Available online at www.sciencedirect.com
SCIENCE DIRECT®
Computers in Human Behavior 22 (2006) 1043–1058
Computers in Human Behavior
www.elsevier.com/locate/comphumbeh

Self-efficacy beliefs, computer training and psychological well-being among information and communication technology workers

Maria Isabel Beas *, Marisa Salanova

Department of Psychology, Faculty of Human and Social Sciences, Universitat Jaume I, Castellón, Spain

Available online 16 April 2004

Abstract

This study examines the factorial structure of self-efficacy and the relationship among different levels of self-efficacy (i.e., generalised, professional and computer) and psychological well-being and training among Information and Communication Technology (ICT) workers. The sample was made up of 496 workers from different occupational sectors using ICT in their jobs and a subsample of these workers who were trained in ICT. Results show that (1) the generalised-specific structure is maintained in the three levels as expected but in fours factors: i.e., generalised self-efficacy, professional self-confidence, achieving professional objectives and computer self-efficacy. (2) There is a negative and significant relationship between self-efficacy and different psychological well-being indicators. (3) Computer attitudes moderated the relationship between computer training (i.e., number of training hours) and professional self-confidence. So far, workers with high positive attitude towards ICT, when number of hours are high, their levels of professional self-confidence increase, but it depends on the number of training hours (i.e. more training hours, more self-confidence). However, workers with low levels of positive attitude towards ICT experimented a decrease in professional self-confidence. In conclusion, training has not a direct influence on self-efficacy but moderated by type of training. Limitations of the study and practical implications of these findings are discussed.

Keywords: Self-efficacy; Computer training; Information and communication technology; Computer attitude; Psychological well-being

* Corresponding author. Tel.: +34 964 72 9567/729077; fax: +34 964 729127.
E-mail address: mbeas@sg.uji.es (M.I. Beas).

0747-5632/$ - see front matter
doi:10.1016/j.chb.2004.03.027

1. Introduction

The concept of self-efficacy has been widely used in clinical, educational, social and organisational health contexts. Bandura has developed widely this concept through the frame of Social Cognitive Theory (1997, 1999, 2001). In this sense, beliefs of self-efficacy produce effects through cognitive, motivational, affective and selective processes (Bandura, 1997). According to Bandura (1997, 1999, 2001) self-efficacy theory is a comprehensive theory that explains inside a conceptual unified framework, the origins of personal beliefs of efficacy, its structure, function, processes and the diverse effects that produce.

Perceived self-efficacy refers to beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments (Bandura, 1997, p. 3). However, this author specifies that self-efficacy measures must be addressed to specific psychological domains. Moreover, beliefs in one's capabilities can be developed by enactive mastering, vicarious learning, social persuasion and emotional activation. Self-efficacy has commonly understood as specific-domain. People can have different beliefs about themselves in different domains. However, some researchers have conceptualised a generalised sense of self-efficacy as the global confidence in the own capability to face up a wide range of new and demanding situations (Sherer et al., 1982; Snyder et al., 1991; Wallston, 1992).

Schwarzer (1999, p. 1) defines generalised self-efficacy as a global confidence in one's coping ability across a wide range of demanding or novel situations, been a wide and stable characteristic. This author defends the utility of a general measure. Other studies show that general and specific self-efficacy are positively and significantly related, and can operate in a complementary way (Grau, Salanova, & Peiró, 2000; Jex & Bliese, 1999; Watt & Martin, 1994). Other authors point out the necessity to develop specific competencies measures in specific populations (Maibach & Murphy, 1995), and using specific measures of self-efficacy. Cherniss (1993) introduced professional self-efficacy as the belief in been capable of performing the labour role. Moreover, Murphy, Coover, and Owen (1989) defined computer self-efficacy as one's perception of one's capabilities regarding specific computer-related knowledge and skills. Related to this, Grau et al. (2000) found that specific self-efficacy moderates more relationships between stress and strain than general self-efficacy. Schwoerer, May, and Hollensbe (1999) observed that specific self-efficacy (i.e., professional) was incremented more after training than generalised self-efficacy. Salanova, Peiró, and Schaufeli (2002) extended the Job Demands-Control of Karasek, including the computer self-efficacy as a moderator variable between job demands (i.e. quantitative overload), job control (i.e. time and method control) and burnout (i.e. exhaustion and cynicism). Furthermore this relationship was not found in the case of generalised self-efficacy. So far, research show that although generalised self-efficacy can contribute to explain stress in organisations, the specific self-efficacy in different domains explain even more variance.

In this way, research has showed the need to study more personal variables as potential moderator in the relations of stress and their consequences (DeRijk, Le Blanc, & Schaufeli, 1998; Heinisch & Jex, 1997; Jex & Bliese, 1999; Jex, Bliese, Buzzell, & Primeau, 2001; Jex & Elacqua, 1999; Parkes, 1990; Salanova et al., 2002). However, there is relatively little investigation focused in explaining the way in which these individual differences influence the relation stressor-strain (Jex et al., 2001). It can be hypothesised that self-efficacy influences how employees face up stressors in the workplace. Few studies have examined these questions directly, the group of research of Steve M. Jex, of the University of Wiscosin (Jex & Bliese, 1999; Jex et al., 2001; Jex & Gudanowski, 1992); Jimmieson (2000); the

group of research WONT in Spain (Grau et al., 2000; Salanova, Llorens, Cifre, Martínez, & Schaufeli, 2003; Salanova et al., 2002) and Schaubroeck and colleagues (Schaubroeck, Lam, & Xie, 2000; Schaubroeck & Merrit, 1997). While Jex and Gudanowski (1992) did not find empirical evidence upon the moderator role of self-efficacy in the process of job stress, the remainder found it.

A particular kind of stress in the workplace is the concept of burnout (Maslach & Jackson, 1981). Burnout is an adverse reaction of the workers that are found implied in very nearby interactions with clients in human services. Burnout is composed by three specific dimensions: emotional exhaustion (i.e., the draining of energy due to excessive efforts spend at work), depersonalisation or cynicism (i.e., an indifferent, detached and distant attitude towards one's work) and (lack of) professional efficacy (i.e., a sense of low accomplishment and low job competence). Initially the syndrome of burnout was conceptualised in the environment of the human services, but has applied to other professions, for example the ones that work in contact with the new technologies (Salanova et al., 2003; Salanova & Schaufeli, 2000; Schaufeli, Leiter, Maslach, & Jackson, 1996). In this way, research show the moderator role of self-efficacy in the relation among job demands and burnout (Grau et al., 2000; Jimmieson, 2000; Salanova, Grau, Cifre, & Llorens, 2000; Salanova et al., 2002; VanYperen, 1998).

Utilising specific self-efficacy measures, in a study carried out upon a sample of 140 ICT workers, Salanova et al. (2000) showed the moderating role of computer self-efficacy between computer training and burnout (i.e., emotional exhaustion and cynicism). Frequency of use and computer training increased levels of computer self-efficacy. Thus, the higher level of computer training, the higher levels of cynicism, when self-efficacy was low. The results show a ''return effect'' of self-efficacy. That is: computer training seems to increase computer self-efficacy, but only when workers had high previous levels of computer self-efficacy. On the other hand, when previous levels were low, training experience was a kind of stressor because increase the levels of burnout.

On the other hand, research also suggests differences of gender, age and educational level in computer self-efficacy. In some studies males have significantly greater level of computer self-efficacy than females (Carlson & Grabowsky, 1992; Chou, 2001). However, other studies do not find significant differences (Torkzadeh, Pflughoeft, & Hall, 1999). For instance, differences depends more on the complexity of the task. In this sense, men inform of greater levels of self-efficacy for the complex tasks, but not for the simple tasks (Murphy et al., 1989; Torkzadeh & Koufterous, 1994). Besides, gender has an moderator effect in the relation among computer training and computer self-efficacy (Chou, 2001). Regarding to the age, there are few studies that examine psychological effects of computers by groups of age (Kelley & Charness, 1995; Staufer, 1992). In any case, seems that the relationship is not direct among both variables but indirect. Finally, the educational level has a positive effect in computer self-efficacy, so workers with greater level of formal training have greater confidence in their competencies for the use computers aided technologies (McQueen & Mill, 1998).

Regarding to effects of exposure to technology in psychological well-being, results of research are contradictory. Some studies agree that high exposure to technology is related to a decrease in psychological well-being, or an increase (satisfaction, self-efficacy) (Bohlin & Hunt, 1995; Colley, Brodzinski, Scherer, & Jones, 1994; Igbaria & Chakrabarti, 1990; Jones & Wall, 1990; Kay, 1990; Okebukola, Sumampouw, & Jegede, 1992; Todman & Managhan, 1994). Other studies show that the relationship between exposure to technology and psychological well-being depends on type of exposure (frequency of use, training

courses) (Chen, Wigand, & Nilan, 1999; Leso & Peck, 1992; Rousseau, Jamieson, Rogers, Mead, & Sit, 1998; Woodrow, 1991). Finally, other research points out the moderator role of psychosocial variables in this process (technology appraisal, attitudes to technology, values, and so for) (Bitter & Davis, 1985; Majchrzak & Borys, 1998; Salanova & Schaufeli, 2000; Torkzadeh et al., 1999; Zoltan & Chapanis, 1982). In this vein, computer training can be conceptualised as "exposure" to technology.

In a context of continuous technology changes, training can appear as a useful strategy to deal with introduction and management of new technologies (Salanova & Grau, 1999). Necessity to update in new technology and the large amount of money invested in this process by government and enterprises, arises the question: How optimise efficiency of computer training? In the last years, the Information and Communication Technologies, user's interaction, and training in such Technologies is a relevant topic to be researched in order to identify key variables and its relationship in this process.

Research about transfer of training in the last decade found that among the independent variables studied, self-efficacy is considered like one of the more important individual variables located in the phase of pre-training or prior to the training in itself, together with other as cognitive abilities or locus of control (Cheng & Ho, 2001; Haccoun & Saks, 1998; Salas & Cannon-Bowers, 2001). Independently that self-efficacy has been acquired before or during the training process, research suggest that self-efficacy influences in the hole training process, and specifically: (1) this is positively related to motivation before the training; (2) is a powerful predictor of performance; (3) the effectiveness of training in transfer process; (4) modulates and moderates the effects of training in transfer results and training results (5) besides is a moderator of other personal variables as job satisfaction. In summary, research suggest that self-efficacy enhance results of learning and execution. In consequence, a key factor for trainers is to know when and how enhancing trainee's self-efficacy (Haccoun & Saks, 1998).

Also research about training and self-efficacy has tested the different role that self-efficacy plays in the training process and vice versa. In many studies self-efficacy has been considered like a dependent variable, which indicates effectiveness of training (i.e., an increment is pursued of self-efficacy after training) (Chou, 2001; Decker, 1999; Karsten & Roth, 1998; Schwoerer et al., 1999; Torkzadeh et al., 1999). Besides in longitudinal studies self-efficacy has been studied like a variable of the pre-training and the post-training process (Schwoerer et al., 1999; Wolfe, Nordstrom, & Williams, 1998). In other cases has been studied as moderator variable (Grau et al., 2000; Saks, 1995; Salanova et al., 2000; Stevens & Gist, 1997).

Finally, it is important to point out that impact of attitude in training is a key factor in this process. Bitter and Davis (1985), Torkzadeh et al. (1999) and Zoltan and Chapanis (1982) found that to be successful in computer training it is necessary to consider user's computer attitude. In fact, the mere exposure to computers does not generate interest, unless user has a positive attitude to computers. Specifically, Torkzadeh et al. (1999) studied a sample of university students developing an introductory module of computer use through a longitudinal design. They found that undergraduates started with a moderated level of computer self-efficacy, and after the training, this level increased. However, students showing negative attitude to computers did not increase computer self-efficacy. Moreover, only a few students showing negative attitude to computers improved their attitude to computers after training. So, general speaking, training programmes are effective to increase computer self-efficacy, but they are ineffective for those users showing a negative attitude to computers.

The main aim of this paper is to analyse the factorial structure of self-efficacy and the relationship among different levels of self-efficacy (i.e., generalised, professional and computer self-efficacy), computer training and psychological well-being. Specifically the hypothesis are:

Hypothesis 1: We expect different factors of self-efficacy, from more generalised to more specific ones, according levels of domains.

Hypothesis 2: We expect that low levels of self-efficacy will be positively and significantly associated to high levels of burnout (i.e., exhaustion and cynicism), job related anxiety and job related depression.

Hypothesis 3: We expect that specific self-efficacy will have stronger relationship to strain (i.e., exhaustion, cynicism, anxiety and depression) than generalised self-efficacy.

Hypothesis 4: We expect that computer attitude will moderates the relationship between computer training and self-efficacy.

Hypothesis 5: We expect stronger interaction effect of computer training × computer attitude moderation when self-efficacy is more specific.

2. Method

2.1. Procedure and participants

The sample was made up of 496 workers (50.6% men and 49.4% women) from different occupational fields. The common characteristic throughout the sample was that all study participants used Information Technology (IT) in their jobs. The main occupational groups consisted in sales and customer orientation (12.7%), administration – computer department, human resources department, accounting and finance department – (33.3%), laboratory (6.7%), production (5.2%) and managers (9%). The common characteristic through the sample was that they all use computer-aided technology (i.e. at least 10% or more of their week work-time). Furthermore, 173 workers of this sample had received continuous training in computers. Ages ranged from 20 to 58; the mean age of the sample was 32 (SD = 8.07).

Subjects were asked to answer a set of self-report questionnaires. Risk prevention experts in each firm were made responsible for the distribution of the questionnaires, which were delivered in an envelope. A covering letter explained the purpose of the study, that participation in the study was voluntary, and confidentiality guaranteed. Respondents were asked to return filled questionnaires inside the sealed envelope either to the person who had distributed them or directly to the research team.

2.2. Measures

Psychological Well-being was measured with 'burnout' and 'job-related anxiety and depression'.

Specifically, *Burnout* was assessed with two subscales of the Spanish version (Salanova et al., 2000) of the MBI-GS-Maslash Burnout Inventory-General Survey (Schaufeli et al., 1996): exhaustion (5 items) (e.g. ''I feel emotionally drained by my work''), and cynicism (4 items) (e.g. ''*I have become more cynical about whether my work contributes anything*''). Participants responded on a 6-point scale which ranged from 1 (never) to 6 (often/everyday) to measure the frequency with which they experience this feeling. One cynicism item

(#13: "*I just want to do my job and not be bothered*") was deleted because of its insufficient factorial validity shown in other studies (Leiter & Schaufeli, 1996; Salanova & Schaufeli, 2000; Schaufeli, Keijsers, & Reis Miranda, 1995; Schutte, Toppinen, Kalimo, & Schaufeli, 2000). Alpha coefficients of 0.85 for both subscales were reported.

On the other hand, *Job-related anxiety and depression* were assessed by two subscales of the questionnaire "Psychological well-being related to work" (Warr, 1990): anxiety (six items, e.g. "tense") and depression (five items, e.g., "depressed"). The six point scale was from "never" to "always". Item "miserable" from depression subscale was deleted because of its insufficient factorial validity. Workers had to answer by a six-point scale (from "never" to "every day"). Alpha coefficients of 0.81 for anxiety and 0.73 for depression were reported.

2.3. Self-efficacy beliefs

We used different scales in order to measure different levels of specificity of self-efficacy: generalised, professional and computer self-efficacy. Generalised self-efficacy has been assessed by a short version (Grau et al., 2000) from Spanish adaptation of General Self-efficacy (Bäßler & Schwarzer, 1996). One example of item of this one-dimensional scales is "*I can always manage to solve difficult problems if I try hard enough*". The alpha coefficient of the scale was 0.83.

Professional self-efficacy was assessed by the professional self-efficacy subscale on the MBI-GS (Maslach Burnout Inventory-General Survey, Schaufeli et al., 1996). The total number of items was 6. An example of item was "*In my opinion, I am good at my job*". Alpha coefficient 0.71 was reported. In two previous factorial analysis (Beas, 2001; Salanova & Schaufeli, 2000) this subscale was separated into two factors: 'professional self-confidence' and 'achieving professional objectives'.

Finally, computer self-efficacy was assessed by a self-constructed scale and validated in a previous study (Beas, Agut, Salanova, & Grau, 1999). An example of one item is "*I feel very competent using Information and Communication Technology*". The alpha coefficient was 0.67.

2.4. Computer-aided technology training

Computer training was assessed by a direct question to the workers about the training got at their companies: number of courses and total number of training hours received.

2.5. Computer attitudes

Attitudes towards ICT were assessed by a self-constructed scale and validated in a previous study (WONT, 1999). This scale is composed by 7 items about the attitude of workers towards technology. An example of item is "*Information and Communication Technology are valuable and necessary*". The alpha coefficient was 0.80.

2.6. Socio-demographic variables

Also age, gender and educational level (from 1, illiterate person, to 8, BA Degree) were considered.

2.7. Data analysis

A confirmatory factorial analysis was performed, using AMOS (Arbuckle, 1997) in order to test the factorial structure of self-efficacy beliefs Maximum likelihood methods estimation were used. Fit index methods: χ^2, AGFI (adjusted goodness of fit index) and RMSEA (root mean square error approximation) were used. χ^2 proves the difference between observed and predicted covariance matrix. However, this index is sensible to the sample size, so it is necessary to use other indexes (Bentler, 1990). Following Browne and Cudeck (1993) AGFI bigger than 0.90 indicates reasonable fit, while AGFI bigger than 0.95 indicates a closed fit. Moreover, RMSEA values smaller than 0.08 indicate a reasonable fit, and values bigger than 0.1 indicates a rejection of the model. Following Marsh, Balla, and Hau (1996) another relative fit index were calculated: NMFI (non-normed fit index), CFI (comparative fit index); TLI (Tucker–Lewis index). Values closed to 0.90 indicate a good fit (Bentler, 1990). Secondly, bivariated correlation with every extracted factors, and between factors are shown. Finally, four hierarchical multiple regression analysis with stepwise method were carried out with every dependent variable and the four factors of self-efficacy in order to test the hypothesis of the study. In the first step, age, gender and educational level were introduced. In the second step were introduced every dependent variable (number of training courses, number of hours of training) and the moderator variable. In the last step independent variables were computed in order to test interaction effects (cf. Cohen & Cohen, 1983; Kleinbaum, Kupper, & Muller, 1988).

3. Results

3.1. Confirmatory factor analysis

In the factorial analysis, 15 original items from the three questionnaires were included, i.e. 5 items from the generalised self-efficacy, 6 items from professional efficacy and 4 items from computer self-efficacy. We expected that professional efficacy split in two subscales (Salanova & Schaufeli, 2000): professional self-confidence and achieving professional objectives.

Results indicate that 4-factors proposed model fits reasonably to data. That is, values of fit indexes and RMSEA satisfy their respective criteria of >0.90 and <0.08. $\chi^2 = 156.71$; df = 84; GFI = 0.96; AGFI = 0.94; TLI = 0.95; NFI = 0.92 CFI = 0.96 and RMSAE = 0.04. In conclusion, H1 is confirmed: the four-factor structure (i.e. generalised self-efficacy, professional self-confidence, achieving professional objectives and computer self-efficacy) of the self-efficacy beliefs fits to the data of the sample.

3.2. Descriptive analysis

Table 1 shows the means, standard deviations, alpha coefficients, and zero-order correlation of the studied variables.

As we can see in Table 1, age (date of birth) correlates significantly to exhaustion. The younger is the worker, the more exhausted is. Regarding educational level, the more high is, the more computer training hours receives and the more level of computer self-efficacy shows. Number of courses are positively associated to number of hours of training. Moreover, those workers who score higher in achieving professional objectives, attend more

Table 1
Means, standard deviations, internal consistencies (Cronbach's α) and zero order correlations ($N = 495$)

	M	DS	α	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age (date of birth)	33.3	8.16	–	0.20***	0.11*	−0.10	0.08	0.09*	0.03	0.05	0.18***	0.02	−0.09*	−0.01	0.12**	0.08
2. Gender	1.46	0.5	–	–	0.02	−0.09	0.14	0.00	0.06	0.06	0.04	−0.08	−0.08	−0.06	−0.03	−0.09*
3. Educational level	6.25	1.53	–	–	–	0.06	0.17*	0.05	0.05	0.04	0.00	0.08	0.01	−0.05	0.02	0.13**
4. Computer training courses	1.59	0.77	–	–	–	–	0.19*	−0.01	−0.04	−0.08	−0.02	0.13	0.04	0.12	0.12	0.12
5. Computer training hours	67.08	80.3	–	–	–	–	–	0.07	0.00	−0.07	0.01	0.06	.03	0.00	0.17*	0.06
6. Anxiety	3.07	0.86	0.81	–	–	–	–	–	0.54***	0.35***	0.52***	−0.05	−0.18***	−0.16***	−0.04	−0.14***
7. Depression	2.63	0.93	0.73	–	–	–	–	–	–	0.49***	0.47***	−0.15***	−0.29***	−0.30***	−0.29***	−0.22***
8. Cynism	1.65	1.34	0.85	–	–	–	–	–	–	–	0.55**	−0.19**	−0.18**	−0.35***	−0.43***	−0.18***
9. Exhaustion	2.27	1.21	0.85	–	–	–	–	–	–	–	–	−0.15**	−0.21**	−0.19***	−0.10*	−0.14**
10. Computer attitude	5.57	0.86	0.80	–	–	–	–	–	–	–	–	–	0.31**	0.23***	0.24***	0.56***
11. Generalised SE	3.93	0.56	0.83	–	–	–	–	–	–	–	–	–	–	0.44***	0.26***	0.27**
12. Professional self-confidence	4.36	0.92	0.71	–	–	–	–	–	–	–	–	–	–	–	0.40***	0.22***
13. Achieving professional objectives	4.32	1.16	0.49***													0.18***
14. Computer SE	5.12	0.87	0.67	–	–	–	–	–	–	–	–	–	–	–		–

Note: SE (self-efficacy).
* $p \leqslant 0.05$.
** $p \leqslant 0.01$.
*** $p \leqslant 0.001$.

training hours. Regarding computer attitude, is negatively associated to cynicism and positively associated to every level of self-efficacy. Moreover, the results show that low levels of self-efficacy are positively and significantly associated to high levels of burnout (emotional exhaustion, cynicism), anxiety and depression. So hypothesis number 2 is confirmed.

On the other hand, anxiety is negatively related to every level of self-efficacy, except for achieving professional objectives, but correlates higher to generalised self-efficacy. Regarding depression, correlates negatively to every level of self-efficacy, but higher to professional self-confidence and generalised self-efficacy, the same as exhaustion. Cynicism are negatively associated to every level of self-efficacy, but higher with specific self-efficacy, specially to achieving professional objectives. So, regarding hypothesis 3, it is only true for variable cynicism, but not for the other indicators of psychological well-being.

3.3. Regression analysis

In order to test hypothesis 4, four hierarchical regression analysis were carried out with every level of self-efficacy. In order to interpret the a-priori standardised variables as correctly as possible, no standardised regression coefficients were performed. The results are shown in Table 2.

3.4. Generalised self-efficacy

Regarding generalised self-efficacy, results show that the proposed model is significant ($F = 2.76$**). The model explain 12.9% of variance. Main effects of moderator variable (i.e., computer attitude) are found, but there is no interaction effect between the moderator and the dependent variable.

Table 2
Hierarchical multiple regression analysis ($N = 173$)[a]

	Generalised self-efficacy		Professional self-confidence		Achieving objectives		Computer self-efficacy	
	β	R^2 change	β	R^2 change	β	R^2 change	β	R^2 change
1. Age (birth year)	−0.11		0.06		0.21**		0.14	
Gender	−0.08		0.06		−0.06		0.03	
Educational level	0.10	0.05	0.08	0.01	0.05	0.07*	0.13	0.07*
2. Computer training courses	−0.02		0.12		0.09		0.07	
Computer training hours	−0.01		−0.10		0.13		−0.04	
Computer attitude	0.29***	0.07**	0.33***	0.12***	0.25**	0.09***	0.49***	0.23***
3. N courses × moderator	−0.04		−0.12		0.01		−0.03	
N hours × moderator	0.09	0.01	0.17*	0.03	0.00	0.00	0.07	0.00
Multiple R	0.36		0.40		0.40		0.54	
R^2	0.129		0.160		0.162		0.30	
F	2.76**		3.54***		3.57***		7.88***	

[a] The β values are the coefficients from the final stage of the regression analysis.
* $p \leqslant 0.05$.
** $p \leqslant 0.01$.
*** $p \leqslant 0.001$.

3.5. Professional self-confidence

The proposed multivariate model is significant, too ($F = 3.54$***). The model explains 16% of variance. Sociodemographic variables are not associated to professional self-confidence. However, computers attitude (i.e., moderator variable) is positively associated to professional self-confidence, and have a main effect. Neither number of courses nor number of hours in computer training have main effects. So far, there is a specific interaction effect between number of hours and ICT attitude ($\beta = 0.17$*), which will be commented later on.

3.6. Achieving professional objectives

Analysis shows that proposed multivariate model is significant ($F = 3.57$***), and explains 16.2% of variance. Main effects are found in age (date of birth), ($\beta = 0.215$**), so being younger is positive and significantly associated to achieving professional objectives. Moreover, there is a main effect of ICT attitude, but not of training variables. No interaction effects are found between moderator and dependent variable.

3.7. Computer self-efficacy

Analysis shows that multivariate model is significant ($F = 7.87$***). It is the model which explains more variance (29.7%). Moreover, sociodemographic variables (age, gender and educational level) are not significant in the model, but closed to being significant ($\Delta R^2 = 0.06$*). Computer attitude is positively and significantly associated to this specific self-efficacy, while training measures do not have main effects. No interaction effects were found between training and moderator variable.

4. Interaction effect

The significant interaction effect of computer training (i.e., training hours) and professional self-confidence is graphically represented in Fig. 1, following the method recommended by Aiken and West (1991) and Jaccard, Turrisi, and Wan (1990). Values for the moderator were chosen 1 SD below and above the mean. Entering these values in the regression equation generated simple regression lines.

Those workers showing high positive computer attitude, when number of hours are high, their levels of professional self-confidence increase. However, a different picture

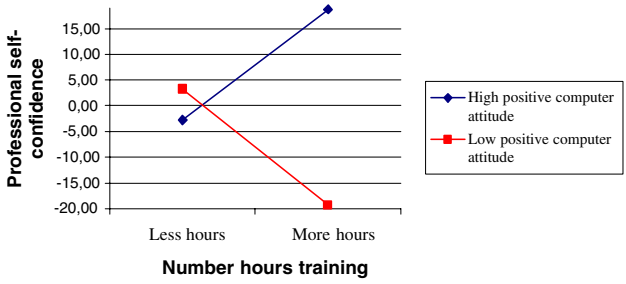

Fig. 1. Two-ways interaction effect of computer attitude and number of computer training hours on professional self-confidence (levels of professional self-confidence on *y*-axis).

was shown for workers scoring low in computer attitude. In this case, high number of training hours were associated with a decrease in professional self-confidence. In this way, hypothesis number 5 was partially confirmed because we did not find interaction effect of computer training × computer attitude when self-efficacy was the most specific (i.e., computer self-efficacy). However, we found this interaction effect in professional self-efficacy, what is more specific than generalised self-efficacy.

5. Discussion

The current study confirmed the four-factor structure of self-efficacy and the relationship among different levels of self-efficacy (i.e., generalised, professional and computer), computer training and psychological well-being. Regarding factorial structure and according previous research (Beas et al., 1999; Salanova & Schaufeli, 2000), we expected 4 dimensions of self-efficacy: generalised, professional confidence, achieving objectives and computer self-efficacy. Results supported our hypothesis, because the structure generalised-specific is confirmed using Confirmatory Factor Analysis. We confirmed that the 4-factor model fits reasonably to data. This structure also shows that different levels of self-efficacy exists. On the other hand, the separation into two factors of professional self-efficacy, scale of MGI, confirms previous research as well (Salanova & Schaufeli, 2000), and indicates the complexity of this construct.

The present study support our hypothesis that low levels of self-efficacy will be positively and significantly associated to high levels of burnout (i.e. exhaustion and cynicism) and job-related anxiety and depression, according to Bandura's Social Cognitive Theory (Bandura, 1992, 1995, 1999, 2001). These results support the results of previous research (Beas et al., 1999; Kavanagh, 1992; Salanova et al., 2003; Schwarzer, 1999; Schwarzer, Bäßler, Kwiatek, Schröder, & Zhang, 1996): there is a significant and negative relationship between self-efficacy and different indicators of psychological well-being. Generally speaking, people feeling less confident in their own capabilities show higher strain at workplace than people feeling more confident. However, regarding relationship of levels of self-efficacy and psychological well-being, our hypothesis is only partially supported for the case of cynicism. These results support a previous study with a smaller sample of workers using ICT (Beas et al., 1999). We found that achieving professional objectives predicted cynicism as well. Grau et al. (2000) found that exhaustion was more associated to generalised self-efficacy, and cynicism was more associated to professional self-efficacy. Schwarzer (1993), pointed out that generalised self-efficacy was a better predictor for general psychological well-being indicators, as anxiety and depression. Hence, anxiety and depression (related to work) are a generalised indicators of well-being, while burnout is more specific to work context. So, it can be suggested that generalised and specific measures can be complemented. Besides, our results show that self-efficacy specific measures explain more variance than generalised self-efficacy measures and support, again, the necessity of taking into account specific measures in specific domains (Bandura, 1986, 1997; Maibach & Murphy, 1995).

Results indicates that labour stress exists in the studied enterprises, and usually seems to be unavoidable. When stress situation are not possible of being controlled by the enterprise, enhancing self-efficacy can be used as a prevention strategy, for instance, through training programmes to enhance professional self-efficacy. Our study suggest that high levels of self-efficacy can help workers to deal with stressors effectively. To achieve this aim,

training should include a variety of components which are consistent with theoretical cues for self-efficacy building Bandura (1997): enactive mastery, vicarious experiences, coaching and encouragement (verbal persuasion) and managing physiological states.

Also our study showed that positive computer attitude moderates the relationship between computer training and self-efficacy, but only in case of "number of training hours" and professional self-confidence. Our results confirm results of previous research (Beas, Llorens, & Salanova, 2000) who found that only attitudes moderated the relationship between training and professional self-efficacy. On the other hand, attitude has a main effect on every level of self-efficacy so it is important in the training process (i.e. appraisal of training object). Our study suggest that the only exposition to computers (i.e. computer training) does not produce an increase in self-efficacy. Hence, we can suggest that other moderator effects can be found with different variables, such number of hours of voluntary training.

So far, it is important to know the specific content of the training in order to know if it fits to necessities of the workplace. Moreover, training profit for users are influenced by personal variables (attitude to object of training) so it is necessary to detect, assess and control attitudes in order to achieve training efficacy.

The present study supports the results of previous research which points out that the effect of technology experience depends on the different types of technology exposure (number of hours, number of courses) and psychosocial variables, as computer attitudes (Chen et al., 1999; Coffin & MacInyre, 1999; Leso & Peck, 1992; Majchrzak & Borys, 1998; Rousseau et al., 1998; Salanova et al., 2002; Woodrow, 1991). Hence, more hours of training are associated to an increase of professional self-confidence, but only in case of having a positive computer attitude. According to our results, computer training does not have main effect on self-efficacy, but interacts to computer attitude. Hence, effect of computer training seems to "increase" attitude direction to training object, in the case of professional self-confidence, because for those with negative attitude to computers, increasing number of hours is associated to a decrease in professional self-confidence. This result could be explained because these workers do not perceive utility of such training in their workplace, so they do not transfer the learnt contents to the workplace. In Davis' Technology Acceptance Model (1986, 1989) it is a key factor the "perceived utility" of technology, which directly influences attitude and intention of ICT use. In order to confirm such hypothesis future research should investigates in depth different quality training indicators (for instance, voluntarily of professional training in the enterprise). On the other hand, date of birth is negatively associated to achieving professional objectives. Therefore, it is necessary to study the core of training: design, in order to take into account every aspect of the adult trainee.

In conclusion, the training design is a key factor, so it is fundamental to take care of every aspect of the process. Hence, to achieve a high level of professional self-efficacy it is important to design training with quality standards, in order to get the transfer of training to the workplace. In this context, self-efficacy can be considered as a quality indicator of training, and should be measured before the training starts.

6. Limitations

The main limitation of this study is the use of a cross-sectional design. This methodology implies the results need to be interpreted with caution, as no causal inferences should be made. We are preparing longitudinal designs in future studies. Secondly, we have obtained our results from self-reports measures, so they can be contaminated by common

variance. Thirdly, our sample is composed by workers using ICT, and this fact can influence our results.

Despite of this limitations, current study show relevant results about the structure of self-efficacy and its relationships with psychological well-being at work, besides of the relevant role played by computer attitude as moderator of computer training and professional self-confidence of workers.

Acknowledgements

The writing of this paper was supported by grant BANCAIXA (#P1B98-10).

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Arbuckle, J. L. (1997). *Amos user's guide version 3.6*. Chicago, IL: Smallwaters Corporation.

Bäßler, J., & Schwarzer, R. (1996). Evaluación de la autoeficacia: Adaptación española de la escala de autoeficacia general. *Ansiedad y estrés, 2*(1), 1–8.

Bandura, A. (1986). *Social foundations of though and action: a social cognitive theory*. Eglewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1992). Exercice of personal agency though the self-efficacy mechanism. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action*. Berlin: Taylor & Francis.

Bandura, A. (1995). Guía para la construcción de escalas de autoeficacia. Retreived from http://www.one-net.com.ar/cv/edgardo-perez/effguideSpanish.htm.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Bandura, A. (1999). Social cognitive theory of personality. In L. Pervin & O. John (Eds.), *Handbook of personality* (second ed.). New York: Guilford.

Bandura, A. (2001). Social cognitive theory: an agentic perspective. *Annual Review of Psychology, 51*, 1–26.

Beas, M. I. (2001). La autoeficacia y su relación con el bienestar psicológico y la formación en trabajadores usuarios de nuevas tecnologías (Self-efficacy and its relationship with psychological well-being and computer training in New Technology users). Master's degree. University Jaume I (not published document).

Beas, M. I., Agut, S., Salanova, M., & Grau, R. (1999). La autoeficacia general y específica y su relación con diversos indicadores de estrés laboral (General and specific self-efficacy and its relations with job stress) Paper presented to IV International Conference on Cognitive/Behavioral Psychology, Valencia, 2–4 December.

Beas, M. I., Llorens, S., & Salanova, M. (2000). Formación para el uso de ordenadores y niveles de autoeficacia: el rol modulador de las actitudes hacia los ordenadores. In E. Agullo, C. Remeseiro, & J. A. Fernández (Eds.), Psicología del Trabajo de las Organizaciones y de los Recursos Humanos. Nuevas aproximaciones (pp. 441–446).

Bentler, P. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Bitter, G. G., & Davis, S. J. (1985). Measuring development of computer literacy among teachers. *AEDS Journal, 18*(4), 243–253.

Bohlin, R. M., & Hunt, N. P. (1995). Course structure effects on student's computer anxiety. *Journal of Educational Computing Research, 13*(3), 263–270.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Carlson, R. D., & Grabowsky, B. L. (1992). The effects of computer self-efficacy on direction-following behaviour in computer assisted instruction. *Journal of Computer-based Instructions, 19*, 6–11.

Chen, H., Wigand, R. T., & Nilan, M. S. (1999). Optimal experience of Web activities. *Computers in Human Behavior, 15*, 585–608.

Cheng, E., & Ho, D. (2001). A review of training studies in the past decade. *Personnel Review, 30*(1), 102–118.

Cherniss, C. (1993). Role of professional self-efficacy in the etiology and amelioration of burnout. In W. B. Schaufeli & Ch Maslach (Eds.), *Professional burnout: Recent developments in theory and research. Series in applied psychology: social issues and questions* (pp. 135–149). Washington, DC: Taylor & Francis.

Chou, H. W. (2001). Effects of training method and computer anxiety on learning performance and self-efficacy. *Computers in Human Behaviour, 17*, 51–60.

Coffin, R. J., & MacInyre, P. D. (1999). Motivational influences on computer-related affective states. *Computers in Human Behavior, 15*, 549–569.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioural sciences* (second ed.). Hillsdale, NJ: Erlbaum.

Colley, E. A., Brodzinski, J. D., Scherer, R. F., & Jones, P. D. (1994). The impact of cognitive appraisal, locus of control and level of exposure on the computer anxiety of novice computer users. *Journal of Educational Computing Research, 10*(4), 329–340.

Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems: theory and results. Doctoral Dissertation. Sloan School of Management, Massachussetts Institute of Technology.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science, 35*, 509–566.

Decker, C. A. (1999). Technical education transfer: perceptions of employee computer technology self-efficacy. *Computers in Human Behavior, 15*, 161–172.

DeRijk, A. E., Le Blanc, P., & Schaufeli, W. B. (1998). Active coping and need for control as moderators of the job demand-control model: Effects on burnout. *Journal of Occupational Psychology, 71*, 1–18.

Grau, R., Salanova, M., & Peiró, J. M. (2000). Efectos moduladores de la autoeficacia en el estrés laboral. *Apuntes de Psicología, 18*(1), 57–75.

Haccoun, R. R., & Saks, A. M. (1998). Training in the 21st Century: some lessons fron the last one. *Canadian Psychology, 12*, 33–51.

Heinisch, D. C., & Jex, S. M. (1997). Negative affectivity and gender as moderators of the relationship between work-related stressors and depressed mood at work. *Work & Stress, 11*, 46–57.

Igbaria, M., & Chakrabarti, A. (1990). Computer anxiety and attitudes towards computer use. *Behavior and Information Technology, 9*(3), 229–241.

Jaccard, J., Turrisi, R., & Wan, C. K. (1990). *Interaction effects in multiple regression*. Newbury Park, CA: Sage.

Jex, S. M., & Bliese, P. D. (1999). Efficacy beliefs as a moderator of the impact of work-related stressors: a multinivel study. *Journal of applied psychology, 84*, 349–361.

Jex, S. M., Bliese, P. D., Buzzell, S., & Primeau, J. (2001). The impact of self-efficacy on stressor-strain relations: coping style as an explanatory mechanism. *Journal of Applied Psychology, 86*(3), 401–409.

Jex, S. M., & Elacqua, T. C. (1999). Self-esteem as a moderator: a comparison of global and organization-based measures. *Journal of Occupational and Organizational Psychology, 72*, 71–81.

Jex, S. M., & Gudanowski, D. M. (1992). Efficacy beliefs and work stress: a exploratory study. *Journal of Organizational Behaviour, 13*, 509–517.

Jimmieson, N. L. (2000). Employee reactions to behavioural control under conditions of stress: the moderating role of self-efficacy. *Work & Stress, 14*(3), 262–280.

Jones, P. E., & Wall, R. E. (1990). Components of computer anxiety. *Journal of Educational Technology Systems, 18*(3), 161–168.

Karsten, R., & Roth, R. (1998). Computer self-efficacy: a practical indicator of student computer competency in introductory IS courses. *Informing Science, 1*(3), 61–68.

Kavanagh, D. (1992). Self-efficacy and depression. In Schwarzer (Ed.), *Self-efficacy: Thought control of action*. Bristol: Taylor & Francis.

Kay, R. (1990). The relation between computer literacy and locus of control. *Journal of Research on Computing in Education, 22*(4), 464–474.

Kelley, C. L., & Charness, N. (1995). Issues in training older adults to use computers. *Behaviour and Information Technology, 14*(2), 107–120.

Kleinbaum, D. G., Kupper, L. L., & Muller, K. E. (1988). *Applied regression analysis and other multivariable methods* (second ed.). Boston: PWS-Kent.

Leiter, M. P., & Schaufeli, W. B. (1996). Consistency of the burnout construct across occupations. *Anxiety Stress and Coping, 9*, 229–243.

Leso, R., & Peck, K. L. (1992). Computer anxiety and different types of computer courses. *Journal of Educational Computing Research, 8*(4), 469–478.

McQueen, R. J., & Mill, A. M. (1998). End user computing sophistication in a large health services organization, Effective utilization and management of emerging information technologies. In M. Khosrowpour (Ed.), *Information resources management association conference* (pp. 263–276). Hershey: Idea Group Publishing.

Maibach, E., & Murphy, D. A. (1995). Self-efficacy in health promotion research and practice: conceptualization and measurement. *Health–Education–Research, 10*(1), 37–50.

Majchrzak, A., & Borys, B. (1998). Computer-aided technology and work: moving the field forward. *International Review of Industrial and Organizational Psychology, 13*, 305–354.

Marsh, H. W., Balla, J. R., & Hau, K. T. (1996). An evaluation of incremental Fit Indices: a clarification of mathematical and empirical properties. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling, issues and techniques* (pp. 315–353). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Maslach, C., & Jackson, S. E. (1981). *MBI: Maslach burnout inventory*. Manual Palo Alto, CA: Consulting Psychologists Press.

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validity of the computer self-efficacy scale. *Education and Psychology Measurement, 49*, 893–899.

Okebukola, P. A., Sumampouw, W., & Jegede, O. J. (1992). The experience factor in computer anxiety and interest. *Journal Educational Technology Systems, 20*(3), 221–229.

Parkes, K. R. (1990). Coping, negative affectivity, and the work environment: additive and interactive predictors of mental health. *Journal of Applied Psychology, 75*, 399–409.

Rousseau, G. K., Jamieson, B. A., Rogers, W. A., Mead, S. E., & Sit, R. A. (1998). Assessing the usability of on-line library systems. *Behavior and Information Technology, 17*(5), 274–281.

Saks, A. M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationships between training and newcomer adjustment. *Journal of Applied Psychology, 80*(2), 211–225.

Salanova, M., & Grau, R. (1999). Análisis de necesidades formativas y evaluación de la formación en contextos de cambio tecnológico. *Revista de Psicología General y Aplicada, 52*(2–3), 329–350.

Salanova, M., Grau, R., Cifre, E., & Llorens, S. (2000). Computer training, frequency of usage and burnout: the moderating role of computer self-efficacy. *Computers in Human Behaviour, 16*, 575–590.

Salanova, M., Llorens, S., Cifre, E., Martínez, I., & Schaufeli, W. B. (2003). Perceived collective self-efficacy, subjective well-being and task performance among electronic work groups: an experimental study. *Small Groups Research, 34*(1), 43–73.

Salanova, M., Peiró, J. M., & Schaufeli, W. B. (2002). Self-efficacy specificity and burnout among information technology workers: a test of the job demands-control model. *European Journal of Work and Organizational Psychology, 11*, 1.

Salanova, M., & Schaufeli, W. B. (2000). Exposure to information technology and its relation to burnout. *Behaviour and Information Technology, 19*(5), 385–392.

Salas, E., & Cannon-Bowers, J. A. (2001). The science of training: a decade of progress. *Annual Review of Psychology, 52*, 471–499.

Schaubroeck, J., Lam, S. S. K., & Xie, J. L. (2000). Collective efficacy versus self-efficacy in coping responses to stressors and control: a cross-cultural study. *Journal of Applied Psychology, 85*(4), 512–525.

Schaubroeck, J., & Merrit, D. E. (1997). Divergent effects of job control on coping with work stressors: the key role of self-efficacy. *Academy of Management Journal, 40*(3), 738–754.

Schaufeli, W. B., Keijsers, G. J., & Reis Miranda, D. (1995). Burnout, technology use and ICU-performance. In S. L. Sauter & L. R. Murphy (Eds.), *Organizational risk factors for job stress* (pp. 259–271). Washington, DC: APA Books.

Schaufeli, W. B., Leiter, M. P., Maslach, C. h., & Jackson, S. E. (1996). Maslach burnout inventory – general survey. In C. Maslach, S. E. Jackson y, & M. P. Leiter (Eds.), *The Maslach burnout inventory test manual* (third ed.) (pp. 19–26). Palo Alto, CA: Consulting Psychologists Press.

Schutte, N., Toppinen, S., Kalimo, R., & Schaufeli, W. B. (2000). The factorial validity of the Maslach burnout inventory – general survey across occupational groups and nations. *Journal of Occupational and Organizational Psychology, 73*, 53–66.

Schwarzer, R. (1993). *Measurement of perceived self-efficacy: Psychometric scales for cross-cultural research*. Berlin: Freie Universität Berlin, Institut für Psychologie.

Schwarzer, R. (1999). General perceived self-efficacy in 14 cultures. Self-Efficacy assesment, Retreived from: http://www.yorku.ca/faculty/academic/schwarze/world14.htm.

Schwarzer, R., Bäßler, J., Kwiatek, P., Schröder, K., & Zhang, J. X. (1996). The assessment of optimistic self-beliefs: comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology: An International Review, 46*(1), 69–88.

Schwoerer, C., May, D. R., Hollensbe, E. C. (1999). General and specific self-efficacy: Their roles in a training intervention. Retreived from: http://www.bschool.ukans.edu/pages/generated/page_214.html.

Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). *Psychological Reports, 51*(2), 663–671.

Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., Yoshinobu, L., Gibb, J., Langelle, C., & Harney, P. (1991). The will and the ways: development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology, 60*, 570–585.

Staufer, M. (1992). Technological change and the older employee: implications for introduction and training. *Behaviour and Information Technology, 1*, 46–52.

Stevens & Gist (1997). Effect of self-efficacy and goal-orientation training on negotiation skill maintenance: What are mechanisms. *Personnel Psychology, 50*, 955–978.

Todman, J., & Monaghan, E. (1994). Qualitative differences in computer experience, computer anxiety and students' use of computers: a path model. *Computers in Human Behavior, 10*(4), 529–539.

Torkzadeh, G., & Koufterous, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer traininng. *Education and Psychological Measurement, 54*, 813–821.

Torkzadeh, R., Pflughoeft, K., & Hall, L. (1999). Computer self-efficacy, training effectiveness and user attitudes. An empirical study. *Behaviour and Information Technology, 18*(4), 299–309.

VanYperen, N. W. (1998). Informational support, equity and burnout: the moderating effect of self-efficacy. *Journal of Occupational and Organizational Psychology, 71*, 29–33.

Wallston, K. A. (1992). Hocus-pocus, the focus isn't strictly on locus: Rotter's social learning theory modified for health. *Cognitive Therapy and Research, 16*, 183–199.

Warr (1990). The measurement of well-being and other aspects of mental health. *Journal of Occupational Psychology, 63*, 193–210.

Watt, S. E., & Martin, P. R. (1994). Effect of general self-efficacy expectancies on performance attributions. *Psychological-Reports, 75*(2), 951–961.

Wolfe, S. L., Nordstrom, C. R., & Williams, K. B. (1998). The effect of enhancing self-efficacy prior to job training. *Journal of Social Behaviour and Personality, 13*(4), 633–650.

WONT (Work & New Technologies). (1999) Propiedades psicométricas del cuestionario CET Cuestionario de Experiencias relacionadas con el Trabajo. Non published working document.

Woodrow, J. (1991). A comparison of four computer attitude scales. *Journal of Educational Computing Research, 7*, 165–187.

Zoltan, E., & Chapanis, A. (1982). Experience with and attitudes towards computers. *Behaviour and Information Technology, 1*(1), 55–68.

Maria Isabel Beas is Assistant Professor in the Department of Psychology, Faculty of Human and Social Sciences, Jaume I University, Castellón, Spain and head of Career Services in International and Educational Co-operation Office, Universitat Jaume I.

Marisa Salanova is Associated Professor in the Department of Psychology, Faculty of Human and Social Sciences, Jaume I University, Castellón, Spain.