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# **SOJEL**



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## WELCOME TO SOJEL

Foreword by the Editor, Dr John Biggam



SOJEL is an online e-Learning peer-reviewed journal, reflecting e-Learning theory and practice in Scotland, Europe and further afield. The response to SOJEL from the e-Learning community – in academia and elsewhere – has been excellent. Long may this enthusiasm continue! The papers published in this very first issue of SOJEL are rich in variety of topic, from Peter Hinch's informative paper on delivering mathematics through an e-Learning platform to plumbing apprentices, to Professor Martyn Sloman's personal reflections on the development of e-Learning in the corporate world.

Scotland has a proud tradition of looking outwards to learn from others. This journal tries to live up to that tenet, evidenced in the number of papers accepted from outwith these borders: from Spain, Italy, Eire, Luxembourg and Belgium. Such diversity of cultures and experiences can only enhance the goal of SOJEL, which is to learn from each other and to develop best practice in e-Learning.

SOJEL is a free journal, published twice a year, in June and December. This journal is only made possible because of you, the learning community. The contributions are warmly received, greatly appreciated and of a high standard. Thank you.

*John Biggam*

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## AN EXPERIMENTAL STUDY OF THE EFFICACY OF TRUST-BUILDING SEALS AND OTHERS DETERMINANTS OF USEFULNESS IN B-LEARNING MANAGEMENT SYSTEMS

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### Abstract

*An experimental situation was set up in order to analyse how the application of trust-building seals (logotypes of recognised entities and private security certificates) can impact on the perceived usefulness of a blended electronic (b-learning) learning management system, widely introduced in recent years. In terms of the improvement of usefulness, the successful outcome of such Web technologies depends on the specific situation applied and other explanatory factors under the control of the organization that developed them. So, the results of the analysis of covariance emphasize that the more importance attributed to the results obtained by use of a system, the greater will be the perceived usefulness of that system. Furthermore, perceived usefulness could mainly improve for use of logotypes of recognised entities.*

Keywords: b-learning content management systems, usefulness, trust, job relevance, trust-generating seals

### 1. Introduction

“Evaluation”, “adoption” and “implementation” are the main states established by the Innovation Diffusion Theory (Prescott and Conger, 1995). Many studies have centred on the adoption state of a technological innovation from the users' viewpoint, obtaining models of intention or theories of behavioural decision, traditionally applied in social psychology (Swanson, 1982; Davis, 1989; Harrison et al., 1997; Pavlou 2002). Researchers therefore seem to have decided that theories of behavioural decision or intention provide a basis for the study of adoption of Information Technologies (IT) (Davis, 1989; Davis et al. 1989; Taylor and Todd, 1995; Bernadette, 1996; Harrison et al., 1997; Karahanna et al., 1999; Malhotra and Galletta, 1999; Venkatesh and Davis, 2000; Moon and Kim, 2001; Koufaris, 2002; Venkatesh, et al., 2003) and electronic commerce (Chen et al., 2002; Pavlou, 2002; 2003; Featherman and Pavlou, 2003; Gefen et al., 2003; Castañeda et al., 2005; 2007; Sánchez and Rondán, 2004; 2005).

Among the models most frequently used to examine adoption of technological innovation are the Theory of Reasoned Action, TRA (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980), the Theory of Planned Behaviour, TPB (Ajzen, 1991) and the Technology Acceptance Model, TAM (Davis et al., 1989). Although the first models of Fishbein and Ajzen were designed to explain any human behaviour, they

also contained theoretical principles valid in a wide variety of contexts. The predictive value of TAM and TRA to explain behaviour towards adoption of IT has been consistently significant (e.g., Lucas, 1975; Davis, 1989; Davis et al., 1989; Bernadette, 1996; Harrison et al., 1997).

The usefulness of this kind of model lies in describing the factors conducive to the acceptance of online exchanges, which helps both academics and users to better understand online behaviour in emerging exchange relations (B2B, B2C, A2C,...). There is a lack of research on the acceptance content management systems for e-learning or blended learning (*b-learning*). On the basis of the meta-analyses of TAM by Lee et al. (2003) and King and He (2006), as well as an *ad-hoc* search through the main databases (see Castañeda, Muñoz-Leiva and Luque, 2007), 66 studies were identified focused on Internet user acceptance. Of these, 18% were centred on the acceptance of the Internet as a medium, 45 % on the acceptance of *e-commerce* sites, 12% on e-mail, 8% on other Internet-mediated services and 5% on *free-content* Web sites. Only the remainder (8 %) was centred on *e-learning* systems.

In this environment, considerable research has been done on the acceptance of new IT or information systems but less attention has been paid to the assessment of the factors determining perceived usefulness, despite the fact that this belief has been one of the most important factors in the acceptance of the Web sites (Moon and Kim, 2001; Koufaris, 2002; Chen et al., 2002; Pavlou, 2002; 2003; Koufaris, 2002; Featherman and Pavlou, 2003; Bhattacharjee and Premkumar, 2004; Sánchez and Rondán, 2004; 2005; Castañeda et al., 2005; 2007). This underscores the need for more research in the usefulness of e-learning systems and its determinants.

To this end, a real experimental design provided data enabling an explanation of the perceived usefulness of a Web-based content management system as well as the moderating effects of trust-generating seals (McKnight et al., 1998; McKnight et al., 2002; Yousafzai et al., 2005). Specifically, we focused in the application of logotypes of recognised entities (situational normality) and private security certificates (structural assurance). Equally, the aim is to test the effect on the usefulness of its main determinants, i.e., trust toward the new Web technology and relevance of use for learning tasks. The empirical evidence obtained allows a Web designer or IT specialist to design actions aimed at influencing the acceptance and use of the virtual learning technologies by manipulating controllable external factors, such as the visual characteristics or the structure and contents.

## 2. Literature review

Perceived usefulness was defined as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context” (Davis, 1989, p.985) and has a direct influence on the use of IT in particular. Analysis of the literature on technological innovations shows some of the effects of perceived usefulness. Specifically, this is a multidimensional concept related to increased speed of work, the manner work is done, increased productivity and effectiveness as well as other practical aspects (Featherman and Pavlou, 2003). There is consistent evidence of the relation between attitude and usefulness in research focussed on information systems and computer technology (e.g. Davis et al., 1989; Malhotra and Galletta, 1999) and electronic commerce (e.g., Bhattacharjee 2000; Sánchez and Rondán, 2005).

The Technology Acceptance Model (TAM) also proposes a direct relation between usefulness and behavioural intention (Davis et al., 1989). In organizational contexts, the relation between usefulness and behaviour is based on the idea that people form intentions towards behaviours they believe will improve their work, beyond positive or negative feelings about the behaviour *per se*. This is because perceived usefulness is considered a tool to achieve rewards extrinsic to the content of the work. In this sense, the present study is based on the hypothesis that perceived usefulness will increase intentions to reuse a Web-based content management system supporting learning tasks.

Few studies have focussed on the assessment of the antecedents of usefulness, including trust, relevance of results for job (in our case: learning), quality of results, ease of use, accessibility to information or quality of content (Venkatesh and Davis, 2000; Venkatesh et al., 2003; Pavlou, 2002, 2003; Hu et al., 2003; Chen et al., 2002; Hong et al., 2002). In other words, perceived usefulness is a function of the system's characteristics, such as the high quality results perceived when a Web site offers rich information (Chen et al., 2002). Concretely, the job relevance is a "function of the importance within one's job of the set of tasks the system is capable of supporting" (Venkatesh and Davis, 2000: 191) and is a cognitive judgement distinct from other social influences that exercises a direct effect on perceived usefulness.

Concerning trust shown by people towards something determines the nature of many social and business relations (Fukuyama, 1995; Wrightsman, 1991). Trust refers to "the expectations that other individuals or companies with whom one interacts will not fall into inappropriate conveniences deriving from the dependence one has on them" (Gefen et al., 2003, p.308). Trust is merely a simple transactional decision (specific task) occurring at a single moment (specific time) and consists in an individual's interpretation of responsibility and actual risk given limited information about the reality (Pavlou, 2002).

Moreover, as put forward by Singh and Dalal (1999), individuals consider a Web site to be an additional source of information for promotion of the organization. Internet, and particularly Web pages, can thus be considered advertisements, given their conceptual similarity, physical appearance and function (Singh and Dalal, 1999), so that the concept of attitude towards the advertisement can be equated to attitude towards the Web site (Luna et al., 2002). In view of the foregoing, many models used to examine consumer behaviour towards advertising can also be used for the Internet. Therefore, given the lack of trust that can be generated towards information found on particular Web sites, it may be desirable to sponsor a recognised organization to ratify the (lucrative or not) benefits to be obtained by using a Web site. This could increase the message's credibility and, therefore, improve the trust in assessment of the benefits obtained by the system, thus strengthening purchase intention and behaviour (Parkinson, 1975). Improved consumer trust in a Web innovation can be attained, among other methods, by sponsorship of either public institutions or private independent organisms.

A few authors analysed and demonstrated how the application in Internet of elements such as logotypes of recognised entities and private security certificates –Verisign, BBBOnline, Trust-e,...– (situational normality and structural assurance, respectively) affect the trust toward and acceptance of a Web-site or e-commerce (e. g. McKnight et al., 1998; McKnight et al., 2002; Yousafzai et al., 2005).

### 3. Research hypotheses

Gefen et al. (2003), Gefen and Straub (2000) and Pavlou (2002 and 2003) include the trust construct in the context of electronic services. Moreover, trust influences transactional behaviour through intentions, attitude and perceived control, as well as indirectly through perceived usefulness and ease of use (Chircu et al., 2001; Pavlou, 2002 and 2003).

According to Gefen (1997), trust is a determinant of perceived usefulness, especially in online contexts, as the consumers' assurance of achieving a certain degree of Web-interface usefulness depends on the people behind the Web site. In some studies, the relatively weak effect of trust on behavioural transaction intentions suggests that it operates indirectly through perceived usefulness and other factors (Pavlou, 2003).

Trust allows the consumer to depend on Web retailers and the underlying infrastructure and so make the interaction more useful. Conversely, if Web retailers are trusted but behave differently to the beliefs instilled, the interface will become useless. The reason is that excessive risk causes the consumer to reject use of the system and, in this case, there is no reason to expect usefulness to be gained with use of the interface (Pavlou, 2002). We can therefore establish the following hypothesis:

*H1: Trust has a positive effect on the perceived usefulness of a system.*

Venkatesh and Davis (2000) include job relevance as an instrumental cognitive process which, together with quality of result, demonstrability of results and perceived ease of use make up the instrumental cognitive determiners of perceived quality. Quality of result has related aspects included in the concept and specificity of perceived usefulness. The effect of job relevance on usefulness of technology was also examined by Hong et al. (2002) and Hu et al. (2003).

Several authors have linked user acceptance with variables similar to relevance for work, such as the job-determined importance, involvement or task-technology fit (Leonard-Barton and Deschamps, 1988; Hartiwick and Barki, 1994; Goodhue, 1995). In the context of distance learning, the users of the system tends to acquire autonomy in their learning process, which implies the choice of Web support technology, supplementary teaching material, methods of task submission, and so forth. In this sense, it is important to assess the effect of relevance for the results of a new technology. We can therefore establish that:

*H2: The importance recognized to the results obtained by use of a system has a positive effect on the perceived usefulness.*

In order to increase perceived usefulness, it may be pertinent to include trust-building mechanisms such as logotypes of recognised organizations – in the field of education – (situational normality) and a private security certificate (structural security); analysed by McKnight et al. (1998), Pavlou et al. (2003), McKnight et al., (2004) and Yousafzai et al. (2005). With an effect mediated via trust (e. g. Pavlou, 2002; Gefen et al., 2003), we can expect that:

*H3: The presence of logotypes of recognised organizations increases the perceived usefulness of a system.*

*H4: The presence of security certificates increases the perceived usefulness of a system.*

and therefore:

*H5: The presence of logotypes of recognised organizations and of security certificates increases the perceived usefulness of a system.*

## 4. Methodology

### 4.1. Sampling and measurement scales

Information was gathered from 381 undergraduate students from different courses at the Business Faculty of the University of Granada, who were offered a questionnaire structured according to the scales commented here after they had become familiarised with all the options of the WebCiM platform. The elements sampled were selected and assigned by the researcher's judgment, with the aim of obtaining a balanced size (approximately 100 cases per treatment level) for each group. The fieldwork was carried out over the first two weeks of October 2005. Seven questionnaires were discarded because of an excessively high number of missing data and five because of atypical behaviour. The final sample consisted of 369 valid cases (see table 1).

Treatment level	Valid cases (%)
CG: WebCiM <sup>a</sup> platform	<b>92 (24,93)</b>
EG1: UGR and Ministry of Education logotypes	<b>88 (23,84)</b>
EG2: Security certificates	<b>88 (23,84)</b>
EG3: Logotypes and security certificates	<b>101 (27,37)</b>
Total	369 (100%)

**Table 1. Distribution of sample by treatment applied**

A structured questionnaire was used to measure both variables to be explained (usefulness) and trust and job relevance by using the Web-based learning platform. The introduction prior to completing the questionnaire did not refer to the aims of the research, in order to prevent an artificial effect of the treatments on the variables of behaviour and their determinants.

All measurements were carried out on 1 to 7 scales. The usefulness scale of 7 items was adapted to our particular case from Moore and Benbasat (1991), Moon and Kim (2001) and Hu et al. (2003). The 8 item trust scale originated in McKnight et al. (2002), was validated in the context of IT by Castañeda (2005) and adapted to use of a learning support platform for this study. The scale of relevance for work consists of 2 items and is by Venkatesh and Davis (2000). Regarding other variables related to usefulness and job relevance, in this research ease of use had no effect on usefulness, and demonstrability of results was not included in our study, as it was considered a construct that can not be valued by new users of the system.

### 4.2. Experimental design

A real experimental design was set up in which the stimulus consisted in exposing the student to a fully operative *b-learning* management system or teaching support platform [WebCiM]. This platform was developed by the Department of

Commercialisation and Market Research of the University of Granada. It incorporates several support utilities for student learning. It is available at <http://marketing.ugr.es>.

Since the aim of the study consists in analysing the effect of the incorporation of logotypes of recognised entities and security certificates on usefulness, trust and job relevance (for the learning tasks) regarding use of the Web platform, three treatment levels were set up (see appendix) plus one control group, CG. The CG consisted in using the platform without any added elements (treatments). The first two levels involved adding to this group the logos of the University of Granada and the Ministry of Education and Science [experimental group 1, EG1] and an imaginary "Secured Version" security certificate [EG2]. The third joint treatment included both the logos for free public access and downloading of material (after prior user identification on the platform), and also the security certificate for access to the student's intranet data management and access to notifications and results [EG3]. The cases were assigned at random to the treatments and the sizes of the EGs and CG were kept balanced (see next section).

Thus, the experimental design proposed was:

$$y_{ij} = \mu + \tau_i + \beta_j (x_{ij} - \mu_x) + \varepsilon_{ij}$$

where,  
 $y_{ij}$  = usefulness (dependent variable)  
 $\mu$  = general mean of usefulness  
 $\tau_i$  = effect of treatment levels (CG, EG1, EG2, EG3)  
 $X_j$  = trust and job relevance (covariables)  
 $\mu_x$  = mean of each covariable  
 $\beta_j$  = effect of each covariable  
 $\varepsilon_{ij}$  = error

In order to increase the robustness and power of the contrasts to be drawn and also to give the experiment internal validity, the treatments were guaranteed to be carried out in the same conditions. To this end the interviewers were suitably instructed on the operations to be followed and special care was taken that the different stimuli had the same colour, screen definition and speed (see appendix).

## 5. Results: effectiveness of experimental treatment

An ANCOVA (Analysis of Covariance) was performed, in order to analyse the effectiveness of our experimental design and contrast the hypotheses proposed. In our case, the basic suppositions of Variance Analysis (normality, equality of variances and independence of groups) are respected, except for normality, which is not present according to the Kolmogorov test, although its effect on goodness of fit can be ignored (Luque & Ibáñez, 2000: 285). Furthermore, the number of covariables included in the analysis hold leading rule of Hair et al. (1993: 274).

As regards the explanatory capacity of the models, the determination coefficient ( $R^2$ ) obtained intermediate values, explaining approximately 60% of the total variance.

Source	Sum of squares (type III)	d. f.	Squared mean	F	Sign.
<b>Model corrected</b>	<b>425,571<sup>a</sup></b>	<b>5</b>	<b>85,114</b>	<b>103,864</b>	<b>0,000</b>
<b>Intersection</b>	<b>0,538</b>	<b>1</b>	<b>0,538</b>	<b>0,656</b>	<b>0,418</b>
<b>Treatment</b>	<b>18,923</b>	<b>3</b>	<b>6,308</b>	<b>7,697</b>	<b>0,000</b>
<b>Trust</b>	<b>40,889</b>	<b>1</b>	<b>40,889</b>	<b>49,897</b>	<b>0,000</b>
<b>Job relevante</b>	<b>100,165</b>	<b>1</b>	<b>100,165</b>	<b>122,230</b>	<b>0,000</b>
<b>Error</b>	<b>281,900</b>	<b>34</b>	<b>0,819</b>		
<b>Total</b>	<b>7.858,111</b>	<b>35</b>			
		<b>0</b>			
<b>Total corrected</b>	<b>707,471</b>	<b>34</b>			
		<b>9</b>			

a Calculado con alfa = 0.05

b R-squared = 0.602 (R-squared corrected = 0.596)

**Tabla 2. ANCOVA: Test of signification for the inter-subjects effects**

Parameter	$\tau_i/\beta_j$	Typical error	t	Sign.
<b>Intersección</b>	<b>-0,069</b>	<b>0,237</b>	<b>-0,289</b>	<b>0,773</b>
<b>CG</b>	<b>0,000<sup>a</sup></b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>EG1</b>	<b>0,546</b>	<b>0,139</b>	<b>3,917</b>	<b>0,000</b>
<b>EG2</b>	<b>0,039</b>	<b>0,138</b>	<b>0,282</b>	<b>0,778</b>
<b>EG3</b>	<b>0,413</b>	<b>0,135</b>	<b>3,061</b>	<b>0,002</b>
<b>Trust</b>	<b>0,411</b>	<b>0,058</b>	<b>7,064</b>	<b>0,000</b>
<b>Job relevante</b>			<b>11,05</b>	
	<b>0,498</b>	<b>0,045</b>	<b>6</b>	<b>0,000</b>

a. The parameter has been assigned value zero because is redundant. The rest is adjusted by reference.

**Tabla 3. ANCOVA: Without standardized coefficients and other results**

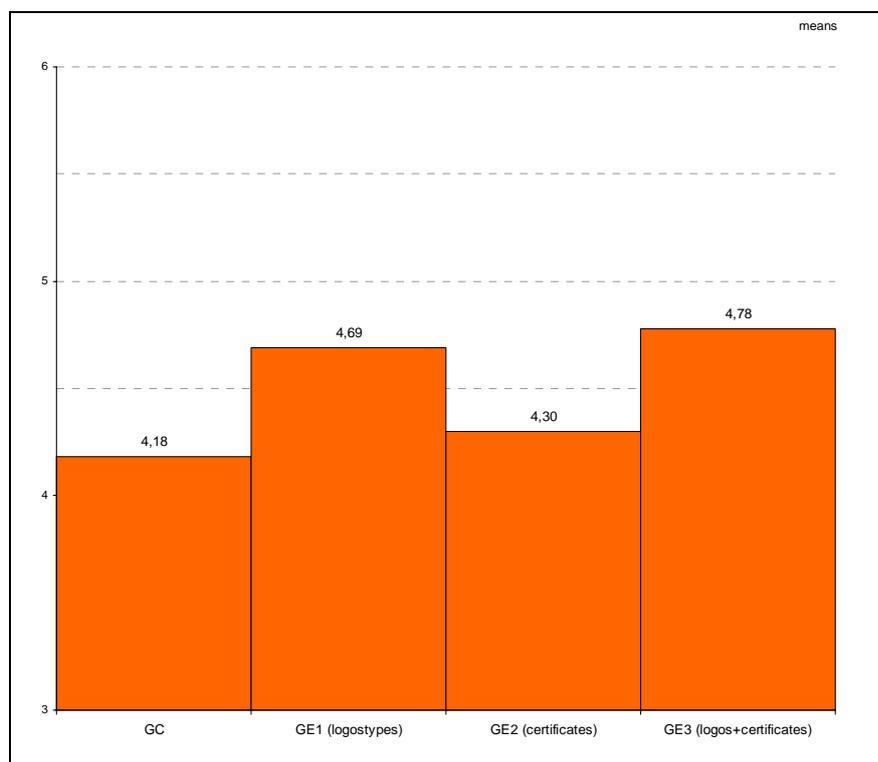
The result of the *t* test for parameters obtained warns that, for a 1% significance level, perceived usefulness can be explained by the two variables (job relevance and trust) considered its determinants. According to the effects ( $\tau_i/\beta_j$ ) obtained, any increase in trust, in relevance for learning tasks or in treatment levels implies an increase in perceived usefulness.

Therefore, there is empirical support to confirm the positive effect of job relevance with the use of the Web platform on the perceived usefulness of that platform (hypothesis H2). In addition, with a slightly inferior effect, as trust in the Web site increases, so does the perceived usefulness of that site (H1).

Comparison	difference	significance
CG – EG3	0.59	0.0181**
CG – EG1	0.50	0.0735*
EG2 – EG3	0.43	0.0869

\*\*p<0.05; \*p<0.10

**Table 4. ANCOVA: Significant difference in post-hoc analysis of perceived usefulness (HSD Tukey test)**



**Figure 1: Mean of perceived treatment levels**

Different behaviour is observed between treatments (for a 1% significance level), with significant effect of the “logotypes” treatment on perceived usefulness when compared with the CG (see figure 2 and *post-hoc* analysis). So, it is appreciated that the levels “logos” (EG1) and “logos + certificates” (EG3) of the factor have a positive and significant effect on usefulness. This confirms the existence of a positive effect of logos from recognised organizations on perceived usefulness (H3). We also found a significant increase in perceived usefulness in the case of the combined experimental group (logotypes and certificates) (H5), but this effect is due only to the presence of logos.

At the same time, a neutral effect was detected for security certificates (EG2) on perceived usefulness, with no empirical evidence to support hypothesis H4.

## 5. Conclusions and recommendations

An experimental situation was set up in order to analyse the effect of perceived trust and job relevance, and of associations with trust-building mechanisms (logotypes and security certificates) on the usefulness of Web platforms designed as learning support for university students. The successful acceptance of this type of Web technology depends on the experimental situation and the attributes of the Web platform intervening in the explanation of the usefulness. These attributes can be controlled from the organization developing such platforms.

So, the results of the ANCOVA emphasize the higher importance of job relevance when explaining usefulness. The way to increase a Web site's perceived usefulness should therefore be to find arguments that basically refer to the relevance of the tasks to be undertaken with the system. Likewise, the effect of trust toward the Web platform is significant. This can all help decisively the acceptance of this type of Web innovation because it guarantees that the trust and job relevance perceived for usage of the Web site will not impact negatively on perceived usefulness.

Our experimental design did not allow us to adequately isolate the effect of security certificates and logos from other variables, but we can reach some interesting outcomes. In this way, the perceived usefulness of the new Web-based learning management system improves with the inclusion of logotypes of recognised entities and so we suggest the need to include sponsorship of recognised prestige in the introduction of new Web sites on the WWW or in the development of Web platforms for distance learning or *e-learning*.

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## Appendix



Figure 1. WebCiM with logos of the University of Granada and the Ministry of Education and Science



Figure 2. WebCim with security certificates