

# Gender Issues in Systems Design and User Satisfaction for e-Testing Software

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## **Abstract**

*Few researchers have investigated user satisfaction issues for web design, and the effect of gender on the context of end-user e-testing software, which normally consists of a website used as a medium of student evaluation in IT skills and language use when applying for places in post-compulsory education. Designers' ignorance of gender differences is particularly evident in studies suggesting that software is not deliberately designed for males (Huff, 2002). The notion designing for a particular gender involves the act of building the whole interface bearing in mind some particular facts and factors which are only valid for one gender, with the belief that it covers both genders. This paper closely investigates to what extent does the established recommendations for the website design elements satisfied both genders.*

## **Keywords:**

*Usability, web interface elements, user satisfactions, gender.*

## **Introduction**

The one size fits all approach often used in web site design methodology, even in the researchers' recommendations for website design, and there are no particular recommendations to accommodate each gender. We believe that satisfaction e-testing software, used for student evaluation, varies according to gender, and that the suggested recommendations could be better implemented if the effect of user gender on end user satisfaction is considered. This research could enable female students to better support women applying for testing through an e-testing medium, thereby increasing the potential of women in education. According to (Kendall , 1996) replacing one gender by another only exacerbates existing gender stereotypes, while doing nothing to change individuals' expectations regarding gender as a social construct. Indeed, considering the patriarchal foundations through which the Internet has evolved (Greber, 1990) in addition to the dominant masculine sub-culture embodying the Internet (Edwards, 1990) this research focuses on establishing and clarifying the real gender requirements for design rather than a stereotyped ideas.

We have also been investigating whether doing so is necessary, because evidence from other domains, such as psychology and marketing, strongly suggests that females process information and solve problems in very different ways from males (Beckwith, Burnett, 2004). Without taking these differences into account in the design of e-testing software, the needs of half the population, for whom the software is intended, are potentially being ignored. In fact, some research has shown that software is unintentionally designed for males (Huff, 2002).

End-user satisfaction can be described as the overall affective evaluation of an end-user, regarding their experience related with the information system (Garrity and Sanders, 1998). The term experience can be made more specific to focus upon different aspects related to the information system (e.g., computing, training, etc.). In general, past studies have focused primarily on the satisfaction measurement of the computing/use aspect of a system, without taking into consideration the design effect on user satisfaction or differences such as gender on user satisfaction. But it may well be satisfaction with activities other than system use (e.g., training, participation or involvement in development or selection) that may also be of value in predicting subsequent behaviour (e.g. utilization) or performance. A global measure of the end-user computing experience may equally be of value. What we intend to explore is whether the user satisfaction of e-testing software depends on gender.

Using quantitative empirical methods we are evaluating gender related user satisfaction of webpage design software, particularly use of gender-aware design features. We are investigating the gender effect on e-testing software, (software built to use the intranet in the university to evaluate students in selected topics to study), issues in user satisfaction of webpage design, in order to determine gender affect on user satisfaction and how satisfaction varies according to gender, and to consider gender aware design features. The research is ongoing, the first stage of which involved collecting data from participants through a survey, now completed. The second stage would be to analyse the collected data and come up with new more customized recommendations and apply it to a new design for the e-testing system, while the final stage would be to measure again user satisfaction on the newly design e-testing to validate the findings of this research's first stage findings .

### ***Website Interface Elements***

In this research we are trying to discover if a one size fits all approach is suitable for users with different gender and different experience level using the internet. According to Nielsen (2000) there are four main categories which form any webpage. Firstly, the Text elements which is mainly the group of letters and words in the webpage which form the page and its properties. Secondly, Link elements which deal with the parts of webpage that facilitate the navigation wither text or graphs. Also the Graphical elements, i.e. the pictures, images or the text saved as pictures or image as well as the animation in the webpage. Finally, the Page formatting elements. Also each category of the four mentioned can be divided as following:

Text elements: Page Text: we mean by it the text inside the web page which includes the continent and information. According to landesman and Schroeder (2000) Page with more continents is preferred by user than continent over multiple pages. Also Nieleesn (2000) mention recommendations for these part of the webpage that webpage should include short text almost 50% less than printed publications. While Flanders and Willis (1998) recommended to break text up into smaller units on multiple pages.

Page title: the page title is the word or group of words as the header of the page, which identify the page and its continent. According to Berners-Lee, (1995) it must be less than 64 characters. While according to Flanders and willis (1998) 2-6 words or 40-60 characters. Also Nielsen (2000) highlighted that there should be a different page title for each page.

Page abstract: which is the part of webpage includes in the coding that facilitate the search option and the indexing of page in the different search engine. Although Meta tags are not a visible feature in the web page it helps locate information when searching. Nielsen (2000) recommended using Meta tags with 150-200 characters. Body text: This is the text in the webpage that included the data and information, the continent of the webpage. According to Nieleesn, (1997) and Schriver (1997) the body text affect user ability to read and scan the web page. Also Nieleesn (1997) mentioned that the use of heading and subheadings meaningfully helped users to locate specific information.

Link text: the words and characters that used as a hotspot for user to click on them to move to other page or another website according to Nielsen (2000) link text should be between 2-4 words. While, Sawyer and Schroeder (2000) recommended that link text should be between 7-12 useful words. Content percentage: according to Nielsen (2000) 50-80% of web page should be used for content. Navigation percentage: Nielsen (2000) suggested that 20% of the web page should be used for navigations, with higher percentage for homepage and intermediate pages.. Readability GFI: according to Nielsen (2000) the gunning fog index is the only suitable readability measurement tools. Spool et al. (1999) indicate that GFI of 7-8 for 7th or 8th grade education. While GFI > 15.3. For college education to read them. Spool et al. (1999) indicated the equation for measuring the GFI. " $GFI = ( fog\ word\ count / fog\ sentence\ count ) + ( fog\ big\ word\ count / fog\ word\ count ) * 0.4$  fog word: number of words, fog big words: number of word with more than 2 syllables, fog sentence: number of sentence".

Information quality: Rosenfeld and Morville (1998) recommended that website should Support easy first time use by logical grouping. Also Flanders and Willis (1998) and Nielsen (2000) indicated that the contents should be updated often.

Link elements: Links: according to Larson and Czerwinski (1998) links should Use moderate level of space with minimal depth in the architecture of information. Also Zaphiris and Mtei (1997) indicated to the use of minimize depth. While (Spool et al. (1999) says that the large number of links slow down navigations. Also Flanders and Willis (1998) says that the webpage developers or the maintenance personal should make sure there are no broken links. Text Links: Flanders and Willis (1998), Sawyer and Schroeder (2000) and Spool *et al.* (1999) says that text links consider the most important type of links. Also they highlighted that Text rather than image links should be used. (Flanders and Willis, 1998) (Spool *et al.* 1999), link graphics: Scanlon and Schroeder (2000) and Spool *et al.* (1999) indicated that webpage developers should avoid using graphical text links because they may ignore or hold up the navigation process. Also Flanders and Willis (1998) says that navigation should use corresponding text links. Within page link: Nielsen (2000), Sawyer and Schroeder (2000) and Spool *et al.* (1999) says that the use of link to another area of page has been found problematic.

Also Nielsen (2000), Sawyer and Schroeder (2000) and Spool *et al.* (1999) point out that within page link should be avoided cause it's confusing. External links: Nielsen (2000) and Spool *et al.* (1999) reveal that the use of External links can be problematic since user may not be aware that he/she left the website to another one. Another study of nineteen user reading indicated that link to outside website increase the credibility. Also Nielsen (2000) suggests using different colours for external links and informing users that they are leaving the website. Embedded links: according to Rosenfeld and Morville, (1998) and Spool *et al.* (1999). Developers should avoid surrounding links with text because it's difficult to scan. Redundant links: the multiple links to same place confessed cyber shopping malls according to Kim and Yoo (2000), while Spool *et al.* (1999) recommended using it only within appropriate way in each area. Sawyer and Schroeder (2000) recommended the use different forms for repeated links (text, graphical text or image). Navigation quality: Spool et al. (1999) recommended using clear heading with related links.

While Sawyer *et al.* (2000) expose multiple levels of information architecture (clustering link with headings). Also Furnas (1997) stated that the use of small pages for effective navigations and few clicks between pages. Miller and Remington (2000) says that Ambiguous link text obstructs navigation, and Spool *et al.* (1999) says that similar link text across links makes navigation difficult. Avoid shell strategy. While Spool *et al.* (1999) recommended the use of navigation bars on top and bottom of pages other than using down the side. Fleming (1998) says its better to Support multiple modes of finding information (direct searching and browsing). While Nielsen (2000) highlighted to avoid use of the phrase "click here". Fleming (1998) adds into this point by saying that Navigation scheme must be easy to use and learn as well as relevant to the site type.

Graphic elements: the over all recommendation for almost all the researchers who conducted research recommended to avoid the use of graphics, images or animation unless it really add something to the functionality of the website or to the navigation process ,but in all circumstances avoided the large size images or graphics. Graphics: Flanders and Willis (1998) recommended to avoid using large graphics.

Page Formatting Measures: Colour Combinations: The quality of colour combinations used on computer screens, in a Webpage in particular, has also been discussed in the literature of Flanders and Willis (1998), Murch (1985) and Nielsen (2000) they stated a Specific guidance that the Use of colour combinations determined to be good (i.e., high contrast) via research studies. Also Flanders and Willis (1998) recommended to avoid using black backgrounds and to Use high contrast between background and text.. Fonts: according to Schriver (1997) a font is a combination of four features: a font face, a font size, whether text is bolded, and whether text is

italicized. Several sources discuss fonts like Nielsen (2000), Schriver (1997) and Stein (1997) they suggests that Web designers use no more than tow fonts and possibly one for special text.

Line length: The width of text lines on the page is discussed in the literature (Flanders and Willis 1998; Schriver 1997) they specific guidance includes the following. Firstly, keep line lengths to 40-60 characters (Schriver, 1997). Secondly, keep text between 9 to 15 words per line (Flanders and Willis, 1998). Leading: spacing between uninterrupted text lines on a page is more of a concern for print documents than Web documents, since Web page typically use consistent spacing as dictated by browsers. Style sheet parameters can also control leading. (Schriver, 1997) suggests that leading be 120% of the font face's point size and even larger between paragraphs. Given that leading is mainly controlled by the browser.

Framesets: according to (Flanders and Willis 1998; Nielsen 2000; Stein 1997) the Use of framesets is an often debated topic in Web design literature, since they typically confuse users. However, the Specific guidance regarding this point was to a void using framesets according to Nielsen (2000) and to use tables instead of framesets (Flanders and Willis 1998)., Interactive Elements: Use of buttons, text boxes, pull-down menus, and other interactive elements has been discussed extensively in the literature by (Flanders and Willis 1998; Rosenfeld and Morville 1998; Sawyer and Schroeder 2000; Scanlon and Schroeder 2000b; Spool et al. 1999) .there Specific guidance on interactive elements includes the following. A void used mouseovers and pull-down menus for navigation (Rosenfeld and Morville 1998; Sawyer and Schroeder 2000). Support search; users use search half of the time (Scanlon and Schroeder 2000b). Make the scope and results of searching clear (Spool et al. 1999).Do not use form buttons as links (i.e., overuse buttons) (Flanders and Willis 1998). Screen Size: Much guidance is provided in the literature on the width and height of Web interfaces by (Flanders and Willis 1998; Nielsen 2000; Sano 1996; Sawyer et al. 2000). Which include the following., Limit horizontal width to 572 pixels or less (Sano ,1996) Restrict page width and height to 595 x 295 pixels (Flanders and Willis 1998) Restrict page width to less than 600 pixels (Nielsen 2000). Longer pages are better; use 800 x 600 pixels; and avoid horizontal scrolling (Sawyer et al. 2000).

Screen Coverage: The total screen area covered (i.e., non white space) is also discussed in the literature (Sawyer et al. 2000; Spool *et al.* 1999) The harmony is that the Webpage designers minimize white space on the page (Sawyer et al. 2000; Spool *et al.* 1999).. Text density: The screen area covered by text is discussed in the literature (Sawyer et al. 2000; Schriver 1997; Spool *et al.* 1999) there specific guidance includes the following. Text should cover no more than 25-30% of the screen area (Schriver 1997).Greater text density facilitates page scanning (Sawyer *et al.* 2000; Spool et al. 1999).

Scrolling: Vertical and horizontal scrolling is discussed deeply in the literature (Flanders and Willis 1998; Nielsen 2000; Spool et al. 1999) specific guidance the following. Minimize scrolling (Spool *et al.* 1999). Minimize vertical scrolling to 2 screens (Flanders and Willis 1998).Users should not be required to scroll (Nielsen 2000). Style sheets: Use of style sheets to control page layout has been discussed in the literature of Flanders and Willis (1998) also by Nielsen (2000) and specific recommendations include the following. Use style sheets to enforce consistency (Flanders and Willis 1998; Nielsen 2000). Use external rather then embedded style sheets (Nielsen 2000).

Layout Quality: All of the measures discussed in this section provide some insight about some aspects of layout quality. Other high-level aspects discussed in the literature include: webpage appearance, alignment, balance, and the presence of distractions (e.g. popup windows or spawning browser windows) (Flanders and Willis 1998; Nielsen 2000; Sano 1996; Scanlon and Schroeder 2000a; Schriver 1997). They suggested that Web designers minimize distractions (e.g., spawning browser windows) (Scanlon and Schroeder 2000). Page Function: Another aspect of page formatting is the primary function of Web pages (i.e., whether pages are primarily for content or link), which needs to be considered during design (Flanders and Willis 1998; Sano 1996; Stein 1997).The first metric study showed that considering page function (home vs. other

pages) leads to more accurate predictions. Although several studies have focused on automatically predicting the type of a site (e.g., commercial or academic) (Bauer and Scharl 2000; Hoffman et al. 1995; Karlgren ,2000) surveyed over 600 Web users to determine a set of eleven types of websites (e.g., home pages, searchable indices, journalistic, report, FAQs, and others) and used 40 linguistic (e.g., number of adverbs, characters, long words, present participles, etc.) and Web (e.g., number of images and links) measures for predicting page type. Karlgren developed a decision tree to generate predictions; however, the author did not report the accuracy of the tree nor provide model details. This work was incorporated into a search interface that clusters search results by genre. Pirolli et al. (1996) present a set of functional categories for Web pages, including home (organizational and personal), index, source index (sub-site home pages), reference, destination (sink pages such as acronym, copyright, and bibliographic reference), and content. Pages can belong to multiple categories in their classification scheme.

***Gender***

Despite some research on gender HCI (Czerwinski, Tan, and Robertson, 2002), to date researchers have not taken into consideration how differences in gender should influence the design of systems, such as e-testing. We have been investigating whether doing so is necessary, because evidence from other domains, such as psychology and marketing, strongly suggests that female's process information and problem solve in very different ways than males do (Beckwith, Burnett, 2004). Without taking these differences into account in the design of e-testing software, the needs of half the population for whom the software is intended are potentially being ignored. In fact, some research has shown that software is unintentionally designed for males (Huff, 2002).

***Study Hypothesis***

1- H<sub>0</sub>: user satisfaction of e-testing software varies depending on user gender.

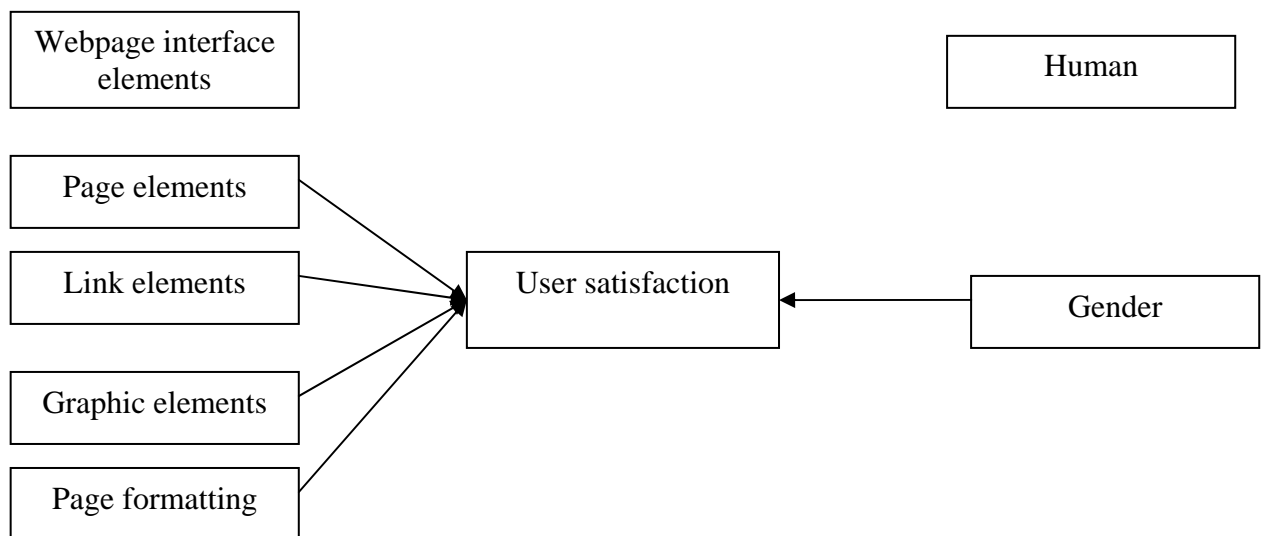
H<sub>a</sub>: user gender has no effect on user satisfaction of e-testing software.

H1.1	H <sub>0</sub> : user satisfaction of Page elements_varies depending on user gender. H <sub>a</sub> : user gender has no effect on user satisfaction of Page elements.
H1.2	H <sub>0</sub> : user satisfaction of link elements_varies depending on user gender. H <sub>a</sub> : user gender has no effect on user satisfaction of link elements.
H1.3	H <sub>0</sub> : user satisfaction of graphic elements_varies depending on user gender. H <sub>a</sub> : user gender has no effect on user satisfaction of graphic elements.

H1.4	H <sub>0</sub> : user satisfaction of Page formatting measures_varies depending on user gender.
	H <sub>a</sub> : user gender has no effect on user satisfaction of Page formatting measures.

**Table 1: sub hypothesis**

**Experiment design**



**Diagram 1**

There are two approaches that the research methodology can be derived from. These two approaches can be classified into two main categories: a positivistic and a phenomenological approach. These two categories are sometimes described by different terms. The positivistic approach can sometimes be labelled as traditional, quantitative, or empiricist. Basically, the positivistic approach is largely based on quantitative data.(Jeffrey A. Gliner 2000) Explaining causality requires the establishment of relationships between variables and linking them to a certain theory. The benefits of positivistic approach are cost effective and speed in data collection, the ease of analysis, apposite for testing hypotheses and determining relations between variables and establishing the reliability and generalisability of data. The phenomenological approach or post positivistic, on the other hand, has emerged as a result of criticism of the application of positivistic approach.

The researcher has adopted the positivistic approach in the first stage of the research due to the following reasons.

1. The issues of validity and reliability are often seriously questioned because of the ‘soft’ nature of the data and the issue of subjectivity in phenomenological related approaches.
2. The need to satisfy the research objectives in terms of factor analysis and testing hypotheses and to verify relationships between the variable and constructs of the study that are not possible in phenomenological related approaches.

(Bowen 2001)

The survey design and analysis which will be adapted as the method that guides the data collection and analysis, aims to establish the existence and importance of the relationships among

the variables of the proposed study. The process of operationalisation and measurement of the model variables and testing the research hypotheses will be based on the proposed research model. This research will use the qualitative approach in the second stage after the module have been statistically proven. A deep look into the open question and comments as well as a focus group will be used and adjusted according to the result of the first stage of the research .

### ***Research Findings and Conclusions***

#### **Statistical Analysis:**

The characteristics of study subjects were described using means, and frequency distribution. Categorical variables were described by frequencies and percentages.

#### **1) Gender**

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
<b>male</b>	<b>84</b>	<b>62.2</b>
<b>female</b>	<b>51</b>	<b>37.8</b>
<b>Total</b>	<b>135</b>	<b>100%</b>

**Table 2: gender percentage**

The above table shows the males are more than males. They were (84) with a (62.2%). females were (51) with a (37.8%) percent.

Arranged by the most important statement to the less, Depending on means

<b>Std. Deviation</b>	<b>Mean</b>	<b>Maximum</b>	<b>Minimum</b>	<b>N</b>	<b>Statement</b>
.721	4.52	5	1	135	Web page formatting - Information quality
.834	4.36	5	1	135	Graphic elements-Graphic quality
.916	4.27	5	1	135	Page Formatting Measures-Style sheets
.686	4.17	5	2	135	Web page formatting -Body text
1.002	4.16	5	1	135	Link elements-Redundant links
1.014	4.16	5	1	135	Link elements-Navigation quality
.984	4.16	5	1	135	Graphic elements-Animation
.899	4.16	5	1	135	Page Formatting Measures-Color Combinations
.844	4.06	5	1	135	Web page formatting - Navigation percentage
.926	4.02	5	1	135	Graphic elements-Graphical links
.954	4.00	5	1	135	Page Formatting Measures-Line length
1.060	3.95	5	1	135	Web page formatting -Page abstract
1.169	3.93	5	1	135	Page Formatting Measures-Scrolling

.836	3.90	5	1	135	Page Formatting Measures- Interactive Elements
1.141	3.84	5	1	135	Web page formatting -Page title
.905	3.84	5	1	135	Link elements-Links
1.076	3.83	5	1	135	Web page formatting -Content percentage
1.036	3.82	5	1	135	Page Formatting Measures- Screen Size
1.144	3.75	5	1	135	Graphic elements-Graphics
.958	3.73	5	1	135	Page Formatting Measures- Fonts
1.134	3.73	5	1	135	Page Formatting Measures- Framesets
1.005	3.72	5	1	135	Page Formatting Measures- Screen Coverage
1.289	3.70	5	1	135	Page Formatting Measures- Layout Quality
1.210	3.66	5	1	135	Web page formatting -Page Text
1.245	3.62	5	1	135	Link elements-External links
1.156	3.58	5	1	135	Link elements-Embedded links
1.234	3.39	5	1	135	Link elements-Within page link
1.215	3.38	5	1	135	Web page formatting -Link text length
1.300	3.34	5	1	135	Page Formatting Measures- Leading
1.313	3.27	5	1	135	Link elements-Link graphics
1.355	3.23	5	1	135	Graphic elements-Graphical ads
1.313	3.17	5	1	135	Page Formatting Measures-Text density
1.381	3.13	5	1	135	Link elements-Text Links

Table 3: indicates the attitudes of the sample towards questionnaire statements.  
Hypothesis testing results:

H1.1

H0: user satisfaction of Page elements varies depending on user gender.

Ha: user gender has no effect on user satisfaction of Page elements.

Compare means one way ANOVA used to test the hypothesis

#### Page elements

Sig.	F	Mean Square
0.041	7.015	.003
		.183



**Table 4**

The Above table shows that The Examined (F) value came equal to (7.015) with possibility value (0.041) and it is less than the specific value (0.05).which it shows an existence relation with statistic concept between user satisfaction of Page elements and gender, we accept the hypothesis. user satisfaction of Page elements varies depending on user gender.

H1.2

HO: user satisfaction of link elements varies depending on user gender.

Ha: user gender has no effect on user satisfaction of link elements.

Compare means one way ANOVA used to test the hypothesis

**Link elements**

<b>Sig.</b>	<b>F</b>	<b>Mean Square</b>
0.042	6.427	.127
		.298

**Table 5**

The Above table shows that The Examined (F) value came equal to (6.427) with possibility value (0.042) and it is less than the specific value (0.05).which it shows an existence relation with statistic concept between user satisfaction of Link elements and gender. User satisfaction of link elements varies depending on user gender

H1.3

HO: user satisfaction of graphic elements varies depending on user gender.

Ha: user gender has no effect on user satisfaction of graphic elements.

Compare means one way ANOVA used to test the hypothesis

**Graphic elements**

<b>Sig.</b>	<b>F</b>	<b>Mean Square</b>
0.036	7.314	.090
		.286

**Table 6**

The Above table shows that The Examined (F) value came equal to (7.314) with possibility value (0.036) and it is less than the specific value (0.05).which it shows there is a relation with statistic concept between user satisfaction of graphic elements and gender, we accept the hypothesis. user satisfaction of graphic elements varies depending on user gender.

H1.4

HO: user satisfaction of Page formatting measures varies depending on user gender.

Ha: user gender has no effect on user satisfaction of Page formatting measures.

Compare means one way ANOVA used to test the hypothesis

**Page formatting measures**

<b>Sig.</b>	<b>F</b>	<b>Mean Square</b>
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0.028	8.021	.005 .253
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**Table 7**

The Above table shows that The Examined (F) value came equal to (8.021) with possibility value (0.028) and it is less than the specific value (0.05).which it shows there is a relation with statistic concept between user satisfaction of Page formatting measures and gender, we accept the hypothesis. User satisfaction of Page formatting measures varies depending on user gender.

### ***Conclusion and Further Researcher Recommendation***

The results of the survey analysis clearly support the fact that web page designer design satisfies more the need of male than female. This research was a fact finding mission although, it will be more helpful if we could know how to overcome this situation therefore a further research strongly recommended emphasis the how to part.

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