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Feelings of satisfaction in mature students of financial accounting in a virtual learning environment: an experience of measurement in higher education

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Abstract

Currently, the usefulness of ICT (Information and Communication Technologies) in the teaching-learning process has not been discussed; unlike distance learning, these new tools are used via technologies. The current approach to social development, supported by the exercise of innovation, learning and research, is undeniable. Within this framework, student satisfaction regarding blended e-learning has been studied. However, in distance university models, which are supported by virtual platforms, it is necessary to ask ourselves the following question: are students satisfied when they are not in a face-to-face classroom environment?

The objective of this study is to analyse students' perceptions of their satisfaction levels in a virtual learning environment. In this evaluation, the students' generic skills were also considered, as well as their perception of the learning environment.

The findings of the analysis seem to reveal that students have a high perception of satisfaction, considering students' perception and learning experience as a proxy of the feeling of satisfaction. Students' perceptions of the virtual learning environment and of their own skill, which also takes on high values, could have some type of effect on their overall satisfaction. A significant finding is that students with a high positive perception of their generic skills are also satisfied with the learning process and with the virtual learning environment. The validity of the three construct designed to measure the latent variables—feelings of satisfaction, acceptance of the virtual learning environment and students' self-perception on their generic skills—ensures their usefulness as variables of measurement.

Keywords: Accounting learning, Virtual learning environment, Learning satisfaction, learning skills, distance learning

Introduction and theoretical framework

Teaching technologies offer a wide range of possibilities to be applied to learning processes (Cortina-Pérez, 2008; Garrison & Anderson, 2005), which have been increased by the use of open resources in education and by their impact on higher education, especially for developing countries (United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2002). Due to these technologies, a new type of relationship has been established between teacher and student, namely, a relationship that does not

necessarily require a physical and face-to-face space. Physical spaces for education are being replaced by virtual or blended learning via a virtual learning environment, whose use could offer both advantages and barriers (Kurelovic, 2016; Monereo, 2007). This virtual environment allows students to build and develop their own learning path. In this way, education is considered, in the current approach, as involving the use of widespread technology, such as a smartphone, tablet or computer, applied to education in informal learning (Santos & Ali, 2012) and lifelong learning (Sharples, 2000), especially with mature students. I is thought that mature students use information and communication technology (ICT) more frequently for academic purposes than for other objectives (Mensah, 2017), perhaps because this environment allows students a more personal optimization of e-tools and learning decisions can be made based on each person's timetable. This social framework for learners and teachers has led to the analysis of users' attitudes as a relevant scientific line of research. The objective is to provide a greater knowledge of the learning and teaching process in higher education (Viberg & Grönlund, 2013) and, as a consequence, to also accept virtual and technological learning environments (Chen, 2017). Furthermore, research on feelings has traditionally been linked to the success of this current learning environment based on the web (Conati, 2002), mainly through the exploration of the perception of the people's engagement with the learning and reaching process (Van Wyk, 2017), especially students and teachers.

In terms of the accounting market, employers presume that students are prepared for their requirements and have the capacity to adapt to a changing environment (Byrne, Flood, & Willis, 2002), which implies having the skills to move in online environments, and the ability to familiarize themselves with technological environments (Hall, Ramsay, & Raven, 2004).

The use of virtual learning environments in universities has advantages over traditional face-to-face teaching in a classroom. Every student can connect from anywhere to receive online training. The virtual learning environment is a fully customized way of studying at any time that offers completely flexible training adapted to everyone's personal needs, which results in greater specialization and the possibility of having virtual contact with the assigned teacher via the use of teaching e-tools, such as digital whiteboards, chats, web-conferences or web-videos. These technologies allow the teacher to offer an almost immediate response. Student feedback in terms of perception and usefulness is stated in student experiences in these virtual learning environments. As Soto and Fernández (2003) note, the use of e-tools in virtual environments provide greater advantages to people with special educational needs, such as those of mature students, who are sometimes excluded from university education due to their social characteristics (Enoch & Soker, 2006; Tett, 2004). In this way, ICTs facilitate not only the educative inclusion but also the social inclusion of adults through teaching (Requena, 2016) because studying part-time as a mature student can have a profound effect on people's lives (Swain & Hammond, 2011);supporting this emerging and traditionally overlooked population requires an in-depth understanding of mature students' experiences (Van Rhijn, Lero, Bridge, & Fritz, 2016).

Virtual students are part of these virtual learning environments. Virtual students require several skills, none of them generic skills, to be successful in the job market (Kavanagh & Drennan, 2008). These virtual students must be familiar with virtual

environments and able to use computers, the Internet, chats and other information technology tools to carry out their studies (Martínez-Cerdá, Torrent-Sellens, & González-González, 2018).

The question that must be asked now is the following: are virtual students satisfied with this virtual teaching model? Some authors consider this satisfaction level to be quite high (Cabero, Llorente, & Puentes, 2010; Cassidy, 2016), perhaps due to the flexibility (Arbaugh, 2000) and the immediacy of the students' interaction with that model (Al Ghamdi, Samarji, & Watt, 2016), the perceived self-efficacy regarding its use in computerized learning environments (Navimipour & Zareie, 2015; Wu, Tennyson, & Hsia, 2010), or the visual and interactive features embedded in applications (Violante & Vezzetti, 2015). A virtual environment provides students with absolute autonomy in planning their study and work hours. Only an Internet connection is necessary and one does not even need a computer, as the connection can be made through any electronic devices, such as tablets or smartphones. The work—life balance is better when students controls their study times; being able to study without physical or space restrictions, as everything one needs is included in the virtual course in which one is enrolled.

Currently, the usefulness of ICTs in the teaching-learning process has not been fully discussed, but in a distance-learning model, these online tools are perhaps the sole support for reproducing traditional teaching via technologies. This aspect is a new focus for social development supported by the exercise of innovation, learning and research (Palacios & Galván, 2003), and it is necessary to analyse the satisfaction of students in blended e-learning (Wu et al., 2010). According to the above, the necessity of carrying out an exploratory analysis to verify the students' perception of three variables involved in this virtual learning method is considered; these variables are self-perception of generic skills [GS], perception of VLE [VLE] and satisfaction perceived [STF] in the EHEA in a distance education model.

Methodology

e-tools and the virtual learning environment

Virtual learning environments can be generic and are based on open platforms that provide their own electronic tools for learning. However, when applied to official degree studies primarily supported by e-learning, the VLE is usually designed ad hoc for such degrees. Even when the VLE is self-developed, tools are often included whose benefits have already been corroborated as suitable for virtual learning environments. In this way, the use of video applied to teaching as a habitual teaching tool in new environments has been studied and corroborated (Brecht, 2012; Brecht & Ogilby, 2008; Holtzblatt & Tschakert, 2011; Stanley & Edwards, 2005), has been tested, and allows one to learn in more visual forms; these videos are perceived as powerful learning tools by students (Henderson, Selwyn, & Aston, 2017). Another common tool is chats and online forums, which are used to connect students and thus improve the performance and development of certain skills (Potter & Johnston, 2006), as these allow users to overcome the physical distance between teacher and student through online tutoring (Cano, 2009; Castillo, 2008). In a virtual learning environment, there must also be a tool for knowledge self-assessment (Oosterhoff, Conrad, & Ely, 2008) because it is essential to improve one's autonomous online learning and maximize opportunities and performance through training (Rodríguez & Ibarra, 2011).

The research has been carried out at the Universidad Nacional de Educación a Distancia (UNED) in a Tourism Degree programme, in the subject of accounting. The UNED has over 40 years of experience in distance education and distance learning with large student groups.

The students are mainly mature students, with families and jobs, who joined the university at an older age. These students have limited time and require resources that allow them to take full advantage of their study time. In addition, some of these students are less skilled in the use of online tools due to their late access to the university or their lack of knowledge. The average age of students is approximately 36 years old.

Since its founding, the university has applied a blended learning system using its own methodology designed ad hoc for its studies. The teaching is supported by a structure of associated centres distributed in multiple locations in Spain and abroad, as well as in the VLE that was developed ad hoc. Students can thus opt to attend "face-to-face" sessions in the university-associated centre, online activities in the VLE, or both. These methods are not exclusive but complementary, providing a voluntary classroom option for students.

In fact, many students interact and learn via the virtual environment due to their characteristics as mature students and the limited time they have to spend in a traditional face-to-face class.

In recent years, the methodology has been reinforced by the application of online tools to enhance engagement and mitigate abandonment. In this sense, although all the subjects taught in the university share a similar VLE structure, teachers are developing and testing various online resources, exploring teaching innovations for the most appropriate tools for each subject. That is the reason why we refer to these online methods as new tools, because they are new resources and are being used in a new way, or simply because they are new tools for mature students.

In this way, the VLE within which this research has been developed is supported by a platform that allows the application of a set of e-tools considered useful for the development of virtual teaching, as seen in Fig. 1, among which are included online questionnaires to assess knowledge, forums to interconnect students and teachers, videos applied to teaching, and other e-tools. These tools were available on an IT platform (aLF). Via this platform, every student could access the VLE and manage all the resources without restriction of physical or temporal learning space. Our VLE combines tools, resources, contents, educational assistance and discussions. Despite the advantages of virtual learning environments, student acceptance is perhaps the most important factor for success (Martins & Kellermanns, 2004), hence the need to analyse the satisfaction of learning in virtual environments in a distance education model online.

For the above reasons, these kinds of resources were made available online for students studying financial accounting in a tourism programme.

Sample and questionnaire

To answer questions about the satisfaction with and acceptance of virtual learning environments, researchers have analysed students' perceptions through a survey (Al-Samarraie, Teng, Alzahrani, & Alalwan, 2017). Like previous research, in this paper, student satisfaction has been examined as an indicator of whether learners are satisfied with their learning experience (Li, Marsh, Rienties, & Whitelock, 2016; Richardson,

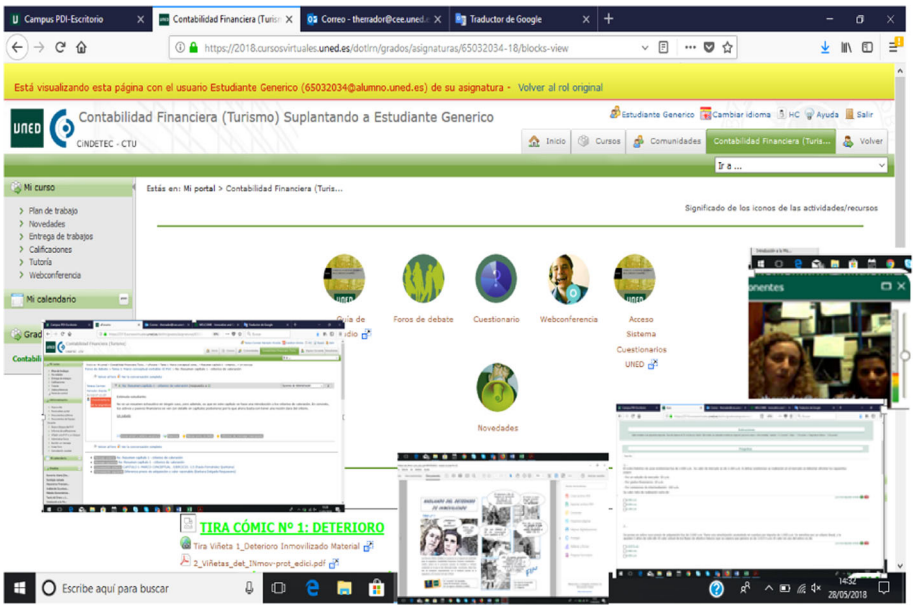


Fig. 1 Virtual Learning Environment

Maeda, Lv, & Caskurlu, 2017) using perceived satisfaction as a proxy of the latent variable of the feeling of satisfaction via a questionnaire (Kang, Park, Jung, & Park, 2009).

At the end of the term, the students' perception was measured in relation to various aspects of the teaching-learning process in the VLE using an online questionnaire developed ad hoc as in previous studies (Boza & Toscano, 2012; Herrador-Alcaide & Hernández-Solís, 2017; Hurtado & Lara, 2015).

The study was conducted taking as a population students studying the subject of accounting in a tourism degree programme. The number of students enrolled was nearly 500 students. All students could participate in the VLE and use different e-tools. At the end of the academic period, a survey was circulated to all students. The number of students who answered the questionnaire was 146 students. The number of valid questionnaires answered was 134 questionnaires, which were collected during 2017. These valid questionnaires were limited to those students who used multimedia resources and who correctly completed the questionnaire. As a consequence, the sample comprised approximately 30% of all students.

Some of the sociodemographic characteristics of the sample are shown in Table 1.

The questionnaire was designed to group items into several dimensions: one dimension was related to the student's aptitude for the VLE, another dimension was related to the self-perception of the fulfilment of the generic skills defined for the studies, and a third dimension was related to their perception of satisfaction with learning in the environment.

All items took a value using a Likert scale of 1 to 5 ("1" = "Strongly disagree" to "5"= "Strongly agree"). Once the initial questionnaire was constructed, it was reviewed by professors in accounting, education and psychology to ensure its validity. Using feedback from these experts, some items were modified or eliminated. Several full-time professors with extensive experience in university teaching, both face-to-face and in blended learning, participated in the prior review process. Teachers were consulted not only from the university involved but from other universities. These teachers were

Table 1 Sociodemographic characteristics

Gender					
		Statistical Frequency (SF)	Percentage (p)	Valid Percentage (VP)	Accumulated Percentage (AP)
Valid	Female	97	72,4	72,4	72,4
	Male	36	26,9	26,9	99,3
	Do not want to answer	1	,7	,7	100,0
	Total	134	100,0	100,0	
Level of previous studies completed					
		SF	P	VP	AP
Valid	University studies	20	14,9	14,9	14,9
	Master	19	14,2	14,2	29,1
	University entrance examination for over 25 years	19	14,2	14,2	43,3
	University entrance examination for over 45 years	4	3,0	3,0	46,3
	University access exam after High School	72	53,7	53,7	100,0
	Total	134	100,0	100,0	
Part-time students for work					
		SF	P	VP	PA
Valid	No	15	11,2	11,2	11,2
	Yes	119	88,8	88,8	100,0
	Total	134	100,0	100,0	

Source: own development by SPSS

selected among people with experience in research and publication in the field, each in relation to their specialty. These professors specifically reviewed the validity of the questionnaire, both in content and in the methodology with which it was to be applied. The bases for this questionnaire had been established over 3 previous academic years. Accordingly, different parts of the methodology, especially the questionnaire and its constructs, had been previously reviewed through debate in both education and accounting congresses. The reviewed questionnaire was piloted with a small group of students to once again ensure the comprehension and validity of items as an instrument to measure students' perception, as is usual in educational research (Alsadoon, 2017; Chang, Hajiyev, & Su, 2017).

The questionnaire content applied to this research had been previously validated and the reliability ensured by the Alpha-Cronbach test as shown in Table 2. The minimum value for reliability in social sciences research should be 0.7 (Chen, Chen, & Kinshuk, 2009). Items in this study have good reliability and discriminant validity.

When a set of items with the same unit of measurement is used, the interpretation is performed with the reliability of the value of Cronbach's alpha, based on the correlation between the items, so that the higher it is, the more likely it is that the instrument will be consistent (Frías-Navarro, 2014).

When Cronbach's alpha takes values from 0.7, it is considered valid for data inference (George & Mallery, 2003). However, even when inferior, when Cronbach's alpha is very close to 0.7, it can be accepted as valid in prospective research in the establishment of

Table 2 Reliability by Cronbach

Reliability for Generic Skills		
Alfa Cronbach	Standardized Alfa Cronbach	Number of items
,674	,686	5
Reliability for students' perception on satisfaction related to e-learning process		
e-Alfa Cronbach	Standardized Alfa Cronbach	N
,902	,905	5
Reliability for students' perception on virtual learning environment		
Alfa Cronbach	Standardized Alfa de Cronbach	N
,797	,803	7

Source: own development by SPSS

initial conclusions (Nunnally, 1967; Nunnally, 1978). Moreover, Loewnthal (1996) suggested that a reliability value of 0.6 can be considered acceptable for scales with fewer than 10 items. For all previous arguments, the Cronbach values of this study support the conclusions of this investigation.

Variables and items

The items measuring students' perceptions of the VLE were based on previous studies on functionality and interaction (Chen & Jones, 2007; Herrador-Alcaide & Hernández-Solís, 2016; Johnston, Killion, & Oomen, 2005; Kreijns, Kirschner, & Jochems, 2003; Levy, 2007; Pituch & Lee, 2006; Van Raaij & Schepers, 2008). This dimension comprised 7 items (variable << VLEi >>). Satisfaction with learning was reviewed in previous studies (Chiu, Hsu, & Sun, 2005; Wu & Wang, 2005), and for skills (Gámiz-Sánchez & Gallego-Arrufat, 2016; Harnar, Brown, & Mayall, 2000; Martínez, Pérez, & Martínez, 2016), which included generic or general skills as defined in the Official Memory of the Degree. Hence, these dimensions comprised 5 items for both (variables <<STFi> > and < <.GSi> > for satisfaction and generic skill respectively), as seen in Table 3 and Fig. 2.

The items measuring students' perceptions of the VLE were based on previous studies on functionality and interaction (Herrador-Alcaide & Hernández-Solís, 2017; Johnston et al., 2005; Kreijns et al., 2003; Pituch & Lee, 2006; Levy, 2007; Chen, & Jones, 2007; Van Raaij & Schepers, 2008). This dimension comprised 7 items (variable << VLEi >>). Satisfaction regarding learning previous research was reviewed (Chiu et al., 2005; Wu & Wang, 2005), and for skills (Gámiz-Sánchez & Gallego-Arrufat, 2016; Harnar et al., 2000; Martínez et al., 2016), which included generic or general skills as defined in the Official Memory of the Degree. Hence, these dimensions comprised 5 items for both (variables << STFi> > and < <GSi> > for satisfaction and generic skill respectively), at seen in Table 3. The strong correlation among variables is expected, as shown in Fig. 2.

Results

The first results show that the perceived satisfaction of learning by the students is high, with a score of approximately 4 on a Likert scale of 1 to 5, where 5 is the highest score. The self-perception of their generic skills also scored an approximate average of 4 points, while the perception of their attitude towards the VLE was slightly lower.

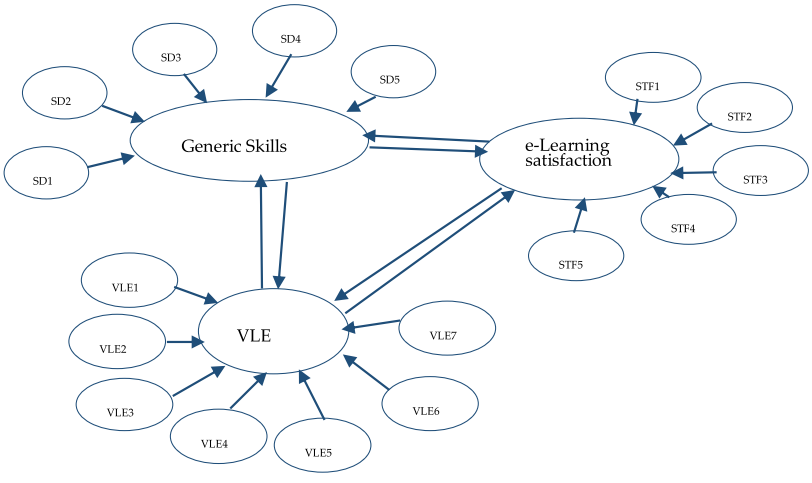
Table 3 Items

Self-perception of generic skills	
GS1	My ability to solve problems
GS2	My analytical skills
GS3	My ability to work in a group
GS4	My written communication skills
GS5	My ability to plan my own work
Students' perception on satisfaction related to e-learning process	
STF1	I have learned a lot with the course of Financial Accounting (Tourism)
STF2	I do not regret the time invested in this subject
STF3	I feel that I have learned useful knowledge for business management
STF4	I have had a feeling of reaching achievements in my learning as I progressed
STF5	I would encourage others to take the subject
Students' perception on virtual learning environment	
VLE1	E-learning encourages more active learning than traditional classes
VLE2	I enjoy using personal computers and similar devices
VLE3	My experience in using electronic devices (computers, tablets, smart phones ...) has helped me move in the virtual space of the subject
VLE4	I usually use electronic devices in virtual environments
VLE5	I do not feel intimidated in virtual learning environments (e-learning)
VLE6	In a virtual classroom I feel more comfortable than in a face to face classroom
VLE7	The e-learning allows you to learn at your own pace

Source: own development

Students' perception of generic skills

The descriptive dimensions related to the self-perception of the students in relation to their generic abilities indicate that students perceive they possess the generic skills at a high level (close to 4 points out of 5). The statistic mean of all the items of the generic skill constructor is 3.7 points out of 5. The ability to organize their own work stands out as the best skill, as shown in Tables 4 and 5.



Source: own development by SPSS

Fig. 2 Model. Source: own development by SPSS

Table 4 Statistics of items on Generic Skills

	Mean	SD	N
GS1	3,70	,859	134
GS2	3,49	,802	134
GS3	3,79	1034	134
GS4	3,75	,888	134
GS5	3,86	1098	134

Source: Own development by SPSS

The correlation between the items (second order variables) is positive (0′3). Hence, the Pearson coefficient indicates that there is a bivariate linear association between the generic and positive generic items. However, the percentage of linear association is low, except for the linear relationship between GS1 and GS2 (0, 641). That is, there is a high association between the self-perception of one's ability to solve problems and the analytical skills possessed by students, and this behaviour can be adjusted to a linear relationship. The lowest linear association occurs between the ability to work in a group and written communication skills (see Table 6).

Students' perception on virtual learning environment

The mean in relation to the assessment given to the perception that students have in relation to the VLE is high, 3.7 on a Likert scale of 5, with a variance of 1.13. The correlation and the covariance are positive, which indicates that on average the association of variables two to two evolves in the same way (see Tables 7 and 8). The items that scored higher were VL4, VL7 and VL3.

Within this framework, most students recognize that they usually use electronic devices in virtual environments. Likewise, other students place an important value to the fact that the previous use of multimedia devices has facilitated their performance in the VLE of the subject. Also, considering that e-learning helps to learn at your own pace. The lowest score is given to VL6, despite exceeding the statistical median. This low value indicates that the students manifest that they are not in a more comfortable virtual classroom than in a face to face classroom.

The correlation between the variables VLE is positive, that indicates that they evolve in the same way. The item with the highest score is the relationship between VLE3 and VLE4 (0.616), because the habitual use of virtual devices is closely related to the fact that previous experience facilitates the management in the VLE. However, the correlation between VLE5 and VLE7 is low (0.183) (See Table 9).

Table 5 Statistics among elements (GS)

	Mean	Minimum	Maximum	S Range	SD^2	N
Means among elements	3719	3493	3858	,366	,019	5
SD^2	,889	,643	1205	,563	,057	5
Statistical covariance	,260	,164	,441	,278	,008	5
Correlations	,304	,181	,641	,460	,016	5

Table 6 Correlations on Generic Skills

	GS1	GS2	GS3	GS4	GS5
GS1	1000	,641	,226	,287	,370
GS2	,641	1000	,198	,256	,293
GS3	,226	,198	1000	,181	,298
GS4	,287	,256	,181	1000	,288
GS5	,370	,293	,298	,288	1000

Source: Own development by SPSS

Students' perception on satisfaction related to e-learning process

The mean of all the items related to satisfaction is high, with a score of almost 4 out of 5 points. This implies that students, on average, are satisfied with learning in the virtual environment. It cannot be said that any of the relative items to SAT take values that stand out, neither upward nor downward, since they all stand at around 4. This rating could indicate that the satisfaction with learning is valued almost with an "A". The observed SD take similar values also (see Tables 10 and 11).

The correlation between the variables is positive (see Table 12). The highest correlations are between STF4 and SFT1 (0.725) and between STF5 and STF1 (0.726). The lowest correlation is between STF3 and STF1 (0.658). The first correlation implies that students who consider that they have learned a great deal also consider that they have reached their learning goals. The second implies the high correlation between the students who felt that they had learned a great deal and considered they would recommend this course to other students.

The third correlation implies that students who considered that they learned a great deal also considered that their knowledge is useful for business.

To further specify the relationships between the variables of the different constructs, an analysis of bivariate correlations among all the variables was carried out (see Table 13). In this table, the significant correlations at the 0.01 level have been highlighted for each satisfaction variable. Given that we seek to analyse is the satisfaction of the students with the accounting learned through the VLE, according to these results, we consider the following relationships among variables for an extension of the analysis (see Table 14).

Regarding the analysis of correlations among the different variables of satisfaction, generic skills and VLE, a linear regression analysis has been performed to establish the percentage of each satisfaction's variables that is explained linearly by the variables that

Table 7 Statistics of items on VLE

	Mean	SD	N
VLE1	3,28	1174	134
VLE2	3,81	1098	134
VLE3	4,19	,836	134
VLE4	4,24	,903	134
VLE5	3,97	1176	134
VLE6	2,87	1198	134
VLE7	4,19	1007	134

Source: Own development by SPSS

Table 8 Statistics among elements (VLE)

	Mean	Minimum	Maximum	Range	Variance	N
Means	3795	2873	4239	1366	,276	7
SD^2	1133	,699	1435	,736	,087	7
Statistical covariance	,408	,168	,670	,502	,017	7
Correlation	,368	,167	,616	,448	3678	7

Source: Own development by SPSS

correlate at the 1% level with each satisfaction variable. To this end, five multiple linear regressions have been carried out, one for each of the satisfaction variables. The independent variables are all those items that are related in the table with STF1, STF2, STF3, STF4 and STF 5.

Regarding Table 14, the following regressions have been carried out.

Regressions

R1 :

$$\boldsymbol{STF1}_t = \beta_1 + \beta_2 \cdot \boldsymbol{GS1} + \beta_3 \cdot \boldsymbol{GS2} + \beta_4 \cdot \boldsymbol{GS3} + \beta_5 \cdot \boldsymbol{GS4} + \beta_6 \cdot \boldsymbol{GS5} + \beta_7 \cdot \boldsymbol{VLE1} + \beta_8 \cdot \boldsymbol{VLE2} + \beta_9 \cdot \boldsymbol{VLE3} + \boldsymbol{\varepsilon}$$

In the first explanatory model of satisfaction (STF1), the variables explain 31.7% of the behaviour of STF1. This result implies that satisfaction with what has been learned cannot be well determined by certain generic skills or by the attitude towards the VLE, since these variables can only explain part of the perceived satisfaction with the contents learned (see Tables 15 and 16).

R2 :

$$\boldsymbol{STF2}_t = \beta_1 + \beta_2 \cdot \boldsymbol{GS1} + \beta_3 \cdot \boldsymbol{GS2} + \beta_4 \cdot \boldsymbol{GS5} + \beta_5 \cdot \boldsymbol{VLE1} + \beta_6 \cdot \boldsymbol{VLE2} + \beta_7 \cdot \boldsymbol{VLE3} + \beta_8 \cdot \boldsymbol{VLE4} + \beta_9 \cdot \boldsymbol{VLE7} + \beta_{10} \cdot \boldsymbol{STF1} + \boldsymbol{\varepsilon}$$

In the second model (R2), which measures the satisfaction of the learning process from the perspective of time invested, the explanatory variables can justify almost 45% of the perception of said satisfaction (see Tables 17 and 18), so these variables will be taken into consideration in future research, for the design and adjustment of the VLE. It must be noted that, in mature university students, time is one of the main limitations to academic performance and, as a consequence, to the persistence in the study.

R3 :

$$\boldsymbol{STF3}_t = \beta_1 + \beta_2 \cdot \boldsymbol{GS1} + \beta_3 \cdot \boldsymbol{GS2} + \beta_4 \cdot \boldsymbol{GS4} + \beta_5 \cdot \boldsymbol{GS5} + \beta_6 \cdot \boldsymbol{VLE2} + \beta_7 \cdot \boldsymbol{VLE7} + \beta_8 \cdot \boldsymbol{STF1} + \beta_9 \cdot \boldsymbol{STF2} + \boldsymbol{\varepsilon}$$

Table 9 Correlations on VLE

	VLE1	VLE2	VLE3	VLE4	VLE5	VLE6	VLE7
VLE1	1000	,520	,365	,418	,322	,470	,443
VLE2	,520	1000	,425	,394	,258	,399	,468
VLE3	,365	,425	1000	,616	,342	,167	,321
VLE4	,418	,394	,616	1000	,425	,230	,288
VLE5	,322	,258	,342	,425	1000	,291	,183
VLE6	,470	,399	,167	,230	,291	1000	,394
VLE7	,443	,468	,321	,288	,183	,394	1000

Source: Own development by SPSS

Table 10 Statistics of items on Satisfaction

	Mean	SD	N
STF1	3,88	,859	134
STF2	3,98	1058	134
STF3	4,04	,913	134
STF4	3,91	,938	134
STF5	4,01	1004	134

Source: Own development by SPSS

R4 :

$$STF4_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot VLE1 + \beta_5 \cdot VLE2 + \beta_6 \cdot VLE7 + \beta_7 \cdot STF1 + \beta_8 \cdot STF2 + \beta_9 \cdot STF3 + \varepsilon$$

The third model (R3) has a high capacity to explain the variable STF3 (see Tables 19 and 20). In the fourth model (R4), which measures the satisfaction with respect to the achievements reached as the students were performing the learning process, the independent variables can explain 65% of the perception of satisfaction (see Tables 21 and 22).

R5 :

$$STF5_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot VLE2 + \beta_5 \cdot VLE7 + \beta_6 \cdot STF1 + \beta_7 \cdot STF2 + \beta_8 \cdot STF3 + \beta_9 \cdot STF4 + \varepsilon$$

In the fifth model (R5), which measures overall satisfaction with the process, independent variables explain almost 70% of the perception of this satisfaction (see Tables 23 and 24). This result leads us to strengthen this model to limit the variables that condition satisfaction with the accounting learning process in a VLE for mature distance students.

According to the five models related to the different aspects of satisfaction with the online learning process, only the fifth model (R5), for the global satisfaction, shows an explanatory capacity of almost 70%. The focus of the question that supports the variable STF5 and the high adjustment of this fifth model make it possible to summarize the total satisfaction with the process of virtual learning through this model where the direct relationship between each explanatory variable and the dependent variable is shown by the highlighted lines in Fig. 3.

This result is important for the applied educational model, since it allows us to state that the ability to solve problems (GS1) and the analytical skills (GS2) of students are determining factors of satisfaction in the online learning process in accounting. In this sense, the teaching team will assess these skills at the beginning of the academic year,

Table 11 Statistics among elements

	Mean	Minimum	Maximum	Range	SD^2	N
Means among elements	3964	3881	4037	,157	,004	5
SD^2	,915	,738	1120	,382	,022	5
Statistical covariance	,592	,509	,686	,177	1348	5
Correlations	,655	,560	,752	,193	1344	5

Source: Own development by SPSS

Table 12 Correlations on Satisfaction

	STF1	STF2	STF3	STF4	STF5
STF1	1000	,560	,658	,752	,726
STF2	,560	1000	,569	,566	,588
STF3	,658	,569	1000	,698	,705
STF4	,752	,566	,698	1000	,729
STF5	,726	,588	,705	,729	1000

Source: Own development by SPSS

and we will propose special follow-up activities for students with a low profile in those skills for upcoming years.

It is also important to emphasize that the fact of enjoying the use of computerized environments (VLE2) and being able to mark the study rhythm itself (VLE7) may be related to the problem-solving and analytical capacity characteristics indicated above. This result also leads us to consider that, to increase the overall satisfaction and commitment of the students, customizable actions of analytical learning should perhaps be carried out, so that students are aware of their limitations due to their profile, and they could be oriented to actions that would refurbish the learning process before the learning dropout occurs. Early knowledge of the effect of these profiles relative to generic skills and the VLE itself can also allow teachers to undertake actions to assist and reinforce commitment and prevent dropout from the university.

Discussion and conclusion

Virtual environments applied to learning are proposed as effective solutions for learning, especially in distance education models. E-learning, despite having detractors and

Table 13 Correlations among variables

	GS1	GS2	GS3	GS4	GS5	VLE1	VLE2	VLE3	VLE4	VLE5	VLE6	VLE7	STF1	STF2	STF3	STF4	STF5
GS1 Pearson Correlation	1	,641**	,226**	,287**	,370**	,256**	,196*	,333**	,316**	,170*	-,008	,163	**,329****	**,398****	**,235****	**,303****	**,293****
GS2 Pearson Correlation	,641**	1	,198*	,256**	,293**	,218*	,105	,215*	,221*	,087	-,013	,114	**,414****	**,314****	**,262****	**,339****	**,299****
GS3 Pearson Correlation	,226**	,198*	1	,181*	,298**	,105	,091	,117	,030	,094	-,022	,010	**,260****	,154	,112	,151	,047
GS4 Pearson Correlation	,287**	,256**	,181*	1	,288**	-,019	,076	,095	,121	,187*	-,107	,020	**,237****	,130	**,271****	,190*	,148
GS5 Pearson Correlation	,370**	,293**	,298**	,288**	1	,212*	,015	,194*	,103	,154	-,037	,025	**,373****	**,321****	**,238****	,192*	,166
VLE1 Pearson Correlation	,256**	,218*	,105	-,019	,212*	1	,520**	,365**	,418**	,322**	,470**	,443**	**,250****	**,278****	,194*	**,228****	,188*
VLE2 Pearson Correlation	,196*	,105	,091	,076	,015	,520**	1	,425**	,394**	,258**	,399**	,468**	**,287****	**,229****	**,270****	**,225****	**,316****
VLE3 Pearson Correlation	,333**	,215*	,117	,095	,194*	,365**	,425**	1	,616**	,342**	,167	,321**	**,242****	**,413****	,217*	,195*	,212*
VLE4 Pearson Correlation	,316**	,221*	,030	,121	,103	,418**	,394**	,616**	1	,425**	,230**	,288**	,124	**,273****	,208*	,105	,087
VLE5 Pearson Correlation	,170*	,087	,094	,187*	,154	,322**	,258**	,342**	,425**	1	,291**	,183*	,078	,217*	,155	,107	,115
VLE6 Pearson Correlation	-,008	-,013	-,022	-,107	-,037	,470**	,399**	,167	,230**	,291**	1	,394**	,080	,057	,046	,023	,058
VLE7 Pearson Correlation	,163	,114	,010	,020	,025	,443**	,468**	,321**	,288**	,183*	,394**	1	,218*	**,322****	**,286****	**,297****	**,250****
STF1 Pearson Correlation	,329**	,414**	,260**	,237**	,373**	,250**	,287**	,242**	,124	,078	,080	,218*	1	**,560****	**,658****	**,752****	**,726****
STF2 Pearson Correlation	,398**	,314**	,154	,130	,321**	,278**	,229**	,413**	,273**	,217*	,057	,322**	,560**	1	**,569****	**,566****	**,588****
STF3 Pearson Correlation	,235**	,262**	,112	,271**	,238**	,194*	,270**	,217*	,208*	,155	,046	,286**	,658**	,569**	1	**,698****	**,705****
STF4 Pearson Correlation	,303**	,339**	,151	,190*	,192*	,228**	,225**	,195*	,105	,107	,023	,297**	,752**	,566**	,698**	1	**,729****
STF5 Pearson Correlation	,293**	,299**	,047	,148	,166	,188*	,316**	,212*	,087	,115	,058	,250**	,726**	,588**	,705**	,729**	1

[a]Correlation is significant at the 0.01 level (2-tailed)
[b]Correlation is significant at the 0.05 level (2-tailed)

Table 14 Regressions

Regression	Dependent variables	Explanatory variables (correlation at the 1% level)		
		GS variable	VLE variables	STF variables
R1	STF1	GS1, GS2, GS3, GS4, GS5	VLE1, VLE2, VLE3	
	$STF1_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot GS3 + \beta_5 \cdot GS4 + \beta_6 \cdot GS5 + \beta_7 \cdot VLE1 + \beta_8 \cdot VLE2 + \beta_9 \cdot VLE3 + \varepsilon$			
R2	STF2	GS1, GS2, GS5	VLE1, VLE2, VLE3, VLE4, VLE7	STF1
	$STF2_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot GS5 + \beta_5 \cdot VLE1 + \beta_6 \cdot VLE2 + \beta_7 \cdot VLE3 + \beta_8 \cdot VLE4 + \beta_9 \cdot VLE7 + \beta_{10} \cdot STF1 + \varepsilon$			
R3	STF3	GS1, GS2, GS4, GS5	VLE2, VLE7	STF1, STF2
	$STF3_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot GS4 + \beta_5 \cdot GS5 + \beta_6 \cdot VLE2 + \beta_7 \cdot VLE7 + \beta_8 \cdot STF1 + \beta_9 \cdot STF2 + \varepsilon$			
R4	STF4	GS1, GS2	VLE1, VLE2, VLE7	STF1, STF2
	$STF4_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot VLE1 + \beta_5 \cdot VLE2 + \beta_6 \cdot VLE7 + \beta_7 \cdot STF1 + \beta_8 \cdot STF2 + \beta_9 \cdot STF3 + \varepsilon$			
R5	STF5	GS1, GS2,	VLE2, VLE7	STF1, STF2, STF3, STF4
	$TF5_t = \beta_1 + \beta_2 \cdot GS1 + \beta_3 \cdot GS2 + \beta_4 \cdot VLE2 + \beta_5 \cdot VLE7 + \beta_6 \cdot STF1 + \beta_7 \cdot STF2 + \beta_8 \cdot STF3 + \beta_9 \cdot STF4 + \varepsilon$			

defenders, contributes some practical aspects to the process of education through ICT supported by various studies. However, it is debatable whether the success of online learning processes is conditioned by the perception that students have about it and the satisfaction upon completing it. Likewise, it may be that the students' own individual abilities can condition their performance in the VLE and, as a consequence, their satisfaction with learning. Thus, such generic abilities of each student could condition the success of the VLE.

In this paper, students' perceptions of the three variables that could be conditioning the success of the learning process were analysed; these three variables are the attitude towards VLE, the self-perception of students related to their generic skills, and the satisfaction with the learning process.

The first results of the analysis indicate that the students showed a high positive evaluation in the self-perception about their generic skills. Likewise, students perceived the VLE in a very favourable way, expressing their agreement with most of its aspects. The students also stated that they perceive a high score of satisfaction with learning, both for the results and for other aspects, such as the usefulness of the knowledge, the time spent on the online course and other aspect related to both variables. Overall, the results seem to indicate that students who perceive their generic abilities as high are also satisfied with the learning process and with the VLE.

These preliminary conclusions, together with the validity of the three constructors analysed, allow one to plan a future analysis of how the weight of the different variables represented by each constructor (VLE, STF and GS) can be decisive in an educational model. An understanding of these aspects could determine the success of the VLE, and, in the end, the success of the educational programme, making it easier to achieve a satisfactory academic performance.

Table 15 Model Summary R1[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,563[a]	,317	,274	,732	1794

[a]Predictors: (Constant), VLE3, GS4, GS3, GS2, VLE1, GS5, VLE2, GS1
[b]Dependent Variable: STF1

Table 16 ANOVA R1[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31,126	8	3891	7263	,000[b]
	Residual	66,964	125	,536		
	Total	98,090	133			

[a]Dependent Variable: STF1
[b]Predictors: (Constant), VLE3, GS4, GS3, GS2, VLE1, GS5, VLE2, GS1

Table 17 Model Summary R2[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,670[a]	,449	,409	,814	1888

[a]Predictors: (Constant), STF1, VLE4, VLE7, GS5, GS2, VLE1, VLE2, VLE3, GS1
[b]Dependent Variable: STF2

Table 18 ANOVA R2[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	66,811	9	7423	11,209	,000[b]
	Residual	82,122	124	,662		
	Total	148,933	133			

[a]Dependent Variable: STF2
[b]Predictors: (Constant), STF1, VLE4, VLE7, GS5, GS2, VLE1, VLE2, VLE3, GS1

Table 19 Model Summary R3[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,724[a]	,525	,494	,649	1957

[a]Predictors: (Constant), STF2, GS4, VLE2, GS2, GS5, VLE7, STF1, GS1
[b]Dependent Variable: STF3

Table 20 ANOVA R3[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58,135	8	7267	17,243	,000[b]
	Residual	52,679	125	,421		
	Total	110,813	133			

[a]Dependent Variable: STF3
[b]Predictors: (Constant), STF2, GS4, VLE2, GS2, GS5, VLE7, STF1, GS1

Table 21 Model Summary (R4)[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,810[a]	,657	,635	,567	2395

[a]Predictors: (Constant), STF3, VLE1, GS2, VLE7, VLE2, STF2, GS1, STF1
[b]Dependent Variable: STF4

Table 22 ANOVA (R4)[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76,779	8	9597	29,883	,000[b]
	Residual	40,146	125	,321		
	Total	116,925	133			

[a]Dependent Variable: STF4
[b]Predictors: (Constant), STF3, VLE1, GS2, VLE7, VLE2, STF2, GS1, STF1

Table 23 Model Summary R5

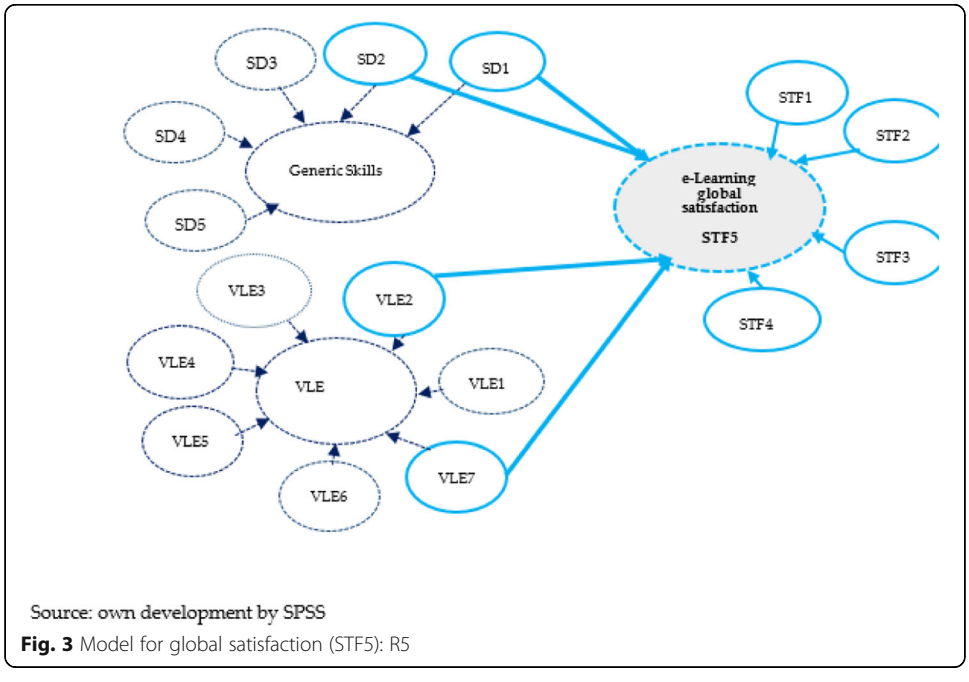
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,816[a]	,666	,645	,598

[a]Predictors: (Constant), STF4, VLE2, GS1, VLE7, STF2, GS2, STF3, STF1

Table 24 ANOVA R5[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	89,242	8	11,155	31,175	,000[b]
	Residual	44,728	125	,358		
	Total	133,970	133			

[a]Dependent Variable: STF5
[b]Predictors: (Constant), STF4, VLE2, GS1, VLE7, STF2, GS2, STF3, STF1



Source: own development by SPSS

Fig. 3 Model for global satisfaction (STF5): R5

According to the explanatory effect of certain competences related to the ability to solve problems and the analytical capacity in the global satisfaction with the teaching-learning process in VLE, it is necessary to continue the analysis of these variables by replicating the study using similar teaching environments and with other subjects.

In addition, this result also allows actions to be taken to monitor and reinforce the students with the lowest profiles in these competences. These educational actions would also be applicable to students with low profiles in affinity to computerized environments or those with a lower capacity for study self-organization.

In short, we consider these findings useful for expanding the knowledge of the factors that determine the satisfaction with the learning processes when it is strongly supported by a VLE, especially in subjects requiring a high analytical and numerical capacity, such as accounting. These results can open a line of research aimed at improving learning outcomes in subjects with similar characteristics.

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All the authors have made the same contribution to the paper. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests.

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