Migration Letters

Volume: 21, No: S14 (2024), pp. 1272-1283

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Semiotics Of User Interface Language Field: Human Computer Interaction

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Abstract

In the present days, user interfaces are complicated software components which play important role in web application usability.Fewer attention paid toward semiotics theories for the design of web interface..The main objective[1] of this research is to get user perception in interface signs and how this could affect on the web application usabilityIn this research, authorattempt to evaluate the toward page level and site level semiotics. Page level semiotics and site level semiotics observed as a solid determination of participatentsatisfaction. The most interesting and relevant outcome is associated to site level semiotics. A questioner stood intended to assemble information to validate the purposed model and hypothesis furthermore partial least square method and analysis of variance was adopted to examine the calm data from participants who participate in the survey (n=257). Finally, responses of participants give solid provisions to the purposed model and hypothesis. The relationship between the site level semiotics was observed to a stronger relationship with satisfaction.

Keywords: *Semiotics, user interface language, ANOVA, SPSS (Statistical Package for the Social Sciences)*

Introduction

One of the key components of the standard internet is the World Wide Web (Chen et al., 2024). The web wants to be used by a wide range of users in precise ways and in fascinating situations (Liu et al., 2024). World Wide Web indicates that the participant is in the challenging task and that only designing is correctly formed (Sudirjo et al., 2024). Furthermore, the advent of universal and upward moving information and connection tools over the past few years has led to a wide range of complicated internet purposes and interfaces that have been developed to keep them understandable and functional (Armakovic et al., 2024). Therefore, well-designed online web user interfaces (UI) play a key role in achieving engineers' goals as well as final customers (Vayadande et al., 2024). Four traditional study areas serve as the foundation for this investigation. These foundations are provided in the following sections and include usability engineering, semiotics, human-computer interaction (HCI), and web user interface design (Lamas & Tomberg, 2024).

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Human-computer interaction is a multidisciplinary area that frequently anxious through the taught, intention, analysis, and growth in addition to execution of human centric interactive figuring out organisms (Hassan et al., 2024). The Association for Computing Machinery (ACM) distinctive attention workforce of Computer Human Interaction (CHI) defines human-computer interaction as a strength of mind involved with the design, evaluation, and implementation of interactive computing method for human use and with the be trained of foremost phenomena surrounding them (Lowgren & Stolterman, 2007)

Human-computer interaction (HCI) is defined as "two powerful understanding processors (human and computer) trying to communicate with each other through a thin-bandwidth, especially restricted interface" (Hellmund, 2003). Actually, HCI examines how computer methods are made more easily, more intuitively, and more practically (Cairns & Cox, 2008). It also examines how users interact with these computer methods (Aminizadeh et al., 2023). Connections between customers and a system process place a special focus on "interaction on the interface" (Gong et al., 2018). The internet has become more cooperative as a result of the basic components of a computer system that is a web interface allows one to navigate a link internationally with a tick of the mouse (Internet Computing, 2020).

As a result, the internet is considered to be a direct consequence of HCI training, and one of the main challenges in promoting active human-computer interaction is designing well-designed web user interfaces (Zheng et al., 2024).

Regarding web user interfaces because interface indicators serve as a record of conversations between participants and programmers, layout examiners are crucial because they show how users have interacted with the system (Bao et al., 2024). Interface indicators are also thought to be among the most complex aspects of interfaces because they are premeditated by encoding a referential, which means that a client must fully decipher the sign in order to understand its accurate meaning (Islam & Tetard, 2014). Pointers and interfaces do not always have a one-to-one relationship, though (Cicek & Manduchi, 2022).

The majority of users find it challenging to determine a sign's precise mean. The user has trouble understanding information from UI designs since some interfaces are not user-friendly (Akwukwuma et al., 2024). The primary focus of this research study is on how participants interpret web application interface signs from a semiotics standpoint. This empirical study set out to address two significant web usability concerns.

(i) User understanding in interpreting the intended meaning of interface signs.
(ii) User behavior to perform a specific task with respect to his/her understanding of the task related interface signs.

The following restrictions limit the scope of the research. Due to the fact that web user interface analysis typically focuses on web interface indicators, which continue to be a unique feature of internet evaluation interface design, the research is focused on a particular paradigm of HCI form (i.e., communication among internet customers and its UI). For instance, web user interfaces are the main focus of the research; the reports available on the subject are still focused on web user interfaces (i.e., consumer interfaces of web pages and internet functions) and essentially take into consideration the net interface indicators, which are minor aspects of web user edges.

Although the study is not focused on "web engineering," it organize the process of evaluating and designing web interfaces, which is a significant but incomplete aspect of network manufacturing. Although the research does not consider interface indicators for strategy

development in general (such as computer device applications, video games, cellular user interfaces, and many others), it does best describe web interface symptoms under interfaces that are also typically designed for laptops and desktop computers. This research study is focused to determining the participant's degree of perception regarding web interface design.

Literature Review

Ancient Greece is where the first semiotics research was conducted (Lagopoulos, 2024). In the medical industry at the time, the idea of symbols was utilized to identify and forecast diseases based on their symptoms (Leone, 2015). An ancient Greek physician wrote the first book on the history of symbols, titled "Book of Prognostics" (Caplan & Aggarwal, 2022). As the name implies, semiotics is the science and theoretical approaches that investigate symbols and how they are used (Innis, 2022). It looks at the nature and traits of symbols, their various meanings, the laws governing their development and change, and the connections between symbols and people (Hu et al., 2021).

The system of communication and symbol-based signification is at the heart of semiotic studies (Petrilli, 2015). Since every science must employ symbols and communicate its findings through them, semiotics can serve as a tool for all sciences and is a "method of the method" (Salupere, 2011). Semioticians make it abundantly evident that semiotics shares many of philosophy's broad, multidisciplinary prominent characteristics (Chandler, 2022). One of the fundamental foundations of modern philosophical thought is semiotics (Pelc, 2007). In an attempt to improve the way that interface indicators are presented to purchasers, the user interface (UI) is composed of several warning signals of the smaller interface such as navigational links, command buttons, and thumbnails (Wilson, 2022).

The importance of HCI lies in the participant's impression of how to use buttons, icons, and special panels to make participant enactment more proficient (Taylor et al., 2017). Remaining positive can also be used as a layout symbol if the programmer's understanding of men and women aligns with the resources allotted (Burnett et al., 2017). Exceptional techniques and an emphasis on these types of characteristics have been used to analyze interactive goals in the field of Human Computer Interaction (MacKenzie, 2024). Semiotic engineering was intrigued by the last two, while the so-called Cognitive Engineering focused more on the first two characters that is the Design mannequin and the User mannequin (DeSouza, 2005).

Semiotic engineering is more interesting when it comes to examining the specifics of interfaces and assessing how the user determines them (Carroll, 2023). Several semiotics objects and frameworks are planned for user interface design and analysis (Islam et al., 2023). A character interface is a collection of computer based indicators, any and all process system materials that are audible, usable, and interpretable by a group of users (Hara & Fleger, 2020). The Swiss linguist Ferdinand de Saussure initially proposed the idea of semiology in (1894), which is when modern semiotics was first introduced (Joseph, 2017). In addition to being a pioneer of structuralism, he was regarded as the father of contemporary linguistics (Joseph, 2022).

Previous researcher examined language in his 1916 book "A Course in General Linguistics", and addressed the topic of symbols from a linguistics perspective, particularly the construction, use, and relationships between symbols (Seuren, 2018). Prior researchers groundbreaking contribution to the in-depth study of structuralism semiotics by founding and researching the linguistic school of semiotics (Gramigna & Madisson, 2023). In order to create a system of semiotics that incorporates language behavior and culture, American philosopher and semiotics scholar Charles William Morris developed and incorporated Pierce theory with behaviorism

sociology (Gorlee, 2022). Three branches of acceptable accurate pragmatics were postulated by Morris in 1946 (Noth, 2011).

The philological and semiotic challenges of user-interactive application communication have recently been highlighted by pertinent Human-computer Interaction (HCI) divisions (Masullo & Maiello, 2024). The bulk of study in this diverse and expansive discipline, including computer semiotics and semiotic engineering, attempted to interpret every human computer interaction as a message sent from the application's creator to the user (Souza, 2005).

Methodology

A deductive strategy is being used in this research investigation. This research study is both quantitative and descriptive. A survey questioner was created in order to investigate the research topics and disprove these theories. The signs on the website are highlighted, and in order to accomplish this, an inquiry into Government College University Faisalabad is carried out. The user of this research study must complete a specific assignment and observe or gain an understanding of semiotics. A survey scale was created and connected with the questioner to gather subjective data in order to assess the suggested hypotheses.

The survey questionnaire consisted of 16 items to assess the impact of web design attributes on users' satisfaction. The measurement scale was developed in English that is understandable for respondents. Further, a five-point Likert-scale ranging from 1 (strongly agree) to 5 (strongly disagree) was used to measure each observed item. The purposed research model was analysis through analysis of variance (ANOVA) and T-test by using SPSS. In the analysis section:1 it is analyzed the demographics descriptive of students after that analysis of variance (ANOVA) and T-test conducted. In the analysis section: 2 data is analyzed to justify the purposed Hypothesis Research model. See analysis section: 1 and analysis section:2.

ANOVA Test

Table 1: Demographics descriptive of Participant

Categories	Frequency	Percentage	Mean	Std. Deviation	Skewness	
			Statistic	Statistic	Statistic	Std. Error
Gender						
Female	209	81.3	1.19	.390	1.617	.152
Male	48	18.7				
Browsing Experience						
Beginners	96	37.4			.291	.152
Intermediate	136	52.9	1.72	.629		
Expert	25	9.7				

In the above table 1: demographic descriptive of the participant shown. The table 1 present the frequency, percentage, Mean, Standard deviation and Skewness value of the participant. These values create differentiate in the perception level of the participant.

Table 2: ANOVA test with Browsing Experience

	N	Mean		Std. Error	95% Confidence Interval for Mean

				Std. Deviation		Lower Bound	Upper Bound
PLS1	Beginner	96	2.11	.916	.094	1.93	2.30
	Intermediate	136	2.02	1.036	.089	1.85	2.20
	Expert	25	2.00	1.000	.200	1.59	2.41
	Total	257	2.05	.987	.062	1.93	2.18
PLS2	Beginner	96	2.18	.858	.088	2.00	2.35
	Intermediate	136	2.01	.798	.068	1.88	2.15
	Expert	25	2.00	.577	.115	1.76	2.24
	Total	257	2.07	.804	.050	1.98	2.17
PLS3	Beginner	96	1.99	.827	.084	1.82	2.16
	Intermediate	136	1.94	.901	.077	1.79	2.09
	Expert	25	2.20	.957	.191	1.80	2.60
	Total	257	1.98	.879	.055	1.88	2.09
PLS4	Beginner	96	2.19	.786	.080	2.03	2.35
	Intermediate	136	2.07	.827	.071	1.93	2.21
	Expert	25	2.20	.913	.183	1.82	2.58
	Total	257	2.12	.820	.051	2.02	2.23
PLS5	Beginner	96	2.33	.902	.092	2.15	2.52
	Intermediate	136	2.04	.868	.074	1.90	2.19
	Expert	25	2.32	1.069	.214	1.88	2.76
	Total	257	2.18	.910	.057	2.07	2.29
PLS6	Beginner	96	2.39	.899	.092	2.20	2.57
	Intermediate	136	2.08	.852	.073	1.94	2.23
	Expert	25	2.24	1.052	.210	1.81	2.67
	Total	257	2.21	.898	.056	2.10	2.32
PLS7	Beginner	96	2.14	.763	.078	1.98	2.29
	Intermediate	135	1.97	.791	.068	1.84	2.11
	Expert	25	2.12	1.054	.211	1.69	2.55
	Total	256	2.05	.810	.051	1.95	2.15
	Beginner	96	2.21	.870	.089	2.03	2.38

PLS8	Intermediate	136	2.00	.843	.072	1.86	2.14
	Expert	25	2.24	.970	.194	1.84	2.64
	Total	257	2.10	.869	.054	1.99	2.21
PLS9	Beginner	96	2.20	.705	.072	2.06	2.34
	Intermediate	136	2.13	.755	.065	2.00	2.25
	Expert	25	2.44	1.003	.201	2.03	2.85
	Total	257	2.18	.766	.048	2.09	2.28
SLS1	Beginner	96	2.21	.905	.092	2.02	2.39
	Intermediate	136	2.13	.850	.073	1.99	2.28
	Expert	25	2.04	.790	.158	1.71	2.37
	Total	257	2.15	.864	.054	2.05	2.26
SLS2	Beginner	96	2.24	.818	.083	2.07	2.41
	Intermediate	136	2.23	.869	.075	2.08	2.38
	Expert	25	2.08	.759	.152	1.77	2.39
	Total	257	2.22	.838	.052	2.11	2.32
SLS3	Beginner	96	2.27	.864	.088	2.10	2.45
	Intermediate	136	2.10	.778	.067	1.96	2.23
	Expert	25	2.24	.970	.194	1.84	2.64
	Total	257	2.18	.832	.052	2.07	2.28
SLS4	Beginner	96	2.14	.790	.081	1.98	2.30
	Intermediate	136	2.22	.875	.075	2.07	2.37
	Expert	25	2.32	1.069	.214	1.88	2.76
	Total	257	2.20	.863	.054	2.09	2.30
PLSS1	Beginner	96	2.24	.805	.082	2.08	2.40
	Intermediate	136	2.16	.827	.071	2.02	2.30
	Expert	25	2.32	1.030	.206	1.90	2.74
	Total	257	2.21	.839	.052	2.10	2.31
SLSS2	Beginner	96	2.07	.757	.077	1.92	2.23
	Intermediate	136	1.98	.890	.076	1.83	2.13

	Expert	25	2.00	.866	.173	1.64	2.36
	Total	257	2.02	.838	.052	1.91	2.12

Table 3: ANOVA test with Gender

Descriptive

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
PLS1	Female	209	2.06	.976	.068	1.93	2.20	1	5
	Male	48	2.02	1.041	.150	1.72	2.32	1	5
	Total	257	2.05	.987	.062	1.93	2.18	1	5
PLS2	Female	209	2.08	.817	.057	1.97	2.19	1	5
	Male	48	2.06	.755	.109	1.84	2.28	1	4
	Total	257	2.07	.804	.050	1.98	2.17	1	5
PLS3	Female	209	1.94	.888	.061	1.82	2.06	1	5
	Male	48	2.19	.816	.118	1.95	2.42	1	5
	Total	257	1.98	.879	.055	1.88	2.09	1	5
PLS4	Female	209	2.07	.808	.056	1.96	2.18	1	5
	Male	48	2.35	.838	.121	2.11	2.60	1	5
	Total	257	2.12	.820	.051	2.02	2.23	1	5
PLS5	Female	209	2.13	.899	.062	2.01	2.26	1	5
	Male	48	2.38	.937	.135	2.10	2.65	1	5
	Total	257	2.18	.910	.057	2.07	2.29	1	5
PLS6	Female	209	2.16	.887	.061	2.04	2.28	1	5
	Male	48	2.44	.920	.133	2.17	2.70	1	5
	Total	257	2.21	.898	.056	2.10	2.32	1	5

PLS7	Female	209	2.01	.803	.056	1.90	2.12	1	5
	Male	47	2.21	.832	.121	1.97	2.46	1	4
	Total	256	2.05	.810	.051	1.95	2.15	1	5
PLS8	Female	209	2.04	.848	.059	1.92	2.15	1	5
	Male	48	2.38	.914	.132	2.11	2.64	1	5
	Total	257	2.10	.869	.054	1.99	2.21	1	5
PLS9	Female	209	2.12	.727	.050	2.02	2.22	1	5
	Male	48	2.46	.874	.126	2.20	2.71	1	5
	Total	257	2.18	.766	.048	2.09	2.28	1	5
SLS1	Female	209	2.14	.891	.062	2.02	2.26	1	5
	Male	48	2.21	.743	.107	1.99	2.42	1	4
	Total	257	2.15	.864	.054	2.05	2.26	1	5
SLS2	Female	209	2.18	.862	.060	2.06	2.29	1	5
	Male	48	2.40	.707	.102	2.19	2.60	1	4
	Total	257	2.22	.838	.052	2.11	2.32	1	5
SLS3	Female	209	2.13	.836	.058	2.02	2.24	1	5
	Male	48	2.38	.789	.114	2.15	2.60	1	4
	Total	257	2.18	.832	.052	2.07	2.28	1	5
SLS4	Female	209	2.16	.865	.060	2.04	2.28	1	5
	Male	48	2.38	.841	.121	2.13	2.62	1	5
	Total	257	2.20	.863	.054	2.09	2.30	1	5
PLSS1	Female	209	2.22	.855	.059	2.10	2.34	1	5
	Male	48	2.15	.772	.111	1.92	2.37	1	5
	Total	257	2.21	.839	.052	2.10	2.31	1	5

SLSS2	Female	209	1.97	.854	.059	1.85	2.09	1	5
	Male	48	2.21	.743	.107	1.99	2.42	1	4
	Total	257	2.02	.838	.052	1.91	2.12	1	5

PLS= page level semiotics, SLS= site level semiotics, PLSS= page level semiotics satisfaction, SLSS=site level semiotics satisfaction.

Discussion of demographics descriptive of students

81.3% female and 18.7% of males fill the questioner by clicking on the link which is provided to them. In the browsing experience, the beginner level user of the website was 37.4%, intermediate level participant 52.9% and 9.7% of user are experts furthermore the 7.4 % of the user was 18 years' old and 20.6 % user was 19 years old and 72.0% are that participant whose age is in between 20-25. And the last category of qualification 85.2% user was undergraduate and 14.8% participant was post graduate (see table: 3)

Discussion of ANOVA test with Browsing Experience

By applying ANOVA with respect to the Browsing Experience there was no significance difference observed for all question. However, it is found one difference (where the sig value <0.05) with respect to PLS5(The sign and semiotics of this Web Page are recognizable and easy to read), PLS6 (The position and size of signs relate it properly to another semiotics unit on the page.), where the significance value of PLS5 having F value (3.234) and P (sig) value (0.041) and significance value of PLS6 having F value (3.307) and P (sig) value (0.038) from browsing Experience. It simply means that Beginner level user highly satisfied with the statement of PLS5 with Mean value (2.33) and PLS6 with the Mean value (2.39).

Discussion of ANOVA test with Gender

ANOVA test is applied with respect to the Gender there was no significant difference observed for all question. However, with respect (where the sig value <0.05) to PLS4 (Categories of various icons and links are relevant and meaningful), PLS8(The sign and symbol used on this page give me per size meaning), PLS9 (The affordance of the web signs readily apparent to the user), where the significance value of PLS4 having F value (4.700) and p-value (0.031) and significance value of PLS8 having F value (5.973) and P (0.015) value and significance value of PLS9 having F value (7.826) and P value(0.006) from gender. It's simply means in the statements of the PLS4 male are more satisfied as compare to a female with the mean value (2.35) and in PLS8 again males are more satisfied with the Mean values (2.38) and in PLS9 again males with the Mean value (2.48) get more satisfied.

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