

# Heuristic Evaluation of Online Documentation using Qualitative Indicators

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## ABSTRACT

This paper presents a heuristic evaluation method for online documentation to identify specific usability problems, which are observed with such documentation. We have used qualitative indicators for all heuristics, which are summed up to provide a usability index (with base 100). This index quantifies the goodness of online documentation under consideration. We have considered both types of online documents - online tutorial and online help. A tremendous increase in volume and contents of online documentation make its usability extremely vital for helping users in efficient usage and learning. The heuristic evaluation has been performed by three different usability evaluators for two more online documents to ensure the reliability of heuristics proposed in this paper. The specialized set of heuristics and the objectively defined usability indicators are found more reliable in identifying related usability problems. The usability index calculated is useful for comparison of quality of online documents. A tool is implemented which calculates the usability index and provides the analytical graphical output to the users so that they will know the comparative details about usability of the online documents.

## Keywords

Usability, online documentation, heuristic evaluation, qualitative indicators, usability index, online help, online tutorial

## 1. INTRODUCTION

Over the years, as our world is becoming more and more technology-oriented with increasing operational complexity, the volume of information used and generated is increasing tremendously. Today, it is estimated that there are approximately 150 websites for every human being on the earth [13]. The U.S. Library of Congress alone has 545 miles of shelf space which holds over 100 million pieces of literature. The articles in scientific and technical fields are published at a rate of more than 5,500 per day. Finding a required item in such an ocean of information is becoming increasingly difficult. Some experts have estimated that average people spend more than 5 hours a week just trying to find information that has been filed somewhere [5].

### 1.1 What is Online Documentation?

The online documentation means the traditional method for putting information online, using hierarchically structured databases in which users must serially access information [10]. The online documentation has two types - online tutorial and online help. Online tutorial permits users to get hand-on experience with the system immediately and to gain more in-depth knowledge directly within the working environment. The Fig. A (refer to APPENDIX) depicts an example of [www.w3schools.com](http://www.w3schools.com)

[21], which is a popular online tutorial for learning web technologies. Online help consists of either task-oriented or reference information or both [10]. The Fig. B shows (refer to APPENDIX) a screenshot related with an online help of Microsoft Office 2007 [22].

### 1.2 Users of Online Documentation

The users of online documentation are broadly classified into three groups – novice users, intermittent users and expert users [18]. Novice users need a brief description of the problem. They also require more structuring and learning aids to understand the basic concepts. They are likely to read the online document page by page carefully. Expert users already have good understanding of basic concepts and they can take more advantage from advanced concepts in online help during problem solving. They need online document as a last resort and may use just keyword search for specific concepts. Therefore, the document should be detailed enough for novice users and concise enough for expert users.

### 1.3 Advantages of Online Documentation

There are various advantages with a preference to online documentation [19]. The online document is always available to all users whenever it is needed (except if the computer system itself is not available). It is excellent for brief descriptions and quick references. It may be good for extended explanations; but this preference depends on a user referring. The online document is faster (just click on link). The speed for searching indexed terms is higher. It may also support specialized or differently-abled users. Online documentation also provides the ecological benefits like lesser usage as well as wastage of paper. The other advantages include easier transfer, access, maintenance and updation of information; if a suitable operational infrastructure as well as responsible organizational structure is available to do so.

### 1.4 Usability of Online Documentation

The usability of online documentation is vital for users. It depends on many issues such as typography, use of multimedia content, considerations of all types of users including disabled users, navigational as well as organizational structure of the document and balance between concise and detailed descriptions [12]. These usability issues have been studied and considered in formation and evaluation of a set of heuristics and relevant usability indicators.

## 2. RELATED WORK

Horton [5] and Martha [10] have provided fundamentals such as definitions, types and quality issues related to online documentation. Nielsen [14] has proposed ten usability heuristics of user interface design focusing on various aspects such as

visibility, user control, consistency, error prevention, aesthetics and/or help. These heuristics are more general-purpose and may be suitable for most of the software applications. Kantner et al. [6] have presented a structured heuristic evaluation process for evaluating the usability of online documentation, based on a set of heuristics proposed by Nielsen. Their approach tends to miss out some important aspects of user interfaces in online documentation and does not provide the details about usability issues as expected. Also, it does not provide any usability index, which is important for comparison of various online documents. Katre et al. [7] have evolved a specialized set of heuristics combined with objectively defined usability indicators for the usability evaluation of touch screen based ventilator systems. They have chosen an indicator based evaluation method in which some heuristic indicators are checked in terms of their absence or presence and some are elaborated in terms of their qualitative attributes. Their approach is more detailed highlighting major usability issues.

We have come across several usability evaluations which are carried out using the heuristics. Ficarra [4] has performed a heuristic evaluation of multimedia products based on Nielsen's heuristics. Also, the author has defined grouped components of heuristic evaluation attributes: consistency, predictability, metaphors, transparency, typography and/or accessibility. Conte et al. [2] have proposed usability evaluation for web design based on web design perspectives and Nielsen's heuristics. Their work considers four major web design perspectives based on concept, presentation, navigation and structure in heuristic evaluation. Kurosu et al. [8] have developed structured heuristic evaluation, where each usability session is divided into sub-sessions, with each sub-session focusing on one of the usability aspects. The division of sub-sessions or categorization should be within the valid limitation of the evaluator's working memory i. e. seven plus or minus two. Zhang et al. [20] have stated 14 heuristics based on the ten heuristics by Nielsen and eight golden rules by Shneiderman called as Nielsen - Shneiderman heuristics for evaluation of patient safety of medical devices. Allen et al. [1] have used Nielsen-Shneiderman heuristics for evaluation of paper-based web pages. They have taken three members to review and validate these heuristics. A set of heuristics that was agreed on by all three members, is used in the subsequent evaluation process.

## **3. METHODOLOGY**

### **3.1 Online Documents**

Three online documents of different types were selected for formation and evaluation of heuristics. Online documentation is of two types - online tutorial and online help. Therefore, for further study, three online documents – [www.w3schools.com](http://www.w3schools.com) (tutorial), online HP help (<http://www.hp.com/#Support>) and help of Microsoft Office 2007 / Microsoft Windows Vista were selected. As online help is most widely used online documentation, its two examples were considered in the study. For a validation of proposed heuristics, two more documents were selected. One is an online tutorial of – Sun Developer Network's (SDN) Java Developer Tutorial [24] and other is an online help of eBay [25] – a popular online shopping mall.

### **3.2 Usability Heuristics and Indicators**

Usability evaluation is done by various methods such as cognitive walkthrough, formal usability inspection, heuristic evaluation or pluralistic walkthrough [15]. For usability evaluation of online documentation, a heuristic evaluation method was selected. The usability problems and design deficiencies commonly prevalent among all three online documents were identified. A

comprehensive list of relevant problems and observations, which contribute to usability of online documentation, was prepared. The items in this list were sorted into seven groups by using card-sorting method [16]. All the authors along with one more usability evaluator actively participated in card-sorting. The relevant heuristics were prepared based on the items in these seven groups and observations made during the study of three online documents. These seven grouped components are elaborated in next section - Introduction to heuristics. The qualitative usability indicators [7] were identified to measure the compliance. Instead of applying the 1-5 Likert scale [9] uniformly across all parameters, we have chosen an indicator based evaluation method. Some heuristic indicators are checked in term of their absence or presence and some are elaborated in terms of their qualitative attributes. Each indicator is rated mostly between 0 and 1 and rarely extended to 2.

### **3.3 Usability Evaluation**

In the process of usability evaluation, the values of usability indicators for all related heuristics were added and a resultant number is converted into a usability index based on a scale of 100. The heuristic evaluation has been also performed to validate the study of heuristics with online documentation using three usability experts. They evaluated two more online documents - online tutorial of Sun Developer Network's (SDN) Java Developer Tutorial and online help of eBay using formulated heuristics to ensure reliability.

### **3.4 Color Coding**

Color coding is used in figures ahead (from Fig. 1 to Fig. 8) for differentiation among usability features. The positive features in online documents are highlighted with enclosure in rectangles using green color whereas negative features are in rectangles using red.

### **3.5 Implementation of a Tool**

A tool is implemented for heuristic evaluation of online documentation. The tool provides user interface for evaluation. The usability indicators are checked by usability evaluator in terms of their presence or absence and some are elaborated by their attributes. The graphical result is provided to the evaluator with the usability index of each usability component. The comparison of various evaluators' result is also provided using graphs.

## **4. INTRODUCTION TO HEURISTICS**

The following are the heuristics for evaluation of online documentation. These are evolved during the study of usability issues and design deficiencies in various online documents.

### **4.1 Accessibility**

The online documentation should be easily accessible. The Microsoft Office 2007 provides a separate login for each user. The help facility is provided in local Indian language – Hindi as shown in Fig. 1 [7]. But, the audio support is available for users in English only, if required. This facility can be extremely important for all blind users. Microsoft Office 2007 does not support this facility for other languages; especially many languages in India. So, there is a need to extend it to many other spoken languages. All these accessibility options are shown in Fig. 1. The Fig. 2 consists of two examples of date format [7]. One date is in English and another is in Hindi. This is an excellent culture-specific practice followed in online documentation.

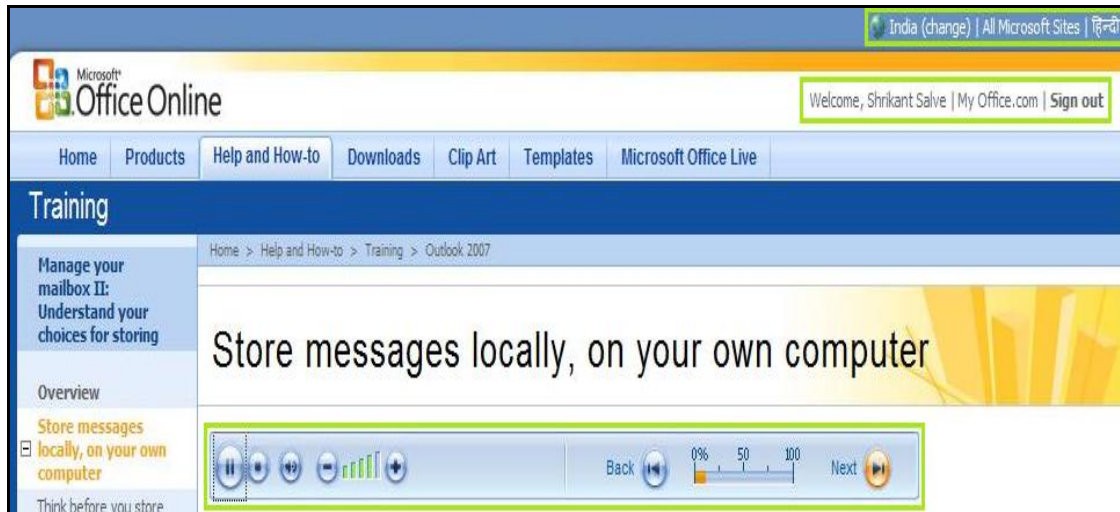


Fig. 1. Sample screen shot of accessibility in online help - Microsoft Office 2007

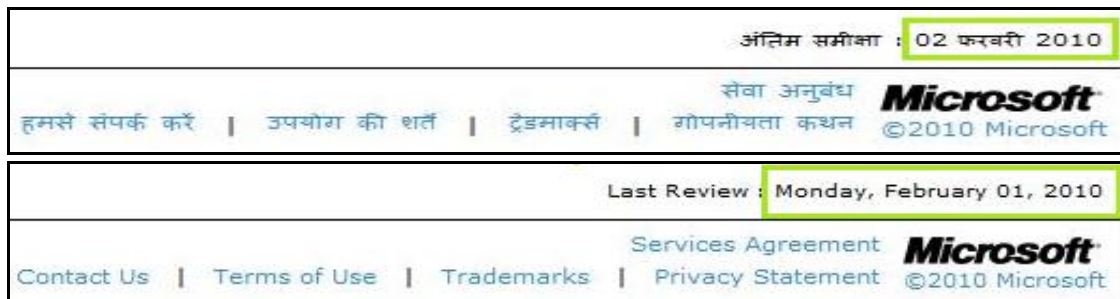


Fig. 2. Sample screen shots of date format in online help - Microsoft Office 2007

The list of heuristics evaluating the accessibility of online documentation is enlisted in Table 1.

Table 1. Heuristics for evaluation of online documentation for accessibility

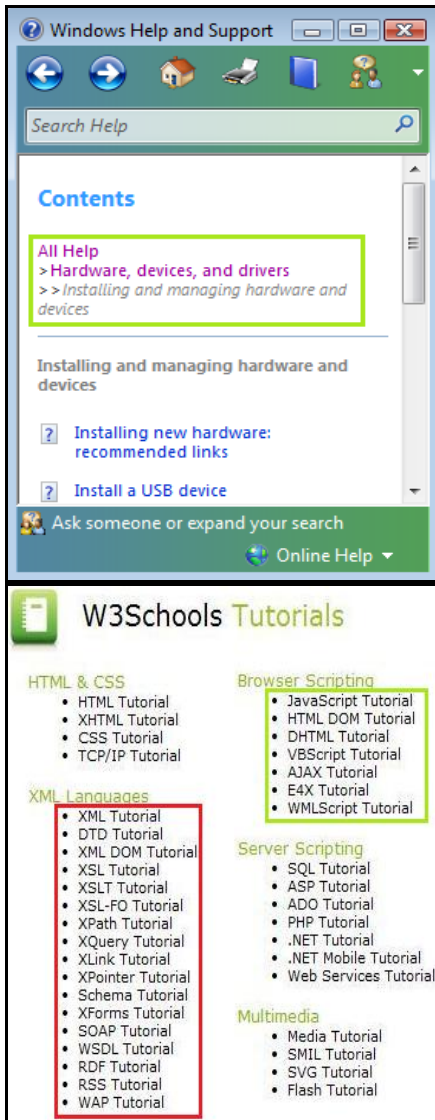
Accessibility		
<b>Access</b>		
H1	Provide a login and password.	Provided (1) Not provided (0)
H2	Make it available for free	Available for free (1) Not available (0)
H3	Provide hypertext / hyperlink for data abstraction	Provided (1) Not provided (0)
<b>Language Support</b>		
H4	Support local language	Supports (1) Does not support (0)
<b>Software Support</b>		
H5	Require installation of additional software product / component	Not required (1) Required, but facility provided for download (1) Required (0)
<b>Universal Access</b>		
H6	Support easy access to users who do not have highly configured computing facilities	Supports (1) Does not support (0)

H7	Support easy access to specialized users	Color-blind users (1) Blind users (1) Acoustically handicapped users (1) Older users (1) Left-handed users (1) None (0)
<b>Culture Specific Preferences</b>		
H8	Provide the choice for date format (dd/mm/yyyy or mm/dd/yyyy)	Provided (1) Not provided (0)
H9	Provide the choice for color scheme as per local culture	Provided (1) Not provided (0)
H10	Provide the choice for measurement of units for parameters	Provided (1) Not provided (0)
<b>Accelerators</b>		
H11	Provide shortcuts for expert users	Provided (1) Not provided (0)

## 4.2 Organization and Navigation

As shown in Fig. 3 (a), the map can help a user to identify one's current position in the document [17]. This navigational map informs the user that how one has arrived at a section of the document related with installation of new hardware. There is a recommended practice that user should organize information in chunks of seven plus or minus two [3, 11]. Fig. 3 (b) provides an example highlighting chunking provided in online tutorial -

www.w3school.com. The first chunk has seventeen elements and it violates the Miller's principle; whereas the second chunk has seven elements which is a perfect example of chunking.



**Fig. 3. Sample screen shots of a) map in online Microsoft Windows Vista help b) chunking in online tutorial**

Table 2 elaborates the list of heuristics evaluating the organization and navigation of online documentation.

**Table 2. Heuristics for evaluation of online documentation for organization and navigation**

Organization and Navigation		
Organization		
H12	Organize the content with suitable hierarchical representation	Organized (1) Not organized (0)
H13	Use tables and charts for representation of information	Tables used (1) Charts used (1) Not used (0)
H14	Use abbreviation only after providing full form initially	Followed (1) Not followed (0)

H15	Provide navigation to explore document through	Jumping (1) Traversing (1) Opening (1) Paging (1) Scrolling (1) Not provided (0)
H16	User knows that one is at the end of series of screens	Knows (1) Does not know (0)
<b>Maps</b>		
H17	Provide a map for exploring various paths or selection of options available	Provided (1) Not provided (0)
<b>Level of Explanation</b>		
H18	Provide different levels of explanation	Provided (1) Not provided (0)
<b>Chunking</b>		
H19	Follow the rule - seven plus minus two for chunk sizes	Completely followed (2) Partially followed (1) Doesn't followed (0)
<b>Minimalist Design</b>		
H20	Use several screens for displaying complex information	Used (1) Not used (0)

### 4.3 Control, Errors and Feedback

The features like emergency exit, redo and undo improve the user control with the online documentation. The errors and mistakes should be highlighted by proper messages as well as feedback. Also, the user should be able to backtrack from mistakes or undesirable states while using the online documentation [17]. The list of heuristics evaluating the accessibility of online documentation is elaborated in Table 3.

**Table 3. Heuristics for evaluation of online documentation for control, error and feedback**

Control, Errors & Feedback		
User-control		
H21	Provide emergency exit	Provided (1) Not provided (0)
H22	Support for undo and redo	Supports undo (1) Supports redo (1) Does not support (0)
Reversibility and Error Recovery		
H23	Allow user back-track from mistakes	Allowed (1) Does not allowed (0)
Feedback		
H24	Provide meaningful system messages	Provided (1) Not provided (0)
H25	Provide meaningful error messages	Provided (1) Not provided (0)

### 4.4 Textual Aspects

Headings are concise descriptions of the content that they precede. Generally, the extremities like two-word or ten-word heading is least useful to users. The heading should be between concision and verbosity [17]. The heading provided in online HP help as depicted in Fig. 4 is definitely too long and not concise. Fig. 5 shows the text size adjustment option provided with Microsoft Windows Vista help. The facility of text size adjustment can help older users to increase the text size as per their requirement while exploring the help. Even other users can utilize this facility while exploring Microsoft Windows Vista help in relaxed mood or studying it from a distance.

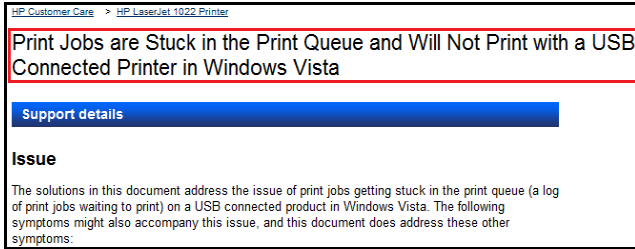


Fig. 4. Sample screen shot of unstructured heading of online HP help



Fig. 5. Sample screen shot of text size adjustment in online Microsoft Windows Vista help

Table 4 shows the list of heuristics evaluating the textual aspects of online documentation.

Table 4. Heuristics for evaluation of online documentation for textual aspects

Textual Aspects		
<b>Typographical Legibility</b>		
H26	Provide appropriate alignment of text	Aligned (1) Not aligned (0)
H27	Provide justified text	Justified (1) Not justified (0)
H28	Provide case-sensitive (upper case/lower case) text	Provided (1) Not provided (0)
H29	Keep text size adjustable	Adjustable (1) Not adjustable (0)
<b>Structured Heading</b>		
H30	Provide structured headings	Provided (1) Not provided (0)
H31	Provide concise and appropriate headings	Concise (1) Appropriate (1) Not concise and / or appropriate (0)
<b>Landmarks</b>		
H32	Provide landmarks to direct the reader through content	Italic (1) Bold (1) Underlined (1) Colored text (1) Capital letters (1) Not provided (0)
<b>Readability</b>		
H33	Provide a readable text	Easily readable (2) Readable (1) Hard to read (0)

## 4.5 Visual Aspects

Well-established metaphors [14] help users to identify various options and facilities provided with online documentation. Fig. 6 (a) shows a visual metaphor of a scissor, as a “cut and paste” is an important operation while trying out a sample code or an example in the process of learning web building tools. In Fig. 6 (b), the option - “Software & Driver Download” is represented by a metaphor - Compact Disk (CD) and the next option - “Solve a Problem” is represented by a puzzle metaphor.



Fig. 6. Sample screen shots of metaphors in online documentation a) online tutorial b) online HP help

The lists and bullets provide ways to relate large or complicated bodies of information. Bulleted list should be used for items at the same conceptual level in which ordering is unimportant, while numbered lists should be used when ordering is critical. In Fig. 7 (a), the “HTML & CSS References” are followed by bulleted list containing relevant references. This list also follows seven plus minus two rule. Iconic markers are visual items that highlight important elements such as warnings or cautions [17]. Fig. 7 (b) shows an iconic marker providing an alert to the user about authorized peripheral service providers of HP.

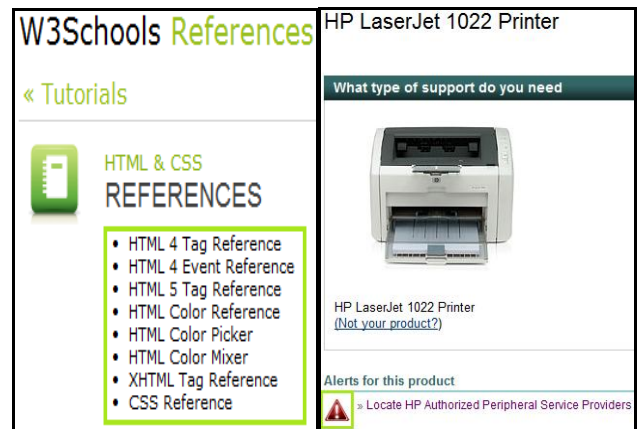


Fig. 7. Sample screen shots of a) bullets in online tutorial b) iconic marker in online HP help

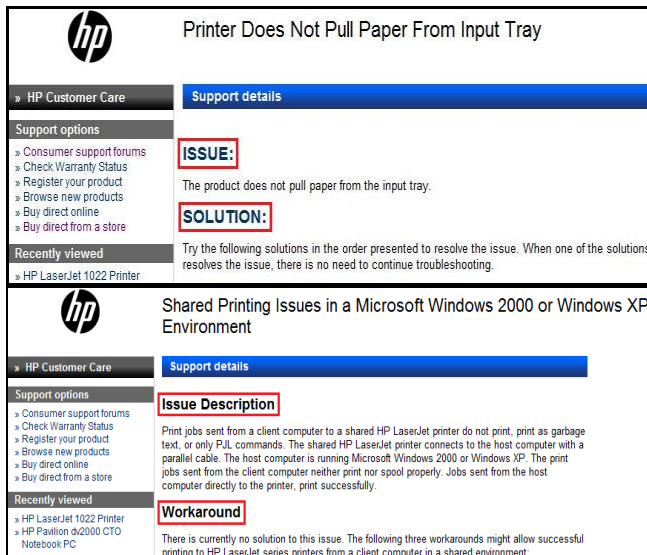
The list of heuristics evaluating the visual aspects of online documentation is elaborated in Table 5.

**Table 5. Heuristics for evaluation of online documentation for visual aspects**

Visual Aspects		
<b>Visual Aesthetics</b>		
H34	Present the information in colored format	Presented (1) Not presented (0)
H35	Include the pictures or graphics (screenshots)	Included (1) Not included (0)
<b>Metaphors</b>		
H36	Use visual metaphors for presentation	Provided (1) Not provided (0)
<b>Bulleting and Lists</b>		
H37	Provide lists and bullets to represent information	Lists (1) Bullets (1) Not provided (0)
<b>Iconic Markers</b>		
H38	Provide Iconic markers	Provided (1) Not provided (0)
<b>Discourse Cues</b>		
H39	Provide suitable discourse cues	Bookmarks (1) Indexes (1) Table of contents (1) Header (1) Footer (1) Visual indicate (1) Related topic link (1) Not provided (0)
<b>Negative Spaces</b>		
H40	Provide adequate negative spaces	Fully provided (2) Partially provided (1) Not provided (0)

## 4.6 Consistency

The online documentation should be consistent from one screen to another and across the various features [17] such as text-boxes, headings, control buttons, menu-item names, dialog boxes etc. Fig. 8 shows the inconsistency in online HP help. As shown screen shot 1, the subheading – ‘ISSUE’ is in color and in capital letters. Similar subheading – ‘Issue Description’ is in title case and in black color as shown in Fig. 8 screen shot 2.



**Fig. 8. Sample screen shot 1 and 2 of inconsistency in online HP help**

Table 6 elaborates the list of heuristics evaluating the consistency of online documentation.

**Table 6. Heuristics for evaluation of online documentation for consistency**

Consistency		
H41	Provide headings at same appropriate level and position	Provided (1) Not provided (0)
H42	Follow the uniform navigation pattern throughout the documentation	Followed (1) Not followed (0)
H43	Provide various features on the screen consistently occupying the same location	Text-boxes (1) Headings (1) Control buttons (1) Menu-item names (1) Dialog boxes (1) Not provided (0)
H44	Provide consistent spacing between paragraphs	Consistent (1) Not consistent (0)
H45	Provide tool tip and balloon help	Tool tip provided (1) Balloon help provided (1) Not provided (0)

## 4.7 Common Facilities

Annotation means the explanatory note [6]. User should be able to add explanatory note in the online document whenever desired. It may reduce the memory load. The common facilities may also contain context sensitivity, printer option or search. The list of heuristics evaluating the common facilities of online documentation is elaborated in Table 7.

**Table 7. Heuristics for evaluation of online documentation for common facilities**

Common Facilities		
<b>Annotation</b>		
H46	Annotate (explanatory note) information easily	Annotate (1) Does not annotate (0)
<b>Support-on-support</b>		
H47	Require any cascading effect (help on help) in support information	Not required (1) Required (0)
H48	Provide simple and elegant support	Simple (1) Elegant (1) Difficult (0)
<b>Dynamic Help / Context-sensitivity</b>		
H49	Observe context-sensitivity	Completely observed (2) Sometimes observed (1) Not observed (0)
<b>Printer Option</b>		
H50	Provide printing option	Printable format (2) PDF format (2) As it is (1) Not provided (0)
<b>Search</b>		
H51	Provide search option	Advanced (1) Simple (1) Not provided (0)

## 5. EVALUATION OF ONLINE DOCUMENTS

We have evaluated the usability of online documents using the heuristics and usability indicators with following objectives:

1. Measure the usability and overall efficacy of online documents in terms of usability index.

- Study the reliability of the heuristics by involving three more usability evaluators to carry out the evaluation of additional two online documents.

This heuristic evaluation was carried out by 4 Usability Evaluators (UE). In this, UE1 are the authors of this paper who have formulated the heuristic guidelines. UE2, UE3 and UE4 are other usability evaluators who used our heuristic evaluation method for evaluating the additional 2 Online Documents (OD) – OD1 and OD2. OD1 is online tutorial of SDN Java Developer Tutorial ([http://java.sun.com/developer/online Training/index.jsp](http://java.sun.com/developer/online%20Training/index.jsp)) [24] and OD2 is online help of a popular online shopping mall - eBay (<http://pages.ebay.com/help/index.html>) [25].

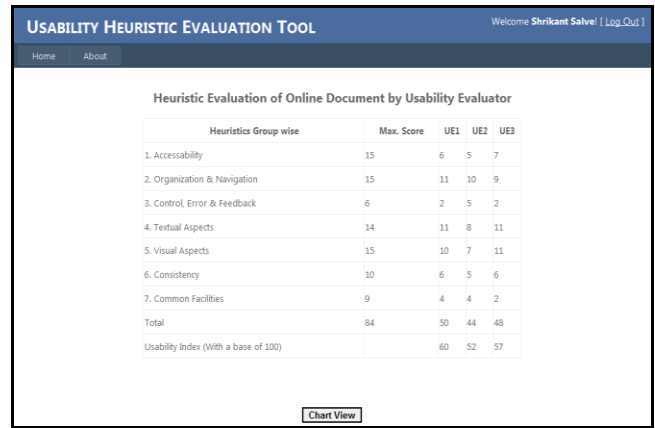
We ensured that the usability evaluators had adequate understanding of Human Computer Interaction (HCI). They were sensitized about the proposed heuristics, fundamentals about documentation and the usability evaluation of online documents. Their queries about the heuristics and related evaluation were discussed and then, they carried out individually the heuristic evaluation of the online documents provided to them. The total scores of usability evaluations by all four usability evaluators are consolidated in Table 8.

**Table 8. Heuristic evaluation of two online documents by four different usability evaluators**

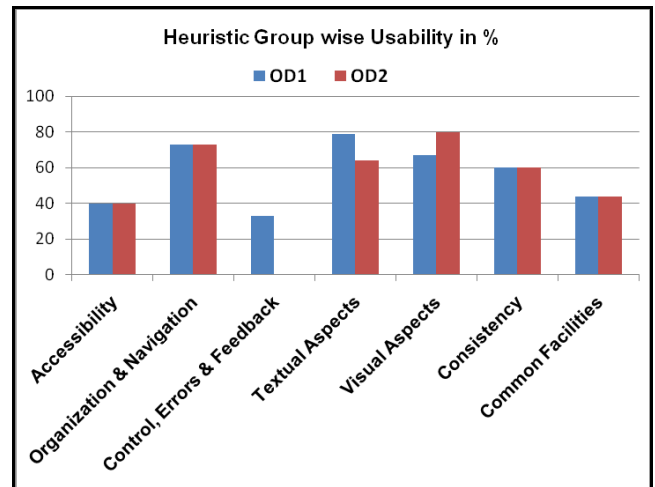
	Max. Score	Usability Evaluators	Scores for Online Documentation	
			OD1	OD2
1. Accessibility	15	UE1	06	06
		UE2	05	05
		UE3	07	06
		UE4	05	06
2. Organization and Navigation	15	UE1	11	11
		UE2	10	12
		UE3	09	12
		UE4	11	12
3. Control, Errors & Feedback	06	UE1	02	00
		UE2	05	05
		UE3	02	02
		UE4	03	03
4. Textual Aspects	14	UE1	11	09
		UE2	08	07
		UE3	11	08
		UE4	09	08
5. Visual Aspects	15	UE1	10	12
		UE2	07	10
		UE3	11	10
		UE4	13	12
6. Consistency	10	UE1	06	06
		UE2	05	06
		UE3	06	05
		UE4	05	07
7. Common Facilities	09	UE1	04	04
		UE2	04	05
		UE3	02	03
		UE4	06	06
<b>Total</b>	<b>84</b>	<b>UE1</b>	<b>50</b>	<b>48</b>
		UE2	44	50
		UE3	48	46
		UE4	52	54
<b>Usability Index (With a base of 100)</b>		UE1	60	57
		UE2	52	60
		UE3	57	55
		UE4	62	64

## 5.1 Usability Heuristic Evaluation Tool (UHET) for online documentation

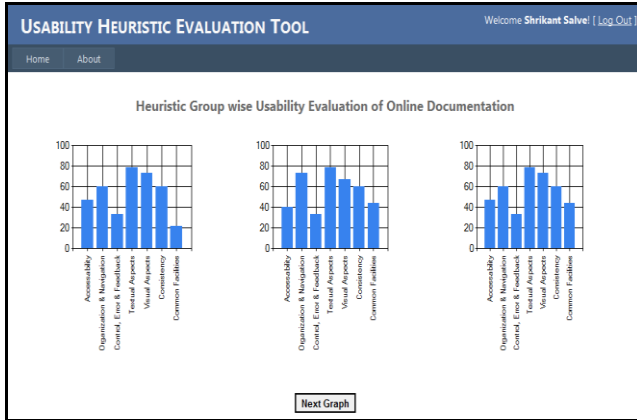
UHET is software tool for heuristic evaluation of online documentation. During the evaluation process, UHET provides the component-wise list of heuristics. The heuristics are then checked in terms of their absence or presence and some are elaborated in terms of their qualitative attributes. Each indicator is rated either 0 or 1 and rarely extended to 2 and the result is stored in the database. Using the answers provided by user, usability index is calculated. The tool also provides analytical graphical output showing the current three evaluators results according to usability components and comparison of their usability indices. Few screen shots of UHET are shown below. Fig. 9 shows the screen shot of UHET showing the heuristic evaluation of online document done by three different usability evaluators.



**Fig. 9. Screen shot of UHET showing the heuristic evaluation of online document by three different usability evaluators**



**Fig. 10. Heuristic component-wise usability of two online documents as per the evaluation of UE1**

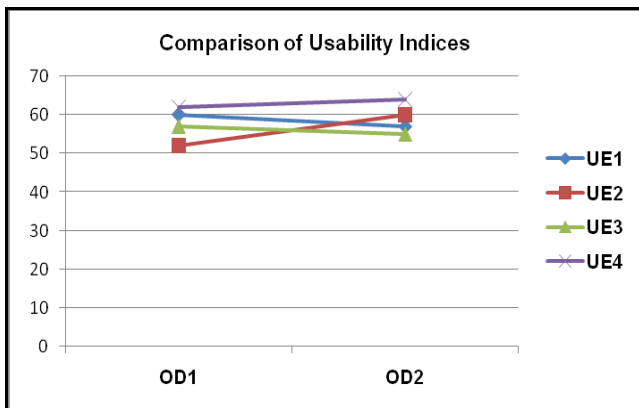


**Fig. 11. Screen shot of UHET showing heuristic component-wise usability of online document as per the evaluation of three different usability evaluators**

Fig. 10 depicts a graph representing heuristic component-wise usability of two online documents as per the evaluation of UE1. This graph can help the user in heuristic component-wise comparison of two documents under consideration. Fig. 11 shows the screen shot of UHET showing heuristic component-wise usability of online document as per the evaluation of three evaluators - UE1, UE2 & UE3.

## 6. VALIDATION OF USABILITY HEURISTICS

The Fig. 12 shows a graph for a comparison of usability evaluation of two online documents under evaluation by four usability evaluators (UE1, 2, 3 and 4). The usability evaluation by other usability evaluators – UE2, UE3 and UE4 differs from UE1 by 3.00 % for OD1 and 2.66 % for OD2. The evaluation by UE4 is significantly different than the other usability evaluators because his interpretation of some heuristics (H39, H46 and H49) is slightly different than expected. On an average, the evaluation of other usability evaluators has differed by 2.83% (addition of all % / 2) which is not significant if compared with the results of Nielsen’s heuristics [14,6, 2].



**Fig. 12. Comparison of usability evaluation of online documents by four evaluators (UE1, 2,3 & 4)**

## 7. CONCLUSION

A study of various online documents and the outcomes of their heuristic evaluation using usability indicators show that there are many usability issues as well as design deficiencies, which needs

to be addressed. The specialized set of heuristics categorized into relevant grouped components and the objectively defined usability indicators are helpful in identifying specific usability problems in online documentation. A heuristic evaluation must identify specific usability problems in order to ensure better accessibility, error handling and consistency among online documents to make them user-friendly and more humanized. This process helps in better understanding and usage of online documents by maximum possible users including disabled users. The reliability of our approach in terms of reduced subjectivity and objective definition of heuristics, usability indicators and usability index specifically designed for online documentation is much higher. We would like to collaborate with the web designers and technical writers to propose an improved design patterns for online documentation.

## 8. ACKNOWLEDGEMENT

We are thankful to the designers and vendors of online documents, which are used in usability evaluation process based on heuristics and related quality indicators during this research work. We appreciate the support extended by Dr. Shekhar Karmarkar, Ms. Swati Abhang and Mr. Sachin Jamdade in heuristic evaluation and validation process. We thank Mr. Alkesh Chalke for his participation in implementation of card sorting technique for categorization of usability issues of online documentation. We are also grateful to Prof. Priyadarshan Dhabe, Prof. N. Z. Tarapore and Prof. M. L. Dhore at Department of Computer Engineering for their continuous encouragement to research activities like ours.

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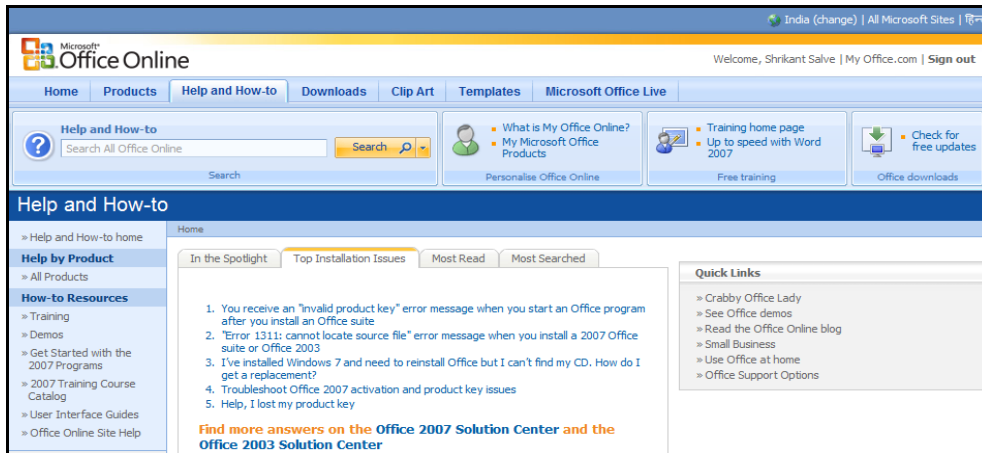


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## APPENDIX: Screenshots of Online Documentation evaluated



Fig. A. Example of an online tutorial – [www.w3schools.com](http://www.w3schools.com)



**Fig. B. Example of an online help – Microsoft Office 2007**