpose. It was decided to test (i) the support that the Knowledge View Patter implementation gives teacher to create Concept Maps; (ii) the help that common sense knowledge offers teachers in identifying concepts to compose a Concept Map; and (iii) the resources that the Cognitor WISIYWG web-page editor makes available to teachers in order to elaborate the learning material content.

After the test purpose definition, a short tutorial of the tool was prepared to be presented before the test itself, since previous usability tests on the tool have shown that Cognitor is a tool that needs initial training.

A questionnaire to be applied to the test users was also prepared. The short form of QUIS (Questionnaire for User Interaction Satisfaction) [6] [29] was chosen as the basis of the questionnaire for assessing the user satisfaction in using Cognitor. This questionnaire was chosen because it is a well-known questionnaire which has already been proved to get relevant data about the user satisfaction on using a system [6]. Two specific sections were added to QUIS with questions concerning the use of the Knowledge View Pattern functionality and the common sense knowledge support. A section where users were supposed to list three pros and three cons of using the tool was also added. It is worth pointing out that this addition was made based on the QUIS authors’ suggestions on fitting the questionnaire to evaluate specific issues of the system which is going to be evaluated.

![Figure 3. Test User’s Profile](image-url)
Finally, the environment where the test was going to take place and the resources which would be necessary to the test execution was prepared and tested.

**Introduction**

Following Nielsen’s usability test guidelines [19], an introductory section was conducted before the test itself. In this stage, the purpose of the test was explained to the users and the ethical aspects of the activities which were going to be performed were approached. For example, as the test was going to be recorded, the users were asked to sign up an agreement form. In the form they agreed to be recorded and the testers committed themselves not to publish any information which reveals the user’s identity and to use the videos only to identify usability problems in the tool. The users were also told that they could interrupt the test in any moment they want due to any reason without any problem.

After the explanation, the short tutorial prepared in the test first stage was presented, in which it was demonstrated how to use the Knowledge View Pattern implemented in Cognitor as well as the process for editing content and inserting medias in a page of the learning material. Finished the tutorial, the tasks that the users were supposed to do was assigned and, then, the test itself started.

**Execution**

The users were asked to produce a learning material with five concepts related to the Health domain, which was select due to its relevance and novelty. The themes approached by the users varied from diabetes to sexually transmitted diseases. They were oriented to use the Knowledge View Pattern to organize their learning material navigational structure and were asked to export the material in HTML format at the end of the test in order to see the result of their work locally, i.e. without having to deploy the material in a web server or in a learning environment, such as the ones mentioned in section 2. Exported the material, the users opened it in an Internet browser and verified whether the hyper documents were consistent with what they have edited in Cognitor. During the test two testers observed the users and interact with them in order to make them talk about what they were thinking of the tool, using the Thinking Aloud strategy [19] which allows identifying problems which users are facing with and state the users’ feelings on interaction with the system.

Figure 4 shows the artifact produced by one of the test users, opened in an Internet browser. That artifact is related to the learning material presented in Figure 1. In the case of Figure 1 the learning material was in Cognitor and the text was in English for those who do not know Portuguese. It can be noticed in Figure 4 three great areas. Area 1 corresponds to the learning material navigational tree through which learners can explore the material as they...
interact with any hyper document. As it was mentioned before, this navigational tree is generated automatically by Cognitor. Teachers do not have to program any tag in HTML to have their pages generated as well as their navigational structure. Area 2 refers to the content to explain a specific concept. In the example, the text is related to the concept DST (abbreviation in Portuguese for Sexually Transmitted Disease). Area 3 corresponds to another navigational item that can be included using Cognitor. With just a click the tool inserts in the learning material that sequential navigation item. It is worth mentioning that teachers can decide for one of the navigational structures present in Figure 4. For example, they can decide to deactivate the links of the navigational tree or even to hidden it if for their pedagogical goals it is better the learners to explore the pages of the material sequentially. On the contrary, they can also do not make available the sequential navigation element.

Debriefing

After exporting the material and exploring it in an Internet browser, the users answered QUIS. As soon as they left the place, the videos recorded and the artifacts generated were related to the users’ participation number, for the purpose of the data evaluation performed after the test. The data about the user satisfaction gotten by QUIS and the usability issues observed during the video analyses are explored in the next sub-section.

Results

In order to assess the users’ satisfaction in using Cognitor, the answers that the users gave to QUIS were compiled and analyzed and an analysis of the videos recorded during the test was also performed. The video analysis was done for the purpose of checking the consistence between the users’ answers to the questionnaire and their interaction with the system, since it is known that users tend to give in questionnaires answers which are closer than what the tester want to hear or what it is socially acceptable [20]. This section presents the results gotten through these analyses, grouped according to the parts of the questionnaire applied. The parts of the questionnaire, except Part A and B that are related to the users’ profile and that have already been explored at the beginning of section 4, as well as the average grade assigned by the users for each question of the questionnaire are depicted in Figure 5.

As it can be noticed in Figure 5, in Part C the users have evaluated the system positively. They have mentioned in their comments that the system usually responded as they expected and that they could perform their activities easily without big problems. The video analysis has confirmed the users’ answers, although there were some special cases which are along this analysis.

Regarding the Part D, the users were a bit inconsistent in their evaluation. Notwithstanding assigning good grades to the issues related to this part in QUIS (the majority of them assign grade 4 to the most of the considered issues, in a scale from 1 to 5, where 5 was the best grade), they have mentioned in their comments that the terms of the system were difficult to understand and have criticized the lack of feedback and help in the system. These comments were gathered in the blank space left after each part of the questionnaire for users to justify their answers, when they wished.

About the Part E, the users evaluated the system as easy to learn. However, most of them mentioned in their comments that without the tutorial section, it would be very difficult to use the tool successfully, confirming what previous usability tests on the tool have already pointed to.

In the Part F, there were also inconsistencies with the users’ evaluation. They have assigned good grades to the questions however the video analyses have shown that they have got a bit frustrated because the system took a long time during the material exporting and there were no feedback whether the system were still working.

Regarding Part G, it was the issue best evaluated on Cognitor. It corresponds to the Knowledge View Pattern implementation, which guides the user through the definition of a Concept Map which is used to generate the learning material navigational tree. The users considered that the generation process was intuitive, the search for common sense concepts was easy and the organization of the process in three steps was adequate. This felling could be verified in the video analysis, although some usability problems have been identified. For instance, the interface elements do not tell immediately to the user the action which will be performed by using each of them. However, after some moments the users got familiar with those elements and could easily interact with the tool.

Part H. Common sense support, had an average evaluation. The users liked the proposal of knowing the common sense concepts related to the concepts which were in their Concept Map, but some time the system did not bring any related concept or brought concepts which were not relevant to the context. This happens because the knowledge base used in Cognitor is still small [16].

There was still a last part, Part I, which is not depicted in Figure 5, which collected users’ comments about Cognitor. This part has gotten suggestions such as to improve Cognitor feedback system and to develop an on-line help system. Moreover the users have commented each part of the questionnaire which gave the evidences approached all along this section, as it was mentioned before.

Finally, the users have registered in the last part of the questionnaire three pros and cons of Cognitor. The three more cited pros were: (i) automatic generation of the learning material navigational structure; (ii) the possibility of generating a web-based learning material without
### PART C – Overall User Reactions

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<tbody>
<tr>
<td>1. Overall reactions to the system:</td>
<td>Frustrating</td>
<td></td>
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<td>Satisfying</td>
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<tr>
<td>2.</td>
<td>Dull</td>
<td></td>
<td></td>
<td></td>
<td>Stimulating</td>
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<tr>
<td>3.</td>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
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<tr>
<td>4.</td>
<td>Inadequate</td>
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<td></td>
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<td>Adequate</td>
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### PART D – Terminology and System Information

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<tr>
<td>5. Use of terms throughout system</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
</tr>
<tr>
<td>6. Messages which appear on screen</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
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<tr>
<td>7. Location of the messages on screen</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
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<tr>
<td>8. Does the system give information about what should be done?</td>
<td>Never</td>
<td></td>
<td></td>
<td></td>
<td>Always</td>
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<tr>
<td>9. Does the computer keep you informed about what it is doing?</td>
<td>Never</td>
<td></td>
<td></td>
<td></td>
<td>Always</td>
</tr>
<tr>
<td>10. Error message</td>
<td>Unhelpful</td>
<td></td>
<td></td>
<td></td>
<td>Helpful</td>
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### PART E – Learning

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<tbody>
<tr>
<td>11. Learning to operate the system</td>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
</tr>
<tr>
<td>12. Exploration by trial and error</td>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
</tr>
<tr>
<td>13. Remembering names and use of commands</td>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
</tr>
<tr>
<td>14. Can tasks be performed in a straight-forward manner?</td>
<td>Never</td>
<td></td>
<td></td>
<td></td>
<td>Always</td>
</tr>
<tr>
<td>15. Help messages on the screen</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
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### PART F – System Capabilities

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<tr>
<td>16. System speed</td>
<td>Slow</td>
<td></td>
<td></td>
<td></td>
<td>Fast</td>
</tr>
<tr>
<td>17. How reliable is the system?</td>
<td>Very unreliable</td>
<td></td>
<td></td>
<td></td>
<td>Very reliable</td>
</tr>
<tr>
<td>18. Correcting your mistakes</td>
<td>Difficult</td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
</tr>
<tr>
<td>19. Is the system adequate for both experienced and inexperienced users?</td>
<td>Inadequate</td>
<td></td>
<td></td>
<td></td>
<td>Adequate</td>
</tr>
<tr>
<td>20. Concluding the tasks</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
</tr>
<tr>
<td>21. How was your experience of generating a hyper document using the system?</td>
<td>Frustrating</td>
<td></td>
<td></td>
<td></td>
<td>Satisfying</td>
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### PART G – Generation of the Hyper document Navigational Tree

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<tbody>
<tr>
<td>22. Generation process</td>
<td>Not intuitive</td>
<td></td>
<td></td>
<td></td>
<td>Intuitive</td>
</tr>
<tr>
<td>23. Process for searching common sense related concepts</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
</tr>
<tr>
<td>24. Generation process results</td>
<td>Confusing</td>
<td></td>
<td></td>
<td></td>
<td>Clear</td>
</tr>
<tr>
<td>25. Organization of the generation process in three steps</td>
<td>Inadequate</td>
<td></td>
<td></td>
<td></td>
<td>Adequate</td>
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### PART H – Common Sense Support

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<tbody>
<tr>
<td>26. Search for common sense concepts</td>
<td>Irrelevant</td>
<td></td>
<td></td>
<td></td>
<td>Relevant</td>
</tr>
<tr>
<td>27. Quality of the retrieved concepts</td>
<td>Bad</td>
<td></td>
<td></td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>28. Common sense support for structuring Concept Maps</td>
<td>Uninteresting</td>
<td></td>
<td></td>
<td></td>
<td>Interesting</td>
</tr>
</tbody>
</table>

*Figure 5. Average grade assigned by users assessing Cognitor*
knowing HTML; (iii) common sense support for contextualizing the learning material to the learners’ reality.

The three more cited cons were: (i) lack of feedback in the tool; (ii) lack of mechanisms to prevent errors, such as to present users only the functionalities which are available in the different situations of interaction; and (iii) bugs in the text formatting.

By the analysis it can be concluded that the tool complies with its purpose of supporting teachers in generating learning material easily and that users feels comfortable in using the tool, although some problems of interaction still have to be solved.

CONCLUSIONS AND FUTURE WORKS
This paper presented Cognitor, a tool to support teachers in transposing some of the challenges brought by the new approaches made available by the use of computers in education, which proposal is that teachers can develop their learning material to be publish on the web or in digital media, having the support of common sense knowledge and an e-Learning Pattern Language for reaching pedagogical issues in the content generated, such as culture sensitivity [1][2].

As it was mentioned before, it is necessary that teachers think of suiting their learning activities and material to e-Learning and, for that purpose, it is important to offer tools to help them with their tasks.

The Cognitor can be especially useful to teachers who work in extensive countries like Brazil, and who consequently deal with learners from different regions and cultures.

The usability test performed on Cognitor has shown that the tool has potential to achieve its goals, providing use satisfaction to whom interact with it and allowing people to generate and export web-based learning material easily.

However, as discussed, there are other usability issues which should be solved so that the tool can better help users such as a better user feedback. As future works it is proposed to work on the usability problems brought out during the test, to make the editor a collaborative authoring tool, an important feature in the current knowledge society which values the group work and the collaboration in developing and publishing content on the web.

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REFERENCES


