USABILITY, INFORMATION ARCHITECTURE AND SEMIOTIC ENGINEERING APPLIED TO THE WRITING OF SUPPORT SYSTEMS

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Abstract: *Virtual interfaces are becoming an ever increasing part of our daily lives. The constant changes in those interfaces make self-teaching imperative. In this context, support systems are utilized so that users can interact with the interfaces in an independent way. Unfortunately, users often find it hard to work with those tools. A possible explanation for this problem is related to the use and availability of the language in support systems. With the recognition of the necessity to increase the quality of the educational materials, this piece has the objective of studying how effective the application of usability techniques can be in this context. Here, the concept of usability means its application to improve the writing in grammatical issues as well as in its presentation and organization. The quality of language is dependent on the type of user it is designed for, therefore, the educational material is aimed for software development support teams. It is expected that the application of usability concepts will allow the team to have a greater understanding capability and therefore more knowledge about the product and more independence while using it.*

Keywords: Usability in Writing, Self-Teaching, Support System.

1. INTRODUCTION

It is very common for end-users not to be able to solve their problems in support systems, which makes them seek help from the support team which in turn needs to contact the developers, who ask the analysts for help, and so on. This search for information generates operational and economic burdens to the subjects involved. Such problem can be solved by the development of an efficient support system for the support team. Often, factors such as misused language, poorly organized contents and interfaces that are difficult to interact with make the learning process harder. In regard to efficient documentation, the most relevant factors in play are related to language use and availability of textual content. Suchman (1987) apud Barbosa and Silva (2010, p.65) claims that the way people control computing machines and their resulting behaviour is increasingly linguistic instead of mechanic. The operation of the machine is less of a matter of pressing buttons and pushing levers for a physical result, and more about specifying operations and evaluating their results through the use of language.

This research aims to study the efficiency of several usability directives, with emphasis on the linguistic vertent, applied to educational materials in virtual interfaces. To narrow down the concept of usability, directives of Usability in Writing, Information Architecture and Semiotic Engineering received focus.

After bibliographical study, the produced content was analyzed and tested, thus enabling the evaluation of its efficacy. After that, news elements were added to the list of usability directives.

It is important to point out the reasons why the system was developed for support teams instead of end-users. They're detailed in Table 1:

Reason 1:	The support team has more technical knowledge. This characteristic is seen as a requirement to use the product independently;
Reason 2:	-To encourage self-teaching skills among the support team allows for the reduction of operational costs, since other sectors won't need to provide solutions;
Reason 3:	-The use of the systems by the internal support team can serve as a test so that in the future the management of end-user documentation may be more effective;
Reason 4:	-End-user documentation requires a greater knowledge about teaching methods, a subject that is out of this study's scope;
Reason 5:	-Even though resources are already spent with the end-user, believe investing in support and development teams can be cheaper.

Table 1: Reasons why the system was developed for support teams instead of end-users

2. USABILITY

According to the technical normative ISO 9241 (1991), ergonomy of usability is defined as "the degree to which a product is used by specific users to reach specific objectives with efficacy, efficiency and satisfaction in a specific context of use". In its turn, the technical normative ISSO/IEC 9126 defines usability as a set of attributes related to the effort necessary for the use of an interactive system, and to the individual evaluation of such use by a specific group of users. According to Nielsen (1993) apud Barbosa and Silva (2010, p.29), usability is a set of criteria which define how well a person can interact with a system. The criteria considered by the author are: easiness of learning, easiness of memorization, efficiency, safety of use, and user satisfaction. Usability has some subcategories, explained in the following sections.

2.1. INFORMATION ARCHITECTURE

This refers to the designing of information: the way texts, images and sound are presented on the computer screen, the classification and distribution of information, the navigation structure and the search mechanism, in short, the available ways to reach information (STRAIOTO, 2002, p.10).

According to Scheeren (2006), the practical application of Information Architecture follows six steps: the first step comprises the definition of objectives, the second step consists of a study of the target public, different scenarios are created in the third step, the products offered by competitors are analysed in step four, the fifth step comprises the gathering of information about those competidores, finally, the generated information is catalogged in the sixth step.

2.2. SEMIOTIC ENGINEERING

Souza (2005) *apud* Barbosa and Silva (2010) states that the *agent of the designer* is the element

responsible for effectively communicating the designer's meta message to the user. In this actual study, the agent of the designer is the interface used for the presentation of the educational material.

The same author defines communicability as the capacity an agent of the designer has to reach complete metacommunication, delivering the essence of the designer's original message to the users. To evaluate the quality of the communication in this case, the MIS (Semiotic Inspection Method) was used.

It is applied by an IHC expert and annalyses the interface through 5 steps: the first step comprises the analysis of metalinguistic symbols, static symbols are analysed in the second step, while the third step consists of the analysis of dynamic symbols, the fourth step comprises the comparison between the metacommunication messages generated in the previous steps, while the qualitative evaluation of the communicative capabilities and interpretative limits found is made in the fifth step.

2.3. USABILITY IN WRITING

Even though the proposed material is not intended only for online ambients, it was produced as if it was. The available written production on this matter is aimed almost exclusively for this kind of application. Besides, migration of content from physical platforms to digital ones is ever more common.

Certain guidelines were used as a tool to achieve quality in usability. They came from suggestions by Nielsen Norman in his website and in his book *Usabilidade na Web* (2007). Those are simple guidelines regarding text presentation, such as font size, page backgrounds, text colors, text effects, titles and subtitles, use of lists, etc.

3. QUESTIONNAIRE

A questionnaire was produced to allow users to evaluate the efficacy of the changes implemented to the target educational material. The questionnaire was composed according to guidelines provided by Nielsen (2000, 2006, 2010) and Barbosa and Silva (2010). The use of qualitative questions instead of quantitative (statistical) ones was preferred due to the level of complexity and details involved in linguistic issues, and to better represent the usability approach. Was applied via e-mail to 5 users.

4. ANALYSIS AND RESULTS

4.1. INFORMATION ARCHITECTURE

In the first step, Definition of Objectives, our objective was defined as to produce pieces of documentation addressing the main problems the support team faces, development tutorials and instructional content about the company's rule of business;

In the second step, Study of the target public, our target public was defined as the support and development team of the studied company. Thereby it is important to highlight the intent of

subsequently developing educational materials for end-users;

In the third step, Creation of scenarios, six different scenarios were considered, detailed in Table 2:

Scenario 1	Creation of the document titled "Frequently Asked Questions". It is more oftenly used by end users contacting the company to receive information. E.g.: information abou fiscal receipts;
Scenario 2	Originated the document titled "Data Dictionary". Composed for system developers, it contains descriptions for the functionalities of some entities (tables);
Scenario 3	A change in organization with the "Procedures" directory. Inside it, recurring activities of the support team that don't need programming are presented. These presentations are too long to be placed on the "Frequent Problems" document;
Scenario 4	More changes in organization by adding the "Business Rule" directory. The inclusion of new employees to the company makes it necessary for them to obtain knowledge about the business rule of the company and the operation of the system. This scenario also applies for senior developers that need to consult such materials.
Scenario 5	Originated the "Other software" directory. It was placed to meet the need for interaction with external software
Scenario 6	Creation of the "Codification" directory. It aims at helping new programmers with the utilization of the ZIM programming language

Table 2: Third step, Creation of scenarios

In the fourth step, Analysis of competitors, the following support systems were analysed: HelpZim (http://www.zim.biz/WebHelp/index.htm). Microsoft Answers (http://answers.microsoft.com/pt-br), WikiHow: (http://pt.wikihow.com/P%C3%A1gina-pr incipal)

In the fifth step, Information was gathered about the competitors in step four. Following the customer's request and due to the easy-to-use interface, the general structure of the produced application is similar to Help Zim's. Also, the tree-structured menu was used. The collection of several Frequently Asked Questions in a single piece of interface inspired the use of a single document to visualize FAQ's about various subjects, as it is the case in Microsoft Answers. Microsoft's website has an appropriate use of colors and good positioning of the "Related Content" area. WikiHow's searchbar system was also an inspiration for the development.

In the sixth step, Information Catalogging, after analysing the results of the previous steps, the project for the interface that will store the content is presented in Figure 1. This prototype and the textual content in it will be the base for the continuation of the research.

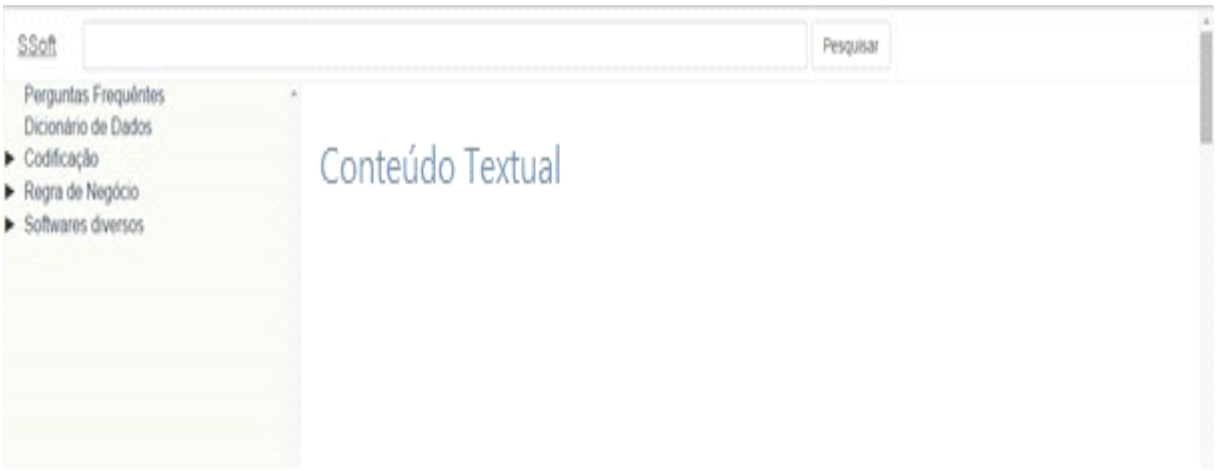

Figure 1: Interface proposed for the support system

4.2. SEMIOTIC ENGINEERING

As a target for this particular stage, the "Frequently Asked Questions" (Dúvidas Frequentes) document was selected. Then, the MIS method was utilized.

In the first step, an Analysis of Metalinguistic Signs was carried out, as seen in figure 2 and table 3.

Figure 2 shows the Frequently Asked Questions document with highlights. Each one of them points to a presentation issue detailed in Table 3.

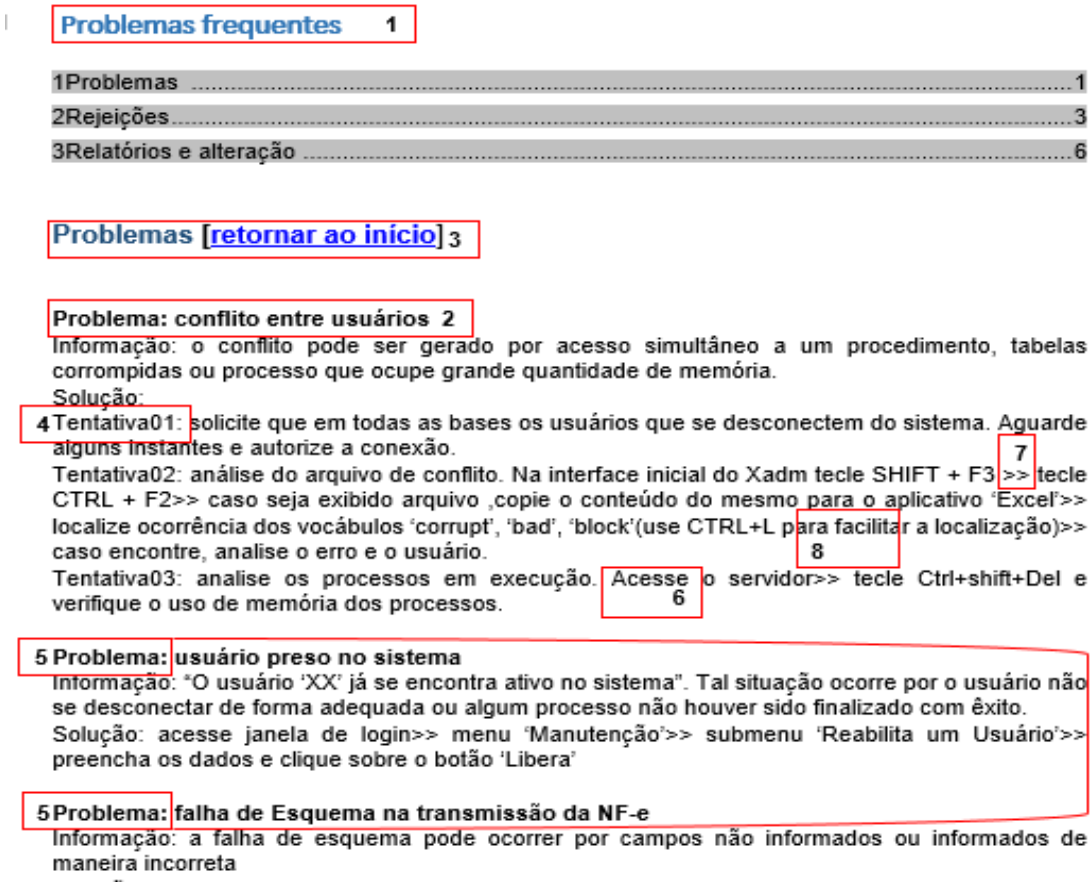

Figure 2: the Frequently Asked Questions document with highlights to presentation problems

Some of the relevant signs present in figure 2 are: vocabulary, verbal tenses, words in bold format, highlighted words, words between double quotation marks, word between single quotation marks, words between brackets, images, summary contents.

Problem 1: the title "Frequent Problems" causes a negative impact	Solution: substitute "Frequent Problems" for "Main Solutions"
Problem 2: titles in bold format look like *links*.	Solution: substitute bold format for italic.
Problem 3: the use of the blue color makes some words look like *links*.	Solution: the blue color was changed to gray colors. Blue was mantained in *hyperlinks*.
Problem 4: the word "Tentativa01" (Trial01) gives the impression that the procedure won't be successful	Solution: Change it from "Tentativa01" to "Opção01" (Option01)
Problem 5: the words "Problema" (Problem) and "Rejeição" (Rejection) become repetitive if used at every instruction. Besides, the "Problem" word can be interpreted in a negative way.	Solution: the "Problem" and "Rejection" words were excluded. The "Problem" word was changed to "Interrupções" (Interruptions)
Problem 6: instructions given to the user were written	Solution: to inform the instructions with verbs in the

using an imperative mode for verbs	continous tense
Problem 7: the symbol ">>" represents transition between menu levels. It was inadequately used with other objectives.	Solution: change the inadequately used ">>" symbols for linking words.
Problem 8: shortcut keys are presented without mention to its functions.	Solution: include a description for the keys's activities and place the referenced keyboard shortcut between parenthesis.

Table 3: Semiotic Inspection Method - Analysis of methalinguistic symbols

Metamessage: "You are a user of the SSoft system, or you belong to the company's support team, and you need to collect information about the software. I have developed some support documents for you, the most important of them being "Frequently Asked Questions", which contains the most recurring doubts. You can use the search bar or the tree menu to locate the desired subjects, and you can also use the Crtl+F command if the content is in the same document.

"In the socuments you will find some symbols I have standardized for greater understanding of the content. Word in bold format indicate titles, questions or rejections. The ">>" symbol indicates the sequence of accesses in the SSoft interface. Underlined words in blue indicate hyperlinks. Words placed between simple quotation marks indicate the name of the component in the interface. Words placed between double quotation marks indicate the content of the component in the interface. The hyperlink "Return to top" indicates the return to a subect's summary."

In step two, Analysis of static signs was performed. Identification of relevant signs: the main window, the contents menu, search bar, images.

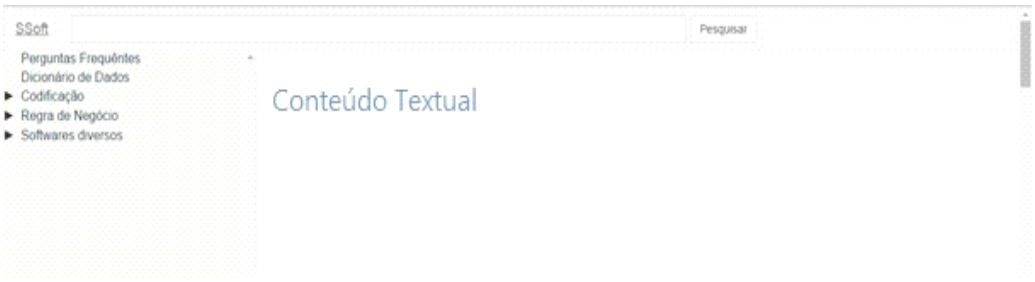

Figure 3: main window of the support system, with the search bar on top, and the contents menu to the left.

Metamessage: "You are a user of the SSoft system. You want to search for information to solve problems or to know more about the product. You can use the search bar to find a specific subject or choose a subject in the menu to the left, which is divided in categories."

In step three, an Analysis of dynamic signs was performed. This refers to the integration of menus and hyperlinks.

Metamessage: "I believe you will have a wide range of subjects to analyse, so I subdivided the menu items in three sections that are highlighted as you access them. As the subjects co-relate frequently, I've added *hyperlinks* to navigate between them."

In step four, a single metamessage was composed: you are a user of the SSoft system or you belong to the company's team, and you need information about the functioning of the system. I believe you will have a wide range of contents to analyse, so I created a search menu that subdivides into some main sections. As you access the content,the menu will be highlighted to allow easier location. Another option is to use the Ctrl+F command to access a subject. For organization reasons, I've created a document for "Frequently Asked Questions" in which you can find the most common problems and their solutions. It is important to highlight that hyperlinks are utilized in all of the documents to facilitate the navigation between contents.

In step five, a Global evaluation of communicability was carried out. Because there is so much support material available, the document that is most frequently used by the support team was selected for analysis, called "Frequent Doubts".

Task to be inspected by the evaluator was to analyse the quality and clarity of the available information, as well as the quality of its storage interface.User profile was an adult user with intermediate knowledge in computing. Creation of scenarios was defined how search and interpretation of a user's doubts in the "Frequently Asked Questions" (Dúvidas Frequentes) document.

4.3. Usability in Writing

After the MIS method was used, the directives persent in section 2.4 were applied to improve the textual content according to concepts of usability in writing, such as the proper font size, avoiding visually polluted backgrounds, avoiding field-specific language, using porper font colors, etc.

4.4. Questionnaire Analysis

A standardized questionnaire was answered by 5 users, after usage of the SSoft system. All of them were able to tell that the learning material was aimed at informatics personell. When considering the objectives of the material, all of the users answered that it was providing user support.
All the participants showed approval for the menu, the color scheme and font size. There were suggestions to add images to improve the learning quality of the material, to move the margins of the text away from the scroll bar to improve reading. One user suggested modifying the color shades to improve distinction between fonts and background.

All of the participants considered the text to be shortly written. Two of them considered the text to have a highly formal language, while three considered it to have little formality. No elements of the text were noted as offensive.

On problems with textual interpretation, there were several remarks. When questioned about the symbol ">>", one of the users thought it reffered to the presence of a hyperlink, which was not accurate - the symbol referred to different menu levels.

None of the users affirmed that the use of an imperative tense could cause disconfort to users. Participant 1 said that the imperative expressions generated more proccimity between the sender and the receiver o the message. Participant 3 said users searching for support already expect short

instructions to accomplish the task. Participant 4 stated the same. Participant 5 clearly stated that he doesn't like receiving orders but still believes this is the best form of communication for this purpose.

Thus, for our users, the best way to work with instructions is to use the imperative tense. This result was not expected, as Semiotic Engineering experts recommend the use of continuous tenses.

5. CONCLUSIONS

This study will be able to generate great benefits to the software development sector, as well as to other sectors that work with written communication. It exposes in a practical way various Usability parameters that could not be easily interpreted by professionals in the informatics field.

In Table 4, the guidelines obtained after data analysis are presented. They can be used in addition the model presented by Nielsen.

Guideline 1:	Use instructions in the imperative tense
Guideline 2:	Use contrasting tones in the scheme of colors
Guideline 3:	See that the content is kept away from the limits of the page by an appropriate margin
Guideline 4:	Whenever possible, include explaining images
Guideline 5:	Utilize symbols and expressions in a standardized way

Table 4: Guidelines produced after the realization of the research

Two themes surfaced as possible choices for future examination. The first one, an analysis of textual content based on Information Architecture. The other, a study about interpretation of metalinguistic signs in computer interfaces.

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