

# Usability Evaluation of Educational Websites: A case Study of University of Basrah Website

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**Abstract**—Administrators of Educational websites have to know the usability issues that might be found on their websites. They should be aware of the potential weaknesses and what has to be improved, in order to enhance the user friendliness of these websites and enable users to get full benefits of usable educational websites. Unfortunately, there is little independent assessment of websites' usability especially Arabic academic websites. Therefore, this research aims to fill the lack of information on usability assessment of Arabic educational websites and investigate the usability of an academic website. Specifically, it evaluates and identifies the usability problems in the University of Basrah, one of the largest and oldest universities in Iraq, using the heuristic evaluation method.

The evaluation process involved recruiting two usability experts to browse and examine all the website pages including the pages related to colleges and departments. Evaluators extracted the website's usability issues and their comments were aggregated and analysed. The results found a total of 3,143 usability issues in the University of Basrah website. The identified usability problems were categorised into 25 specific types and into their location. The results show that heuristic evaluation is an effective method to identify a large number of usability issues and provide sufficient details regarding specific types of usability issues.

**Keywords**- Educational websites; evaluation; heuristic evaluation; usability; University of Basrah.

## 1. INTRODUCTION

Educational websites are widely used in the academic institutions for several purposes, such as: distributing information to the public, providing students with online learning facilities, and promoting the institution's available courses[1]. They are an affordable and appropriate way to communicate with lecturers, students, faculties, alumni, and guests. They also provide all these stakeholders with essential information about the institution[2]. Academic institutions, in order to show their strengths and advantages, they should take full of the opportunities that the website provides to do this. To achieve this goal, academic institutions should build an academic website with high usability level.

Usability is defined as "a measure of the quality of a user's experience when interacting with a product or system, whether a web site, a software application, mobile technology, or any user operated device"[3].

Generally, based on how the usability problems are identified, there are three methods to evaluate the usability of websites[4]:

1- Evaluator-based methods: the method involves usability experts identifying the website's usability issues, for example, heuristic evaluation, which involves having a number of evaluators assess the user interface and judge whether it conforms to a set of usability principles (namely, 'heuristics').

2- User-based method: the user-testing techniques include a set of methods to identify the system's usability problems by involving users. This method utilises questionnaires and interviews to test users' satisfaction with the interface or to record users' performance by observation.

3- Tool-based methods: an automated method uses software tools to assess the website's internal attributes which cannot be perceived by users, like html code errors.

In spite of the importance of making educational websites usable, there were few studies found related to the usability evaluation of these kind of websites, specifically Arabic websites. Five previous studies, that evaluate the usability of Arabic education website by using different evaluation method, were found [4], [5], [6], [7], [8]. However, the studies did not present sufficient details related to the types of usability issues which could be found on educational websites.

The main objective of this study is to fill the lack of information on usability issues that could be found on Arabic educational websites. It comprehensively investigates the usability of University of Basrah website in Iraq, in order to identify usability issues that could be found on Iraqi academic websites. The basic research priorities are:

- Using the heuristic assessment methodology to determine the degree to which the University of Basrah website has complied with the principles of usability. This study uses the heuristic evaluation method because it is a fast, easy, and inexpensive method applied to the completed operated software [4].
- Identifying the number of usability issues that could be found on University of Basrah website in terms of their type and location.

The paper is structured as follows. Section two presents a brief history of University of Basrah. Section three describes the research related work. Section four explains the research methodology. Section five illustrates the analysis process. The study results are provided in section six followed by extensive discussion in section seven. Section eight presents the conclusion of the study. The paper ends with some recommendations in section nine.

## **2. ABOUT THE UNIVERSITY OF BASRAH**

In this research, we selected the University of Basrah website as a case study. It is a public university located in Al-Basrah city in the southeast of Iraq and is one of the biggest and oldest universities in Iraq. It was founded in 1964 with four colleges, namely, Arts, Law and Politics, Engineering, and Science [9]. Over time, the university was expanded to contain 21 colleges and 4 research centres. In 2019, according to the QS ranking website, the university ranked fourth among Iraq universities [10].

## **3. RELATED WORK**

The methods used to evaluate the usability of websites are wide and varied. In this research, the heuristic evaluation method was used as a technique to evaluate University of Basrah website. Heuristic evaluation is an informal method in which evaluators interact with the system interface and then judge whether it follows a set of usability principles (heuristics).

Regarding educational websites, several studies have been conducted to identify their usability problems. Some of these studies utilised the heuristic evaluation method. They used either the ten usability heuristics suggested by Nielsen or heuristics which were specifically designed for educational websites.

An example of previous research which used the ten usability principles is a study conducted by [11]. In this study, two evaluators used heuristic evaluations to identify the usability issues in the Hellenic Start School (HOU) website. Based on Nielsen's ten usability rules, 38 usability faults were detected in relation to eight of them. Then, the authors provided several suggestions to improve the detected faults in order to increase the website's effectiveness and efficiency.

Another example of studies that employed the heuristic evaluation method is the study performed by [5]. The study aimed to find out the usability problems in the University of Jordan website by applying a specific set of heuristic guidelines that had been particularly designed for assessing academic websites. These specific heuristic guidelines consisted of five main categories: navigation, architecture/organisation, ease of use and communication, design, and content. Five evaluators were asked to identify the usability problems with the university website. The final results showed the website had 2,926 problems. These problems were distributed among 28 subcategory usability issues. The results showed that more than a half of the total usability issues were found in the design category with 66.10% while the fewest usability issues were found in the ease of use and communication category with only 3.01%.

Several studies have employed users in the evaluation process to identify the usability problems in educational websites. Hina Gull et al. [6], for example, employed different undergraduate students to evaluate the usability of the King Abdul Aziz University website. They developed a close-ended questionnaire based on the five specific heuristic principles: navigation, content, design, ease of use, and supporting user tasks. Then this questionnaire was distributed among the university students. The results revealed that the King Abdul Aziz University website violated several of the heuristic rules. The number of violations in each category were as follows: 19 in the design, 13 in the ease of use, navigation and content had the same number of violations with 9 each. With these usability issues, the study concluded that the King Abdul Aziz University website did not confirm to many standards of the heuristic rules, and thus, the site required improvement.

Similarly, both Kasli and Aucikurt [12] and Christoun et al. [13] employed students to investigate the usability of educational websites. The former study recruited 54 students to investigate 132 websites of tourism departments at universities in Turkey while the second study recruited 293 students to explore the usability of the website of the European University of Lefke. Then they measured the students' overall satisfaction in the university website regarding its technology, usability, aesthetic, and content. The results revealed students' dissatisfaction about both the tested academic websites. The studies identified several usability problems in both websites such as out-of-date content [12], missing information [12], not supporting more than one language [12], ineffective search function [13], and difficulty in finding information [13].

Another previous study which was based on the user-testing technique is the study performed by Lencastre and Chaves [14]. The researchers employed five master's students to identify the usability issues in Minho University, Portugal. A set of 49 questions divided into 7 categories, specifically, visual clarity, navigation, content, control, feedback, errors, and consistency, was used to assess the usability of the site. The obtained data were analysed, but the study provided limited information.

In some other studies, more than one evaluation method was used to evaluate educational websites. For example, the study conducted by Mustafa and Al-Zou'bi [7] evaluated the usability of nine Jordanian university websites. To do this, a questionnaire was developed and designed based on 23 usability criteria

divided into 5 categories: content, navigation, user interface design, performance and effectiveness, and educational information. Then, the questionnaire was given to 252 students to evaluate the universities' websites. Along with the questionnaire, two online automated tools, namely, html toolbox and Web Page Analyser, were used. These tools were used to identify usability issues which could not be recognised by users, such as html code errors, download time, and size of html page. Despite the overall acceptance of the usability level that the results showed, there were some weaknesses related to design, interface, and performance aspects.

A recent study which used more than one evaluation method is the study performed by Al-Omar K.[8]. In this study, the researcher used three automated tools (Web Page Analyser, Qualidator, and Website Grader) to evaluate the internal attributes of e-learning and distance education deanship websites at 12 universities in Saudi Arabia. Furthermore, the research used the heuristic evaluation method to assess the external attributes of the selected websites. The results showed that the university websites were reliable and well-designed. However, there were violations in basic accessibility and usability guidelines. Therefore, the researcher gave several suggestions to improve these websites.

To sum up, many studies have evaluated educational websites. Each of these studies has utilised a different evaluation method. These methods were designed to evaluate either the system's internal attributes or its external attributes. For external attributes, studies used evaluator-based methods (mostly heuristic principles) or user-based methods. In some cases, both methods were used. In contrast, studies concerned with internal attributes used tool-based methods. In addition, some studies aimed to evaluate both external and internal usability attributes; thus, a mix of evaluation techniques were employed.

#### 4. METHODOLOGY

In this research, the University of Basrah website was chosen to be evaluated. The goal was to find any usability issues that the website interface might have. To achieve the research goal, the evaluator-based method (heuristic evaluation) was used to evaluate the university website. Since the University of Basrah is an academic institute, its website can be evaluated according to a specific set of heuristic principles, that is, principles which are specially designed to assess the usability level of academic websites[1],[11]. A document containing these specific guidelines was developed. The document's contents were based on an extensive investigation conducted on several of the studies related to this topic[5], [6],[15].

The adopted heuristics were classified into four major categories. Each category has a set of subcategories, as shown in Table 1. A total of 28 criteria were identified and described.

TABLE 1. THE FIVE CATEGORIES AND SUB-CATEGORIES OF THE ADOPTED HEURISTIC GUIDELINES

Category	Subcategory	Description
<b>Content</b>	Out-of-date information	The dates of posted information on the website, e.g., Is the website regularly updated?
	Incomplete information	Missing information, e.g., broken image or pdf file will not download.
	Relevant information	Content is relevant to the academic website.

	Under-construction pages	The site contains empty pages.
	Reliable/ accurate Information	Is the website reliable or has information which is not correct?
	Easy of information search	The efficiency of the website. How quickly can the user find the information?
	Readable content	The contents are skimmable with short paragraphs.
	No need to scroll left and right	The contents are well fitted in the page.
	Well organized content	Logical organisation with content classified into categories and subcategories.
<b>Navigation and Links</b>	Navigation support	The navigation is not weak; there are links to other pages.
	Effective internal search	The website has an internal search, and it works well.
	Broken links	The links lead to “error page or not found page”.
	Usefulness links	The link does not work, it remains on the same page.
	Misleading links	The links work, but the inner content is different from the title.
	Orphan pages and dead-end pages	Some pages are without any links to or are not reachable from any other page. Pages do not link to any other pages.
	Ease of move forward/backward	The ease of moving around using links and back button.
<b>Performance</b>	Easy interaction with a website	Users easily interact with website, such as finding information or visiting pages.
	Contact us information	Includes contact information, such as the primary address, phone number, and email directly.
	Foreign language support	Supports multiple languages such as English.
	Distinguish between visited and non-visited pages	Users can identify the pages that they have already visited.
	The availability of the website	The website is always available and accessible.
	Responds according to user’s expectation	The website responsiveness is enough to keep the user’s attention, which is between 1 to 10 seconds.
<b>User interface design</b>	Aesthetic design	The visual appealing of the page is it attractive with professional look and feel.
	Appropriate use of images	The images are of high quality and reflect the university’s values and priorities.
	Appropriate choice of fonts	Regarding the font size, colour, and style, are they well-chosen and organised spatially with pages that have heavy text

		content?
	Appropriate choice of colours	Use of comfortable colours and appropriate combination of font and background colour.
	Distracting or irritating elements	The website does not overuse garish, over-bright colours, distracting gifs, or annoying animations.
	Consistent look and feel	Website elements like header, footer, sidebar, and navigation bar should be kept in the same place, and font and colours used should be associated with a specific colour and style.

Two evaluators were recruited to evaluate the University of Basrah website, both of whom were usability evaluation specialists. The evaluators visited all the website pages (the university, colleges, and departments) and utilised heuristic guidelines to evaluate the website in general. They applied the criteria mentioned in Table 1. to assess whether the site conformed to these criteria or not. Each evaluator assessed the website individually and independently. The evaluation time was four months (from April to July). Fig.3 shows the process of evaluation using heuristic evaluation method.

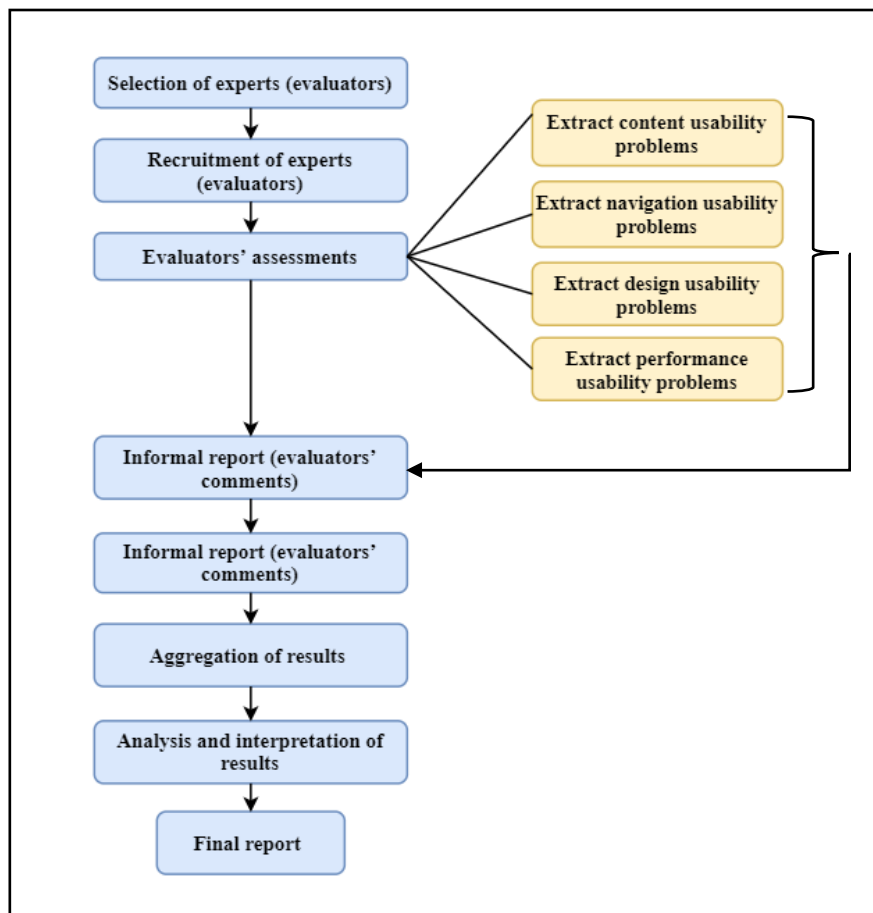


Figure 1. The procedure of evaluation using heuristic evaluation method.



## 5. ANALYSIS

Evaluators' comments on the website were collected and analysed. Each usability issue identified by the evaluators was classified and listed under the categories and sub-categories mentioned in Table 1. In addition, the detected usability problems were grouped into three levels according to their location on the website. The first level is the university, which includes the pages related to the main university website, for example, registration page, university services, and news. The second level is the colleges, which contains the pages related to the university colleges, such as information about the college and the college's news. Finally, the third level is departments; pages such as syllabus, academic staff, and department vision are included in this level.

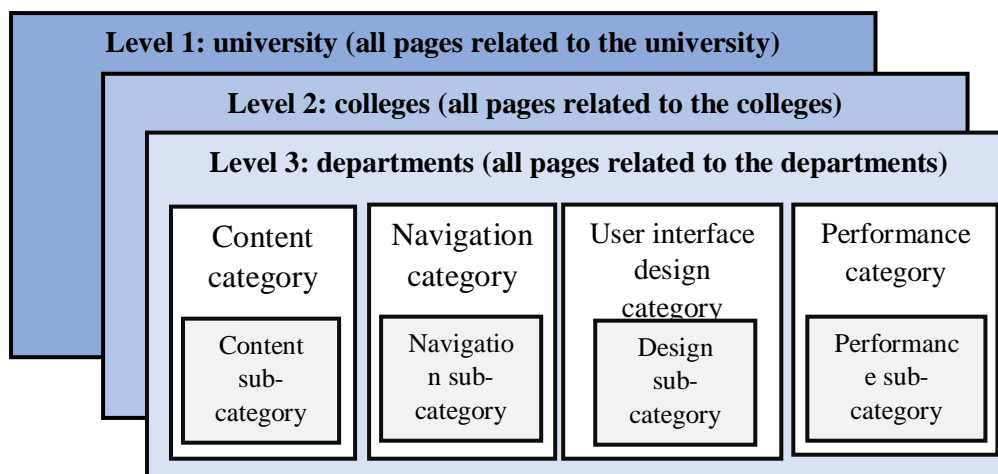


Figure 2. The analysis model divided into three levels. Each level has 4 main category and several sub-category.

Regarding specific heuristic guidelines and the three levels, the University of Basrah website was evaluated, and the results are discussed in the next section.

## 6. THE RESULTS

The output of evaluating all pages of the University of Basrah website was a detailed and comprehensive account of the two evaluators' comments. These comments were analysed and divided into two sections. The first section contains the usability issues that were grouped according to their location (university, colleges, and departments). The second section includes four clusters, which present the usability problems with regard to the four previously described criteria. Each cluster represents one criterion (category) and contains all the usability issues related to this category and sub-category.

### 6.1 Usability problems

This section presents the usability problems which were identified in the University of Basrah website in terms of their number. After analysing the evaluators' comments, the total number of usability issues which were identified in the website was 3,143. During the analysis process, we divided the usability issues into two sections: location and type. Fig.3 shows the percentage of these problems according to their occurrence locations. From the figure, it is clearly seen that the lowest percentage of usability problems (1%) belongs to the university pages, which had 29 usability issues. The largest percentage is recorded in departments' pages

with 52% that is, 1,620 usability problems. Finally, the remaining percentage (47%) of usability issues were identified in the colleges' pages which had 1,494 usability problems.

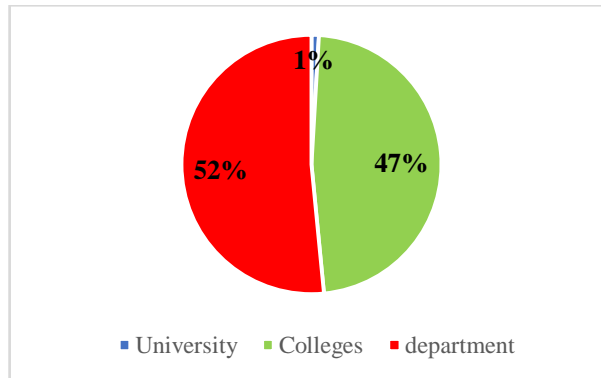


Figure 3. Shows the number of usability issues according to their location.

The second analysis aimed to identify the University of Basrah usability problems according to their type. As we already had categorised the collected academic website criteria, it was time to assign the usability issues to their categories. The results show that the navigation category has the most usability problems with 1,391 issues (44% of the total problems). Content criteria ranks second with 861 issues (28%) followed by the design category with 693 usability issues (22%). The last category, which has the minimum number of usability problems, is the performance category, which has 198 usability problems. Performance accounts for only 6% of the overall usability problems.

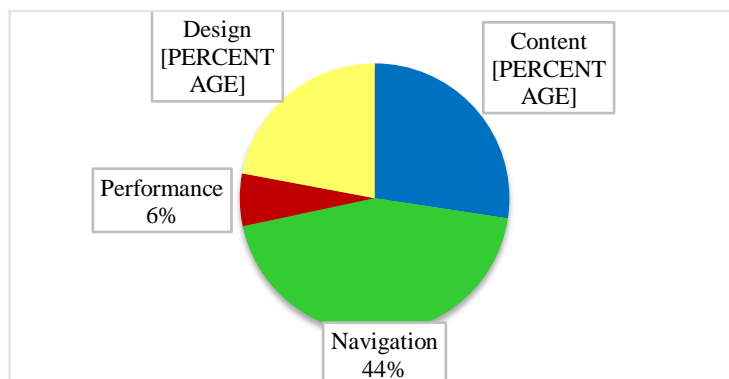


Figure 4. The number of usability issues according to their type.

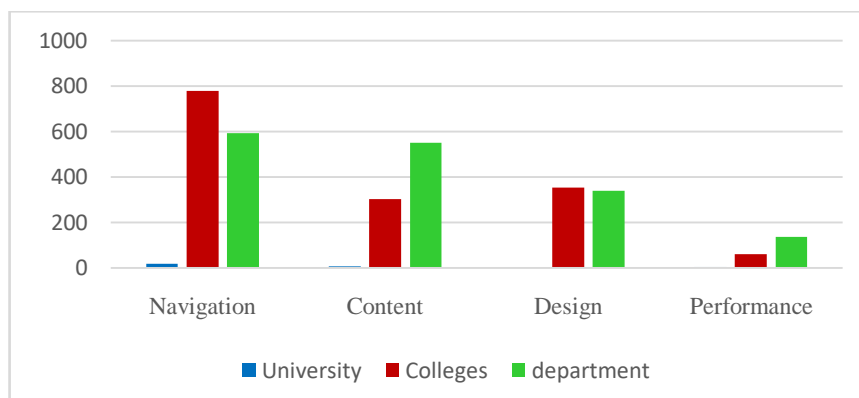


Figure 5. Distribution of usability issues with regards to their types and locations.



## 6.2. Navigation Problems

Fig.4 shows that the most significant percentage of usability issues is navigation. The maximum number of usability issues was recorded in the navigation criteria where, in total, 1,391 problems were identified. These problems were distributed differently on pages related to university, colleges, and departments. Pages related to colleges had the most usability issues (781) while the university pages had the fewest navigation problems (17). Meanwhile, 593 navigation problems were registered in the pages related to departments.

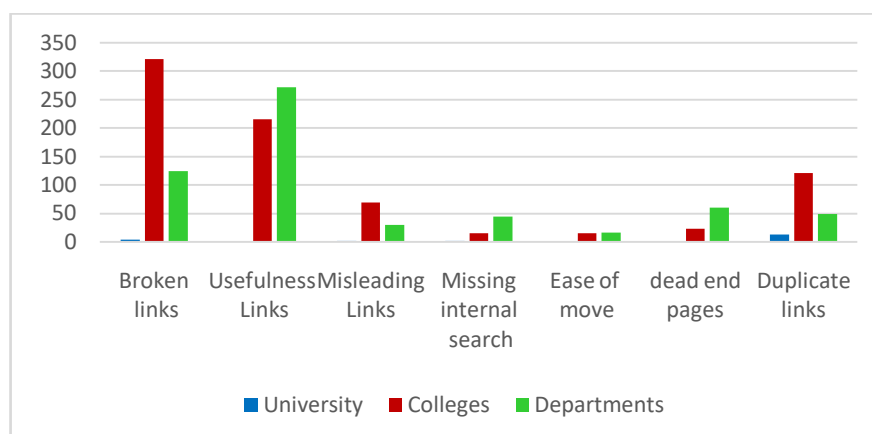


Figure 6. Navigation issues in regard to their types and locations.

Seven specific navigational issues were identified under the main navigation criteria. Table 2. describes these problems and their locations. It can be clearly seen that the “Usefulness links” sub-category has the largest number of usability issues. For example, the agricultural college page contained several links which did not open, for example, the lecturers’ page and the academic calendar. In addition, the evaluators registered many usefulness links in other colleges, such as scientific researches in the College of Art, university journals in the College of Pharmacy and the library link in Colleges of Engineering. Moreover, 272 usefulness links were identified in the pages related to the departments. For example, the links to transfer the user to the lecturers’ CV pages were not working properly. More pages related to the departments also had usefulness links like Google scholar links in the accounting department in the College of Administration and Economics.

The second greatest navigation problem was “broken links”, as 449 broken links were found in the University of Basrah website. These links displayed the message of “not found pages” or “404 error pages” or “403 forbidden error”. Pages related to colleges registered the biggest number of broken links, such as the links to go to other colleges from the College of Sport gave “not found pages” and the Contact us page in the College of Education for Pure Science produced “404 error pages”. Besides that, evaluators identified 124 broken links in the departments’ pages, for example, the modules page in the mathematics department in the College of Science.

TABLE 2. DESCRIPTION AND NUMBER OF NAVIGATION PROBLEMS IN TERMS OF THEIR LOCATION.

Navigation problem	Description	Problem appearance			Total
		U	C	D	
1- Broken links	The link leads to an error or not found page.	3	322	124	449
2- Usefulness	The links do not work; they remain	0	216	272	488

links	on the same page.				
3- Misleading Links	The link name does not match its inner content.	1	69	29	99
4- Missing internal search	The page does not have inner search.	1	15	44	60
5- Difficult interaction	It is not easy to move forward/backward, and there are many steps to reach the target information.	0	15	16	31
6- Dead-end pages	The site's pages do not have links to any other pages.	0	23	60	83
7- Duplicate links	The website contains multiple links on the same page open to the same content.	12	121	48	181
<b>Total</b>		<b>17</b>	<b>781</b>	<b>593</b>	<b>1391</b>

Duplicated links were also identified as a navigation problem by the evaluators. According to [16], duplicated links are links that open the same content from the same page. These links cause the website pages to be full of redundant links and lead to users having a difficult interaction with the website, being distracted, being overloaded, and can result in wasting users' time. Thus, in [16], duplicated links are described as "one of the four major dangerous navigation techniques".

In the University of Basrah website, 181 duplicated links were identified. They were distributed unevenly on the pages related to the university, colleges, and departments. Colleges contained the most duplicated links (121) followed by the departments (48) and, finally, the university pages (12). Most of these links were commonly related to the message from the dean (18 colleges), names of graduated students (18 colleges), e-learning link (13 colleges) and Arabic/ English journal (4 colleges). As an example of duplicated links, the link to the message from the dean appeared three times in the page of the College of Computer Science and Information Technology.



Figure 7. The home page of the College of Arts, which has duplicated links.

The other five specific navigation problems which were found in the University of Basrah website are as follows: 99 "misleading links", 83 "dead-end pages", 60 "missing internal search" and 31 "difficult interaction". An example for each of these problems is given below:

- There was a link in the Computer Information System department in the College of Information Technology addressed as "the yearly coursework". This link should have displayed the CIS students'

marks. Instead, it showed the final exam timetable. This link and all other similar links are considered as misleading links.

- An example of “dead-end pages” is the link “veteran affairs” in the College of Veterans, which led to a page without any links to other pages of the website.
- Many pages in the University of Basrah website lacked an internal search box including the pages related to the university itself.
- Evaluators encountered difficult interactions in 31 pages. One of these pages was the page of the College of Medicine. There were several nested links in this page which increased the effort of moving forward or backward.

### 6.3. Content Problems

In the content criteria, the evaluators discovered 861 usability problems in total. Content problems accounted for 28% of the overall usability problems. These content problems were distributed among five specific content criteria: missing information, out-of-date information, empty pages, grammar errors, and inappropriate content.

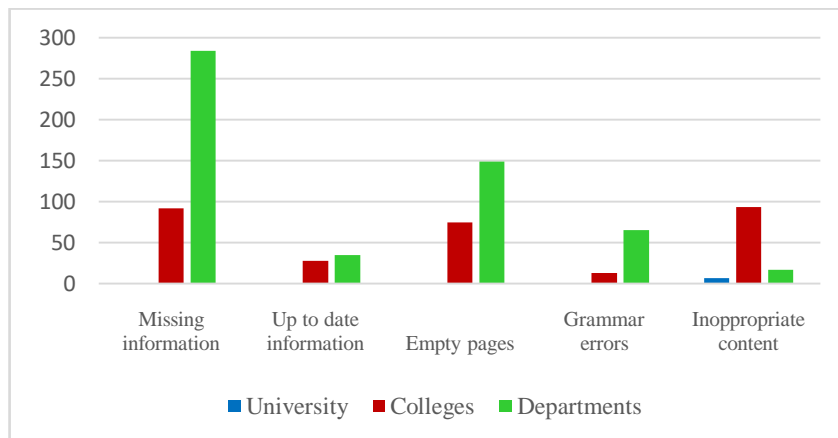


Figure 8. Content issues with regard to their types and locations

For content, five subcategories are presented in detail in Table 3. From this table, it can be clearly seen that “missing information” accounts for the maximum portion of the content usability issues with 377 issues across the three locations (university, colleges, and departments). Most of the missing information was identified in pages related to departments. Furthermore, most of these issues were associated with the syllabus (missing one level or more). For example, the syllabus is missing in the College of Nursing and missing academic staff information (such as academic qualifications and research interests). This was noticed in departments like the College of Civil Engineering, and maths in the College of Science.

مقررات المرحلة الثالثة			
الكورس الثاني	ت	الكورس الاول	ت
QSB	1	بحوث العمليات	1
تفكير استراتيجي	2	ادارة استراتيجية	2
ادارة تامين	3	ادارة المصارف	3
دراسة جدوى	4	القضايا	4
ادارة الابتعا والابتكار	5	ادارة منظمات صغيرة	5
MS PROJECT	6	ادارة مشاريع	6
(محاسبة كلية 2)	7	(محاسبة كلية 1)	7
(ادارة مالية 2)	8	(ادارة مالية 1)	8
مقررات المرحلة الرابعة			
	ت	نظام فطري	ت
	1	ادارة استراتيجية	1
	2	ادارة معرفة	2
	3	ادارة التاج	3
	4	ادارة جودة	4
	5	ادارة مصارف	5
	6	QSB	6
		رقابة وتقييم الأداء	7
		محاسبة ادارية	8
		مشروع بحث	9

Figure 9. The syllabus page of the Administration Management department which has missing the courses of the second semester of the fourth year.

TABLE3. DESCRIPTION AND NUMBER OF CONTENT PROBLEMS IN TERMS OF THEIR LOCATION.

Content problem	Description	Problem appearance			Total
		U	C	D	
1- Missing information	The website has incomplete information.	1	92	284	377
2- Up-to-date information	The site has old information.	0	28	35	62
3- Empty pages	The site has blank pages without any content.	0	75	149	224
4- Grammar errors	The website contains misspelled words and grammatical errors.	0	13	66	79
5- Inappropriate content	The site has unconcise, repeated content.	7	94	17	118
<b>Total</b>		<b>8</b>	<b>302</b>	<b>551</b>	<b>861</b>

Empty pages was the secondly usability problem noticed with regard to content criteria. According to the evaluators, the University of Basrah website had 224 empty pages; departments had 149 and colleges had 75. However, the university pages did not contain any empty pages. The departments' pages which suffered from empty pages were related to the vision, syllabus, and academic staff of the departments, such as the Department of Natural Marine Science in the College of Marine Science.

The pages related to colleges and pages related to departments contained grammar errors. This was recognised as the third content problem in the University of Basrah website. Grammar errors were mostly identified in the pages related to the departments; Table 3. shows that there were 66 grammar errors in the departments' pages. In contrast, colleges' pages had just 13 grammar errors and there were no errors in the university page. All of these errors were misspelled words either in colleges' pages or in departments' pages. For example, the name of the Quran and Islamic Education department was misspelled, as shown in Fig.10.

Further examples of misspelling include the lecturers' names in the Department of Computer Information Technology.

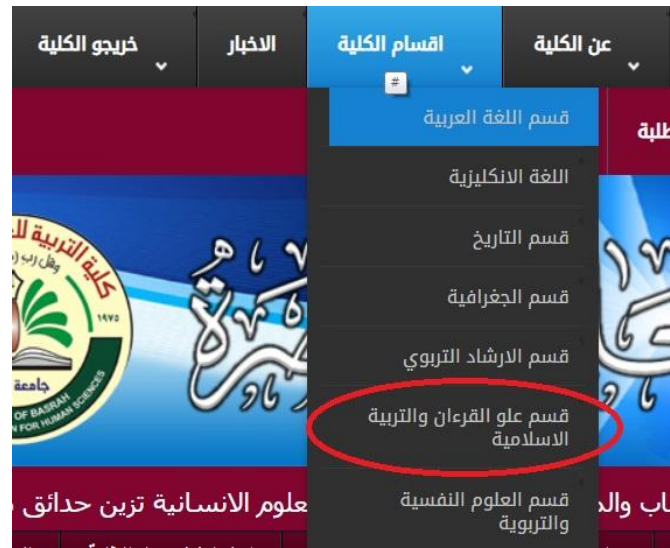


Figure 10. The departments' menu in the home page of the College of Education for Human Science shows a misspelled department name.

The following usability issue with regard to content area is out-of-date information; 62 items of out-of-date information were identified in five colleges and three departments. The pages on the University of Basrah website which commonly had this problem were announcements and news in colleges and exam timetables in departments. Fig.11 shows, for example, the announcement corner of Computer Science and Information Technology, which displays an outdated announcement. The date of the announcement was 10/9/2017 while this study, as indicated in the methodology, was undertaken between the periods April to July 2019.



Figure 11. The announcement corner of Computer Science and Information Technology, which displays an outdated announcement

The last usability problem which the evaluators distinguished in the University of Basrah website in terms of content was “repetitive content” that is, large chunks of text that appear in the website more than once. This

kind of content occurred in the University of Basrah website 118 times; 94 were found in colleges' pages and 17 in departments' pages. The repetitive content was also found 7 times in the university pages. Most of these contents were related to deans' messages. This was common in 20 colleges like Density, Art, and Engineering. News was also the content which was repeated in several colleges such as the College of Education For Women, Alzahraa College of Medicine and the College of Pharmacy. Regarding the departments' pages, repetitive content was found in nine departments. Such content was usually related to departments' academic staff.

#### 6.4. Design problems

Fig.4 shows that the proportion of design usability problems is 22%. Overall, 693 design problems were identified in the University of Basrah website. A total of eight specific design problems were determined by the evaluators. Table 4. illustrates these eight design problems in detail. From this table, problems no.2 and no.3 are concerned with the inconsistency design of the website. Problem no.2 is about the inconsistency of fonts used in the University of Basrah website. The format of the website font differs in terms of type, size, colour, and style while problem no.3 is about the inconsistency in the alignment of fonts, tables, and figures. The total number of both the inconsistency problems is 176. In the university pages, there were no issues in terms of these two problems. However, in both problems no.2 and no.3, departments' pages registered more issues than colleges' pages. The most frequent issue was the different font format, which was identified in the colleges' home page (16 out of 18); this was commonly found in news and links titles.

TABLE 4. DESCRIPTION AND NUMBER OF DESIGN PROBLEMS IN TERMS OF THEIR LOCATION.

Design problem	Description	Problem appearance			Total
		U	C	D	
1- Aesthetic design	The website pages were not visually appealing and looked and felt unprofessional.	0	10	11	21
2- Inconsistency fonts format	The website font was inconsistent in size, colour, and style.	0	55	42	97
3- Inconsistency Alignment	Font, tables, or figures were incorrectly aligned.	0	32	47	79
4- Wrong affordance	The website had objects (buttons and links) with shapes that do not give a clue to their functions.	0	38	121	159
5- Inappropriate menu design	The menus were hidden and become inaccessible.		45	47	92
6- Broken images	The website showed broken images in some pages.	0	86	7	93
7- Pages' heading	The site had pages without headings or with only inappropriate ones.	0	52	59	111
8- Pagination	The website pagination was not clearly designed.	1	27	4	32
9- Visibility	Background and font colours were inappropriate combination, and very small unreadable fonts were used.	0	7	2	9
<b>Total</b>		<b>1</b>	<b>352</b>	<b>340</b>	<b>693</b>



In terms of alignment, although the page related to the university has inconsistent alignment, pages related to departments had 52 and the pages related to colleges had 32 instances of inconsistent alignment. Some of these alignment issues were about the font alignment, like news in the College of Density. Others were problems with alignment in the tables or figures, like table of students' result in the Department of Natural Marine Science of the College of Marine Science.

One of the eight design problems identified in the University of Basrah website is affordance. Affordance is concerned with the designed shape of an object (buttons, links, and labels); it gives a clue to how this object should be used. Heuristic evaluators of the University of Basrah website commented on 159 instances of wrong or poor affordance. Affordance usability issues were related to poorly shaped buttons. This issue was mostly found in pages related to colleges (6 out of 10). On the departments' pages, links were designed in a way that did not give the sense of hypertexts. This caused 121 issues in the pages related to the departments. For example, the academic staff link in the Department of Surgery and Obstetrics of the College of Veterans looked like a label while this text was a link to another type of content.

The next issue under the criteria for design is "broken images". This is when the website shows "x" instead of an image. Table 3. shows that there were 93 broken images in the University of Basrah website. Most of these images were found in the pages related to colleges (86 broken images). Furthermore, most of these broken images were links to other colleges' pages (10 colleges). In departments' pages, there were seven broken images. These were found in pages related to academic staff.



Figure 12. The home page of College of Computer Science and Information Technology, which had two broken images.

Ineffective or missing page headings is another problem noticed by the heuristic evaluators. The page titles of 111 pages in the University of Basrah website were considered ineffective due to either these headings texts being smaller than the body or because the colour was lighter than the rest of the text. Small headings were found in 4 colleges and 23 departments, for example, the heading in the College of Veterans. Light coloured headers were found in five departments such as the Department of Geography in the College of Education in Human Science. In addition, some of the website pages lacked a title. These pages were identified in 4 colleges and 17 departments, for example, the Department of Geology in the College of Science.

The next design issue is inappropriate design of colleges' and departments' menus. The common problem that the evaluators found in both colleges' and departments' menus was the disappearance of their items. For long multi-item menus, the bottom items were hidden behind the content area below the navigation bar, so they would become invisible and could not be accessed and selected. In other menus which were located at

the right edge of the page, their items were hidden behind the page boundaries. This is also made the menu items unreadable. Fig.13 shows examples of inappropriate menu design.



Figure 13. (a) The home page of the Alzahraa College of Medicine shows how the menu items disappear behind the content area. (b) The home page of College of Education for Pure Science shows how the menu items disappear behind the page boundaries.

Another design issue is inappropriate pagination design. This design usability problem was identified once in the university pages, 27 times in the colleges' pages, and 4 times in the departments' pages. All pages in which pagination was designed badly were pages related to the news (14 colleges and 3 departments). In these pages, the pagination design was ambiguous. The next and the previous buttons were unlabelled. In addition, there were useless or inactive pages split between pages.

The following problem with regard to the design criteria is the overall aesthetic design of the website. The evaluators found some of the University of Basrah pages were visually unappealing, in particular, the usage of garish colours and overcomplicated designs. This problem was recognized in the home page of 10 colleges and 11 departments.

The last design problem is visibility. In this subcategory, the colours used in fonts and background did not have sufficient contrast, so, texts become difficult to read. Moreover, in some pages of the University of Basrah website, the font was too small, which made it almost unreadable. The visibility problems were diagnosed seven times in three colleges and two times in two departments. Fig.14 shows the visibility problem in the College of Engineering.



Figure 14. Announcement in the College of Engineering which shows inappropriate use of background/foreground colours.

### 6.5 Performance problems

The last usability criterion for academic websites is performance. In this criterion, the heuristic evaluators diagnosed five specific problems. Table 4. explains all these problems and shows the number of occurrences. The total number of usability problems which were associated with performance was 198 (3 in the university's pages, 59 in the colleges' pages, and 136 in the departments' pages). In terms of their type, as Table 5. shows, there are five sub-categories under the performance category. In this part, we will examine each of these sub-categories.

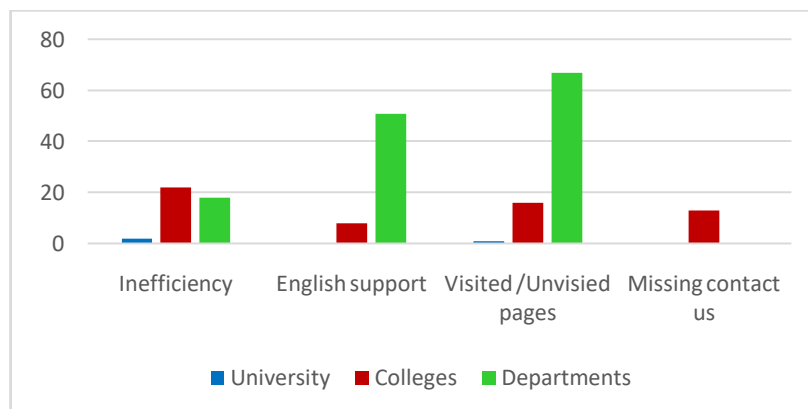


Figure 15. Performance issues with regard to their type and location.

Firstly, it is important to distinguish between visited and non-visited pages. Knowing the pages that users have visited avoids them revisiting these pages repeatedly[17]. If the visited pages differ in colour from the unvisited ones, users can navigate the website more efficiently[17]. Thus, the website should provide its users with different colours for the pages that they have already visited. This usability sub-criterion was recognised by the evaluators when they were browsing the University of Basrah website. They found 84 issues of not distinguishing between visited and unvisited pages. The pages relating to departments had the maximum number of these issues with 67, while pages relating to the colleges had 16 issues and the pages relating to the university had only 1 issue. The links, which stayed the same colour after being visited, were mostly links related to news. Visited news links did change their colour in the university's pages and in 16

colleges' pages. On the departments' side, the links were related to their information (department vision, academic staff, and syllabus).

TABLE 5. DESCRIPTION AND NUMBER OF PERFORMANCE PROBLEMS IN TERMS OF THEIR LOCATION.

Performance problem	Description	Problem appearance			Total
		U	C	D	
1- Foreign language support	The website does not support multiple languages, such as English.	0	8	51	59
2- Distinguish between visited and unvisited pages	The users cannot identify the pages that they have already visited.	1	16	67	84
3- Inefficiency	Late responsiveness means many steps are needed to reach information,	2	22	18	42
4- Missing 'contact us'	The page does not have 'contact us' information,	0	13	0	13
<b>Total</b>		<b>3</b>	<b>59</b>	<b>136</b>	<b>198</b>

Secondly, the performance problems relate to inefficiency. It is crucial to have a fast loading website; that is, the website speed should be from 0.1 to 10 seconds[18]. If the response time is more than 10 seconds, the user's attention will be lost. In 60 pages of the University of Basrah website, the loading time exceeded the speed rate. Thus, these pages were categorised under late responsiveness usability problems. In the university pages, there were 4 delayed load pages whereas, colleges had 22 and departments had 18 delayed load pages. Most of these pages were late loading because of the big size of their content, due to the use of images and videos, that is, the late response pages had video content or large images like video library pages. Examples of late response pages are the college's board page in the College of Law and Politics and the Department of Materials in the College of Engineering. These pages took more than 20 minutes to show all of their content.

It is important to provide a basic contact information (phone number, e-mail and address) page in each website, as visitors should know how to contact the webmaster. However, 13 colleges in the University of Basrah website lacked a contact information page. These colleges included the College of Education in Human Science, the College of Agriculture and the College of Computer Science and Information Technology.

## 7. DISCUSSION

This paper uniquely identified the number of usability problems in University of Basrah website. To the authors' knowledge, the website of University of Basrah has not been evaluated before. Moreover, none of the Iraqi universities went through an evaluation experiment. Therefore, this research addresses the lack of information on usability issues which could be found on academic websites in Iraqi universities. It examined University of Basrah website as a case study as it is one of the biggest Iraqi universities. The paper identified 3,143 usability problem that related to 25 specific types of usability problems which could be found on an academic website. Furthermore, it demonstrated the number of appearance of these issues on the website in terms of university page, colleges' pages, and departments' pages. The research used qualitative data provided by the heuristic evaluators, who explored all the pages of University of Basrah website.

The results of this paper show an agreement between the results of the previous studies that utilized heuristic evaluation as an evaluation method. For example, in and [5],[11]has identified several usability issues such

as: out-of-date content, missing information, and blank pages; ineffective search function, difficulty in finding information, Broken links, orphan pages and dead-end pages, misleading links, and ease of move forward/backward; not supporting more than one language, difficult to interact with a website; weaknesses related to design, interface like: inconsistency, inappropriate colour, poor image quality and alignment. Table 6. summarizes the usability issues that were found by the heuristic evaluators on educational websites in previous studies.

**TABLE 6. USABILITY PROBLEMS FOUND IN STUDIES THAT UTILISED HEURISTIC EVALUATION METHOD.**

<b>Category</b>	<b>Usability problems</b>	<b>References</b>
<b>Content</b>	out-of-date content	[5]
	missing information	[5], [11]
	Blank pages	[11]
<b>Navigation and links</b>	ineffective search function and difficulty in finding information	[5], [11]
	Broken links	[5], [11]
	Orphan pages and dead-end pages	[5],[11]
	Misleading links	[5]
	Ease of move forward/backward	[11]
<b>Performance</b>	not supporting more than one language	[5]
	Difficult to interact with a website	[5], [11]
<b>User interface design</b>	weaknesses related to design interface like: inconsistency, Inappropriate colour, Poor image quality, alignment	[5],[11]

On the other side, the other studies, which utilise other evaluation methods like employed users or used automated tools, revealed similar results to heuristic approach. They identified issues like: out-of-date content, missing information; ineffective search function and difficulty in finding information, Broken or Misleading links; not supporting more than one language, long download time, and weaknesses related to design interface. Table 7. illustrates usability problems found in studies that utilised user-based or automated tools methods.

**Table 7. Usability problems found in studies that utilised user-based or automated tools methods.**

<b>Category</b>	<b>Usability problems</b>	<b>References</b>
Content	out-of-date content	[6], [12]
	missing information	[6], [12]
Navigation and links	ineffective search function and difficulty in finding information	[12], [13], [14]
	Broken or Misleading links	[6]
Performance	not supporting more than one language	[12], [13], [14]
	Difficult to interact with a website	[6], [12], [8]
	Long download time	[7], [8]
User interface design	weaknesses related to design interface like: inconsistency, Inappropriate colour, Poor image quality, alignment	[6],[7],[14]



The results of this research show that heuristic evaluation is an effective method to identify a large number of usability issues. Other evaluation methods like user-based and automated tools could also identify usability issues on educational websites. However, these kind of evaluation methods focus on the accessibility of a site instead of its general usability. Moreover, they do not provide sufficient details about the types of problems on a website, while heuristic evaluation provides thorough information regarding specific types of usability issues.

Despite the fact that heuristic evaluation has proved its effectiveness to determine a large number of usability issues and given their specific types, this method still has limitations. As the method employs heuristic evaluators to do the evaluation process, it ignores the role of real users. Evaluators could not anticipate actual issues that users may face while using the website. Thus, a further step should be taken in future work. Students will be recruited to identify the usability problems on the website from their point of view. Then, compare the results from this paper (25 type of usability problems) to the results will be obtained from students. In order to shed light on usability issues that might be considerable for students. As well as, know to which these issues related to: navigation, content, design, or performance.

To sum up, the results of this paper are especially useful for designers, developer, manager and/or evaluators of universities' websites in Iraq, who are willing to enhance the design of their websites make usable and user-friendly educational websites. The obtained of 25 specific types of usability issues which were addressed in this research formed as a guidance that should be taken into consideration when designing and/or evaluating educational websites.

## **8. CONCLUSION**

This study comprehensively evaluated the usability level of the University of Basrah website by using the heuristic evaluation method. Two evaluators were recruited to visit and evaluate all the website pages related to the university, colleges, and departments.

The results revealed the evaluators identified a total of 3,134 usability problems in the University of Basrah website. These problems were related to four main educational website criteria: navigation, content, user interface design, and performance. Most of these usability issues were related to navigation criteria, which is where 44% of usability problems were found. The least number of usability issues were related to performance in which 6% of the total problems were identified. Content and user interface design recorded 28% and 22% respectively.

Furthermore, the research has given an explanation of 25 sub-categories which were commonly found in the university website. It has also offered more information in terms of the locations of these usability issues; the majority of usability issues were found in pages related to departments while pages related to colleges registered fewer problems. Finally, the pages related directly to the university had the fewest usability issues.

The results showed that heuristic evaluation is an effective method to evaluate educational websites. It gives a large number of usability problems and sufficient details regarding the problems' types. Unlike the other evaluation methods (user-based or automated tools) which focus on the accessibility of a site. However, heuristic evaluation ignores the role of real users, who use the website and face the actual issues. Therefore, in future work, students will be employed to identify the usability problems on University of Basrah website from their perspective. In order to determine the usability problems that might be significant for students.



## 9. RECOMMENDATIONS

The results confirm that the University of Basrah needs to have a more user-friendly website. Thus, the research suggests that the developers and designers of the website should involve specific principles during the development process. These principles are specially designed for academic website designers, and this research has explained the principles in detail.

In addition, the developers and designers of the University of Basrah website should focus on the 25 usability problems identified in this research. These specific usability problems can serve as guidelines to assist the University of Basrah website developers and designers to build a more user-friendly and effective website.

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