

## Gender differences in university students' experiences in virtual learning environments: A pilot study<sup>1</sup>

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Traditionally, empirical evidence suggests that women feel, think and interact with technologies in a different way than men do: women feel more anxious and less competent in computing, display worse attitudes towards it, and are less available for its use than men. The development of virtual learning environments, that seeks to innovate and enrich university teaching by making an intensive use of ICT, could reproduce these gender differences between individuals. Specifically the aim of this study is to analyze gender differences in students' experiences (i.e., perceived competence, attitudes, self-efficacy, enjoyment and learning) with a virtual learning environment, the so-called *Human Site*, dynamically developed by the research team with students in an interactive manner. The sample is composed of university students from Spain who have been using *Human Site* in their subjects. The results reveal that despite the fact that, in general, males report higher previous experience in ICT, and also in e-learning, no statistically significant gender differences appear in the study variables. Implications of the results and limitations of the study are also discussed.

**Keywords:** gender differences; virtual learning environment; students' experiences.

### 1. Theoretical background

Traditionally, empirical evidence suggests that women feel, think and interact with technologies in a different way than men do. One of the most consistent explanations for this is the existence of gender stereotypes – the generalized beliefs about the traits that men and women supposedly possess and that distinguish them [1, 2]. Technologies linked to science are considered productive activities that pertain to the male domain, in contrast to reproductive activities (e.g., childcare and education) that are considered to be typical of the female domain [3-5], where individual socialisation is a key process that contributes to the learning of the appropriate male or female behaviours in our society. Therefore, despite there being differences between the behaviours of men and women in multiple life areas, their magnitude and range cannot be completely explained by biological reasons, rather by social and cultural aspects.

Nowadays we are witnessing the massive presence of information and communication technology (referred to as ICT from this point onwards) in all life spheres, which offer important opportunities to human development. In fact the term informational society is used to refer to a specific way of social organization where the generation, processing and transmission of information become the essential factors of productivity and power due to the new technological conditions [6]. Compared with most traditional tools for development, ICT could reach a greater number of individuals, in wider geographic spaces, and it could work faster with lower costs. For instance, the number of Internet users has doubled every year since the last decade of the 20<sup>th</sup> century. At the end of 2005, the number of Internet users was 945 million around the world, and according to the most conservative previsions, 2000 million individuals are expected to use the Internet by the end of 2007 [7]. No other information and

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communication technology in the past has, by comparison, developed so rapidly. The magnitude of the shifts that affect the multiple spheres, such as work, economy, leisure, education, and even human relationships, is so remarkable that authors talk about a genuine revolution [8].

Despite the potentialities and advantages of ICT, however, there is no fair distribution of the benefits from such a revolution. So, several authors talk about the *digital gap*, referring to the difference of possibilities for development between those who have access to ICT, and those who do not owing to the lack of economic resources, infrastructure or knowledge about how to use them, and gender plays a key role. This gap is especially broad when we consider the use of the Internet. The typical Internet user is an individual with a university degree and high earnings, who lives in an urban area, speaks English, is more than 35 years old and is a man. For instance, only 38% of Internet users in Latin America are women, while they constitute 25% of all the users in the European Union [9].

In recent decades, numerous studies have dealt with gender differences in individuals' experiences when using any ICT, mainly computers. The results indicate that women feel less competent in computing [10-13]. Similar findings appear in relation to a closed construct, called self-efficacy [14-16], defined as "the beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" [15, p. 3]. Moreover, females display less positive computing attitudes [17-18] and feel more anxious when using a computer [10]. Consequently, a female is less likely to enjoy an interface with ICT than males, which could even have a negative impact on her learning.

Many of these results originate from an education environment, where ICT have a growing presence. ICT can overcome traditional educational barriers such as geographic locations, physical disabilities, the perception that the teacher-student model of knowledge transfer is the only possible model, and the scarcity of educational content. These technologies can create more extensive knowledge and information environments which are more open and flexible than traditional ones. In fact in recent years, there has been a significant development of virtual learning environments that seeks to innovate and enrich teaching by making an intensive use of ICT. These new learning environments could reproduce and even exacerbate the differences between individuals. Specifically the aim of this study is to analyse gender differences in students' experiences (i.e., perceived competence, attitudes, self-efficacy, enjoyment and learning) with a virtual learning environment, the so-called *Human Site*, dynamically developed by the research team with students in an interactive manner.

## 2. Method

### 2.1 Participants and procedure

The sample was composed of 54 university students of Psychology from Castellón (Spain): 15 males - 39 females. Their average age was 22.7 years (SD=4.86). These students were using *Human Site* in their subject of Organizational Psychology during the past academic year (2005-2006). Students completed an online questionnaire placed in *Human Site* at the end of the academic course, prior to their exam covering the subject. Confidentiality of their responses was completely guaranteed.

### 2.2 Measures

The study variables were measured as following:

- Perceived competence was measured by the following self-constructed item: "I have enough knowledge and skills about computing and the Internet".
- Attitude towards *Human Site* was assessed with 3 items that were self-constructed by the research team. A sample item is: "A quality education should include the use of virtual learning environments". Internal consistency (Cronbach's  $\alpha$ ) was .71.
- Self-efficacy was assessed with the 10-item Generalized Perceived Self-Efficacy Scale [19] (adapted to *Human Site*) A sample item is: "I can solve most problems in *Human Site* if I make the necessary effort". Internal consistency (Cronbach's  $\alpha$ ) of the scale was .94.

- Enjoyment was measured by 7 items in a subscale from DELES (Distance Education Learning Environment Survey, Actual Form Student [20]. A sample item is: "The *Human Site* virtual learning environment is exciting". Internal consistency (Cronbach's  $\alpha$ ) of the scale was .91.

- Perceived learning was measured by the following self-constructed item: "I have learnt the same or even more than in traditional classes".

All items were scored on a seven-point rating scale, ranging from (1) "totally agree" to (7) "totally disagree". High scores in all items are indicative of high levels in all variables.

### 2.3 Data analysis

Data analysis was performed using the SPSS statistics computer program. Descriptive analysis, correlations (Pearson  $r$ ), internal consistencies (Cronbach's  $\alpha$ ) and General Lineal Model (GLM) were carried out to achieve the study objective.

## 3. Results

### 3.1. Descriptive analysis

Table 1 shows the means, standard deviations (SD), internal consistencies (Cronbach's  $\alpha$ ) and the correlations of the study variables. The dimensions of attitude towards *Human Site*, self-efficacy adapted to *Human Site* and enjoyment were sufficiently consistent internally since Cronbach's  $\alpha$  met the criterion of 0.70 [21]. All scores were moderate-high, and always above 4. Perceived competence was positively correlated to self-efficacy. In addition, attitude towards *Human Site*, self-efficacy, enjoyment and perceived learning correlated positively among themselves.

**Table 1** Means, standard deviations, internal consistencies (Cronbach's  $\alpha$ ), and correlation (Pearson  $r$ )

Variables	Mean	SD	$\alpha$	1	2	3	4
1. Perceived competence	4.76	1.51	-				
2. Attitude towards <i>Human Site</i>	5.15	.98	.71	.22#			
3. Self-efficacy	4.43	.93	.94	.36**	.29*		
4. Enjoyment	4.54	1.25	.91	.13#	.72***	.40**	
5. Perceived learning	4.87	1.55	-	.14#	.62***	.28*	.42**

\*\*\* $p \leq .0001$ , \*\* $p \leq .001$ , \*  $p \leq .05$ , #= $p$  no significant

### 3.2 Gender differences in students' experiences

In order to test whether males and females differed in the study variables, a GLM was carried out. This multivariate analysis of variance was not significant (Wilks' Lambda,  $F(5, 48)=1.93$ ;  $p=.11$ , n.s.). In addition, none of the particular variance analyses for each variable was significant either. Thus, female and male students did not differ in any study variable significantly.

Moreover, we also performed an analysis of variance (ANOVA) to test possible differences between females and males in their previous experience in ICT and virtual learning environments in order help us to better explain the above findings. For both variables, ANOVAs were significant: previous experience in ICT ( $F(1, 53)=10.43$ ;  $p=.002$ ), and in virtual learning environments ( $F(1, 53)=3.91$ ;  $p=.05$ ). Men scored higher in previous experience (ICT mean=5.67, virtual learning environment mean=5.00) than women (ICT mean=4.33, virtual learning environment mean=4.15).

Thus, despite males reporting higher previous experience in ICT, and specifically in virtual learning environments, no gender differences appeared in the variables explored.

#### 4. Conclusions and discussion

The aim of this study was to analyse gender differences in students' experiences (i.e., perceived competence, attitudes, self-efficacy, enjoyment, and learning) with a virtual learning environment called *Human Site*, dynamically developed by the research team with students in an interactive manner. Our results reveal that there are no significant differences between the women and men of this sample in perceived competence, attitude towards *Human Site*, self-efficacy adapted to *Human Site*, enjoyment and perceived learning. These findings do not agree with previous research which points out that males mostly perceive themselves as being more competent [10-13], have more positive attitudes towards ICT [17-18], feel more efficacious in computing and report more positive emotions regarding these technologies [10]. Furthermore, males report higher previous experience in ICT and also in the virtual learning environment than females, according to previous studies. For instance, data from 2005 in relation to Internet use in Spain indicate that 39% of users are females while 61% are males [7]. Thus, despite the fact that men have more previous experience in ICT, and specifically in virtual learning environments than women, no significant gender differences emerge in any of the study constructs. The absence of differences between both groups is worthy of mention for the perceived competence, self-efficacy and perceived learning variables. Regardless of the fact that women report less previous direct contact with ICT and virtual learning environments, neither their beliefs and feelings of competence and efficacy are negatively affected by this condition, nor is their perceived learning in their virtual subject damaged in comparison with their peers.

The absence of these differences could be due to the level of education within the sample: all individuals are university students, so all of them have a bachelor degree at least and have been at university for some years. In fact, the typical female Spanish user is a woman aged 25-44 years with a high education degree [22]. Thus, perhaps in gender differences in ICT experiences tend to decrease or disappear at such a level of education when individuals have a homogeneous level of education. Furthermore, the non appearance of those variations could be a consequence of the limited sample of this paper. In this sense, we must consider this as a pilot study.

At any rate, our findings allow us to conclude that the differences between males and females in the experiences that subjects have regarding ICT and its use are not as clear and evident as the results obtained in traditional research on technologies in general. Perhaps, gender may not be a key factor to explain the differences between individuals in their behaviours in relation to ICT, rather other variables play a more explicative role. When other variables, such as level of education, are controlled, we observe that the gender differences are lesser or even non existent.

Altogether, our challenge in the education environment is an attempt to make an effort to provide equal access to ICT so that new technologies could close, rather than widen the traditional gap between men and women in the use of technologies.

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