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Technoflow among Spanish and Swedish students: A Confirmatory Factor Multigroup Analysis

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Título: Tecnoflow en estudiantes Españoles y Suecos: Un Análisis factorial confirmatorio con análisis multigrupo.
Resumen: A pesar de la relevancia del concepto de flow en investigación reciente dentro del campo de la Psicología Positiva, aún existe poca investigación sobre esta experiencia óptima en relación al uso de la tecnología. El objetivo del presente estudio es confirmar la estructura tri-factorial (disfrute, absorción e interés intrínseco) del *technoflow*. 154 estudiantes universitarios que utilizan ordenadores en sus estudios (N= 78 estudiantes españoles y N= 76 estudiantes suecos) respondieron el cuestionario. El Análisis Factorial Confirmatorio mostró un mejor ajuste del modelo bifactorial de technoflow (disfrute y absorción). El Análisis Multigrupo mostró que el modelo es invariante entre las muestras. Implicaciones teóricas y practicas así como investigación futura son discutidas en el trabajo.
Palabras clave: Tecnoflow; psicología positiva; tecnología de la información y comunicación; experiencia óptima.

Abstract: Despite the relevance of flow in recent research in Positive Psychology, there exist few studies on this optimal experience in technology settings. The aim of this study is to confirm the three-factorial (enjoyment, absorption and intrinsic interest) structure of *technoflow*. 154 university students who use computers in their studies (N=78 Spanish students and N=76 Swedish students) answered a questionnaire. Confirmatory Factor Analyses showed a better adjustment of a bifactorial model of technoflow (enjoyment and absorption). Multigroup Analyses showed that the model is invariant across samples. Practical and theoretical implications as well as future research are also discussed.
Key words: Technoflow; positive psychology; information and communication technology; optimal experience

Introduction

Information and Communication Technology (ICT) has become a usual tool in our daily activities. Literally speaking, computing technology has moved into every element of our daily lives. Having technology that is useful in our workplaces, homes, schools, community organizations, is of paramount importance. Then, the study of Human Computer Interaction is at the center of the evolution of effective tools to improve the quality of our lives (Olson & Olson, 2003). However, most of the approaches have been focused on the negative effects of the use of ICT, such as negative consequences of the implementation of technology (Åborg & Billing, 2003; Arnetz & Wiholm, 1997; Korunka & Vitouch, 1999; Salanova, 2003; Salanova, Cifre, & Martin, 1999), burnout (Salanova & Schaufeli, 2000), and technostress (Ballance & Rogers, 1991; Towell & Lauer, 2001; Salanova *et al.*, 1999). Nevertheless, in the last decade researchers have turned also their eyes into the positive effects that ICT may produce, and to the study of the positive attitudes towards ICT and positive experiences related to this, as affective psychological well-being (Martínez, Cifre, Llorens, & Salanova, 2002), engagement and self efficacy (Salanova, Grau, Llorens, & Schaufeli, 2001; Sensales & Greenfield, 1995; Shih, 2006). Those studies have been carried out not only in the context of work but also in the context of education.

This desire to understand the positive effects of ICT use might be framed within the Positive Psychology movement, based on the scientific study of the human virtues and strengths (Sheldon & King, 2001). One of the most popular concepts in this context is 'flow' (as a 'good or optimal experience') as the research and theory on flow have had its origin in the desire to understand this intrinsic or autotelic (from the Greek auto-telos that means intrinsically rewarding by itself) phenomenon.

Flow experience has attracted the interest of a growing number of researchers since Csikszentmihalyi introduced and explained the concept in his research (e.g., Csikszentmihalyi, 1975, 1988, 1990, 1997, 2003). He interviewed artists, athletes, composers, and scientists, and asked them to describe "optimal experiences" that made them feel good and motivated because they were doing something that was worth doing for its own sake. He coined this experience 'flow', because many interviewees used this term spontaneously to explain what their optimal experience felt like (Csikszentmihalyi & Csikszentmihalyi, 1988). Thus, flow experience is a condition in which people are so involved in an activity that nothing else seems to matter at the time; the experience is so enjoyable that people will do it even at great cost, for the sheer sake of doing it (Csikszentmihalyi, 1990). Due to flow experience is a phenomenon which is difficult to measure, there is still no agreement about its operationalization . However, recently it is generally accepted that there are three closely related aspects of flow: flow antecedents, flow experience and flow consequences (Chen, 2006; Chen, Wigand, & Nilan, 1999; Chen, Wigand, & Nilan, 2000; Ghani & Deshpande, 1994; Trevino & Webster, 1992).These studies, carried out in the context of ICT use, reveal the necessity to distinguish the conditions that unleash flow from the flow experience itself. It has to be noted that researchers interested in the study of flow experience must not confound flow stages (antecedents, flow experience and

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flow consequences) with the elements or dimensions that constitute each stage. In the present study we will focus on the understanding of flow experience stage by itself.

Experiencing flow using technology: technoflow

Taking up again the issue of ICT positive effects, it might be noticed that flow experience might easily appear during the use of computers in particular, or ICT in general, presumably because of the intrinsically motivating nature of these technologies (Chen *et al.*, 2000; Trevino & Webster,1992) and also because using ICT represents a clear-goal activity. Flow while using computers has been studied both in general (Finneran & Zhan, 2003; Ghani & Deshpande, 1994; Webster, Trevino, & Ryan, 1993) and during performing on-line or Web activities in particular (Chen, 2006; Chen *et al.*, 1999; Chen *et al.*, 2000; Skadberg & Kimmel, 2004).

An examination of previous literature reveals that all definitions of flow experience in general and also in the context of ICT, seem to have three elements in common. The first refers to the sense of involvement, total concentration, focused attention or loss of self-consciousness, in other words, *absorption* (Chen, 2006; Csikszentmihalyi, 1975; Ghani & Deshpande, 1994; Novak & Hoffman, 1997; Lutz & Guiry, 1994; Moneta & Csikszentmihalyi 1996; Trevino & Webster, 1992). A second common element involves the positive feeling of enjoyment while doing the activity, which becomes an intrinsically enjoyable experience (Ghani & Deshpande, 1994; Hedman & Sharafi, 2004; Novak & Hoffman, 1997; Moneta & Csikszentmihalyi, 1996; Privette & Bundrick, 1987), considered as *enjoyment.* Last element specifically refers to the interest in performing the activity for its own sake, not because it has to be done for one reason or another (Novak & Hoffman, 1997; Moneta & Csikszentmihalyi 1996; Trevino & Webster, 1992); that is to say, *intrinsic interest.*

It has to be noted, that intrinsic interest might be understood also as an antecedent or prerequisite of the flow experience. So, there are still some doubts about including intrinsic interest as part of the flow experience. Skadberg and Kimmel (2004) used in their research time distortion (as a result of focused attention and complete involvement) and enjoyment to measure the state of flow. Also Ghani and Deshpande (1994) understand that the two key characteristics of flow are (a) total concentration in an activity and (b) the enjoyment which one derives from an activity. On the other hand, there are also some studies (Bakker, 2005; Demerouti, 2006; Salanova, Bakker, & Llorens, 2006) that use the three-factorial operationalization (absorption, enjoyment and intrinsic interest) to measure flow experience. On the basis of these differences in the operationalization of flow experience stage, in the present study we will try to shed some light on this operationalization. In order to do that we assume that technoflow (flow in ICT context) is a short-term peak experience when using ICT characterized by *absorption*, *enjoyment* and *intrinsic interest.* These three dimensions might be considered the elements that make up the very experience of flow while using ICT, or what could be named *technoflow.*

The aim of the current study is to investigate the structure of technoflow using two samples (Swedish and Spanish students) in order to test the invariance of the flow structure. According to previous studies (Novak, Hoffman, & Duhachek, 2003) we will select only those students that use ICT in their studies (and not in their leisure time), esto tiene que acotarse, especificarse y justificarse muy claramente, ya que toda la literature afirma mayoritariamente que los usos combinados de ICT implican siempre que en alguno de sus aspectos son para el ocio y la sociabilidad. Aunque usaran Internet para estudiar, usarían siempre el móvil y el messenger para socializar por ejemplo. En terminos absolutos, sería imposible encontrar una muestra que no usara ICT para el ocio y la sociabilidad, la sola referencia no es suficiente para justificarlo. as it is during these goal-oriented activities technoflow is more probable to occur.

More specifically, we hypothesize that:

H_1: Technoflow experience will be a multidimensional structure composed by *absorption*, *enjoyment* and *intrinsic interest.*

H_2: This three-factorial structure of technoflow will be invariant across the two samples.

Method

Participants and Procedure

Sample 1 consisted initially of 234 undergraduate students (66% women) from five different Spanish universities who voluntary filled out the questionnaire. Ages ranged from 17 to 43 years old, with a mean age of 23 (*SD* = 3.8). These students came from different areas of study from Social Sciences to Technical Sciences. The process of data collection lasted around 7 months. Only the students who reported that they used ICT in their studies were selected. Thus, the final sample was composed by 78 students, 54 were women (69%) and 24 men (31%). Their mean age was 23 (*SD* = 3.8).

Sample 2 consisted of 76 undergraduate Swedish students (68% women) from the Social Sciences and the Technical Sciences area at Örebro University. Ages ranged from 19 to 37 years old, with a mean age of 24 (*SD* = 4.2). Data collection lasted around 1 month. This sample, consists of students who used computers for their studies. They voluntarily filled in the questionnaires and returned them directly to the researcher.

Variables

All students were asked to answer the RED.ICT questionnaire (Resources, Emotions/Experiences and Demands. Information and Communication Technologies) in its paper-and-pencil version. This questionnaire was developed by the researchers. The validity of this instrument has been obtained in different previous studies (e.g., Salanova, *et al.*, 2006a; Salanova *et al.*, 2006b; Schaufeli, Bakker, & Salanova, 2006; Schaufeli, Salanova, González-Romá, & Bakker, 2002).The questionnaire is available in Spanish and English. The Spanish participants filled in the Spanish version and the Swedish students the English one.

The three dimensions of flow were measured through the following variables included in the RED.ICT questionnaire, both in Spanish and in English.

Absorption was assessed using a slightly adapted version of the Utrecht Work Engagement Scale (UWES; Schaufeli *et al.*, 2002). All 5 items were reworded to refer specifically to ICT work; for instance, the item *'Time flies when I'm working'* was rephrased as *'Time flies when I'm working with computers'*.

Intrinsic interest was assessed by 3 self-constructed items (Salanova *et al.*, 2006a) (e.g., *'I work with computers because I like them, not because I have to'*).

Enjoyment was assessed by 3 self-constructed items (Salanova *et al.*, 2006a) (e.g., *'I enjoy the work I do using computers '*).

All items scored on a 6-point frequency rating scale ranging from '0' (not at all/never) to '6' (always/every day).

Results

Descriptive Statistics

Data were analysed with the statistical program SPSS 13.0. Descriptive analyses were performed and internal consistencies were computed for the scales in each sample separately (see Table 1). In all samples values of Cronbach's α are higher than the criterion of .70 (Nunnally & Bernstein, 1994). In both samples most scales satisfied even the more stringent criterion of .80 (Henson, 2001), except for the case of intrinsic interest in the Swedish sample (α= .77). Then, it can be said that all constructs that were assessed demonstrated good internal consistencies. Regarding correlations, we found that the three variables have positive significant correlations with a mean correlation of r=.57, p<.01. These results are in line with our hypothesis that these three variables are part of the flow experience.

Table 1: Means (M), Standard Deviations (SD), internal consistencies (Cronbach's α) and inter-correlations (Spanish/Swedish) of the study variables in Spanish students (n=78) and Swedish students (n=76).

	Spanish Students			Swedish Students				
	M	SD	α	M	SD	α	2	3
1. Absorption	3.02	1.18	.83	2.29	1.24	.86	.58**/ .63**	.44**/ .59**
2. Intrinsic Interest	2.71	1.44	.86	2.24	1.32	.77		.60**/ .59**
3. Enjoyment	3.26	1.25	.85	2.82	1.32	.81		

Confirmatory Factor Analyses

In order to test hypothesis 1 Structural Equation Modelling (SEM) was employed, as implemented by the AMOS program (Arbuckle, 1997) to test two factorial models: (1) the traditional correlated three-factor flow model including absorption, intrinsic Interest, and enjoyment (M1); (2) the alternative correlated two-factor flow model that includes, what we called, the core of the flow experience (absorption and enjoyment). Both models were first fitted to the data of each sample separately, and then, in order to assess factorial invariance across samples, a multi-group analysis was performed including both two groups simultaneously, using multi-group analyses (Byrne, 2001; pp. 173-199).

As recommended by Jöreskog and Sörbom (1986) and Marsh, Balla and Hau (1996), the absolute and relative goodness-of-fit indices computed were: (1) the χ^2 goodness-of-fit statistic; (2) the Root Mean Square Error of Approximation (RMSEA); and (3) the Goodness of Fit Index (GFI) (4); Normed Fit Index (NFI); (5) Incremental Fit Index (IFI); and (6) Comparative Fit Index (CFI); (7) Expected Cross-Validation Index (ECVI). Non-significant values of χ^2 indicate that the hypothesized model fits the data. Values of RMSEA smaller than .08 indicate an acceptable fit and values greater than 0.1 should lead to model rejection (Cudeck & Browne, 1993). In contrast, the distribution of the GFI and the AGFI is unknown, so that no statistical test or critical value is available (Jöreskog & Sörbom, 1986). For all three relative fit-indices, as a rule of thumb, values greater than .90 are considered as indicating a good fit (Hoyle, 1995).

Results of this first step come from performing this three-factor model using Confirmatory Factor Analysis (CFA) in order to test hypothesis one. We tested the fit of M1 (absorption, enjoyment and intrinsic interest) and M2 (absorption and enjoyment) to the data of all three samples separately.

First of all, CFA were carried out in 234 Spanish students. As can be seen in the first row in Table 2 the three-factor model (M1) fits the data well. Its fit indexes (GFI, AGFI, CFI, and NNFI) all meet the acceptance criteria of .90. The value for the RMSEA is also higher than .08. Although all this indexes are acceptable, the ECVI, that is better whenever it is lower, is higher in comparison with the two-factor model (M2). The second row in Table 2 shows the results for the proposed hypothetical two-factor model (M2). We can observe that its fit indexes have values above .90. On the other hand, the Root Mean Square Error of Approximation (RMSEA) has a value under .08. Therefore, the data fit well to the proposed model, with a high quality of these fit-indexes, even the ECVI is better and lower than M1.

As a second step, a CFA was performed in order to test the fit of M1 (absorption and enjoyment, including intrinsic interest) and M2 (only absorption and enjoyment) again in a different sample composed by 76 Swedish students. Results are shown in third and fourth rows of table 2. As it can be seen M2 fits slightly better than M1 in the Swedish sample due to the ECVI is better when we test the two-factor model.

The third step was to test the model among Spanish students with the same conditions as the Swedish sample. 78 students were selected from the whole Spanish sample on the criteria of using ICT only for their studies (as it has been explained before). Results are shown in fifth and sixth rows of Table 2. As it can be seen M2 fits slightly better than M1 also in the Spanish sample due to the ECVI is better when we test the two-factor model.

Hence, on balance, it can be concluded that M2, which includes only two variables/dimensions as flow core (absorption and enjoyment), fits slightly better or at least equally well, to the data than the model (M1) which includes also intrinsic interest.

Table 2: Confirmatory Factor Analyses to of the three dimensions of Flow (n= 234 students, n=78 Spanish students, n=76 Swedish students).

	Model	χ^2	df	p	GFI	AGFI	RMSEA	NNFI	CFI	IFI	ECVI
234 Spanish	(M1) 3 Factor	100.99	41	.00	.93	.88	.08	.93	.96	.96	.65
students	(M2) 2 Factors	49.49	19	.00	.95	.90	.08	.95	.97	.97	.36
76 Swedish	(M1) 3 Factor	53.46	41	.09	.88	.81	.06	.88	.96	.97	1.38
students	(M2) 2 Factors	26.81	19	.11	.91	.84	.07	.91	.97	.97	.81
78 Spanish	(M1) 3 Factor	106.45	41	.00	.81	.70	.14	.79	.86	.86	2.03
students	(M2) 2 Factors	38.10	19	.01	.89	.80	.11	.87	.93	.93	.94

Df= Degrees of freedom; p= significance test; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index;
RMSEA = Root Mean Square Error of Approximation; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; ECVI = Expected Cross-Validation Index.

Multigroup Analyses

Next, in order to test Hypothesis 2, a multi-group analysis of M2 was performed across both samples simultaneously. As can be seen from Table 3, M2 fits the data well, with all fit indexes satisfying their criteria. Moreover, as expected, the latent absorption and enjoyment factors are significantly positively correlated: the mean correlation across both samples: r = .57 (see Figure 1).

Following the procedure recommended by Byrne (2001), the invariance of M2 across both samples was investigated (see table 3). The invariance of correlations between factors and the invariance of factor loadings was assessed by comparing the fit of the model in which the targeted estimates were constrained to be equal across all both samples (M2c) with that of the unconstrained model (M2) in which this was not the case. When the fit did not deteriorate, the model was deemed to be invariant across samples. However, compared to M2 the fit of the fully constrained model (M2c) deteriorated significantly, meaning that the correlations and the factor loadings of M2 are not invariant across samples.

Next, a model with only the correlations between the latent factors constrained to be equal (M2co) as well as a model with only the factor loadings constrained to be equal (M2fa) was simultaneously fitted to the data of all four samples, respectively. Again, compared to M2 the fit of M2fa deteriorated significantly but not the fit of M2co. The model with the correlations where the latent factors were constrained to be equal was deemed to be invariant across samples. In order to constrain as much factors loadings as possible, different models with factors loadings constrained were fitted to data. Finally, a model was tested with factor correlations and all factors loadings constrained to be equal between both samples, except paths from ABS to items Abs1 and Abs2 that were free because when were constrained the fit of the models was deteriorated significantly. Compared to M2 the fit of M2fi did not deteriorate, so that it can be concluded that the correlations between factors and almost all the factor loadings are invariant across both samples.

From these results, we can say that hypothesis 1 was partially confirmed, although the model was consistent among samples, the two dimensional model of technoflow fits better to the data than the three-dimensional one. Also this two-factor structure is invariant across the two samples. This result confirms the hypothesis 2; absorption and enjoyment are the core elements of the technoflow experience.

Table 3: Multiple group analyses (MGA) of the two-factor flow model including Spanish users (n=78) and Swedish users (n=76).

	χ^2	df	p	GFI	RMSEA	NFI	IFI	CFI	$\Delta\chi^2$	Δdf
M2	64.904	38	.04	.90	.00	.89	.95	.95		
$M2_c$	87.719	45	.00	.87	.08	.86	.92	.92	$M2_c$ - M2 = 22.815***	7
$M2_{co}$	64.935	39	.00	.90	.06	.89	.95	.95	$M2_{co}$ - M2 = 0.031	1
$M2_{fa}$	86.869	44	.00	.87	.08	.86	.92	.92	$M2_{fa}$ - M2 = 21.965***	6
$M2_{fi}$	70.115	43	.00	.90	.00	.88	.95	.95	$M2_{fi}$ - M2 = 5.211	5

Note. χ^2 = Chi-square; df=degrees of freedom; GFI=Goodness-of-Fit Index; RMSEA=Root Mean Square Error of Approximation; NFI= Normed Fit Index; IFI = Incremental Fit Index; CFI=Comparative Fit Index; M2= Flow Model with two flow latent factors (absorption and enjoyment) (freely estimated); $M2_c$ = Fully constrained model. $M2_{co}$ = Constrained correlations; $M2_{fa}$ = Constrained factor loadings; $M2_{fi}$ = Final model
*** p < .001.

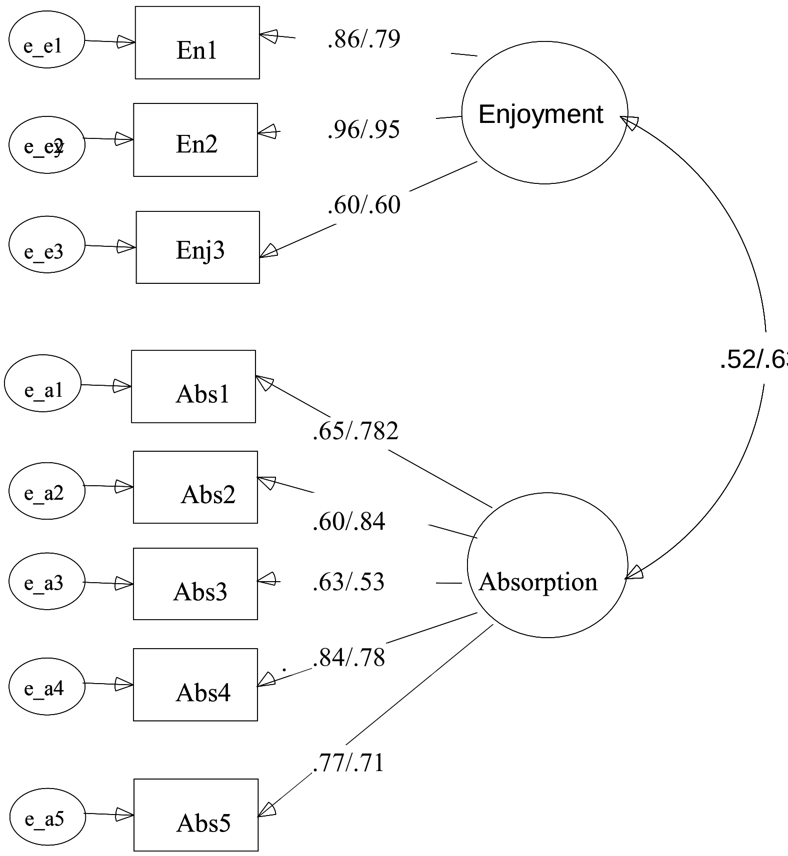

Figure 1: Results of the multi-group analyses (Final Model). Spanish students (n=78) / Swedish students (n=76).

Discussion

The main aim of the current study was to test the dimensions of technoflow and its invariance across samples. As predicted by Hypothesis 1, technoflow experience was composed of absorption, enjoyment and also of intrinsic interest. However, results show that the bifactorial model of technoflow (absorption and enjoyment) showed a better adjustment to data than the three-factorial model . Thus, we can say that the so-called core of flow is made up by enjoyment and absorption. This result was consistent among the two samples studied. So, hypothesis one is partially confirmed.

The role of intrinsic interest in the flow experience is a difficult issue in this research field due to several reasons. One is because the difficulty, as has been mentioned, of discriminating it as a part or not of the flow experience. This study tries to take a step further in the clarification of this question: What kind of role is intrinsic interest playing in the flow experience? The interesting results found in relation to this bidimensionality of technoflow concerns the possibility of considering intrinsic interest as an antecedent of the flow experience. In this line, more research in terms of antecedents of technoflow need to be done. For instance, it is not a crackpot idea to think that intrinsic interest could be related to high levels of flow (absorption and enjoyment) and satisfaction. In fact, there are authors (e.g. Finneran & Zhang, 2003) that state that task should have particular characteristics (intrinsically interesting) that may influence the likelihood of an optimal experience.

Another reason why intrinsic interest is a slippery issue is the difficulty to also operationalize this concept. It has to be noted, that we label this concept *intrinsic interest* instead of *intrinsic motivation* as some authors do (Bakker, 2005; Moneta, 2004). According to the meaning of flow, items refer to flow like a peak experience related with a specific activity (in this case technology use) rather than a general behaviour during the studies or daily life. Motivation is a wide and general concept, and 'interest' comes from 'motivation' but is related with a very specific activity and moment. That is why we rather prefer measuring *intrinsic interest* than *intrinsic motivation.* On the other hand, and regarding Hypothesis 2, a strong point of this study is its multisampling character. The current findings show the stability of the bidimensional structure of technoflow among samples. It opens a new slope on the operationalization of technoflow experience. The results still need to be interpreted with some caution and to be seen as tentative because of the small size of the samples. It also would be interesting to replicate our results in some other countries using different and heterogeneous samples, in order to test the strength of this technoflow structure. That is why more research in this line is needed, the present study takes a first step on it.

Taken together, our results seem to suggest that rather than a three-factor model of flow, genuine enjoyment and absorption constitute the core of flow (or technoflow) experience. This agrees not only with the theoretical view that absorption is one of the central characteristics of flow (Csikszentmihalyi, 1975), and also enjoyment is experienced on this optimal experience, but also with previous research on the structure of flow (Ghani & Deshpande, 1994; Novak & Hoffman, 1997; Moneta & Csikszentmihalyi, 1996; Privette & Bundrick, 1987). In addition, our findings also show that the flow experience can very well be operationalized using *specific* rather than general items. That is, items that refer – in our case – to the use of ICT. In this sense, the present work shows the validity of the measures employed in order to assess technoflow. In sum, the novelty of this study regarding the findings on the structure of technoflow experience as bidimensional, fulfils the parsimony principle. It is also a fairly practical measure with an added value: its applicability.

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References

Åborg, C., & Billing, A. (2003). Health effects of 'the Paperless Office'--evaluations of the introduction of electronic document handling systems. *Behaviour & Information Technology, 22*(6), 389-396.

Arbuckle J. L.(1997). *Amos users' guide version 4.0*. Chicago, Ill: Smallwaters Corporation.

Arnetz, B. B., & Wiholm, C. (1997). Technological stress: Psychophysiological symptoms in modern offices. *Journal of psychosomatic research, 43*(1), 35-42.

Bakker, A. B. (2005). Flow among music teachers and their students: The crossover of peak experiences. *Journal of vocational behavior, 66*(1), 26-44.

Ballance, C. T., & Rogers, S. U. (1991). Psychology of computer use: XXIV. computer-related stress among technical college students. *Psychological reports, 69*(2), 539-542.

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *International Journal of Testing, 1*(1), 55-86.

Chen, H. (2006). Flow on the net-detecting web users' positive affects and their flow states. *Computers in Human Behavior, 22*(2), 221-233.

Chen, H., Wigand, R. T., & Nilan, M. S. (1999). Optimal experience of web activities. *Computers in Human Behavior, 15*(5), 585-608.

Chen, H., Wigand, R. T., & Nilan, M. S. (2000). Exploring web users' optimal flow experiences. *Information Technology & People, 13*(4), 263-281.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco, CA: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of optimal experience*. New York: Harper & Row.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life*. Basic Books.

Csikszentmihalyi, M. (2003). *Good Business. Leadership, flow and the making of meaning*. London: Coronet Books, Hodder & Stoughton eds.

Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (1988). *Optimal experience: Psychological studies of flow in consciousness*. Cambridge University Press.

Cudeck, R., & Browne, M. W. (1993). Alternative ways of assessing model fit. In K.A. Bollen and J. Scott Long (Eds.), *Testing structural equation models* (pp. 1-9). Newbury Park, CA: Sage.

Demerouti, E. (2006). Job characteristics, flow, and performance: The moderating role of conscientiousness. *Journal of occupational health psychology, 11*(3), 266-280.

Finneran, C. M., & Zhang, P. (2003). A person-artefact-task (PAT) model of flow antecedences in computer-mediated environments. *International Journal of Human-Computer Studies, 59*(4), 475-496.

Ghani, J. A., & Deshpande, S. P. (1994). Task characteristics and the experience of optimal flow in human-computer interaction. *Journal of Psychology: Interdisciplinary and Applied, 128*(4), 381-391.

Hedman, L., & Sharafi, P. (2004). Early use of internet-based educational resources: Effects on students' engagement modes and flow experience. *Behaviour & Information Technology, 23*(2), 137-146.

Henson, R. K. (2001). Understanding internal consistency reliability estimates: A conceptual primer on coefficient alpha. *Measurement & Evaluation in Counseling & Development, 34*(3), 177-189.

Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications*. (pp. 1-15) Sage Publications, Inc.

Jöreskog, K. G., & Sörbom, D. (1986). *LISREL user guide version VI* (4th. Ed.). Mooresville, Ill: Scientific Software International.

Korunka, C., & Vitouch, O. (1999). Effects of implementation of information technology on employees' strain and job satisfaction: A context-dependent approach. *Work & Stress, 13*(4), 341-363.

Lutz, R.J., & Guiry, M. (1994). *Intense consumption experiences: Peaks, performances, and Flow*. Paper presented at the Winter Marketing Educators' Conference, St. Petersburg, FL.

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.

Martínez, I. M., Cifre, E., Llorens, S., & Salanova, M. (2002). Efectos de la tecnología asistida por ordenador en el bienestar psicológico afectivo. *Psicothema, 14*(1), 118-123.

Moneta, G. B. (2004). The flow experience across cultures. *Journal of Happiness Studies, 5*(2), 115-121.

Moneta, G. B., & Csikszentmihalyi, M. (1996). The effect of perceived challenges and skills on the quality of subjective experience. *Journal of personality, 64*(2), 275-310.

Novak, T. P., Hoffman, D. L., & Duhachek, A. (2003). The influence of goal-directed and experiential activities on online flow experiences. *Journal of Consumer Psychology, 13*(1), 3-16.

Novak, T.P., & Hoffman, D.L. (1997, July): *Measuring the Flow Experience Among Web Users*. Paper Presented at Interval Research Corporation. [http://www2000.ogsm.vanderbilt.edu/novak/flow.july.1997/flow.htm]

Nunnaly, J. C., & Bernstein, I. H. (1994). *Psychometric theory, 3rd ed*. New York: McGraw-Hill.

Olson, G. M., & Olson, J. S. (2003). Human-computer interaction: Psychological aspects of the human use of computing. *Annual Review of Psychology, 54*, 491-516.

Privette, G., & Bundrick, C. M. (1987). Measurement of experience: Construct and content validity of the experience questionnaire. *Perceptual and motor skills, 65*(1), 315-332.

Salanova, M. (2003). Trabajando con tecnologías y afrontando el tecnoestrés: El rol de las creencias de eficacia. *Revista de Psicología del Trabajo y de las Organizaciones, 19*(3), 225-246.

Salanova, M., Bakker, A. B., & Llorens, S. (2006a). Flow at work: Evidence for an upward spiral of personal and organizational resources. *Journal of Happiness Studies, 7*(1), 1-22.

Salanova, M., Cifre, E., & Martín, P. (1999). El proceso de tecnoestrés y estrategias para su prevención. *Prevención, Trabajo y Salud, 1,* 18-28.

Salanova, M., Grau, R., Llorens, S., & Schaufeli, W. B. (2001). Exposición a las tecnologías de la información, burnout y engagement: el rol modulador de la autoeficacia profesional. *Revista de Psicología Social y Aplicada, 11*, 69-90.

Salanova, M., Llorens, S., Cifre, E., & Martínez, I. (2006b). Metodología RED-WoNT [RED-WoNT Methodology]. In *Perspectivas de intervención en riesgos psicosociales* (pp. 131-153). Barcelona: Foment del Treball Nacional.

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

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement, 66*(4), 701-716.

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies, 3*(1), 71-92.

Sensales, G., & Greenfield, P. M. (1995). Attitudes toward computers, science, and technology: A cross-cultural comparison between students in Rome and Los Angeles. *Journal of Cross-Cultural Psychology, 26*(3), 229-242.

Sheldon, K. M., & King, L. (2001). Why positive psychology is necessary. *American Psychologist, 56*(3), 216-217.

Shih, H. (2006). Assessing the effects of self-efficacy and competence on individual satisfaction with computer use: An IT student perspective. *Computers in Human Behavior, 22*(6), 1012-1026.

Skadberg, Y. X., & Kimmel, J. R. (2004). Visitors' flow experience while browsing a web site: Its measurement, contributing factors and consequences. *Computers in Human Behavior, 20*(3), 403-422.

Towell, E. R., & Lauer, J. (2001). Personality differences and computer related stress in business students. *Mid-American Journal of Business, 16*(1), 69-75.

Trevino, L. K., & Webster, J. (1992). Flow in computer-mediated communication: Electronic mail and voice mail evaluation and impacts. *Communication Research, 19*(5), 539-573.

Webster, J., Trevino, L. K., & Ryan, L. (1993). The dimensionality and correlates of flow in human-computer interactions. *Computers in Human Behavior, 9*(4), 411-426.

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