The examination of factors affecting e-learning effectiveness

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ABSTRACT: Technology information has increased dramatically in the last years and has contributed to the growth in technology delivered instruction as an important learning and education method. In this perspective, many academic researches considered the importance of e-learning effectiveness.

Although the existing models of e-learning effectiveness has improved our understanding of how online training can support and enhance learning, most of published models do not take into account the importance of the relationship between social presence and interaction. Thus, this study develops preceding investigation by extending a model of e-learning effectiveness which adds social presence to other studied variables including computer self efficacy, perceived usefulness, perceived ease of use, interaction between trainer and trainees, and e-learning effectiveness. Moreover, the model includes the possible relationships between independent factors. In this case, the present research seek to identify the influence of computer self efficacy, ease of use, perceived usefulness, interaction, and social presence on e- learning effectiveness. Furthermore, this study considers the possible influences between individual characteristics, perceptual characteristics and environmental characteristics.

Using data from 410 employees, the conceptual model was validated through a Tunisian context. Results indicate the importance of interaction, perceived usefulness, perceived ease of use, and social presence on e-learning achievement. E-learning achievement, in turn, influences e-learning transfer.

KEYWORDS: e-learning, effectiveness, learning transfer, structural equations.

1   INTRODUCTION

Technology information has increased dramatically in the last years and has contributed to the growth in technology – delivered instruction as an important learning and education method.

Thus, technology – delivered instruction or   "e-learning" can be defined as an educational and learning instruction supported by the use of the "ICT", allowing learners to acquire new knowledge and skills delivered electronically without worrying about the space-time shift ([37], [42], [44], [48], [19] – [3]). In this perspective, corporations have recognized the importance of this new way of training to reduce costs and to ameliorate trainees' competitiveness. In this way, many international and national companies and educational institution use e-learning method in order to improve learners' performance. For example, in the United States context, 3.5 million students were enrolled in distance learning at of higher education by 2006 [1].

In Tunisian context, the government recognized the importance of e-learning method. In this case, the government considered that 30% of the courses must be done through e-learning platform. The e-learning can be considered as a solution to reduce the number of government investment regarding the establishment of new educational institution because the number of student tends to decrease by 2030.

The present research seek to indentify the influence of computer self efficacy, ease of use, perceived usefulness, interaction, and social presence on e- learning effectiveness. Moreover, this research considers the possible influences between individual, perceptual and environmental characteristics.

To address the question of e-learning effectiveness, this study examines the factors that contribute to enhance e-learning effectiveness. Specifically, the present research considers eight research questions regarding e- learning. (1) To what degree do computer self efficacy, ease of use, perceived usefulness, interaction, and social presence influences e-learning achievement? (2) To what degree e-learning achievement influences e-learning transfer? (3) To what degree computer self efficacy influences ease of use? (4) To what degree computer self efficacy influences perceived usefulness? (5) To what degree ease of use influences perceived usefulness? (6) To what degree social presence influences interaction? (7) To what degree interaction influences social presence? (8) To what degree computer self efficacy influences interaction?

2 RESEARCH MODEL

As presented earlier, the purpose of this research was to investigate the role of computer self efficacy, along with ease of use, perceived usefulness, social presence, and interaction. In addition, we were interested in two e-learning outcomes: e-learning achievement, and e-learning transfer. These factors are based on social cognitive theory, media richness theory and technology acceptance theory. The theoretical model is shown in Fig. 1.
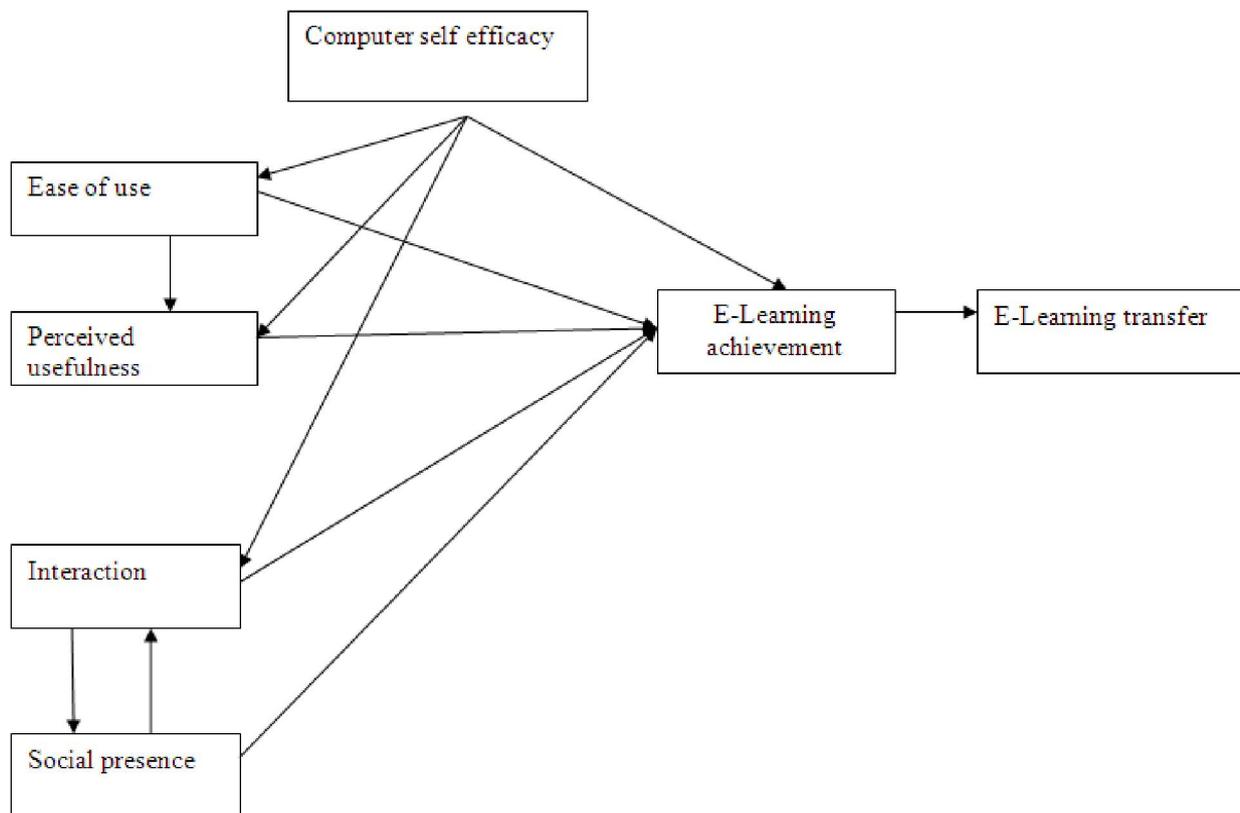

Fig. 1.   The model of e-learning determinants

3 THEORETICAL DEVELOPMENT

3.1 COMPUTER SELF EFFICACY

Self efficacy is shown to influence the behaviors of individuals towards the execution of actions. Thus, self-efficacy is an individual's belief about his or her capacity to mobilize the resources requisite for successful task achievement [4]. Previous research suggested the importance of computer self efficacy on the development of e-learning behaviors (e.g. [6], [31], [31] – [21]). According to social cognitive theory [4], self-efficacy is proposed to influence behavior undertaken by learners, the efforts allowed to this behaviors and the individuals performance. In this perspective, self-efficacy is postulated to influence learning outcomes in interpersonal skills training [17], in military training programs (e.g. [43]), in specific computer tasks (e.g. [7] – [34]), and home page design training course [10]. Self efficacy judgments vary along three dimensions that have robust performance implications: magnitude, strength and generalizability [6]. Magnitude refers to the level of task difficulty and complexity (low, moderate, high). Individuals with high magnitude judge themselves to be capable of performing more difficult activities and tasks than those with lower magnitudes. Strength refers to one's confidence in his or her capabilities to execute activities and tasks. Generalizability refers to the extent to which personnel efficacy is generalized across similar activity domains [29].

Past researches examine the relationship between self efficacy and learning (e.g. [6] - [51]). It is assumed that self efficacy influences the perception of easiness and usefulness (e.g. [49] – [21]). Johnson et al., (2008) suggested that computer self efficacy is important to improve learners interaction mediated via computing technology. For example, highly efficacious learners should be more likely to successfully interact with learning materials and instructors.

Consequently, we formulated the following hypotheses:

H1: Computer self efficacy influences positively the learners' perception of ease of use regarding e-learning.

H2: Computer self efficacy influences positively the learners' perception of usefulness regarding e-learning.

H3: Computer self efficacy influences positively the learners' perception of e-learning achievement.

H4: Computer self efficacy influences positively learners' interaction.

3.2 PERCEIVED USEFULNESS AND EASE OF USE

Several theoretical models focus on the importance of trainees' perceptions of ease of use, which is successful in predicting and explaining actual intention and usage behavior across business areas (e.g. [12] – [13]). In this case, perceived ease of use is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort." ([12], p. 320).

In the context of the online training environment, Ngai et al. (2007) argued that technical support present a meaningful direct effect on the perceived ease of use of learning material. Moreover, Zhang and Zhou (2003) developed a system "e-learning" based on the multimedia. They found that this system is useful and interactive, facilitating the communication between trainees and virtual trainers. Authors argued that, to improve learning effectiveness, online training environment must provide a structural support to multimedia instruction and predict the learning achievement. Piccoli et al. (2001) suggested that virtual training environment must facilitate communications between physically and geographically separated trainees. They suggested, text, hypertext, graphics, computer animations, dynamic content as a part of ease of interaction design between system and trainees. Similarly, Leidner and Jarvenpaa (1995) consider debate rooms, virtual rooms and simulations as a part of ease of use interaction between training material and trainees. Zhang et al. (2006) argued that trainee success can be captured when they can use an interactive video system providing an appropriate interaction. Consequently the construct of perceived ease of use reflects the ease of learning, the simplicity of e-learning material, the easiness of interaction between learners and e-learning materials.

Perceived usefulness is defined as "the degree to which an individual believes that using a particular system would enhance his or her job performance" ([12], p.320). Perceived usefulness is hypothesized to predict learning.

For example, Chiu, Hsu, Sun, Liu and Sun (2005) demonstrated that perceived usefulness influence positively e-learning effectiveness. In addition, Johnson, Hornik and Salas (2008) established that perceived usefulness influence positively e-learning successful. Likewise, when an e-learning behavior is perceived useful by learners, the relationships between perceived usefulness and e-learning behavior is verified.

Based on technology acceptation model, several researchers demonstrated that perceived ease of use played a significant role in predicting perceived usefulness (e.g. [14] - [38]). For example, Saadé and Bahli (2005) found a positive and significant relationship between perceived ease of use and perceived usefulness (path= 0.28, p <0.01).

Consequently, the perceptions of easiness and usefulness explain the behavior of e-learning. In this case, the higher the perceived ease of use and perceived usefulness, the higher will be e-learning behavior successful. On the basis of this literature aforementioned, we proposed the following hypotheses:

H5: Perceived ease of use by learners influences positively e-learning achievement.

H6: Perceived usefulness by learners influences positively e-learning achievement.

H7: Perceived ease of use by learners influences positively perceived usefulness.

3.3   INTERACTION AND SOCIAL PRESENCE

Interaction is the mutual exchange of information between a sender and a receiver. It' is a communication process that can be undertaken between various stakeholders in the e-learning environment (e.g. learners – instructors; learners – learners; etc.) [40]. Tung and Deng (2006) added that the interaction can be viewed as a mutual process of communication between humans and computers. Piccoli et al. (2001) asserted that interaction permits to learners to exchange information, to receive feedback, and assess progress in e-learning achievement. The authors find that virtual training environments provide materials that facilitate interaction between the trainer and trainees and consequently reinforce their training effectiveness. Guffey (2008) asserted that interaction is a communication process where the sender has an idea, encodes it as a message, and sends it over a channel (face to face, e-mail, telephone, etc). This message is then decoded by the recipient. According to Te'eni (2001), interactive process is a communication process of at least two subjects capable of speech and action who establish interpersonal relationships. Lear, Ansorge, and Steckelberg (2010) advanced that communication process facilitates the mutual interaction of students within a class with peers and instructors.
The authors suggested that the students' messages developed the opportunities of social interaction. The theory of media richness classify communication media in order of decreasing richness, face-to-face, telephone, personal documents (e.g., letters or memos), impersonal of unaddressed documents (e.g., reports, bulletins, etc), and numeric reports (e.g., spread sheets) [11].

Face to face is considered the richest medium; it provides immediate feedback between trainer and trainees. Moreover, face to face provides the opportunity of a simultaneous communication of multiple cues via tone of voice, message content and contact of eyes. Lim et al. (2007) suggested that face to face communication permits better problem-solving, sincere interest and immediate feedback without ambiguity. E- mail communication allows trainees to receive immediate feedback at any time and any place. Besides, Leidner and Jarvenpaa (1995) mentioned the importance of e-mail communication between the trainer and trainees.

Specifically, the researchers considered e-mail to be a very useful method when the number of trainees is roughly 30 more. According to Baird and Fisher (2005), the one accomplishment of all the media available for social networking is that these online trainers [28] are "active participants as they construct a learning landscape rooted in social interaction, knowledge exchange, and optimum cognitive development with their peers" (p.24).Lear et al. (2010) asserted that interactivity is essential in e-learning context because it' is what connects the students, instructor and course material together. In this case, Moore (1989) proposed three types of interaction: (a) learner –content interaction, (b) learner – instructor interaction, and (c) learner – learner interaction. With the advancement of the technology, the fourth types of the interaction was proposed by Hillman, Willis, and Gunawardena (1994) including learner – technology interaction. This interaction with technology interface includes mediated synchronous discussion (e.g. videos conferencing), mediated asynchronous dialogue (e.g. e-mail, discussion postings) (Huang, 2010), and interactive computer programs (e.g. [47]). In summary, interactions with peers, instructors, content and technology in online learning are essential for learners' achievement of e-learning course. In case of this study, we will consider the interaction between learners and instructors through two medias: face to face and e-mail.

Short, Williams, and Christie (1976) defined social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship" (p.65). According to Garrison et al. (2001), presence is the ability of learners within an online learning community to develop their personal characteristics into the community and present themselves as a real person. Tu and Mclsaac (2002) consider social presence as a psychological connectivity between learners. Johnson et al. (2008) concentrate on social presence as a trainer perception of online environment in which they feel warm, personal sociable and active and allowed them to be connected with others.

and Walters (2009) asserted that the learners' connection and feeling of being part of a learning community is important effective learning outcomes. Aragon (2003) added that the development of an environment to increase social presence in online learning is a way to improve interactions between learners and instructor, and minimizing the feelings of isolation.

Degane and Walters (2009) considers that social presence is an essential component to the overall success of the educational experience.

On the basis of this literature, we proposed the following hypotheses:

H8: Face to face interaction between trainees and trainer influences e-learning achievement positively.

H9: e-mail interaction between trainees and trainer influences e-learning achievement positively.

H10: Interaction between trainees and trainer influences perception of social presence positively.

H11: the perception of social presence influences interaction process between trainees and trainer positively.

3.4 E-LEARNING EFFECTIVENESS

Alliger et al. (1997) focus on the importance of training effectiveness. They argued that the training effectiveness model needs to include many more variables than are typically included in a taxonomy advanced by Kirkpatrick. Lim et al. (2007) suggested that trainee reaction and learning are studied as central indicators of training outcomes. However, they considered that these variables are no appropriate indicators of the final outcome of training programs. Therefore, a suitable evaluation of training outcomes is made by measuring the relationships between learning goals achievement and behavior change on the job [26].The integration of training program within an organization must improve the performance of this last. Therefore, trainees in charge must perform training program and transfer new knowledge, skills and behavior learned during training [31].

Learning effectiveness has been defined as a trainees' knowledge, skills and behavior learned in a training session and their effective application on their job. Empirical research on learning effectiveness focuses on the predictor of learning and examining their relationships with transfer (e.g. [31]). Learning refers to the learners' skills and knowledge acquired during training experience [27]. Transfer refers to the learners' change of their behavior on the job because of training experience [27].

Alliger et al. (1997) argued that learning has a significant impact on transfer. Moreover, Colquitt et al. (2000) argued that learning outcomes (e.g. knowledge acquisition, reactions) affect directly knowledge transfer into daily routines. Based on previous research, the relationship between learning and learning transfer is hypothesized as associate:

H12: e-learning achievement influences e-learning transfer positively.

4 METHOD

4.1 RESEARCH SETTING AND PROCEDURE

The empirical study of e-learning effectiveness model has been conducted close to 410 employees of nine Tunisian enterprises. The choice of these enterprises has been guided by two considerations. For this research, we used a semi-structured interview format. The result showed that nine enterprises are the more advanced concerning e-learning among the contacted enterprises. Moreover, they display a significant budget for training in general and for online training in particular.

4.2 RESEARCH PARTICIPANTS

Participants were 410 employees, which the proportion of males to females is 55.1 percent to 44.9 percent. Participants varied in age between 20 and 29 years. The mean seniority of participants varied between 10 and 20 years with dominance of administrative post (62.9%).

4.3 MEASURES

All factors were measured using 5-point Likert scales (Appendix A).

Computer self-efficacy: this factor was measured with 10 items scale adapted from Compeau and Higgins (1995a). The authors found 0.81 for internal consistency reliability. This scale was used by Saadé and Dennis (2009) in the e-learning context. The authors found a significant internal consistency reliability ($\alpha = 0.92$).Response options for each items fall along a 5 –point Likert scale ranging from 5 = strongly agree to 1 = strongly disagree.

Perceived ease of use: perceived ease of use was measured with 5items adapted from Davis (1989). The authors found a significant internal consistency reliability ($\alpha = 0.91$). Response options for each items fall along a 5 –point Likert scale ranging from 5 = strongly agree to 1 = strongly disagree.

Perceived usefulness: perceived usefulness was measured with 5 items developed by Davis (1989). The authors found a significant internal consistency reliability ($\alpha = 0.97$). The scale used a 5 – point strongly disagree to strongly agree response format.

Interaction: Interaction between trainees and trainer was measured with four items developed by leidner and Jarvenpaa (1995). For example, employees were asked to respond to statements such as "I was encouraged to have face to face meeting with my instructors outside of online training", "The instructors communicated with me via e-mail", and "I was encouraged to interact with instructors in order to resolve my questions regarding the online training" were used.

Social presence: Social presence was measured with a 5-item scale proposed by Short et al. (1976). For each question, subject assessed the characteristics of the online environment. The scale used a 5-point likert type scale with anchors including "impersonal –personal", "Unsociable – Sociable", "Insensitive –Sensitive", "Cold - Warm" and "Passive-Active".

E- Learning achievement: learning was measured with 15 items developed by Nehari and Bender (1987). The authors found a significant internal consistency reliability ($\alpha = 0.95$). Response options for each items fall along a 5 –point Likert scale ranging from 5 = strongly agree to 1 = *strongly disagree.*

E-learning transfer: learning transfer refers to how the trainees applied the newly knowledge and skills learned during training sessions to their job tasks [31]. Learning transfer was measured using four items from Holton et al. (2000). Statements such as "The activities and exercises learned during training program helped me to apply my learning on the job", and "I' am using what I learned from the training in my daily work". Response options for each items fall along a 5 – point Likert scale ranging from 5 = strongly agree to 1 = *strongly disagree.*

4.4   ANALYSIS

For the assessment of dimensionality, reliability and validity, exploratory analysis and confirmatory analysis was performed on each concept using SPSS 15.0 and AMOS 7.0. Reliability and the internal consistency of items have been assessed through crombach's alpha situated between 0.7 and 0.85. Table 1 shows the results of the reliability test. The unidimensionality of the scales was analyzed via an exploratory factor analysis. The results were shown in table 1.

Table 1. Preliminary analysis

	Crombach's alpha	% explained variance	Loadings	Factors
CSE	0.816	52.35%	>0.5	1
PEU	0.785	70.25%	>0.5	1
PU	0.854	74.54%	>0.5	1
INTF	0.891	75.65%	>0.5	1
INTE	0.936	84.01%	>0.5	1
SP	0.754	67.45%	>0.5	1
L	0.750	58.38%	>0.5	1
TR	0.807	64.022%	>0.5	1

Note: CSE - computer self-efficacy, PEU – perceived ease of use, PU – perceived usefulness, INTF-Interaction face to face, INTE – Interaction e-mail, SP- Social Presence, L – learning, TR – Transfer.

5 RESULTS

5.1 MEASUREMENT MODEL

The measurement model was assessed including items reliabilities, internal consistency and convergent validity. First, reliability measured using Cronbach's alpha, was verified by the composite reliability Coefficient (CRC) [25]. All the constructs exceed the suggested limit of 0.7 [36]. Considering the validity, we calculated the convergence between the items and their corresponding constructs [21].

We concluded that the standardized values of the significant loadings exceed 0.5. Therefore, we can verify the validity in the measurement model proposed.

Table 2. Confirmatory factor analysis

Scale	CRC
CSE	0.835
PEU	0.870
PU	0.850
INTF	0.872
INTE	0.907
SP	0.808
L	0.820
TR	0.819

5.2 STRUCTURAL MODEL ANALYSIS

The structural model permits to analyse the causal relationships proposed in the model of e-learning effectiveness determinants using structural equation modelling. Fitness indices can be considered satisfactory and suggests the good fit of the model. Incremental indices are nearly highly acceptable, despite the fact that fitness indices NFI remains slightly lower to 0.9 (= 0.872). Parsimony indices reaffirm the good adjustment, through a PNFI = 0.771 and X^2 = 2.307 < 5. Besides, the absolute indices confirm an acceptable adjustment resulting in RMSEA = 0.057 nearly 0.05; GFI = 0.857 nearly 0.9; AGFI = 0.829 nearly 0.9; Hoelter.05 index = 197 nearly 200; and Hoelter.01 index = 206 > 200. Therefore, the fitness of the research model is considered satisfactory. The results confirm ten of the eleven hypotheses formulated and the associated coefficients are found in Fig 2.

The results of the hypothesized model have been verified and assessed using AMOS 7.0. Each hypothesis has been verified by measuring values of standard path, being assessed on the basis of statistical significance of t value. From this perspective, the factors influencing trainees e-learning achievement are perceived usefulness (t value = 6.871; standard path = 0.726); Perceived ease of use (t value = 3.145; standard path = 0.167); face to face interaction (t value = 2.080; standard path = 0.081); e-mail interaction (t value = 2.849; standard path= 0.116), and social presence (t value = 2.420; standard path = 0.243). Nevertheless, computer self efficacy does not influence present e-learning behavior (t value = -.513; - .029).

We can conclude that e-learning achievement influences e-learning transfer (t value = 4.465; Standard path = 0.876). Moreover, computer self efficacy influences ease of use (t value = 2.670; standard path = 0.254) and perceived usefulness (t value = 2.840; standard path = 0.350). Also, perceived ease of use influences perceived usefulness (t value = 2.893; standard path = 0.332). Moreover, computer self efficacy influences face to face interaction positively (t value = 2.120; standard path =0.190) and e-mail interaction (t value = 2.230; standard path =0.220). In addition, face to face interaction influences social presence (t value =2.183; standard path = 0.211), and mutually social presence influences face to face interaction (t value = 2.234; standard path = 0.235). E-mail interaction influences social presence positively (t value = 2.256; standard path = 0.253), and reciprocally social presence influences e-mail interaction positively (t value = 2.324; standard path = 0.314).
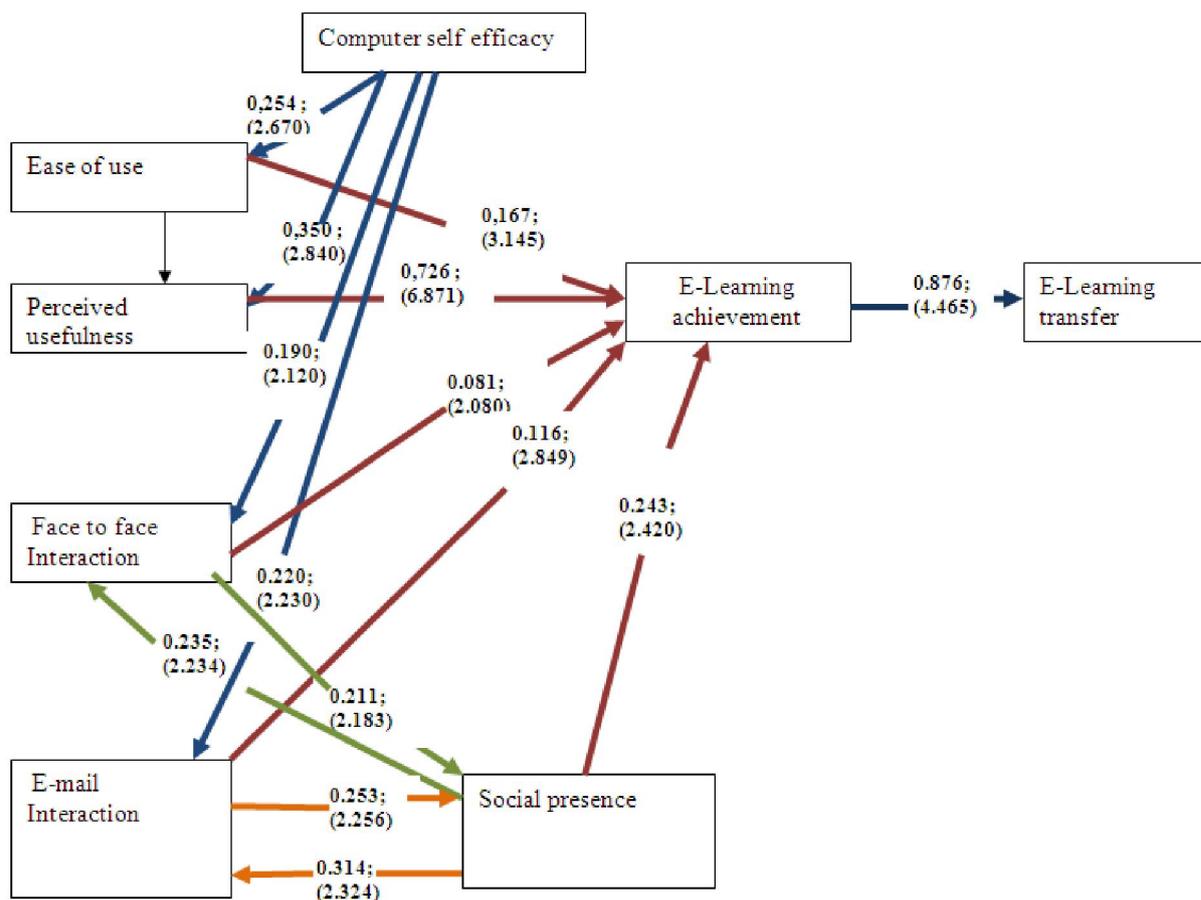
Fig. 2.   Final Model of e-learning effectiveness

6   DISCUSSION

The results of the present study demonstrated that the fact of achieving an online learning program influences the e-learning transfer. These results clarify the relationships between computer self efficacy, perceived ease of use, perceived usefulness, interaction, social presence and the e-learning achievement. Also, the possible relation between the antecedents of the e-learning was shown. In this perspective, the effect of the self-efficacy on e-learning was not supported. This result means that trainees who believe more in their abilities and aptitudes to use computer tools in order to achieve the desired purpose will not be inevitably most likely to perform training tasks to become more operational for the use of newly knowledge and skills in the daily routines of job. By contrast, Lim et al. (2007) showed that self efficacy affect positively online learning. Previous research demonstrated the significant relationship between trainees computer self efficacy and learning (e.g. [7]). Consequently, we can advance that the control of the computer tools does not constitute a handicap for the Tunisian employees since their daily use of it for the performance of their routine tasks.

The perceived ease of use affects positively present e-learning. Consequently the higher online platform is clear, comprehensible and convivial, fewer efforts are required for trainees and better it will tend to achieve learning. This result in accordance with several researchers (e.g. [41], [51] – [52]). The research revealed that perceived ease of use influence positively perceived usefulness. This result reinforces the previous research results (e.g. [14]). Also, the results showed computer self efficacy explained perceived ease of use and perceived usefulness. In this case computer self efficacy acts as antecedent and plays an indirect influence on e-learning achievement. Consequently, perceived ease of use and perceived usefulness act as mediating factors. This conclusion closed to the result advanced by Hermandez et al. (2009) in the of e-commerce. Further, trainer and trainees interaction was related to learning achievement. Lim et al. (2007) the importance of face to face meetings between trainees and trainers in enhancing e-learning achievement. Moreover, several other authors showed the importance of face to face meeting and e-mail as rich means of communication and confirmed their impact on the training performance (e.g. [30]). In addition, social presence was linked to e-learning

effectiveness. Thus, the results showed that developing a shared learning space (e.g. [40]) within an e-learning is essential for increasing e-learning achievement for learners. The results showed the importance of social presence in improving interaction. Thus, through this research the mutual relationships between interaction and social presence were verified. In this case, the learners feeling of interactivity in a shared learning environment improves the social presence therefore minimise the feeling of isolation. Mutually, the perception of social presence in a shared e-learning environment improves the communication process through different channels.

Finally, our findings demonstrate that e-learning achievement influence e-learning transfer. This result coincides with several researchers (e.g. [22], [8] – [31]).

7 LIMITATIONS AND FUTURE RESEARCH

In spite of the lightings brought by the results of this research, a number of limitations must be announced. First, the choice of e-leaning antecedents remains restricted by considering the whole of the possible factors. In this case, considering pedagogical approaches, and feedback in the model are important. Second, this research reflects a first test of a theoretical model and should be subjected to additional investigations with different participants, and contexts. Third, the study participants were employees, so it' is important to make comparison between employees and undergraduate students. Fourth, due to the research questions, the study doesn't fully capture the measure of employees' behaviors when considering demographic characteristics influences (e.g. gender...). For an overcoming of this weakness, a measure of the development of trainees' behaviors and demographic characteristics and its ongoing reciprocal relationship with other variables in the model is recommended.

Fifth, regarding the transverse character of the study, the change of the employees' behaviors towards the learning and transfer process through time could not be measured. A longitudinal study could, for this purpose, better delimit the determinants of e-learning effectiveness and their stability through time.

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APPENDIX A. SCALES EMPLOYED

Constructs	items	Measure	Authors
Computer self efficacy	CSE1 CSE2 CSE3 CSE4 CSE5 CSE6 CSE7 CSE8 CSE9 CSE1	I could complete the online learning tasks using the software packages: … if there was no one around to tell me what to do as I go. … if I had never used a package like it before. … if I had only the software manuals for reference. … if I had seen someone else using it before trying it myself. … if I could call someone for help if I got stuck. … if someone else had helped me get started. … if I had a lot of time to complete the task for which the software was provided. … if I had just the built-in help facility for assistance. … if someone showed me how to do it first. … if I had used similar package like this one before to do the task.	Compeau and Higgins (1995) internal consistency reliability 0.81
Perceived Ease of use	PEU1 PEU2 PEU3 PEU4 PEU5	I find e-learning platform easy to use. I find it easy to get e-learning platform to do I want it to do. My interaction with e-learning platform was clear and understandable. I find e-learning platform flexible to interact with. It would be easy to become skillful at using e-learning platform.	Davis (1989) Internal consistency reliability
Perceived usefulness	PU1 PU2 PU3 PU4 PU5	Using e-learning platform ameliorate the course understandable. Using e-learning platform enhanced my effectiveness in the course. Using e-learning platform enhanced my interaction with the instructors. Using e-learning platform makes it easier to learn. I find the e-learning platform useful in my learning.	Davis (1989) Internal consistency reliability
Face to face interaction	INTF1 INTF2 INTF3	I was encouraged to have face to face interaction with my instructor outside of online learning. I met with one or more instructors during e-learning program. The frequent interaction with my instructors helps me better to resolve problems encountered during the e-learning program.	Leidner and Jarvenpaa (1995)
E-mail interaction	INTE1 INTE2 INTE3	My instructor communicated with me via e-mail. I was encouraged to interact with instructors in order to resolve my questions regarding the online learning. The e-mail media allowed me to receive feedback of my instructors at any time and any place.	Leidner and Jarvenpaa (1995)
Social presence	SP1 SP2 SP3 SP4 SP5	Higher numbers represent more presence and lower numbers represent less presence. Impersonal ....Personal Unsociable..........Sociable Insensitive...........Sensitive Cold.....................Warm Passive.................Active	Short et al (1976)

e-Learning achievement	L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15	I believe that, this online course was a very valuable learning experience for me. I consider this learning experience as time and effort very well spent. This was not a meaningful learning experience. I believe that this online course was a constructive and definitely helpful learning experience. I would like to take another course like this one. I would not recommend this online course to a friend. Taking the online course made little difference for me. This learning experience helped me to become more aware of my own feelings and reactions. This online course had no impact on my personal growth. This experience helped me to realize the importance of my own feelings. In some ways I feel good about myself due to this online course. Some of my values have been clarified due to this earning experience. In this online course I had not developed my own learning goals. Somehow I worked harder in this online course than I usually do. This online course was useful in helping me develop new ways to achieve work tasks. In this online course I have taken more responsibility for my own learning than I usually do.	Nehari and Bender (1987) Internal consistency reliability 0.95
e-learning transfer	LT1 LT2 LT3 LT4	My work allows me time to try the new things I have learned during online course. The activities that I have taught during online course helped me know how to apply my learning on the job. I feel I am using what I learned from the training in my daily work. My job performance has improved since completing that training program.	Holton, Bates, and Ruona (2000) The internal Consistency Reliability Ranged from 0.68 to 0.85