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A Serious Game Prototype to Encourage Citizens to Use e-Government in Libya

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Abstract. Citizen engagement was identified as one of the main factors in e-government success, and many projects failed due to a lack of citizen engagement, particularly in developing countries. The benefits of utilizing serious games in education and training and their positive impacts in the field are expected to be the same in an e-government context, hence, it is argued that the use of serious games to expand knowledge, training, build confidence and trust among citizens can improve their use of e-government service.. This research paper discusses a study conducted with the aim of developing a "e-Reservation" service as a serious game that expands knowledge and trains Libyan citizens on how to act when using the actual e-service. The proposed serious game is dedicated to familiarizing players with all rules and system requirements. Results show that the use of serious games has a positive impact on citizens' motivation to engage with e-government.

Keywords. E-government; Participation; E-reservation; Serious games.

1. Introduction

Utilizing IT innovations enhances government services delivery to and communication with the public is the main object of e-government [1]. However, some e-government implementation projects have failed to accomplish this objective, especially in developing nations, because of a disconnect between e-government initiatives and citizen use of services. Systems failed to engage citizens due to a lack of knowledge regarding e-government advantages, less confidence to use IT tools, and technology knowledge as a determinant of users' participation [2, 3]. Privacy and security barriers also lower trust levels related to the adoption of e-services, compounded by an underlying lack of trust in government itself in many contexts [4, 5].

Libya still in the early stage of e-government development [3]. Thus, it is necessary to take into account the cultural influences in order to narrow the gap between the reality and design. This gap is one of the main reasons for the cause of the failure of e-government projects in developing countries [6]. Therefore, Libyan government should incorporate citizen awareness, trust and participation for successful e-government implementation. As general citizens, employees and business sectors currently have limited knowledge of e-government; this has introduced a major challenge for the Libyan government to move forward in successfully building an e-government project [3].

There are numerous approaches to exchange information or thoughts with people, in general, using modern communication methods, one of the most effective of which is serious games, because of their impact and focusing on all age groups of citizens. Recently, the use of serious games in education, training, healthcare, safety, military and commercial has become a point of focus [7, 8]. According to Knight [9], serious gaming can be utilized to deliver significant objects, increase various skills and allow learners to practice scenarios that are impossible or difficult in the real-world due to cost, time and safety etc. [10, 11]. This study applies the benefits of using the serious games as a tool to encourage citizen participation and to raise the level of public trust in e-services. In addition, it determines how best to utilize serious game technology to provide significant improvements that translate into better citizen invitations to use e-government, especially in developing nations. Thus, this task becomes an integral factor in making the knowledge learning as exciting and interactive steps. Therefore, this paper presents a serious game "e-Reservation" system, a game that allows citizens to learn how to perform while using the actual service, expanding their knowledge of all requirements and information needed. Moreover, it explains privacy and security issues as well as the advantages of using e-reservation, such as saving time and costs.

e-Reservation serious game increases citizen engagement in e-government services by explaining the process and values of the existing reservation system, starting by advertising the service and its benefits to citizens through providing full knowledge, followed by learning how to perform with the services then practicing by following the same steps, which is intended to increase confidence and change beliefs and behaviours. Therefore, the level of trust in government and online services is achieved through understanding explained rules of privacy and security. Finally, all of these processes should lead to instilling motivation, increasing public awareness and motivating citizens to take action.

2. Literature Review

E-government implementation is not simply transferring a demonstrably successful system from one context (i.e. country) to another, especially from developed to developing country, as each context of e-government deployment has unique requirements, with particular differences between developed and developing countries [12]. Practices and cultures have been flagged important because of unsuccessful e-government implementations, which have resulted in the identification of many barriers to adoption, including issues of citizen confidence, privacy and security; citizens' appropriate skills; and the acceptance of e-government as an alternative to traditional governmental interfaces (i.e. bureaucratic systems) [13]. In addition, the digital divide issue in society is also a barrier against e-government success in developing nations. As the primary users of e-government services, citizens play a fundamental role in the success of e-government [6, 12]. Therefore, public usage of e-government services is a core factor of success. E-government literature presents many previous studies that focused on the factors influence e-government success that reflect the inherent complexity of e-government, with a noted emphasis on technological aspects. Some studies have examined decision makers' attitudes and political pressures, organisational and management, legal and regulatory, institutional and environmental barriers, but few studies have considered the users' perspective, such as citizens' perceptions of e-government use [14]. Huge gaps in e-government research still need to be filled to cover

citizens' intention to use e-services and to identify ways to build citizens' confidence in both government and technology [15]. In some cases, e-government experience user failure is a reason for citizens rejecting the use of the system, in spite of the systems being well presented in terms of technological aspects and project development [16]. Some techniques such as m-government was introduced to increase the availability of governmental services and raise citizens' engagement [17]. However, more efforts are still required regarding building citizens' confidence and trust of using e-services. On the other hand, many fields of research have benefited from using serious games technology as safe, low costs, easy to distribute and effective tool [18].

According to Djaout et al [19], serious games are computer programs designed for serious purposes such as learning, teaching and communication in an entertaining format. Other scholars defined serious games as video games, virtual environments and simulations that provide opportunities to be employed through responsive scenarios, gameplay or encounters, to inform and influence to promote well-being and experiences to express meaning [9, 20]. The success or quality of serious games is characterized by the degree to which their aims are achieved. Serious games are identified as experiential environments with less or no entertainment characteristics for experience [10]. According to [21], given the diversity of its applications, it appears that the concept of the serious game can apply to a vast field of applications, and it is not limited to training, although it seems particularly beneficial for educational purposes. With particular modifications of the salient characteristic features of serious gaming (i.e. teaching and entertainment objects), the method can be applied in almost any context (e.g. for all learners, from preschool age to adult learning) to improve knowledge and enable the acquisition of skills [22]. In recent years' serious game technology has been used for different purposes such as education, healthcare, training, commercial, well-being, advertisement, cultural heritage, interpersonal communication and military training [20, 23]. Therefore, the functions of serious gaming should be amenable to the improvement of citizen participation and employee training in the e-government concept.

To conclude, with the growing attention and use of the gaming industry for non-entertainment purposes, serious games and game-based learning technologies have brought undeniable benefits to all fields in which they have been deployed. Therefore, it is clearly necessary to understand how the use of serious games affects, benefits and improves the quality of e-services. Ahmed et al [24] proposed a framework that utilized serious games to address four main elements that affect citizens' intention to use e-government: usefulness, (perceived) ease of use, internet trust and government trust.

3. Methodology

This section provides an explanation and justification of the research process design, methodology, and methods of data collection and analysis, taking into account the nature of the research done in the area of IS.

3.1. Research Method

Libya as a developing country was chosen as a case study for this research were very few or no earlier studies have been conducted. Considering the research objectives, and the e-government service available for citizens to use in Libya. This research is investigating the behaviour of individuals; therefore, it is a very subjective issue. Each

individual has their own experience and perspective. For this reason, a quantitative research methodology was selected for data collection.

A criteria was selected for this systems used in this study, e-reservation services for booking time slot for passport renew/issue systems provided by local governments in Libya. Then a serious game prototype was developed to fulfil all objectives. Then a questionnaire was developed to discover how the participants satisfy after e-Reservation game. Five-point Likert-type scale formats were used to measure the scale items. Result of post-test questionnaire were analysed using SPSS (Statistical Package for the Social Sciences). The samples are the actual e-services user (Libyan citizens) who are intending to either renewing or issuing new passport at Passport and Immigration Departments in Libya. Selection of these participants sample was for several reasons. First, guarantee that all participants will be Libyan citizens who are the targeted customers of the actual e-reservation service. Second, this sample would allow the researcher to gain both pre-test and post-test evaluation. Last, insuring sufficient reliable respondents for the questionnaire.

3.2. Game design

E-Reservation serious game was developed based on a framework that applies the benefits of using serious games as a tool to improve citizens' intention of using e-government [24]. The model shown in figure 1 designed by Lotfiet al [25] allows instructors and trainers to design their own serious games to make the acquisition of knowledge and skills more efficient and entertaining to attract learner engagement.

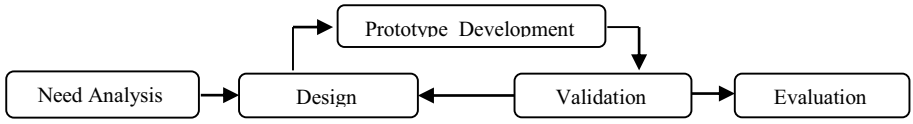

Figure 1: Game Design Model (Lotfi et al, 2014)

3.3. e-Reservation game implementation

E-Reservation game is serious game that aims to empower citizen engagement and participation in e-government services. It is dedicated to citizens of different age groups and educational levels. The game provides players with excitement since the game is will be full of learning and acquiring best practices, expanding e-services knowledge. Moreover, players will discover or deploy some basic IT knowledge that can raise the level of trust in e-services. Also, the e-Reservation game explains privacy, security and efficiency in the e-services to promote trust between citizens and government. Game play is based on rules in questions, whereby players will be asked about certain service requirements and information needed. Afterwards the players can fill a short questionnaire that seeks to investigate user satisfaction and change of intention to use an actual e-reservation system provided by the government. The game was evaluated against several points, such as delivering the expected objectives, improving citizens' participation and engagement in using e-Government and assessing users' willingness to use more games related to e-services.

3.4. *e-Reservation gameplay*

The proposed serious game is based on the actual reservation system that is available for citizens to use in order to book for renewal/issuance of passports in Libya, thus the e-Reservation game follows all of its steps, needs and requirements. Moreover, the game's entertainment starts by the sampling system requirements, such as national ID, computer and internet connection for playing a character to collect in order to be given a key to use the service. Among the outcomes that the proposed game must deliver to learners is a working knowledge of system requirements. Consequently, the filling information level entails the player selecting from one of three options for every section, only one of which is in the correct format.

Figure 2: Screenshot of actual reservation system, filling information and IT knowledge levels of e-Reservation serious game

Non-play characters explain all privacy and security protocols used to protect citizen data and information, as shown in figure 2.

3.5. *Game objectives*

The first objective of the e-Reservation game is to familiarize all citizens with the concept that their government is offering them practical services that can save time and costs as well as guarantee some level of transparency. The second objective is to expand public knowledge regarding using available services, through explaining all needs and requirements. Learning how to perform and use actual services is the main underlying objective of the e-Reservation serious game. By following the exact same steps and required information in a simulated (though essentially identical) environment inspires personal confidence to use the actual service. Another objective is to increase the level of trust in technology by explaining the basics of security knowledge to players and the privacy background of the service through informing the user of who can access to their data and for what purposes. Finally, it increases the level of trust in government itself by showing care about serving the public and improving the way they are served in terms of efficiency, transparency, privacy and confidentiality.

4. Finding

This section contains the overall data analysis results of the use of the proposed e-Reservation serious game by the sampled Libyan citizens. The game was used by 85

people,91% of whom were males. All respondents were coming to issue/renew their passports in different occasions during the five days of fieldwork. The questionnaire conducted included 19 citizens aged between 15 and 24 years, 29 aged 25 - 44, 21 aged 45 - 64, and 16 over 65 years old. Their occupations were categorised as students (19%), government employees (34%), employees of private businesses (16%), self-employed (8%), unemployed (12%) and retirees (11%). Nearly half of the participants had completed a university degree, 28% had finished secondary education, 14% have reached postgraduate level and the rest had basic education (e.g. high school). The statistics shown in figure 3 indicate that at baseline, 28% did not know what e-reservation services are, 32% knew all the requirements and 71% had not used it themselves before.

In terms of having booked appointments, 57% of participants had been booked for the day they came in. However, 75% of them asked a friend or relative who has good IT knowledge and experience to book their appointment. The five-point Likert-type scale was used to measure the participants' satisfaction in terms of understanding the nature of the service, the needs and requirements of use, how to use the service and understand privacy and security issues whose results are shown in table 1.

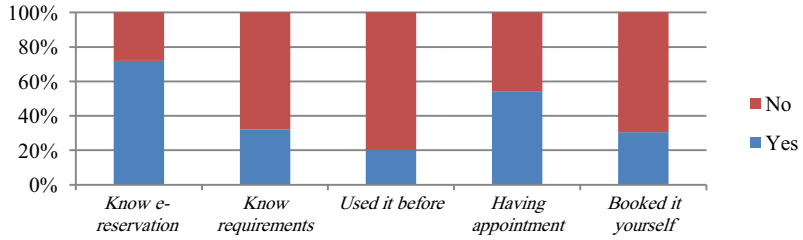

Figure 3: e-reservation service experience

After using the game, 78% of respondents expressed satisfaction and willingness to use the actual e-reservation service provided by government (measured in terms of confidence, ease of use and usefulness) was expressed by 82% of citizens. Finally, the vast majority (88%) said they would recommend the e-Reservation game to others.

Table 1: Game Evaluation Post-test

Theme	Average	Percentages
Satisfaction	3.9	78%
Willing to use actual services	4.12	82%
Recommend the game	4.4	88%

To conclude, comparing pre-test and post-test collected result indicated that e-Reservation game has improved users' confident and intention to use the actual service. Therefore, the use of serious games has good impact on citizens' participation in e-government context.

5. Discussion

This paper examined how serious games would provide an opportunity to improve public engagement in e-government to reduce the probability of failure by focusing on e-government clients' participation and the use of serious games as a tool to increase citizens' intention to get government information and to conduct governmental online

transactions. The results show that 57% of respondents succeeded in booking an appointment, but only 25% of them did this in without assistance. Therefore, 75% of respondents who have booked their appointment did not make it themselves. Thus, there is undeniable problem among citizens' intention and ability to use the governmental e-service provided for the reasons of luck of confident, IT knowledge, and experience. On the other hand, after testing the given serious game, their level of confidence increased to the extent that 82% of participants were willing to use the real system. This significant change in users' intention was made after learning, practicing and expanding knowledge about e-services. Therefore, serious games could provide a great opportunity to e-government in developing nations if used to empower the public. Nevertheless, some respondents made suggestions to improve the proposed game, such as providing the game for mobile platforms for easier and wider distribution and accessibility. Others argued that entertainment should not be included in learning and practicing the game, reflecting the traditionally austere interactions of citizens and government in legacy systems of governance.

6. Conclusion

A large number of users are latently doubtful and reluctant to adopt e-government in developing countries for many reasons, such as the digital divide, less internet experience and disillusionment with (and lack of trust in) government generally. However, organised tools to build confidence, such as serious games, represent an opportunity to improve e-government adoption. Therefore, governments should make efforts to encourage the public to engage in use of e-services, which leads to e-government success and paves the way for e-commerce. This work has proposed and tested a serious game prototype to motivate users to participate in e-government, administered to Libyan e-government clients. Post-test evaluation data was collected, which indicated that the proposed serious game is dedicated to follow the sequence steps of the actual reservation system with detailed explanation of each stage, to gain familiarity and confidence. Additionally, it informed players of all rules and system requirements. The evaluation indicated that a significant improvement could be delivered to the field of e-government adoption by using serious games as tools to bridge the digital divide and increase public awareness.

For future work, it is believed that the proposed solution of using serious games must be expanded and tested in different developing countries. In addition, further work is needed in the implementation and design of serious games, to identify how it could be generalized and facilitate more citizens' participation and engagement in e-government for instance using mobile phones games.

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