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Original Research

An Investigation of How to Retrieve Web-Based Information for Illiterate Users in Iran

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Abstract

Illiteracy can be a significant obstacle to any given country's economic and social development. Hence, exploiting the potential of Information and Communication Technology (ICT) can help solve this problem by creating proper solutions for the illiterate and low-literate population. This study provides search and retrieval strategies for Iran's illiterate or low-literate population by designing an appropriate website. The research method in this study is mixed. A total of 65 individuals were selected using the snowball sampling method. First, by designing qualitative research of ethnographic type, we examined the critical information needs of the research sample. After equalizing the process and information needs, a website was created for the research sample and was provided to them. The designed website does not require human assistance to search for information. In addition, the website uses graphic and audio content related to local culture and language. ISO-9241-11 standard was used to evaluate the performance of the website designed in the research. Furthermore, it examines the characteristics of participants, i.e., gender, and previous experience of using computers and mobile phones on the website's usability. Since the present study population was low-illiterate and illiterate, the research time to prepare them to answer the questions was very long. The results revealed considerable effectiveness, efficiency and satisfaction with the website among the participants. Moreover, the gender variable did not affect how they use the website and their inclination in this respect. Providing the services required by this group of users in any way, including appropriate cyberspace, increasing literacy rates and meeting the information needs of this group at a far lower cost than traditional education, can be taken into account as one of the requirements of governments. The current study is the first experimental research to measure the needs and create suitable tools for using the virtual world on the part of low-literate and illiterate people in Iran.

Keywords: Illiteracy, Website, Information Retrieval, Information Technology, Web-Based Information.

Introduction

Today, information and communication technology is essential in providing various services such as education, treatment, and business. On the other hand, one of the methods of learning and continuing education today is e-learning. By providing multimedia and appealing information, websites are one of the most important learning tools in this regard. Furthermore, one of the most common problems in e-learning is the users' acceptance and inclination to use technology in education. This is especially true for low-literate or illiterate people who are more likely to emerge in underdeveloped or developing countries (Cecato, Balduino, Martinelli & Aprahamian, 2021). Searching for information needs much effort or skill to deal with for low-literate or illiterate people, primarily through the Internet. Accordingly, supporting the provision of the information needed by this stratum through providing an effective solution using highly-skilled information and communication technology seems quintessential. Designing electronic and virtual information retrieval systems for illiterate or low-literate people has specific challenges.

In other words, the life experiences, needs, and expectations of the illiterate and low-literate population must first be determined by the designers of such systems. Designers of such systems must thoroughly understand the world, their lives, relationships and concerns. This is one of the methods that designers use to overcome this problem. Involve or involve the users in the steps of information retrieval systems (Sheikh Lalji & Good, 2008). Today, the Internet penetration rate among the literate people of society to meet information needs has dramatically increased. This can be considered in two ways: first, the change in how the government and other non-governmental organizations communicate and interact with citizens through electronic interactions, and second, the people due to the tremendous increase in virtual networks and the attractiveness of joining these networks. They have been forced to use electronic resources and environments. But despite this growing influence of cyberspace, using electronic information resources is challenging for illiterate and illiterate people. For example, a study by Al-Barhamtoshy, Abdou and Rashwan (2014) found that educating illiterate people in remote zones of Saudi Arabia even created an audio user interface designed to engage users with search engines. Therefore, in designing user interfaces, all aspects of the matter should be considered, and user interfaces should be developed to view all the limitations of illiterate and illiterate people.

On the other hand, the lack of qualified teachers suitable for educating illiterate and illiterate adults is another challenge. Also, most adult education classes in most countries are concentrated in cities, which can be challenging for illiterate and illiterate adults living in rural, remote, and small towns (UNESCO, 2018). The other issue is the livelihood of such people. In addition to being away from cities and educational centers, most illiterate adults spend most of their day and night on economic activities and earning a living to support themselves and their families (ibid. pp 13-15). Therefore, they cannot or may not want to be in such educational environments. Such people, even if they have received formal primary education during adolescence, but due to poverty and living conditions, after a period of formal primary education, are forgotten due to their non-application and return to illiteracy. Therefore, it seems that formal and continuous education can be a solution. Nevertheless, we need effective and constant innovation to overcome adults' illiteracy. Considering that more than 60% of all the inhabitants of the planet are equipped with mobile phones and the penetration rate of cyberspace is increasing day by day, and if some illiterate adults do not have access to and desire these

spaces, the interest of other relatives can Finally expose them to cyberspace systems and environments (Sheikh Lalji & Good, 2008).

Given that illiterate and low-literate people do not know the standard methods and formats for searching and retrieving information, it is essential to fit the shape and form of information for use by users. Therefore, all the conditions and factors involved in the information process of illiterate people should be considered to reach a desirable method of providing information to such users (Ouchi, Saberi, Ansari, Hashempour & Isfandyari-Moghaddam, 2019). These include performance expectations, ease of use, community impacts, user-friendly conditions, and user characteristics (for example, gender and age). Between Unified Theory of Acceptance and Use Technology (UTAUT) is most closely related to the information requirements of illiterate people. This model is the result of the integration of eight models of technology adoption that are: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), social cognitive theory (SCT), Motivational Model (MM), personal computer use model and model Derived from Technology Acceptance Models and Planned Behavior Theory.

Venkatesh, the originator of the model, measured the extent of IT adoption in his study of employee data from four organizations over six months at different times and after initial training. The eight models explained between 17 and 53 percent of the variance in behavioral intention. Therefore, the Unified Theory of Acceptance and Use Technology was tested using the data collected. The results showed that the theory performs better than the other eight models and explains 69% of the variance in intention to use technology. In the present study, also inspired by the research method that Venkatesh used in his research, the research was conducted in several stages, which will be done in the following lines and methodology section (Venkatesh, Thong & Xu, 2016). The subject under study in this research can be examined from another dimension: the concept of intellectual capital and its creation in society. The creation and acceptance of intellectual capital are essential to continue implementing and continuing programs and making fundamental changes in society. Ferenhof, Durst, Zaniboni Bialecki & Selig (2015) believe that to create and accept intellectual capital in society, 11 components should be considered: customer, structural, human, innovation, business, organizational, processes, relational, relational and customer, social and technological. As can be seen, technology, building structure and customer relationships are the main components of creating intellectual capital. Now, considering that according to the data of the Statistics Center of Iran (2021), more than 9 million people in the population of Iran are illiterate and low illiterate people, creating an intellectual procedure for accepting technology (in this study, using the Internet to meet information needs) can help the government in achieving fundamental goals such as integrated and inclusive e-government research in society and ultimately the ease of conducting government processes and services. In addition, creating such a platform can be fruitful in the interaction between different sections of the community with each other. In this study, using quantitative and qualitative methods, the information retrieval in the web environment between low-literate and illiterate people was examined, and the variables involved in this matter.

Literature Review

Little research has been done on human interaction and information technology at the illiterate and low literate levels. Perhaps the reason is the high literacy growth in recent decades,

especially in developed countries. However, given that the illiterate and low-literate population is significant in underdeveloped and developing countries, some researchers have examined their problems in this regard.

By examining the research backgrounds, it can be stated that all studies in this field can be divided into four groups to propose a user interface for illiterate and low-literate people: images, audio, text, and multimedia formats. In this section, the most important studies in each area are introduced. Studies whose proposed user interfaces are based on image format:

In a study, Khan, Hussain, Shah, Iqbal and Shafi (2017) designed a website for job search among illiterate people in the KPK province of Pakistan. The results showed that using visual symbols rather than text search and information retrieval was significantly easier for the research community and increased satisfaction. In another study, Joshi, Welankar, Kanitkar & Sheikh (2008) used colors, rituals and numbers to increase the ease-of-use of the mobile phone contacts. Richler, Vaillancourt, Celetti, Besançon, Arun & Sebastien (2012), used pictograms to convey health information regarding side effects and/or indications of medications and investigated the interpretation of pictographs and image guidelines by physicians providing pharmaceutical care information to illiterate patients. The results showed that the level of formal education among the research sample influenced their interpretation of the images (pictorial instructions). Also, providing visual information in the form of information packages (mobile, website, etc.) and contextual information, makes patients more likely to follow physicians' guidelines. Deo, Nichols, Cunningham, Witten and Trujillo (2004) designed a text and image interface for developing a digital library user interface for low-literate and illiterate people. Parmar, Groeneveld, Jalote-Parmar & Keyson (2009) in a study designed an intuitive and customized user interface for the presentation and interaction of health information among Indian rural women. The results showed that visual interface dramatically enhances rural women's general acceptance of new technologies. Taoufik, Kabaili & Kettani (2007) developed a portal based on visual and audio interaction systems that enabled low-literate and illiterate people to use e-government services. In the study conducted by Alam, Masum, Rahman & Rahman (2008), the design of an electronic voting system with a hand-touchable hand-held interface enabled the participation of illiterate and low-literate people in electronic voting systems. In another study, Kassam Vaillancourt & Collins (2004) analyzed how images are interpreted and understood in non-European cultures. They divided their research into three groups illiterate, low-illiterate, and officially educated people. The results showed a significant difference between the individual's education level and their ability to interpret images accurately through different media. In a study, Medhi, Sagar and Toyama (2006) designed an app for illiterate people of Indian society to search for information based on sound and image. Their results show the considerable likelihood of users searching for image data. Other such studies can be found in Ávila and Gudwin (2009), Chan, Mahastama and Saptadi (2013), Chan and Sengupta (2013), Thatcher, Mahlangu and Zimmerman (2008), Heukelman and Obono (2009), Woldmariam, Ghinea, Atnafu and Grønli (2014), Medhi et al. (2006), Mittal, Agarwal, Gupta and Madhur (2014), Barclay, Brown (2017), and Nordberg (2010).

Research that proposed user interfaces are based on text format. Friscira, Knoche and Huang (2012) created a system called EasyTexting for Hamran phones. The process of word formation and reuse of words used in previous searches and their conversion was significantly facilitated for illiterate and illiterate people. The text-based and keyword search process is related mainly to user interaction with information retrieval techniques. In their research,

Medhi, Gautama, & Toyama (2009) showed that computer and user interactive methods that are purely text-based and keyword-specific are unsuitable for illiterate or low-literate people with low literacy. Studies whose proposed user interfaces are based on multimedia format: in the survey, Akan, Farrell, Zerull, Mahone and Guerlain (2006) at the University of Virginia researched the design and application of an app to collect data on alcohol abuse and depression in a rural community. The results showed that interacting with rural people on the one hand and collecting the above data through a voice and multimedia interface is much easier due to the confidentiality of the information and no need to visit the health centers. Katusiime and Pinkwart (2019) designed an Android-based app to provide health information to illiterate women in Uganda. First, they used a semi-structured interview and group discussion to estimate the information needs of the target community. The results showed that multimedia information and repeating as well as alarming information can be effective in illiterate women using information technology (like mobile). Also, Ullmer and Ishii (1997), in another research paper, devised a solution for sending and receiving an e-mail to illiterate people, in which email content was sent or received as a video file. In a similar study, Wirastuti, Luckin, Sheriff, Walker, Underwood and Dunckley (2008) explored the use of wireless, mobile and other access technologies at any time and place (Ubiquitous Technology) in exploratory research, an informal learning system based on interactive learning among the agricultural population in Kenya. Other such studies can be found in Mahmood, Shabzadi and Tariq (2014), Gavaza (2012), Medhi, Lakshmanan, Toyama and Cutrell (2013), Medhi, Parsad and Toyama (2007), Findlater, Balakrishnan and Toyama (2009), Medhi, Patnaik, Brunskill, Gautama, Thies and Toyama (2011), Al-alaouli, Ohannessian, Choueiter, Akl and Avakian (2006), and Adama, Shehu, Adepoju and Jimoh (2017).

Studies that proposed user interfaces are based on audio format. In a study, Patel Ormandjieva & Pitula (2019) presented a new model of information technology adoption by illiterate and disabled users. In this study, the acceptability of using mobile technology was investigated. The research method was experimental. Other studies can be found in: The results showed that using natural language and audio and text-free information could encourage low-literate and physically disabled users to use information technology. Sherwani et.al (2007), Barnard, Davel and Van Huyssteen, (2010), Kumar, Metze and Kam (2014), Huenerfauth (2002), Ghosh et.al. (2014), Al Barhamtoshy et al. (2014), Sherwani, Palijo, Mirza, Ahmed, Ali and Rosenfeld (2009).

Also, in a few kinds of research, moral, cultural barriers and issues of access of illiterate and illiterate people in the process of information seeking are addressed; for example, Plauche, Nallasamy, Pal, Wooters & Ramachandran (2006) designed and proposed a user interface for illiterate people in a study called Speech Recognition for Illiterate Access to Information and Technology. Their results showed that variables such as cultural and ethnic diversity, type of content, accessibility cost, and multilingualism were the most influential factors in designing applications for such applications. Most of the research was done in less developed or developing countries. In developed countries, such studies are more about upgrading previous user interfaces rather than optimizing them for illiterate or illiterate people. Second, most research seeks to change text and keyword user interfaces to textless user interfaces, using audio, video, and multimedia formats or a combination of both. In the present study, while using the results of previous research, a quantitative and qualitative approach and the use of the subjects' local language will complement previous studies. Also, in the present study, the central

gap that the results of this study can cover is primarily the conduct of such a research project in Iran with the variables under investigation (in this article). Most of the research in the field of information retrieval on the web is done among literate people such as students, faculty and even professionals. On the other hand, in the present study, it has been tried (based on the authors' expertise) to study as much as possible the various variables that were important for the authors of the previous Iranian research. Therefore, a comprehensive study should be based on previous backgrounds and complement them.

Materials and Methods

The research method in this study is quantitative and qualitative, i.e., mixed. This type of research, philosophically based on the pragmatism approach, with the emphasis on paradigm convergence and the avoidance of conventional quantitative-qualitative positions, seeks to combine both quantitative and qualitative approaches in a single study simultaneously (Doulani, Hosseini Nasab & Niknafs, 2010). It is consecutive or variable. The research population consisted of low-literate and or illiterate people in Urmia (West Azerbaijan Province); considering that the low-illiterate and illiterate people studied in this research had no work experience in using the virtual world (they only had non-smart mobile phones), Therefore, identifying the research samples and convincing them to participate in the research, especially due to the quality of the research method and the need to conduct interviews and participate in the process of practical information seeking, was very challenging. According to this, through snowball sampling, people were identified by themselves, and this was done until the collected data reached saturation level and no new data was obtained by importing new samples. So, a total of 65 individuals were selected using snowball sampling. Table 1 shows the demographic characteristics of the participants. Of the 65 participants, the majority of participants (n = 35, 62 percent) were female. By age, most participants were above 40 years old (n = 38, 58 percent). Most participants (n = 42, 65 percent) were illiterate.

The steps for conducting this study were as follows: First, by designing qualitative research of ethnographic type, we examined the critical information needs of the research sample. In the next step, a collective interview was carried out to recognize the reasons for not using the Internet to meet their information needs (other than illiteracy and low literacy), and their views on using the Internet as a source of information were collected. After equalizing the process and information needs, a website was designed for the research sample to use and was provided to them. It is noteworthy that the interview conducted according to the research sample was only for the initial assessment of the information needed in the form of general topics. Figure 1 shows the designed website.

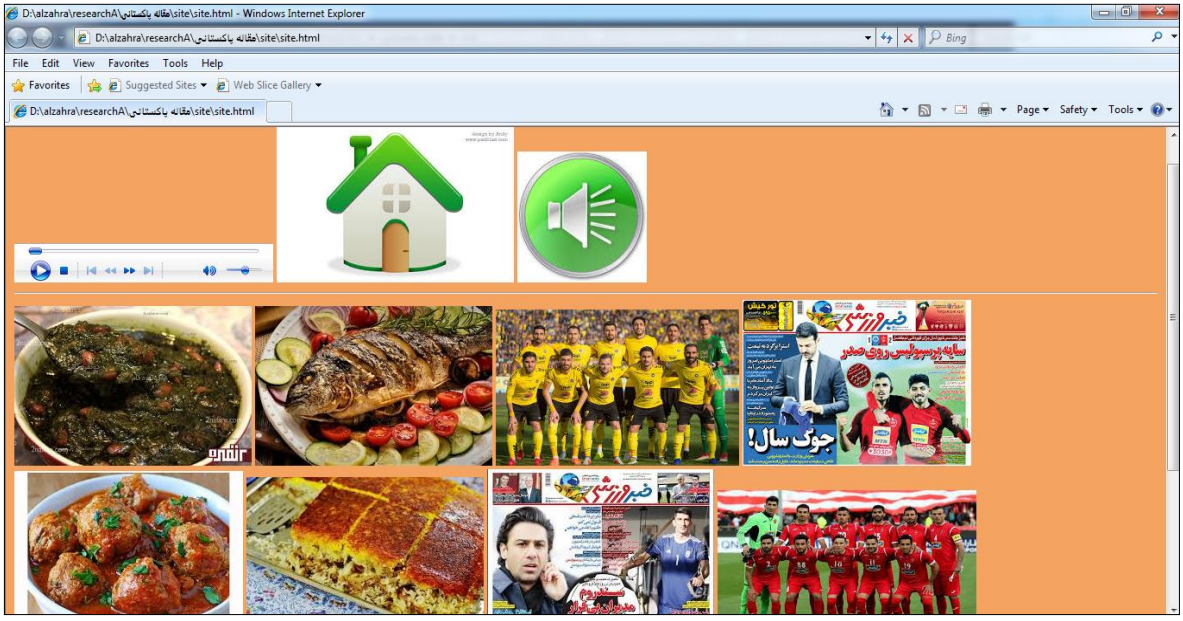

Figure 1: Website designed for illiterate low illiterate people

Before the onset of the information retrieval and information search process, the samples were provided with a very brief tutorial on the basic concepts of clicking and copying the site's address and so on. The evaluation of the capabilities of using the designed website was carried out considering the information obtained from the research sample and the standard ISO9241-11. In this standard, usability is defined as the amount of product use by specific users to achieve specific goals with efficiency and satisfaction in a particular context.

The designed website enjoyed audio support in the local language. The information contained within the website was based on the users' need for information, including sports and cooking information, which included the highest demand from the male and female sex. In addition to audio and video, on the details page, there was also the possibility of printing text information to receive a print version for later use or to get help from others (literate people). The website was also designed to automatically play a video immediately after uploading the site's URL, providing a complete overview of the website and the content of the information contained therein, and then the user accessed the video. Meanwhile, the users provided the image information by moving the mouse on each icon. To comply with the ethical standards of the research, a consent form was developed for the participants to fill in. Because the participants were either low-literate or illiterate, the text of the consent form was read to them, and the researcher found their verbal approval. The experiment continued when the participant's satisfaction was achieved at all stages. Research samples were asked to ensure sufficient information in this step. Finally, after the research samples got familiar with the website, to assess their satisfaction with the website and its efficiency in meeting their information needs, a test was designed based on information from the website, and the users answered the questions orally. Accordingly, the website's effectiveness was determined by asking ten questions to each user based on which three dimensions of effectiveness, efficiency and satisfaction were evaluated. These questions were mainly about the areas of interest of the research sample (male and female), which included the fields of cooking and sports.

Further questions were asked about finding the same information on the website. For

example, “search for news about your favorite sports team?” Or “Search for your favorite recipe?” Success in finding the desired information was then recorded based on the search results of the sample under study and their satisfaction with the information.

Therefore, research objectives, the following questions were raised as research questions:

1. What is the user’s rate of effectiveness of using the designed website?
2. Is there a significant relationship between the effectiveness of using the website design and the gender variable?
3. What is the efficiency of using the website by users?
4. Is there a significant relationship between the efficiency of the website and the gender variable?
5. What is the rate of users’ satisfaction with the use of the website?
6. Is there a significant relationship between users’ satisfaction and gender variable?
7. Is users' previous experience using computers and smartphones effective on effectiveness, efficiency and satisfaction?

Results

In this section, data analysis using descriptive and analytical statistics is presented:

The interview conducted in the present study was conducted in two parts and stages. First, to research the type and context of the information of interest in the sample research, and in the next stage, questions to measure the efficiency and effectiveness of the website designed for them. In the first stage, it was found that 93% of women participating in the study were more interested in information about cooking and housekeeping, while 96.5% of men were interested in news and sports information. Also, the results of the second stage questions showed that 81.6% of women successfully retrieved the desired information from the designed website (using local language, non-textual search, etc.), and men also had a success rate and satisfaction of 87.32%. Dedicated to themselves.

Also, descriptive statistics are provided from the demographic information of the research sample (Table 1).

Table 1

The demographic profile of the participants

Constructs	Indicators	Frequency	%
Gender	Male	30	0/38
	Female	35	0/62
Age	30-40	27	0/42
	Above 40	38	0/58
Levels of study	illiterate	42	0/65
	Low illiterate	23	0/35
Total	-	65	100

What is the user’s rate of effectiveness in using the designed website?

Effectiveness: Bevan Carter and Harker (2015) defined effectiveness as success in achieving specific goals. The present study considered finding the required information with the least amount of time and so-called clicks. For this purpose, the number of optimal clicks needed to reach the necessary information was at least three and a maximum of 5 clicks. The collected data showed that, on average, the maximum and the minimum number of clicks of the

subjects were between 3.61 and 7. The average number of clicks to reach target information based on ISO9241-11 was 3.98, with a standard deviation of 1.12. One sample t-test showed no significant difference between the number of desirable and effective clicks (based on the standard) to reach the target information and the number of clicks on the part of the subjects. Therefore, website designing and brief training have guided the subjects to the required information (Table 2).

Table 2
The effectiveness of using a website designed on the part of the users

	Test Value = 3.98			
	t	df	Sig. (2-tailed)	Mean Difference
effectiveness	6.473	64	.097	4.5

Is there a significant relationship between the effectiveness of using the website design and the gender variable?

In the next step, the subjects' access to objective information was evaluated based on the number of clicks and gender. For this purpose, and due to the non-randomness of the research sample and its inadequacy, the non-parametric Mann-Whitney test was used. The test results (sig = .932) showed no significant difference between males and females and the number of optimal clicks to reach the required data (Table 3).

Table 3
Mann-Whitney U test results to measure the difference between the effectiveness of the website and the gender variable

	effectiveness
Mann-Whitney U	70.500
Wilcoxon W	148.500
Z	-.088
Asymp. Sig. (2-tailed)	.930
Exact Sig. [2*(1-tailed Sig.)]	.932b

What is the efficiency of using the website by users?

Bevan et al. (2015) described efficiency as not wasting time, so efficiency is acceptable when it takes less time to achieve the desired information. In this research, efficiency can be expressed as task completion time. Task completion time is the time it takes users to perform a search and get the desired information; in other words, it is the number of times users need to view the detailed information. Dix (2009) believes that an application should have enough information to interact with users to understand the information correctly. In this research, due to the low literacy or illiterate users, detailed information was included in the site in audio and in their language. So users could listen to this information several times. As listening more than once increases the time it takes to get the information it needs, the frequency of listening to it effectively affects the system's performance. The results of one sample t-test indicated that users listened to detailed information 1.19 times on average. As the average equals one according to the standard, given the significance (Sig. = 0.231) of the relevant test, the information included was sufficient, and most users did not need to reuse them (Table 4).

Table 4

Test results for mean difference for the website efficiency measurement

	Test Value = 1			
	t	df	Sig. (2-tailed)	Mean Difference
efficiency	1.473	64	.231	1.19

Is there a significant relationship between the efficiency of the website and the gender variable?

The next step was to examine the relationship between the website's efficiency and gender. For this purpose, Mann Whitney Test was run due to the non-randomness of the research sample and its inadequacy (like the previous hypothesis). The results showed (Table 5) that there was no significant difference between males and females and the number of optimal clicks to obtain the required information (Sig. = 0.431).

Table 5

Mann-Whitney U test results to measure the difference between the efficiency of the website and the gender variable

	Efficiency
Mann-Whitney U	16.500
Wilcoxon W	36.500
Z	.059
Asymp. Sig. (2-tailed)	.426
Exact Sig. [2*(1-tailed Sig.)]	.431b

What is the rate of users' satisfaction with the use of the website?

To measure the users' satisfaction with questions, the Likert scale was used. As a result of the low-literacy and illiteracy of the participants, the questions on the information obtained through the site were read to them. Concerning the 5-point Likert scale, the average median satisfaction was considered 3. The average satisfaction of 4.4 was estimated with a standard deviation of 0.29. There was also a significant difference (Sig. = 0.001) between the standard median and the calculated median, and the level of satisfaction was high (Table 6).

Table 6

The measurement of satisfaction with the designed website on the part of the users

	Test Value = 3			
	t	df	Sig. (2-tailed)	Mean Difference
satisfaction	18.126	64	.001	4.4

Is there a significant relationship between users' satisfaction and gender variable?

Also, by performing Mann-Whitney statistical tests, there was no significant difference between the two sexes (Sig. = 0.342) to measure the significant difference between male and female gender and satisfaction (table 7).

Table 7

Results of Mann-Whitney U test to measure the difference between satisfaction with website and gender variable

	satisfaction
Mann-Whitney U	18.660
Wilcoxon W	42.700
Z	.059
Asymp. Sig. (2-tailed)	.330
Exact Sig. [2*(1-tailed Sig.)]	.342b

Is users' previous experience using computers and smartphones effective on effectiveness, efficiency and satisfaction?

This section tests the hypothesis that users' previous experience using computers and smartphones affects their effectiveness, efficiency, and satisfaction. Thus, users' effectiveness, efficiency and satisfaction scores were distinguished into two groups with previous experience using a computer or mobile phone (used in any case) and those without prior experience. Concerning the sampling method, Mann-Whitney non-parametric test was applied. The results of the tests (in three stages) between the two groups of users who had the experience of previous use of information and communication technology (ICT) with the other groups that did not have any experience showed no significant difference in the variables studied (effectiveness, efficiency and satisfaction). Therefore, the design of such websites for low-literate and illiterate individuals can facilitate the search for information and satisfy their needs like other ordinary users (Table 8).

Table 8

Mann-Whitney U test results to measure the difference between satisfaction, efficiency and effectiveness based on previous users' experience

	effectiveness
Mann-Whitney U	11.326
Wilcoxon W	29.422
Z	.074
Asymp. Sig. (2-tailed)	.159
Exact Sig. [2*(1-tailed Sig.)]	.186b
	efficiency
Mann-Whitney U	19.550
Wilcoxon W	33.369
Z	.088
Asymp. Sig. (2-tailed)	.168
Exact Sig. [2*(1-tailed Sig.)]	.201b
	satisfaction
Mann-Whitney U	18.524
Wilcoxon W	40.520
Z	.064
Asymp. Sig. (2-tailed)	.310
Exact Sig. [2*(1-tailed Sig.)]	.335b

Discussion

Adult literacy and education are among the most important strategies for developing and increasing production in any country (Al-Barhamtoshy et al., 2014). Due to the problems in underdeveloped or developing countries regarding public education such as lack of qualified teachers, lack of educational space, the concentration of educational facilities in metropolitan areas, the density of most illiterate people in rural areas and far from large urban areas, lack of financial means for the illiterate to pay for their education, etc., It seems that it is necessary to use alternative solutions, especially the use of information and communication technology. This research was exploratory research to provide an ICT solution to the low-literate and illiterate people in Iran to use cyberspace as a new way of finding the information they need. In this study, designing a website that uses graphic and audio content met the needs of users to someone else familiar with cyberspace technology. In so doing, a website with the specifications presented in this study was designed. Given that the sample used in the study consisted of males and females, information on cooking and sporting sections was included on the website. As the results showed, graphical and audio design and the inclusion of detailed information increased data to use quickly and accurately. Accordingly, the design of such websites made the amount of time spent searching for the information needed to a large extent, similar to that of ordinary users. Thus, information retrieval from cyberspace can be considered one of the ways to find the information required for low-literate or illiterate users. It can be said that users were generally satisfied with working with such websites. Also, ease of use is one of the effective factors in the inclination of low-literate or illiterate users to use cyberspace. Given that there is a dearth of research in this area, especially concerning low-literate or illiterate users, comparing the results of this study with those of other studies is difficult. So the results of the first question of the research showed that the effectiveness of optimized website design (design based on image and local language) has greatly increased and has encouraged low-illiterate and illiterate users to use it. Regarding the impact on performance (third research question), the design of such websites also showed a positive effect on performance. Accordingly, the results indicate that changing the common patterns in website design and moving to non-textual websites can largely solve the interaction problem of low-illiterate and illiterate users with user interfaces and, thus, the use of the virtual world. Also, by examining questions 2 and 4 of the study, which measure the effect of gender of the research sample on efficiency and effectiveness, it was found that users in the process of interacting with the website designed by both sexes have a similar situation, so gender in the rate of use or success They have not been effective in searching and retrieving information. Therefore, the type of website design and user interfaces is still effective variables in this field. However, some studies such as those carried out by Sein, Thapa, Hatakka and Sæbø (2019), Khan et al. (2017) in Pakistan, Reppou and Karagiannis (2015), Deo et al. (2004) in the United Arab Emirates, Medhi et al. (2006), and Parmar et al. (2009), can be pointed out the results of which are to a large extent similar to those of the present study. On the other hand, the results of this research and similar research show that although the number of illiterate and low-literate people in advanced countries has decreased to a large extent, and such countries do not need to design such websites in cyberspace, low-literate and illiterate users in underdeveloped and developing countries encompass a significant population. According to the World Bank, the rate of addiction of illiterate people to drugs in underdeveloped and developing countries is significant (Keefer, Loayza & Soares, 2010). Undoubtedly, educating and informing the mentioned people about

the consequences of addiction and providing solutions to get rid of this disease, considering the problems mentioned in the above lines regarding the face-to-face training of illiterate adults, can be said to provide virtual and distance education be constructive. So, the provision of the services required by this group of users in any way, including appropriate cyberspace, increasing the literacy rate, and addressing the information needs of this group at a far lower cost than traditional teaching methods, can be considered one of the necessities of governments. In general, based on the results obtained as well as previous research, it can be stated that the design patterns of websites and user interfaces are based on the designers' knowledge of their search method and also the low limitations of illiterate and illiterate people in this regard, Equally, the use of such people in the virtual world to meet information needs will increase. Research and design of such systems are significant and vital in underdeveloped or developing countries with relatively high illiteracy rates. Because most governments lack financial resources for formal and face-to-face education, the existence of cultural and economic restrictions for uneducated adults can provide permanent and formal education to members of society. In the meantime, it seems that given that the main designers of user interfaces and websites, as well as search engines in developed countries, the participation of researchers in these countries in examining the infrastructure and information needs of illiterate people in underdeveloped countries is necessary and it is necessary. This point becomes more apparent when carefully observed in the background of the research in the present study. Most of the research in this field has been done by researchers in less developed countries. Another important issue in this study is the desire to learn from illiterate and low-literate people. As mentioned in the methodology section, one of this study's challenges was convincing the research samples of the need to learn through cyberspace. Because most of these people (illiterate and low-literate) are naturally poor and unfortunately do not know the reason for this economic poverty, which can be partly related to their illiteracy. This causes such people to suffer from compound ignorance, which means that they do not know that they do not know. This will divert the learning process. Therefore, it is suggested that this issue be considered in other studies conducted by learning, education and psychologists. In general, the research results show that by performing interventions, albeit small, the reaction of low-literate and illiterate people to the encouragement to use the virtual world increases. According to the Statistics Center of Iran[1], out of the population of 84 million people in Iran, 30 million people are currently illiterate and illiterate, of which about 9 million are completely illiterate, which is a high number. Be. Undoubtedly, joining the ranks of potential users in the ranks of network information users who are not able to use this information due to a lack of necessary skills (sometimes elementary skills) can be a great change in the field of the information economy, online marketing, increasing the profitability of Internet corporate and achieve the goal of government and e-citizen. The importance of this issue in the importance of intellectual capital can be interpreted from another dimension. Jordão, Novas and Gupta (2019) believe that intellectual capital will be a way to promote organizational performance improvement that will result in improved financial status, marketing growth, efficiency, innovation and competition. The results of the present study show that due to the high penetration rate of the virtual world in human life, even low-literate and illiterate people are encouraged to use this technology with little publicity and advice or training (Goal 7 in the research). It seems that more education and design of appropriate online information systems for this group can quickly lead to the entry of this group of the population, which in less developed and developing countries includes a

significant population, into the virtual world. Undoubtedly, joining a significant number of potential users to the networked world can create a new market for Internet businesses. Another advantage of this is that governments are not required to use old platforms to interact and provide services to this group and can provide services to all users of society in the context of an (electronic) platform that will bring high economic benefits.

Conclusion

In the present study, various variables were examined to enable the retrieval of information by illiterate and low-literate users who, in some way, in developing and less developed countries, do not have the possibility of specialized use of cyberspace. The use of non-textual information, the use of local language for user interaction by the website, etc. can be cases that in the present study were examined for the first time in such statistical communities. Comparison of gender variables in information design and retrieval was another important factor addressed in the present study from different perspectives. The results of this study show that illiterate and low-literate people, who have a significant population in underdeveloped or developing countries, can join the population using cyberspace by offering unique options. On the other hand, the continuous use of cyberspace and being in the world of information can be a stimulus for the literacy of this group. Therefore, it is suggested that research in this field, especially measuring and monitoring the variables that cause this group to become ordinary web users after becoming familiar with such information systems and increasing their skills.

Limitations

Since the present study population was low-illiterate and illiterate, the research time to prepare them to answer the questions was very long.

Conflict of interest

The authors declare no conflict of interest in this study.

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Endnote

1. https://www.amar.org.ir/%D8%A2%D9%85%D8%A7%D8%B1%D9%87%D8%A7%DB%8C-%D9%85%D9%88%D8%B6%D9%88%D8%B9%DB%8C/%D8%B3%D9%88%D8%A7%D8%AF#5549661-

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