Investigating the role of urban spaces in reduction of digital divide between citizens
(Case Study: Bam-e Tehran *Recreational Complex*)

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Abstract: *The information and communication technologies and their ever expanding and development have transformed all the basic concepts of human life, including the collective life of humans in urban spaces. Now these technologies have caused gradual and sometimes sudden changes in the concepts of space, so that, along with urban spaces, we are witnessing the creation of virtual environments with a wide variety of inclusive activities. This phenomenon led to the formation of virtual communities with a metropolitan state and the virtual universe formation in parallel with the real world. One of the implications of dual spatial and globalization for life of human beings is the creation of a crisis called the digital divide, which is associated with individualism, the reduction of social interactions levels, reducing collective life in the city's social spaces. The present study is carried out aimed to explain the role and capabilities of urban spaces on reducing the individuality of the crisis and promoting interactive levels and social integration. For this purpose, in the research process, three methods of environmental mapping, observation of behavior and interview with users in the Bam-e Tehran* Recreational Complex *have been used. The results showed that cyberspace is not considered as a substitute for physical space and serves as a complement to complete the social functions of urban spaces. Therefore, the creation of smart environments in this urban space and the creation of a hybrid space of physical and cyberspace, called the cyber park, will lead to an ever-increasing active presence of citizens and the promotion of levels of social interaction and ultimately reduce the digital divide among citizens.*

Keywords: Urban Space, Icts, Digital Divide, Social Interactions, Cyberspace, Dual Spatial And Globalization.

INTRODUCTION

Humanity has long been dependent on space and physical setting in order to meet its operational needs, and has continuously made the physical and spatial changes of the settings to optimize performance and accountability. In the turbulent world of today and in the era of information and communication technologies, all human behavior has been affected and has changed the behavior patterns of citizens in the urban community, so that we are seeing systematic, gradual, sudden, superficial, deep, and comprehensive changes in patterns of consumption, residence, social and citizenship patterns, and so on..Urban physical setting with significant potential and capacities as a responsive space to meet the needs of citizens has been changed by social, cultural, political events and so on because of the widespread expansion of information and communication technology and the changes caused by the emergence of the information society and is constantly rebuilding a new space. As a result of these changes due to digital technologies, social life, and communication, it has become a new form that creates differences in the perception of the nature of civilian life and the dual specialization as a collective life in the real world. One of the implications of dual specialization and globalization for life of human beings is the creation of a crisis called the digital divide, which has reduced the citizenship interactions levels, collective life in the city's physical setting. The present study is trying to answer these questions. What are the differences between the urban space in the digital age and urban space in the past considering the full implication of digital technologies in the everyday life of social activists? Can urban spaces act by applying physical changes to reduce the existing digital divide and strengthen social role? Should new requirements and standards be defined in urban space of digital age for collective actions?

LITERATURE REVIEW

Near the end of the 2nd millennium, a number of important events have transformed the outlook for human life. The technological revolution which has focused on information technology is rapidly re-establishing the material basis of society [1]. All of these revolutions - industrial, information technology ... - are characterized by acquisition and etc, by influence in all areas of human activity, not as a source of external influence, but as a tangible one in which such an activity is interwoven. In other words, these revolutions are focused on the process [1]. The new information technologies link the various parts of the world to one another in global networks. Computer communications have created a vast collection of virtual communities [1]. Beyond the use of digital

communications for informal social relationships as well as the instrumental use of this system, observers have become aware of the phenomenon of the virtual communities formation, which may increase the state of the metropolis and globalization of them by reinforcing social networks that are culturally dominant [1]. Thus, based on the emerging paradigm of globalization, with the development of the social space, we have entered the dual-space world from single-space universe, which is based on the industrial and technological foundations, and in the light of which, the world of simultaneous communications has been digitized, as well as the widespread and inclusive of world computer communication devices finds its meaning [2].Human communications in such a space has faced new challenges. In such a space, people are exposed to new communication day by day and in many ways; they are faced with the social world and, consequently, with values, norms, customs, and new issues. The shaped universes each have single users. Therefore, they can't be considered separate from each other, because both have a common point. Thus, the new world must be considered as a continuation of life in a new space, in which all processes are arisen in two physical and virtual dimensions [4]. The emergence of the virtual universe with the physical world has created five-dimensional combinations that have created great and paradigmatic changes in the living space. These five compounds are the cyber-physical of human communications, the cyber-physical of time, the cyber-physical of work, the cyber-physical of culture, and the virtualization of dependencies and attachments [3].

Now, as modern communications and industrial technologies with the emergence of the Internet, and especially the web over the past two decades, have provided the foundation for the same long-term wish of man, we live in a two-world space; the first world is the real physical world. And the second world is world is real, but virtual [3]. The emergence of the virtual universe over time changed the region in the physical world. The definition of time, place, reality, work, and many other basic concepts has undergone profound transformations. This profound transformation continued so far as to affect human identities. The concept of the second life of man, the wings of a new identity in the new world were formed from here, but, meanwhile, the change in human relations was the most important change that created this two-world space. In fact, the change in the communication space could bring the experience of a different social interaction into human life [4]. Technological changes are so fast and the dissemination of computer communications is so rapid that most of the research that was carried out in the 1980s is no longer applicable to social trends of the 1990s, that

is precisely the same moment when modern communication culture is emerging [1].

Deleuze and Guattari (1987) say that new forms of social relationships and networks are formed due to spreading cyberspace and advancing in new generation communications, and eliminate the boundaries of individual and collective identities, and even produce and reproduce different identities in cyberspace. According to Mohseni (2001), on the interconnection of technology and social changes, Augborn argues that technology is always the first factor in social change and since technology is changing rapidly and changes in social institutions are slowly taking place, cultural lag that is a kind of the distance between the systems of society will arise[7]. Also, according to McLuhan's theory, human beings are influenced by electronic communication devices, their social life is subverted, and all manifestations of human culture are changing. With the advent and development of information technologies and the formation of electronic environments, this discussion has arisen in specialized and general circles, in which individualism develops and disrupts the spirit of collectivism of individuals in societies and ultimately leads to a decrease in the active presence of users in interpersonal, group communications and social actions [8]. New technologies redefine content and interact with social institutions, such as government, education, and commerce [4].

According to Henry Lefebvre, multiculturalism is defined against monoculture life and functional integration instead of isolating and linking spaces instead of segmentation of them[15]. Such a space which is considered as integrated virtual reality, has features such as homeless, being beyond time, being pure industrial, unlimited civil laws relying on the nations state, from transformed epistemology, from post modernity, availability at the same time, being in space and having cultural, religious, economic, political space as well as freedom of new physical and sexual identity [2].

The place and time are the fundamental and material aspects of human life. The paradigm of information technology, and the social forms and processes that have originated from the current process of transformation, are working together to transform the place and time [1]. Today, the real world is combined with virtual world in such a way that its separation is very difficult. Time does not have the past space-based concept. Cultures are highly integrated and have lost their past spatial and temporal viability. Therefore, it is natural that identity faces with crisis in the new space in relation with time and space aspects and space-based culture[19]. In social theory, the definition of a place is not possible without reference to social functions. David Harvey, in his book, "The Condition of Post modernity", says: Time and space can't be understood independently of social

action. From the perspective of social theory, the place is the support of the social functions that occurs at a time [9]. In a study published by Craig et al on the relationship between cyberspace and urban space in 2016, they found that cyberspace does not act as a successor to urban spaces, but serves as a complement to improving the functional levels of urban spaces. In this study, which was conducted in 50 different states of the United States between 2000 and 2011, using the death of distance theory, several hypotheses were arisen, so that based on them if the Internet is used as an effective alternative to urban areas, residents of the marginalized areas of the city and villages had higher demands to benefit from virtual spaces. After studying, they rejected their hypothesis and, given the higher level of requests made by urban residents compared to residents of the village and Civic suburbanites, they found that the presence of cyberspace would improve the performance of urban space and respond to the user activity needs, and as a result, cyberspace can be considered as complementary to urban space performance[13].

In 2006, Adriano De souza raised another view of urban reality in the 21st century, in which the contemporary city has become into a hybrid space developed between physical and digital spaces and limited by information and communication technology. The duality of public spaces has become an influential fact on the many changes in urban typology and the redefinition of spatial, social, and technological needs[14]. Today, new digital layers have been added to the city's image which brings new and varied experiences for the public mind from different layers, both through direct communication and communication created by digital technologies, and in fact leads to redefine public spaces, which include both physical and digital aspects [12]. Therefore, information and communication technology can be considered as a kind of urban infrastructure that is effective in facilitating communication and information exchange. Considering the probable effects of new technology and introducing it into the main urban infrastructure should be considered at all stages of designing and implementing the development of urban environments. Accordingly, the impact of information technology should be investigated at various scales and levels in urban environments [15].

The advent of modern technologies has created a new experience of urban spaces with information boards and digital and light advertising. Modern technology provides a new redefinition of urban spaces. A strong element has been added to the defining elements of urban spaces. The new technology has provided innovative features to create a more attractive environment and experience richer than the urban environment for designers. If these new technologies are not used seriously in a variety of fields, urban environments will ultimately become inadequate of the rejection of reality and will be greatly affected and lose its meaning by the course of developments, culture and national identity in urban areas [15].

Urban spaces were considered as the main source of information and politics, as well as embracing diverse discussions and discourses before the invention of digital media. In addition, economic activity has driven the use of markets and retail outlets in public spaces as a place to go shopping[24]. With the growing growth of communication technologies, activities in the public domain were reduced because the information was easily accessible from the home by the Internet, which would sometimes make it unnecessary for parts and even for most of the physical displacement. This phenomenon led to the growth of electronic purchases, as well as the daily discussion of online communities. The Internet has shaped a new form of communal spaces called the message market and the death of distance theory [11]. Today, people engage in both cyberspace and physical spaces, formal or informal gatherings for the purpose of exchanging information, publish their experiences, or eliminate various types of restrictions such as time and space. Since the main role of open collective spaces is related to provide social encounters between people, staying in the way that they can rest and recreate the environment and enjoy, virtual networks have added communication channels and new media to real space. The following table compares the patterns of communication and social events influenced by the presence of digital technologies in the lives of the people of the community[23].

Investigating the emerging social structures in different areas of activity and human experience leads to a comprehensive outcome. As a historical process, the functions and processes dominant in the information age are increasingly organized around the networks every day. Networks form new social from of our societies, and the expansion of network logic generates dramatic changes in operations and outputs of production processes, experience, power and culture [1]. Dreyfus's view is that whatever people use the network more, they more tend to crawl in an unreal and lonely world, because the use of social networks reduces individual involvement in the physical and social world [16].

Social relations of space and communication pattern	Social relationships in real space	Social relationships in the network
Type of relationship	face to face	Online and through the network
Geographical distance	Close	Far
Relationship form	Relationships are somewhat necessary	The relations are selective and varied
The scope of the relationship	Limited number	Diversity and plurality of individuals and groups
Type of engagement	Fairly constant	Relatively variable and multiple
Relationship evolution	Relationships are gradual	Relationships are faster
Attitude and Desire	Attitudes and interests are different and sometimes close	Attitudes and interests are somewhat the same
Language	common language	Different languages

Table 1 Comparing social events in two real and virtual spaces [8]

The increasing use of the Internet, satellite, computer and ... among the various strata of the society has caused various social groups to be exposed to these new means of communication and their indigenous world is linked to global issues through these new means of communication [17]. Other studies conducted by other researchers, in particular Saroukhani and Rezaei Ghadi (2012), Koohi and Hasani (2012), show that with the increasing expansion of new media such as virtual social networks, especially in transitional societies, the modernization process weakens traditional links. These media can affect citizens' attitudes and behaviors and reduce empathy, national belonging, and social cohesion [20, 21]. Memar et al quoted Tomba define the three features of social networks as follows: the space-time compression, the lack of sense of space, and the faded ranges and changed communities, we must keep in mind that every human must be in a special space or time[18]. Continued advances in the era of information technology and revolution that has emerged by mobile phones, wireless Internet, Bluetooth, the Global Positioning System (GPS) and all of their utilities, have had a tremendous impact on the interpersonal interactions ways and interactions between humans and the physical environment around them, and this question arises that "How the nature of these technologies affects the level of use and establishing relationships in communal spaces, and how urban planners can create a new kind of vitality, attractiveness, security and sustainability of communal spaces using the foundations of these technologies? [11]. In studies conducted by Keith Hampton et al on the effects of technology on Social Interactions, and in response to questions about How have the changes been made in the behavior of humans in the collective space of the digital age? And how much human interaction in the pre-epochs of electronic devices has undergone a change?, Using the time-lapse photography method in the Bryan Park in the early 1980's and comparing it with a film that was similar to that of the contemporary era, they examined the behavior of people in this area by using the PPS indicators. They arrived at interesting results that people in the past tended to relate more to face-to-face relationships and social life, but in the present day, people are more inclined to individualism in urban spaces by using

communicative technologies, and are less interested in collective life and social mixing. They also found that mobile telecommunication and electronic communication equipment was largely used only by those who are single in urban areas or who are waiting for someone to join them or to be used in transit spaces between two destinations in order to spend time [5].

METHODS AND MATERIALS

this article is concerned with the long-term evolution of urban societies as they struggle, change and evolve through the introduction of new communications technology. A challenge we face is recording, representing and understanding the patterns of presence and use of diverse forms of interaction spaces that are emerging in our scope of the study through the use of digital technologies. In the research method used in present study, in order to explain the basic notions and the concerns raised therein, the research method is analytical-survey using the three tools of environmental mapping, behavior study and interview with users over the two-month period, in the study area used. Therefore, we will explain how to use the research tools and, by introducing the scope of the study, we will analyze the findings and elaborate them.

- Environmental mapping tool: Using satellite maps, the study site first is limited and then activity layers, users, breathing space, transition spaces, passages and population centers are determined by staining on maps and how the overlapping different layers harvested is analyzed with two other tools.

- Viewing and studying users' behavior tool: mainly by flushing in space and visual perceptions using video recording, time-lapse method, variables such as usage time, duration of use, location, as well as the frequency of use of digital tools by users in urban space were studied. Took Results and findings are presented in the form of tables and charts separated by each variable.

- Interviewing Users Tool: According to the Statistical Center of Iran report, the stationary population of Tehran in 2017 has been counted as 1360,000 people, which was used to determine the sample size using the Cochran formula. The sample size of the statistical population

was 385 people, who were randomly selected among the users over the age of 6 years in the two months period, interviews on the type and type of use, as well as the reason for use of these technologies when they were present in the urban space, were studied.

Introducing the scope of study

Bam-e-Tehran complex begins at the highest point of the Velenjak Street at an altitude of 1830 meters and ends at a height of 1910 meters above sea level at the Tochal ski lift 1th station. Bam-e Tehran Recreational Complex, as one of the successful urban spaces in northern Tehran, has been able to play a significant role in attracting citizens in order to spend leisure time using the natural bedding in the mountain range of Tochal. The beautiful and hearty landscapes, the clean air of the mountains, add to the cleanliness and refinement of the area. There are many leisure and tourism facilities along the 2-kilometer walking route of the complex, in addition to restaurants serving Iranian and international food, fast food and coffee shops, as well as sports and flower equipment booths. Due to its location in one of the northernmost parts of Tehran, Bam-e Tehran Recreational Complex, has always served as a service space for all citizens of Tehran. About the reasons for choosing this urban space among other urban spaces of Tehran, in order to carry out the research process, it can be admitted that due to the location of the complex, by looking at the activity indicators proposed by Jan Gehl and the triple classification of activities in urban space, essential, optional and social, Bam-e Tehran Recreational Complex can be considered as a subset of spaces with the responsive performance to citizens' optional activities. With this explanation, it can be said that this urban space with the purpose of the destination space is considered as a suitable space to pass leisure for the citizens, so users refer to this complex in a fully selective manner, which is one of the main aspects of distinguishing this complex with other urban space in Tehran. Given that this can be considered as a destination space, it can be concluded that the functions of this urban space attract more and more users, hence it seems that existing functions leads to the active presence of users, and the promotion of the level of collective living in this space. The fact is around 20 years past, it was the space of common sense, of knowledge, of social practice, a space hitherto as the environment of and channel for communications. But today, with the full penetration of digital technology, cyberspace, and its links with people's life, according to observations, the growing presence in the virtual world by citizens in this urban space has reduced the active presence of users, collective participation, collective life, consequently, the social functions of this urban space. therefore, we are witnessing the transformation of an active to passive urban space. In the following, analysis of the data extracted from the research tools, the reasons for inactivity, and solutions for improving the performance are presented.

DISCUSSION AND RESULTS

Looking at the environmental maps obtained, the areas with high population density are concentrated near the active users and at the edges of this urban space. There is also a direct relationship between the use of digital technologies and population density. Therefore, the largest statistical population studied, through the observing and interview with users tools, was considered at the high-density sites. Figure 1 shows how overlapping of various activity layers, and density of points of use of virtual spaces and digital technologies.
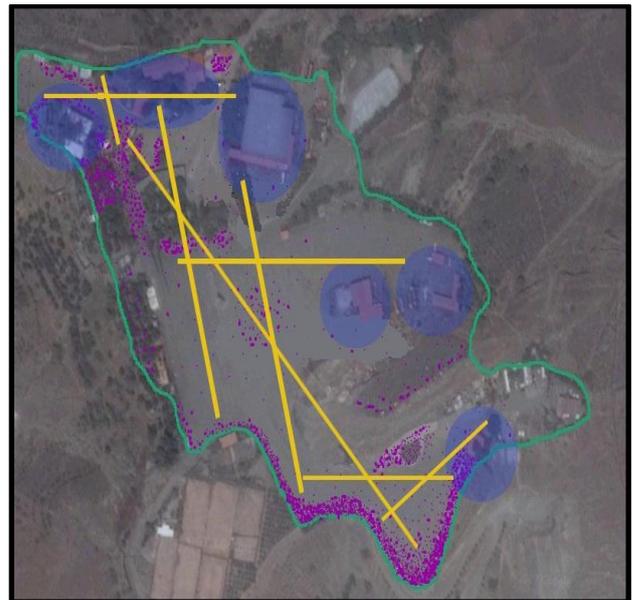
Figure 1 Overlapping of the layers of communication, performance and population density which use cyberspace
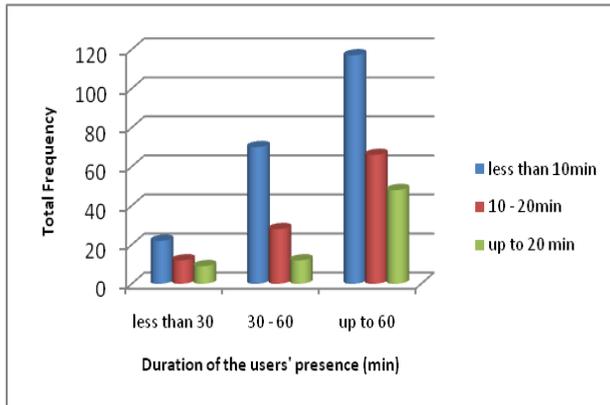Source: Authors.

By using the observing and studying behavior tool, users in this urban space can be categorized in terms of the duration of the use of digital communication and cyberspace technologies into the three time intervals which had the highest frequency. Also in the other category, the duration of the users' presence was considered in three time intervals. The results of the relationship between the two variables, the duration of users' presence in space, and the duration of the use of digital technologies and cyberspace can be seen in Table 2.

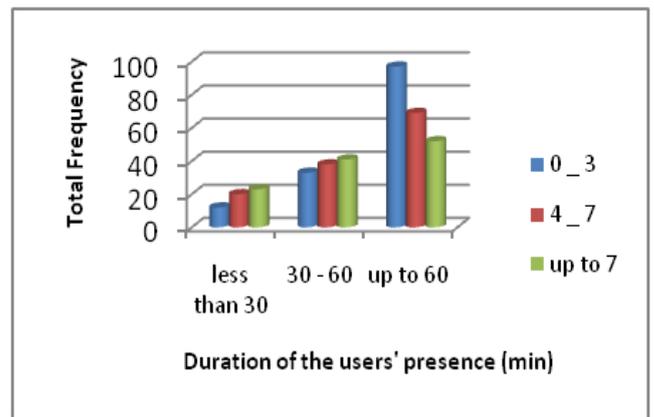| Duration of presence (Minutes)	Duration (min)		
	Less than 10	10 - 20	Up to 20
Less than 30	22	12	9
60 - 30	70	28	12
Up to 60	117	66	48
total	209	106	69

Table 2 Relationship Between duration of Users' Presence in Space and Duration of Use of Digital and Cyber security Technologies, Source: Authors

Duration of Presence (minute)	Number of visits to cyberspace		
	0 - 3	4 - 7	Up to 7
Less than 30	12	20	23
30 - 60	33	38	41
Up to 60	97	69	52
total	142	127	116

Table 3 Relationship between the duration of users' presence in space and number of visits to cybernetics, Source: Authors

Figure 2 Comparison of the variables including duration of presence and duration of the use, Source: Authors

Figure 3 Comparison of the variables, including duration of presence and frequency of use, Source: Authors

According to Fig. 2, it can be said that the duration that people in this urban space use digital technologies and cyberspace have a direct relationship with duration of their presence in space, and whatever more people spend their leisure in this space, spend the longer time in cyberspace. Therefore, it can be concluded that Bam-e Tehran Recreational Complex, in order to continue the active presence of users and the continuity of collective actions, needs to strengthen social functions in order to respond better. Regarding the observations and usual frequency in the multiplicity of users 'use of cyberspace and digital technologies, the three categories were considered for the number of referrals, which results from the relationship between the two variables, the duration of the users' presence in space, and the number of visits are presented in Table 3.

The results of the comparative study in Figure 3 show that whatever more people spend more time in this complex, they go to cyberspace more often. This suggests that this urban space is much replaced by cyberspace, which can be attributed to the exact updating of cyberspace and the uniformity of physical space. To find out why the relationships created between the variables discussed with the observation tool and environmental mapping tool, we reach the third step in the research that we are interviewing with site users. In the first step, how and type of use of digital technologies were asked from interviewees whose results and dimensions are shown in Table 4. The results indicate that the use of digital technologies has been the most widely used, despite the presence of people in communal spaces, the social function of cyberspace is the most frequent. Therefore, social functions in this urban space should be in line with the greater social interference of citizens and increase the various dimensions of social life in cyberspace with facilities in the physical space. Such facilities include the creation of virtual social environments dedicated to this urban space in which citizens have the possibility of interaction and social integration to strengthen collective life.

Type of use	Dimensions	frequency	percent
Searching for health and hygiene.	Health messages, medical advices, health advice	43	11.16%
Communicating with service provider websites.	Asking questions and getting answers in a variety of areas: psychology, scientific research, cooking	62	10.16%
Getting information from government agencies.	Studying news, conferences, Call for recruitment of government agencies	35	9.09%
Sending and Receiving Email.	Correspondence interactions via electronic mailbox	291	58.75%
Calling over the Internet.	VOIP	136	32.35%
Participating in social sites.	Including membership on sites such as Facebook, Twitter and Instagram	342	83.88%
Ordering or buying goods and services.	Including ordering and purchasing goods from online and online sales sites	178	23.46%
Watching TV over the internet.	Internet and non-web networks through special online distribution software	93	15.24%
Game, photo, movie or music.	Online games, software downloads, photos, videos or music	194	38.50%
Reading newspapers, magazines and books.	Newspapers and online magazines and e-books	87	59.22%
Personal web page management	Control, deleting and adding information for sharing	357	72.92%

Table 4 Types of using digital technologies in urban space, Source: Authors

Reasons to use cyberspace from the perspective of users	Frequency	Percent
	385	100%
Selective activities	154	40%
Uniformity in the physical space function	263	68.31%
Duplication of activities in physical space	302	78.44%
Being diverse	180	46.75%
Being inclusive	207	53.76%
Death of distances (distance interactions)	286	74.28%
Updating every one minute	298	77.40%
Selective interactions with preferential social class	284	73.76%

Table 5 Opinions of interviewees for using cyberspace, Source: Authors

The nature of digital spaces provides a virtual concept of freedom and security, since its users can choose groups with their preferences for interactions, define boundaries and limits for their personal bubble, choose one type of immunity and share their opinions freely.

CONCLUSION

The role of information and communication technology networks in the processes of shaping social interactions, as well as their optimization, potential, and their return in this public space, was analyzed, which has provided new ways of recognizing and exchanging them as new examples of behavioral models. In Table 6, the physical and virtual public space has been compared in different ways, which can be understood the differences existing in the past urban space with contemporary urban space in the digital age.

physical space	Digital space
Local identity	Global identity
The sense of belonging to local communities and groups	The sense of belonging to virtual groups
Chance of accidental and unexpected confrontation	Predicted confrontations
Social Identity / Cultural Identity	Group identity / Virtual culture
The sense of ownership of the physical space	No sense of ownership
Physical constraints / Developmental is not possible	Unlimited - without physical limitations
City symbol / identity	Dual identity
Relationships between groups but appearing	Communication with secret groups / Opportunities for separation
A space for everyone	For users of digital devices only
Social relationship between acquaintances	Talk / Chat / Social communication between strangers
Possibility of spontaneous visits	Tools-Based Virtual Meetings
Because of the distance, most visits are not daily	Daily communications without distance, online

Table 6 Physical and Virtual Physical General Comparison, Source: Authors

Urban space in the digital era requires new essentials in order to continue its social functions, which urban designers and planners must consider them as new components of urban space design in order to rebuild a collective life. Since cyberspace and digital technologies are recognized as complementary to urban spaces, allocating and adding digital activities to physical activity can play an important role in enhancing levels of social interaction, citizen participation, social mixing, and increasing the active presence of citizens in the physical settings of the city. Regarding the fact that on average, 85.71% of users have used digital technologies with the aim of presence in social networks and establishing interactions, the establishment of a virtual social network dedicated to Bam-e Tehran complex can increase social interactions and reduce the existing digital divide among the citizens. On average, 73.37% of users believe that they visit cyberspace because of uniformity in performance, and duplication of activities in physical space. Also, 77.40% of the users believe that people are interested in referring cyberspace because it is updated every minute. Therefore, with the participation of users with the help of digital technologies, social events and collective actions can be updated and we can avoid repetition of activities, which will result in active engagement and more interaction among users. 74.28% of users consider the reason for visiting virtual spaces to be able to create remote interactions while preserving their personal bubbles in the physical space, which, in order to meet this need, smart furniture that connect across the city space with other furniture act as a communication medium and create social interactions in a variety of contexts, such as smart and multimedia entertainment, social and local information, as well as information exchange about the same environment.

This study has been conducted in order to achieve the best and most effective solutions that allow us to integrate physical and digital tools in urban space, and gives us to a concept called the Cyber Park, which purpose is to provide an overlap between Real and virtual space. Typically, a cyber park shows a public open space where people spend their free time by creating countless social interactions. However, in order to enhance the functional level of this contemporary urban environment, it should be covered by IT communications technology networks and equipped with them. Creating smart environments will make possible more interactions between users of physical space and their digital devices, such as mobile phones, laptops and tablets, through wireless Internet networks.

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