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Student behavioural intentions to use desktop video conferencing in a distance course: integration of autonomy to the UTAUT model

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Abstract The aim of this study was to examine psychological factors which could influence acceptance and use of the desktop video conferencing technology by undergraduate business students. Based on the Unified Theory of Acceptance and Use of Technology, this study tested a theoretical model encompassing seven variables: behavioural intentions to use desktop video conferencing, performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions and autonomy. Data were collected on a sample of 177 undergraduate business students in a compulsory information system distance course using an online questionnaire. The results indicate that the main drivers of the behavioural intentions to use desktop video conferencing are, in order of importance: performance expectancy, facilitating conditions, general social influence and autonomy mediated by performance expectancy ($R^2 = 50.5$ %). The structural model was further examined across gender and age groups. The results indicated different patterns of strength and significant relationships between groups and with the overall model, suggesting that gender and age played a moderating role. The discussion focused on the most important factors to consider by administrators and faculties in higher education when they come to implement desktop video conferencing in online academic courses.

Keywords Desktop video conferencing · Unified Theory of Acceptance and Use of Technology (UTAUT) · Autonomy · Distance course · Business education

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Introduction

Over the last two decades, online learning has been growing exponentially in higher education (Allen and Seaman 2004; Gosmire et al. 2009). There are many possible reasons for this growth: online courses respond to students' demand for flexible schedules, they give access to a new kind of learner who normally wouldn't attend traditional courses, they provide institutes of higher education with certain financial benefits (Gosmire et al. 2009) and finally, they seem to be at least as effective as face-to-face courses (Myers and Schiltz 2012). Moreover, an often cited meta-analysis of 232 comparative studies conducted by Bernard et al. (2004) concluded that overall, distance courses and face-to-face courses are comparable on student outcomes (academic performance, satisfaction and retention rates). However, the reported results demonstrated wide variability. More broadly, since 2000, more than 15 meta-analyses conducted among different populations, such as K-12 and higher education students confirmed that online courses are as effective as face-to-face courses (Abrami et al. 2011). Furthermore, good news is reported by a meta-analysis of 51 studies comparing students registered in these two kinds of courses (U.S. Department of Education 2010). It revealed that academic performance was higher for online students as compared to those enrolled in face-to-face courses.

Universities offering online courses are putting many efforts into ensuring that online students are as satisfied as those attending face-to-face courses. Student satisfaction with online courses depends on faculty qualities (communication, feedback, preparation, content knowledge, teaching methods, incentive, accessibility and professionalism), technology and interactivity (Abdous and Yen 2010; Bolliger and Martindale 2004; Teo and Wong 2013). Moreover, students view the possibility of interactions with faculty members and with other students as very supportive to their learning (Fabry 2012). Other authors confirm these results and add that synchronous interactions increase student satisfaction with online courses (Schubert-Irastorza and Fabry 2011; Skylar 2009).

Several technologies exist to enhance synchronous interactions in online courses. Among these technologies, instant messaging (IM), Web conferencing, real-time audio and video conferencing, and application sharing (students work together or with the faculty on a shared software application) are some examples of the kind. These technologies seem to create a familiar learning environment for online students in that they strengthen faculty presence, they allow instant and clear feedback as well as more social presence, they facilitate group decision-making, and finally, they help develop a sense of a learning community (Myers and Schiltz 2012; Wang and Hsu 2008).

Video conferencing has been used for more than four decades in distance courses in order to stimulate synchronous pedagogical interactions and communications and to enhance collaborative learning (Alavi et al. 1995). The earliest pedagogical experiments on this matter employed room-based videoconferencing allowing distance students to communicate together and with faculty, through two way audio and video interactions (Guichon 2010). Since then, successive advancements in technology have improved transmission capabilities and the use of videoconferencing has increased drastically in higher education as the costs of providing the

technology have dropped (Lawson et al. 2010). Many examples of usage of this technology in higher education have been reported by previous studies: project management, dissemination, lecture courses, keynote lectures, small groups, orals and interviews (Pitcher et al. 2000). Nowadays, desktop video conferencing (DVC) has emerged as a more promise alternative, as it does not require the students to travel to a specific place (i.e. conference room) in order to attend a session and does not need organisational arrangements, such as timetable co-ordination, booking requirements or support staff services (Pitcher et al. 2000). It "implies using two (or more) computers networked together with software applications and equipped with webcams, instant messaging, file transfer, a whiteboard, and audio conferencing functionalities so that two (or many) interlocutors can see, write, send documents and speak to each other" (Guichon 2010, p. 169). Thereby, students could "collaboratively author text, draw shared diagrams and vote on issues of common interest, working together in real time in an environment that enables them to focus directly on the task and materials at hand" (Bower et al. 2011, p. 152). Moreover, DVC allows distance students to attend course sessions in real-time without having to be physically present in the classroom, while taking advantage of synchronous interactions between all participants (faculty and students) through a variety of modalities. Wang and Hsu (2008) identified three kinds of possible interactions that could be used, depending on faculty pedagogy: faculty to students in one site, faculty to students in multiple sites and multiple students in one site to multiple students in another or in multiple sites. In addition to interactivity, these authors reported other advantages linked to the adoption of this technology. According to them, DVC allows students to save travel time, as they don't need to move to attend class sessions while benefitting from direct contact with faculty and with other students and it enables students to achieve course material for personal review or even to review a session which they could not attend in real-time.

The use of DVC is becoming more and more common in online courses (Karabulut and Correia 2008). A large body of research has been conducted in order to compare face-to-face courses to synchronous distance courses involving two way audio and video interactions and DVC (Abrami et al. 2011; Bernard et al. 2004). For instance, Alavi et al. (1995) compared three environments: face-to-face collaborative learning, distance students on campus and distance students out of campus, where distance students on campus and those out of campus were involved in DVC. These environments were found to be equally effective in terms of student knowledge acquisition. However, higher critical-thinking skills were revealed in the distance out of campus environment. The students in the three learning environments were equally satisfied with their learning process and outcomes, but the distant students out of campus using DVC were more committed and attracted to their groups compared to on campus students who worked face-to-face or through DVC. Other studies conducted specifically on the usage of DVC, reported in a literature review by Lawson et al. (2010), revealed that discussions using this technology promoted reflective learning as students were able to share problems and to generate solutions amongst themselves. Even though many authors such as De Gara and Boora (2006), Myers and Schiltz (2012), and Wang and Hsu (2008) revealed positive impacts of this technology on student learning, other empirical

studies should be conducted to give educators the additional information in regard with acceptance and use of this technology by academic students, which would enable them to make sound decisions, if they wish to adopt such technology. The present study aimed to further this knowledge. More particularly, the goal of this study was to provide administrators and faculty members in higher education with guidance about how to implement DVC in online academic courses based on empirical data regarding psychological factors that influence academic student use. These factors originated from the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al. 2003). The choice of this model was attributable to the fact that it represented an integrative and a global model, derived from the main previous models and theories developed to explain technology acceptance by its users (Ajzen 1991; Compeau and Higgins 1995; Davis 1989; Davis et al. 1989, 1992; Fishbein and Ajzen 1975; Moore and Benbasat 1991; Schifter and Ajzen 1985; Taylor and Todd 1995; Thompson et al. 1991). Hence, this study incorporated a variety of explanatory variables; those originating from the basic model of UTAUT: performance expectancy, effort expectancy, social influence (which, in this study, were divided into general social influence and peer social influence; see below for more explanation), and facilitating conditions. According to Venkatesh et al. (2003), the UTAUT model should be enriched with additional determinants, such as task technology fit and individual constructs. Among these latter constructs, autonomy was taken into account by the present research as it is considered to be an important variable in acceptance of technology by its users (Roca and Gagné 2008; Sorebo et al. 2009). The inclusion of this new variable might improve the predictive value of the UTAUT model.

Unified Theory of Acceptance and Use of Technology (UTAUT) model

Many competing models of acceptance of technology have been elaborated and validated in the contemporary information system literature. These models included different sets of acceptance constructs derived from information systems, psychology and sociology (Venkatesh et al. 2003). Some of these models are presented in Table 1. These models were able to explain up to 40 percent of the variance in intention to use technology (Venkatesh and Davis 2000). However, researchers were confronted with a difficult choice among these models and among the constructs considered. They were led to choose a particular model with its particular constructs, thereby ignoring the contributions of the constructs of alternative models. In order to avoid this inconvenience, Venkatesh et al. (2003) proposed a unified model, called UTAUT. According to this author, "UTAUT is a definitive model that synthesizes what is known and provides a foundation to guide future research in this area" (p. 467). Several previous studies validated the UTAUT model in different environments such as education (Birch and Irvine 2009; Lin et al. 2004; Ouédraogo 2011), banking (Abushanab et al. 2010), organizations (Bourbon and Hollet-Haudebert 2009; Brown et al. 2010; Eckhardt et al. 2009; Al-Gahtani et al. 2007) and tourism (San Martin and Herrero 2012). This model incorporated a wide variety of constructs originating from the main theoretical models of

acceptance of technology. Table 1 presents the models selected by Venkatesh et al. (2003) to formulate the UTAUT model.

In the UTAUT model, Venkatesh et al. (2003) considered four constructs directly influencing behavioural intentions and usage of technology: performance expectancy, effort expectancy, social influence, and facilitating conditions. Venkatesh et al. (2003) provided extensive descriptions for each of these variables. These descriptions are summarized as follows:

Table 1 Models of acceptance of technology selected by Venkatesh et al. (2003) to formulate the UTAUT model

Models and theories of acceptance of technology	Constructs considered	Authors
Theory of research action (TRA)	Attitude towards behaviour	Fishbein and Ajzen (1975)
	Subjective norms	
Technology acceptance model (TAM)	Perceived usefulness	Davis (1989)
	Perceived ease of use	Davis et al. (1989)
	Subjective norm	
Motivational model (MM)	Extrinsic motivation	Davis et al. (1992)
	Intrinsic motivation	
Theory of planned behaviour (TPB)	Attitude towards behaviour	Ajzen (1991)
	Subjective norm	Schifter and Ajzen (1985)
	Perceived behavioural control	
Decomposed theory of planned behaviour (DTPB)	Attitude towards behaviour	Taylor and Todd (1995)
	Subjective norm	
	Perceived behavioural control	
	Perceived usefulness	
Model of PC utilization (MPCU)	Job-fit	Thompson et al. (1991)
	Complexity	
	Long-term consequences	
	Affect towards use	
	Social factors Facilitating conditions	
Innovation diffusion theory (IDT)	Relative advantage	Moore and Benbasat (1991)
	Ease of use	
	Image	
	Visibility	
	Compatibility	
	Results demonstrability	
	Voluntariness of use	
Socio-cognitive theory (SCT)	Outcome expectations—performance	Compeau and Higgins (1995)
	Outcome expectations—personal	
	Self-efficacy	
	Affect	
	Anxiety	

Performance expectancy can be defined as the degree to which a student believes that using the system will help him attain a higher level of academic performance (Venkatesh et al. 2003). This construct is similar to other constructs derived from previous models or theories: perceived usefulness (TAM), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT) and outcome expectations (SCT).

Effort expectancy refers to the degree of ease, as perceived by the student, associated with the use of the system (Venkatesh et al. 2003). It is similar to constructs included in previous models or theories, namely, perceived ease of use (TAM), complexity (MPCU), and ease of use (IDT).

Social influence describes the degree to which a student perceives that important people believe he or she should use the system (Venkatesh et al. 2003). This construct is in line with subjective norm (TPB, DTPB), social factors (MPCU) and image (IDT). Subjective norm is seen as a combination of perceived expectations from people in general who are important to the individual along with intentions to conform to these expectations (Ajzen 1991; Davis 1989; Davis et al. 1989; Fishbein and Ajzen 1975; Taylor and Todd 1995). Social factors are "the individual's internalization of the reference groups' subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Thompson et al. 1991, p. 126). Thompson et al. (1991) include in these factors the support provided by the supervisor and the organization in the use of the technology. Finally, image deals with the status, prestige, and profile enhanced by the use of the technology (Moore and Benbasat 1991).

According to Eckhardt et al. (2009), social influence shouldn't be taken as a single measure, "it needs to be conceptualized in a more distinguishing manner to capture the nuance of the social environment" (p. 11). Therefore these authors examined the effect of social influence within different groups in corporate settings (peers, operating department, IT department, customers and superiors) on the behavioural intentions of individuals to use technologies. Bourbon and Hollet-Haudebert (2009) did the same and considered social influence for two groups: superiors and peers. As for Brown et al. (2010), they reported that social influence of superiors as well as social influence of peers positively affected the perception of social influence, which in turn was positively related to behavioural intentions to use technology. Applied to academic settings, Martins and Kellermanns (2004) suggested that the incorporation of peer social influence in research designs could help expand the understanding of factors affecting successful implementation of instructional technologies in management education. These authors added that students were influenced strongly by what their peers thought in their assessments of the adoption of a technology and that they may be even more susceptible to peer social influence than individuals in corporate settings.

In line with previous research which stated that social influence shouldn't be taken as a single measure (Bourbon and Hollet-Haudebert 2009; Eckhardt et al. 2009; Martins and Kellermanns 2004), and with the definitions of the concepts associated with social influence (Ajzen 1991; Davis 1989; Davis et al. 1989; Fishbein and Ajzen 1975; Moore and Benbasat 1991; Taylor and Todd 1995; Thompson et al. 1991), we subdivided the construct of social influence into two sub-constructs: *General social influence* that pertained to student environment in

general, which included what people think in general of the use of technologies (Subjective norm) as well as the support provided by the faculty and the organization of this use (Social factors), and *peer social influence* arising from colleagues, which dealt with the prestige among peers associated with the use of technologies. This subdivision was used in subsequent analyses.

Facilitating conditions refers to the degree to which a student believes that an organizational and technical structure exists to support the use of the system (Venkatesh et al. 2003). This construct captures the concept of perceived behavioural control (TPB, DTPB), facilitating conditions (MPCU), and compatibility (IDT) from previous models or theories.

The UTAUT model includes two constructs that would influence usage of technology: *facilitating conditions*, already defined in a previous paragraph, and *behavioural intentions* to use technology. In this regard, (Ajzen 1991) argues that "Intentions are assumed to capture the motivational factors that influence a behaviour. They are indications of how hard people are willing to try, of how much of an effort they are planning to exert in order to perform the behaviour" (p. 181). This construct is similar to attitude towards behaviour (TRA, TPB, DTPB) and extrinsic and intrinsic motivation (MM) derived from previous models or theories.

Consistent with the UTAUT original formulation by Venkatesh et al. (2003) and previous evidence (Abushanab et al. 2010; Eckhardt et al. 2009; San Martin and Herrero 2012), we suggest the following hypotheses regarding the behavioural intentions to use DVC:

H_1 Performance expectancy positively affects behavioural intentions to use DVC
H_2 Effort expectancy positively affects behavioural intentions to use DVC

Note that in this study, we subdivided the construct of *social influence* into two sub-constructs: general social influence and peer social influence, provided from colleagues. Overall, as for Venkatesh et al. (2003), we assume direct and positive links between social influence (general social influence and peer social influence) and intentional behaviour to use DVC. Accordingly, we suggest the following research hypotheses:

H_3 General social influence positively affects behavioural intentions to use DVC
H_4 Peer social influence positively affects behavioural intentions to use DVC

Previous research regarding the relationship between facilitating conditions and the usage of technology are somewhat contradictory. Some authors suggest that this construct is directly linked to behavioural intentions (Abushanab et al. 2010; Eckhardt et al. 2009; San Martin and Herrero 2012), whereas others simply exclude this variable from their research design (Bandyopadhyay and Fraccastoro 2007; Chen et al. 2008; Cheng et al. 2011; Lu et al. 2009). Consistent with the first authors, and in line with TPB and DTPB, which include perceived behavioural control (that is similar to facilitating conditions according to Venkatesh et al. 2003) as a determinant of behavioural intentions (San Martin and Herrero 2012), we formulate the following research hypothesis accordingly:

H_5 Facilitating conditions positively affect behavioural intentions to use DVC

Autonomy

Autonomy refers to freedom of choice and to the possibility of leading a self-determined life. It also pertains to the unfailing need to be the cause of one's own actions, as opposed to the impression that external forces cause them (Giesbrecht et al. 2012). Roca and Gagné (2008) also adhere to a similar definition by which "Autonomy concerns the desire to self-organize one's actions when the individual can freely pursue the activity and feels volitional in doing so" (p. 1588). According to these authors, social and contextual conditions supporting one's feeling of autonomy leads to greater performance and positive outcomes, such as trust in the organization, work satisfaction and work engagement. Applied to the academic setting, an autonomous student is one who takes responsibility for and controls his learning (Fillion 2005). Bilodeau (1995) found that students who take distance courses developed more autonomy than students enrolled in face-to-face courses. Moreover, several authors reported that blended learning and the use of technology in face-to-face courses increased student autonomy (Hiltz and Turoff 1994; Urban-Lurain and Weinshank 2000). Fillion (2005) added that online students were more autonomous than those taking a blended format course in the classroom. Roca and Gagné (2008) reported that variables from self-determination theory (Deci and Ryan 1995), including autonomy, were important in shaping the intention to use technology by workers. Sorebo et al. (2009) confirmed these results among a sample of educators in their intention to use e-learning technology. In the light of these research outcomes, we thought that autonomy would positively affect the behavioural intentions to use DVC. We formulate the following hypothesis accordingly:

H_6 Autonomy positively affects the behavioural intentions to use DVC

Roca and Gagné (2008) also reported that autonomy had a positive effect on perceived usefulness (TAM) which corresponds to performance expectancy in the UTAUT model, and on perceived playfulness (TAM) which is similar to effort expectancy according to Venkatesh et al. (2003). We thus suggest the following hypotheses:

H_7 Autonomy positively affects performance expectancy
H_8 Autonomy positively affects effort expectancy

Figure 1 graphically summarizes the research hypotheses as defined in previous paragraphs. The direct links as well as the indirect links between the research variables are depicted in this figure.

Gender and age

In the design of the present study, gender and age were considered as moderator variables. Note that a moderator variable is a qualitative or a quantitative variable that affects the direction and/or the strength of the relationship between two other variables (Baron and Kenny 1986). Venkatesh et al. (2003) reported that gender and age played a moderating role in the relationship between the psychological variables

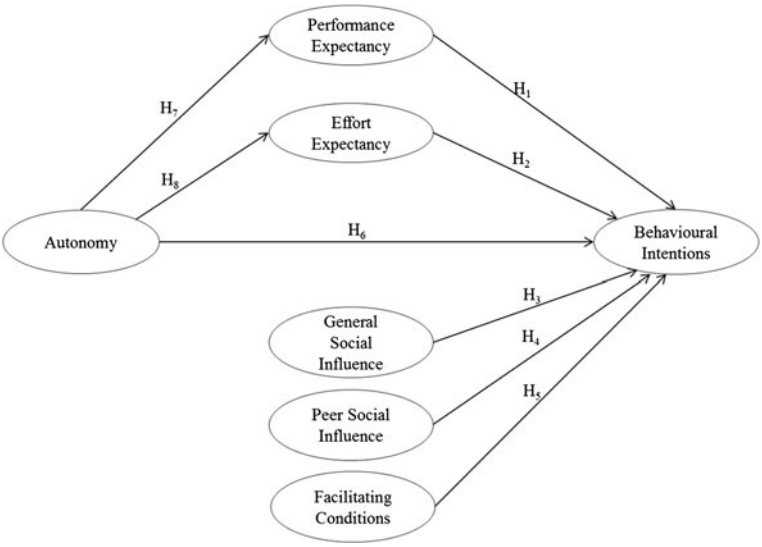

Fig. 1 Overall model and study hypotheses

considered by the UTAUT model and behavioural intentions to use DVC. The literature provides strong evidence of these significant moderating effects (i.e. Bandyopadhyay and Fraccastoro 2007; Cheng et al. 2011; Lu et al. 2009; Venkatesh and Morris 2000). Bandyopadhyay and Fraccastoro (2007) reported that gender and age moderated the relationship between performance expectancy, effort expectancy and social influence on the one hand, and behavioural intentions to use technology on the other hand. As for Cheng et al. (2011), they noted that gender and age mediated solely the relationship between social influence and behavioural intentions. Females were found to be more sensitive to social influence than males and hence the effect of social influence on behavioural intentions was stronger for females, particularly for older females. Lu et al. (2009) reported that gender combined with experience mediated the relationship between social influence and behavioural intentions to use technology, gender combined with age influenced the link between performance expectancy and behavioural intentions to use technology, age mediated the relationships between effort expectancy and social influence on the one hand and behavioural intentions to use technology on the other hand. Venkatesh and Morris (2000) revealed that men's technology usage decisions were more strongly influenced by performance expectancy. In contrast, women were more strongly influenced by effort expectancy and social influence, although this latter effect diminished with age. Given these mixed findings, we suggest that males and females as well as students belonging to different age groups exhibit different patterns of relationships. We didn't have enough evidence to be able to state hypotheses regarding gender and age and to give them directions, as we noted that previous studies reported mixed findings and many non-significant results (i. e. Cheng et al. 2011). These mixed results may be due to the non-consideration of the combined effects of gender, age, voluntariness of use and experience of the original

model (Venkatesh et al. 2003). These effects would have an influence on Venkatesh et al. (2003) directed hypotheses. Two research questions are stated in regard to students' gender and age as follows:

Q_1 Is there a difference in the structural model across male and female students?
Q_2 Is there a difference in the structural model across students belonging to age groups?

Methodology

Participants

Participants were students enrolled in a compulsory undergraduate information-system distance course at a large Association to Advance Collegiate Schools of Business (AACSB) and European Quality Improvement System (EQUIS) accredited Faculty of Business Administration in Quebec City, Canada, offering higher education in French, English and Spanish. A total of 177 students responded to an online questionnaire on a voluntary basis. Among these students, 159 were full-time students. Most of them were familiar with technologies, as 174 respondents have used a computer for two years and longer. The distribution of these 177 students according to gender and age is presented in Table 2.

Procedure

The Faculty of Business Administration is currently testing the use of DVC in several distance courses. One of them was targeted by the present study: a compulsory undergraduate information-system distance course. Among the commercial products of DVC (e.g. Elluminate, Adobe Connect), Elluminate was chosen by the faculty for its advantages (Karabulut and Correia 2008). In this particular course, Elluminate was used to broadcast lectures every week for three hours in order to provide new content. Beside the audio, the course emphasized other functionalities: the whiteboard as a PowerPoint display and the chat room. Thereby, distance students who listened to the course in real time had the possibility to ask questions and to interact with the teacher and with the other students. The class sessions were recorded and students could review a session which they could not attend in real-time especially as the use of DVC was compulsory in the distance course considered in the present study.

Table 2 Frequency distributions for gender and age

	Study sample		Total
	Male	Female	
20 years old and younger	22	60	82
21 years and older	45	50	95
Total	67	110	177

At the beginning of the 2012 winter semester, the students of the targeted course were contacted and invited to participate in the study. Student participation was voluntary. The questionnaire used comprised 38 items and required 10 min to be completed. It was put online during the final three weeks of the 2012 winter semester. To encourage student participation, four gift certificates of 100$ were randomly drawn at the end of data collection. During the data collection period, a reminder message was sent to students by email to invite them to participate in the study.

Measures

Variables from the UTAUT model

In order to operationalize the six variables of the UTAUT model used in this study, we borrowed items from previous studies (Venkatesh et al. 2003). Note that some items were dropped or modified from the original research (Venkatesh et al. 2003) to better fit the context of the present study. This adaptation of the items was necessary because the technology validated was DVC and more specifically, Elluminate, used in the context of a distance course, and also because participants were French speakers. Therefore, the word *System* (Venkatesh et al. 2003) was substituted by *Elluminate*. In addition, some other adjustments were necessary to fit the context of education as opposed to the context of workplace. Finally, scales were translated to French. The UTAUT questionnaire used in the present study comprises 27 items, with 8 items measuring performance expectancy (PE), 4 items for effort expectancy (EE), 4 items for general social influence (general SI), 3 items for peer social influence (peer SI), 5 items for facilitating conditions (FC) and 3 items for behavioural intentions (BI) to use DVC. The list of scale items before translation is presented in Table 3. These items described typical behaviours or reactions and were rated on a seven-point Likert-type scale (from 1 = strongly disagree to 7 = strongly agree).

A study among English speakers reports adequate reliability coefficients for the five variables of the UTAUT model used in the present study. Venkatesh et al. (2003) obtained Cronbach Alpha coefficients of 0.90–0.94 for performance expectancy, 0.90–0.92 for effort expectancy, 0.91–0.92 for social influence, 0.85–0.88 for facilitating conditions and 0.88–0.90 for behavioural intentions. There is a great deal of empirical literature providing evidence for the adequate validity of the UTAUT variables (Venkatesh et al. 2003).

Autonomy

Autonomy (Aut) was measured using the French version (Fillion 2005) of the questionnaire developed by Adler, Milne and Stablein (2001) and Wilson (1990). This questionnaire was adapted to better fit the context of the study. It comprises 6 items. The items described typical behaviours or reactions and were rated on a seven-point Likert-type scale (from 1 = strongly disagree to 7 = strongly agree). A study among French speakers reports adequate reliability coefficients. Fillion (2005)

Table 3 List of scale items adapted to the context of the use of Elluminate in academic setting

Behavioural intentions	
BI1	I intend to use Elluminate in future sessions
BI2	I predict I will use Elluminate in future sessions
BI3	I plan to use Elluminate in future sessions
Performance expectancy	
PE1	Using Elluminate will improve my performance in the course
PE2	I'll find the system useful in my learning activities
PE3	Using Elluminate enables me to accomplish my learning activities more quickly
PE4	Using Elluminate improves the quality of my learning activities
PE5	Using Elluminate makes my learning activities easier
PE6	Using Elluminate enhances my effectiveness in my learning activities
PE7	Using Elluminate increases my productivity in my learning activities
PE8	If I use the system, I will increase my chances of getting higher marks on tests and exams
Effort expectancy	
EE1	Learning to operate Elluminate will be easy for me
EE2	My interaction with Elluminate will be clear and understandable
EE3	It'll be easy for me to become skillful at using Elluminate
EE4	I'll find Elluminate easy to use
General social influence	
SI1	People who influence my behaviour think I should use Elluminate
SI2	People who are important to me think I should use Elluminate
SI3	The teacher of this course has been helpful in the use of Elluminate
SI4	In general, the Faculty of Business Administration has supported the use of Elluminate
Peer social influence	
SI5	In my class, students who use Elluminate enjoy more prestige than those who do not
SI6	In my class, students who use Elluminate have a high profile
SI7	Using Elluminate is academically status-enhancing for students
Facilitating conditions	
FC1	I have the resources necessary to use Elluminate
FC2	I have the knowledge necessary to use Elluminate
FC3[a]	Elluminate is not compatible with other systems I use
FC4[a]	A specific person is available for assistance with Elluminate difficulties
FC5	Using Elluminate fits my learning style
Autonomy	
Aut1[a]	I have good study habits and time management
Aut2	I have autonomous work habits
Aut3[a]	I have a great sense of personal responsibility
Aut4	I have confidence in myself
Aut5	I show initiative and judgment in carrying out my learning activities
Aut6	I show independence and freedom in how my learning activities are conducted

[a] These items were further eliminated from the analyses

obtained a Cronbach Alpha coefficient of 0.92. There is a great amount of empirical literature providing evidence for the adequate validity of this scale (Fillion 2005). The list of scale items before translation is presented in Table 3.

Gender and age

Students were asked to identify their gender on the questionnaire (coded 1 for male and 2 for female). They were also asked to indicate their age group from among the following selection: (a) 20 years and younger (n = 82), (b) 21–25 years (n = 72), and (c) 26 years and older (n = 23). Given the small number of students in the third age group, the second and the third groups were put together in further analyses. The frequency distributions for gender and age after regrouping are presented accordingly in Table 2.

Results

Careful consideration was given to the choice of the most appropriate statistical analyses in light of the research hypotheses and the nature of the data. Given the small number of students in each group of gender and age, and the small sample size as compared to the number of latent and observed variables, the selected method was Partial Least Squares Analyses using PLS-graph. In fact, this method allows multivariate analyses with small samples (Chin 2001). It was used in the present study to assess the measurement model (Chin 2001): the convergent and the discriminant validity (Gefen and Straub 2005), as well as the research hypotheses, using path analysis.

Measurement model

Examination of the measurement model revealed that three items did not load significantly on the facilitating conditions and autonomy constructs. For these three items, the *t* values of the outer model loadings were below 1.96. They were dropped from the model (FC3, Aut1 and Aut3) and the model was re-estimated (Chin 1998; Gefen and Straub 2005). We ran the analyses again; all remaining items loaded significantly on their respective constructs, factor loadings ranged from 0.55 to 0.97.

Convergent validity is verified when items which theoretically measure the same construct are actually correlated. Discriminant validity is established when items theoretically belonging to different constructs, are actually not related.

Convergent validity can be assessed by the strength and the significance of the loadings (factor loadings > 0.50 and $t > 1.96$), the composite reliability (> 0.7) and the average variance extracted (> 0.5). All factor loadings were significant and strong (Gerbing and Anderson 1988), the composite reliability for each construct was greater than 0.70 (Nunnally 1978). The average variance extracted (AVE) was greater than 0.50 for all the constructs considered (Fornell and Larcker 1981), except for the facilitating conditions construct (AVE = 0.49). The item FC4 was then removed because its loading was the lowest (0.55) on its construct and the

analyses were run again. The results are presented accordingly. Convergent validity results are given in Table 4.

As shown in Table 4, the composite reliability of each construct ranged from 0.81 to 0.97, which exceeded the recommended value of 0.70 (Nunnally 1978). Moreover, the average variance extracted (AVE) exceeded 0.50 for each construct (Fornell and Larcker 1981). Factor loadings and cross loadings as produced by PLS indicated that all items loaded on their respective latent constructs from a lower bound of 0.63 to an upper bound of 0.97. Besides, each item loaded higher on its construct than on any other construct. All these results confirmed the convergent validity of these items in presenting distinct latent constructs.

As suggested by Fornell and Larcker (1981), discriminant validity is supported when the square roots of the average variance extracted (AVE) are greater than any other correlations. Table 5 reports the correlation matrix. The elements in the diagonals represent the square roots of the AVE. In all cases, these AVE were greater than any correlations, supporting discriminant validity of the scales.

Structural model results and hypotheses testing

Path analyses were used to test the research hypotheses and the structural models. Note that these models (overall model, model per gender and model per age groups) included: the direct effects of performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions and autonomy on behavioural intentions to use DVC as well as the moderating effect of performance expectancy and effort expectancy. These path analyses were undertaken via PLS-graph (Chin 2001). The results are presented in Figs. 2, 3, 4, 5 and 6.

The overall model

Figure 2 indicates that five paths in the model were significant. Path coefficients were computed using t values (Chin 2001). The R^2 coefficients of determination indicated that 50.5 % of the variability in behavioural intentions to use DVC could be explained by the structural model. More precisely, performance expectancy ($\beta = 0.31$, $t = 3.94$, $p < 0.01$), general social influence ($\beta = 0.24$, $t = 2.75$, $p < 0.01$) and facilitating conditions ($\beta = 0.26$, $t = 3.06$, $p < 0.01$) had a positive impact on behavioural intentions to use DVC. Thus H_1, H_3 and H_5 were supported. However, the relationships between respectively effort expectancy, peer social influence, autonomy and behavioural intentions to use DVC were not significant. H_2, H_4 and H_6 were not supported. Autonomy had a positive significant effect on performance expectancy ($\beta = 0.21$, $t = 3.33$, $p < 0.01$) and on effort expectancy ($\beta = 0.30$, $t = 3.88$, $p < 0.01$), thus providing evidence for supporting the hypothesized relationships in H_7 and H_8.

The model according to gender and age groups

In order to answer to the research questions Q_1 and Q_2 and make appropriate gender and age group comparisons, the sample was initially divided to form two groups:

Table 4 Results of convergent validity

Items/constructs	Factor loadings	*t* value	Composite reliability	Average variance extracted (AVE)
Behavioural intentions (*BI*)			0.97	0.92
BI1	0.95	88.55		
BI2	0.95	84.15		
BI3	0.97	149.57		
Performance expectancy (*PE*)			0.96	0.74
PE1	0.81	21.99		
PE2	0.85	24.71		
PE3	0.87	40.34		
PE4	0.92	67.16		
PE5	0.89	40.60		
PE6	0.92	61.67		
PE7	0.89	44.80		
PE8	0.74	16.43		
Effort expectancy (*EE*)			0.94	0.78
EE1	0.91	43.75		
EE2	0.88	41.96		
EE3	0.87	31.81		
EE4	0.88	34.45		
General social influence (*General SI*)			0.85	0.59
SI1	0.87	30.44		
SI2	0.85	26.02		
SI3	0.63	10.88		
SI4	0.68	12.31		
Peer social influence (*Peer SI*)			0.91	0.78
SI5	0.87	25.81		
SI6	0.90	39.23		
SI7	0.88	36.68		
Facilitating conditions (*FC*)			0.81	0.59
FC1	0.71	10.48		
FC2	0.74	11.86		
FC5	0.84	23.37		
Autonomy (*Aut*)			0.88	0.65
Aut2	0.70	7.58		
Aut4	0.78	16.62		
Aut5	0.88	23.55		
Aut6	0.85	15.80		

BI behavioural intentions, *PE* performance expectancy, *EE* effort expectancy, *General SI* general social influence, *Peer SI* peer social influence, *FC* facilitating conditions, *Aut* autonomy

Table 5 Results of discriminant validity

	BE	PE	EE	SI-General	SI-Peer	FC	Aut
BI	**0.96**						
PE	0.64	**0.86**					
EE	0.36	0.36	**0.88**				
General SI	0.59	0.61	0.47	**0.77**			
Peer SI	0.45	0.58	0.23	0.57	**0.88**		
FC	0.61	0.65	0.56	0.59	0.44	**0.77**	
Aut	0.23	0.21	0.30	0.26	0.06	0.33	**0.81**

The elements in bold in the diagonals represent the square roots of the average variance extracted (AVE)

BI behavioural intentions, *PE* performance expectancy, *EE* effort expectancy, *General SI* general social influence, *Peer SI* peer social influence, *FC* facilitating conditions, *Aut* autonomy

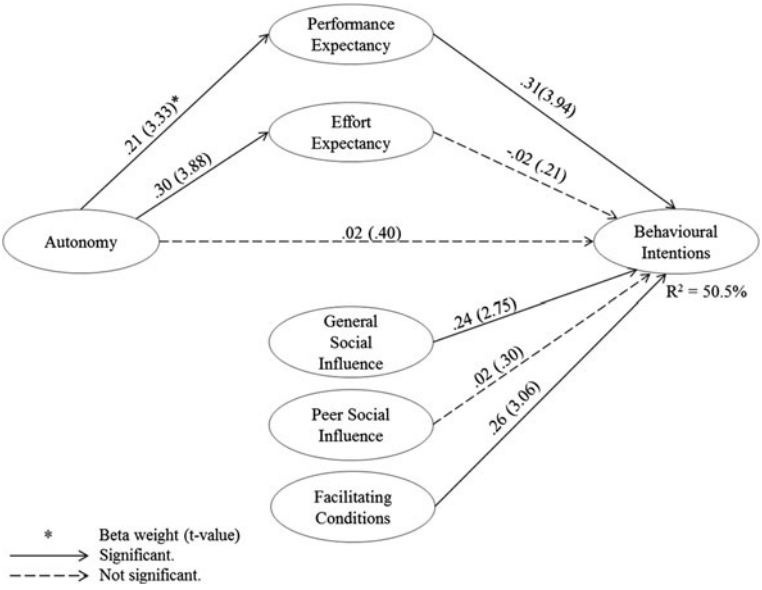

Fig. 2 Overall model results

males (n = 67) and females (n = 110) and then, into two other groups: students aged 20 years and younger (n = 82) and students aged 21 years and older (n = 95). The analyses of the model were run separately for each group. The results are presented in Fig. 3 for females, Fig. 4 for males, Fig. 5 for students aged 20 years and younger and Fig. 6 for students aged 21 years and older. The R^2 coefficients of determination were different in all cases and most of the time higher than R^2 of the overall model (59 % for males, 50.9 % for females, 42.3 % for students aged 20 years and younger and 60.8 % for students aged 21 years and older).

The female model presented similar significant paths as compared to the overall model, except for the relationship between general social influence and behavioural

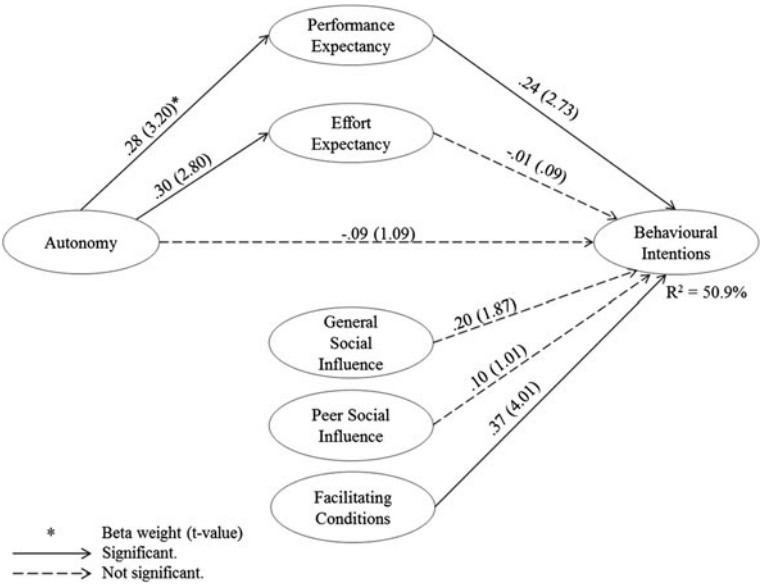

Fig. 3 Model results for females (n = 110)

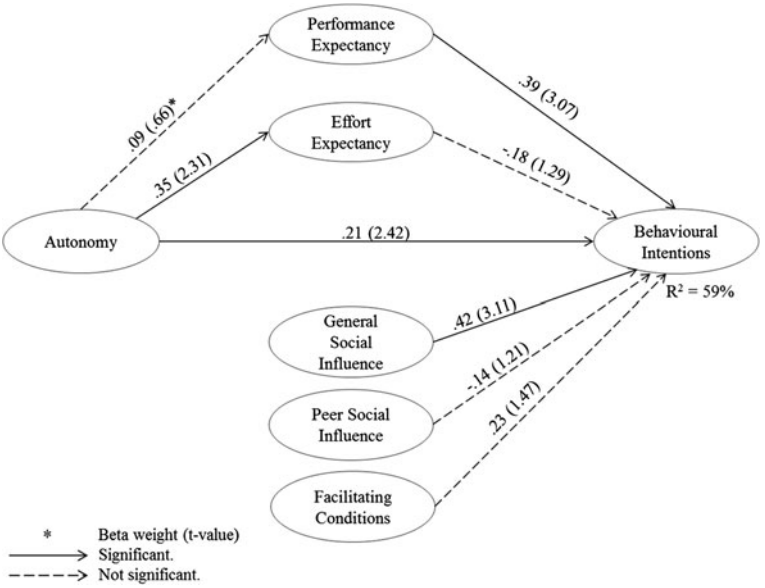

Fig. 4 Model results for males (n = 67)

intentions to use DVC which was not significant for females. The male model revealed different significant relationships than the female model, (answering to the research question Q_1). Moreover, the links between general social influence and

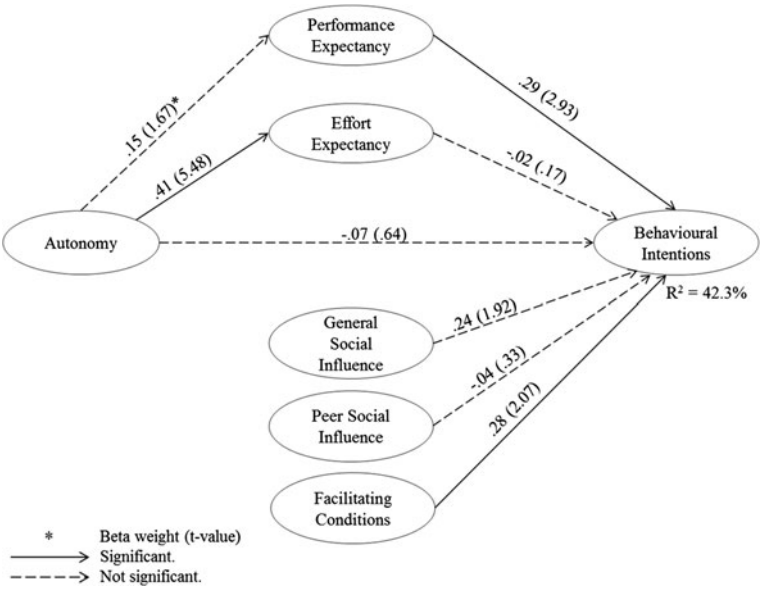

Fig. 5 Model results for students aged 20 years and youngerless (n = 82)

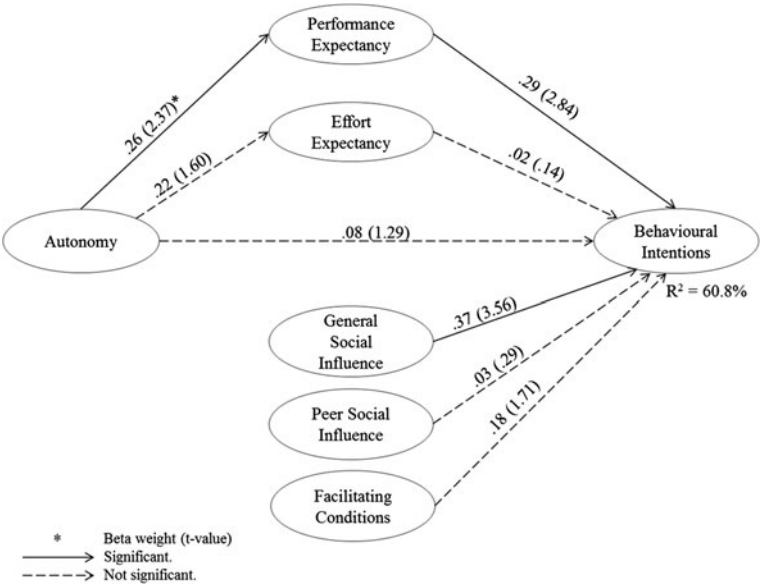

Fig. 6 Model results for students aged 21 years and older (n = 95)

behavioural intentions to use DVC ($\beta = 0.42$, $t = 3.11$, $p < 0.01$) and between autonomy and behavioural intentions to use DVC ($\beta = 0.21$, $t = 2.42$, $p < 0.01$) were significant for males whereas the relationships between autonomy and performance expectancy, and between facilitating conditions and behavioural

intentions to use DVC were not significant. The relationship between performance expectancy and behavioural intentions to use DVC was stronger for males ($\beta = 0.39$, $t = 3.07$, $p < 0.01$) than for females ($\beta = 0.24$, $t = 2.73$, $p < 0.01$), however the difference between the two coefficients β is not significant (Chin and Dibbern 2010). Table 6 presents the significant differences between the β coefficients according to gender and age. The link between autonomy and effort expectancy was also stronger for males ($\beta = 0.35$, $t = 2.31$, $p < 0.01$) than for females ($\beta = 0.30$, $t = 2.80$, $p < 0.01$). Again, the difference between the two coefficients β was not significant (Table 6).

The models according to age groups did reveal different significant relationships than did the overall model. Moreover, the two models per age group presented different patterns of significant relationships, (answering to the research question Q_2). More precisely, the relationships between general social influence ($\beta = 0.37$, $t = 3.56$, $p < 0.01$) and behavioural intentions to use DVC, and between autonomy and performance expectancy ($\beta = 0.26$, $t = 2.37$, $p < 0.01$) were significant for students aged 21 years and older, but not for the other age group. Inversely, the links between facilitating conditions and behavioural intentions to use DVC ($\beta = 0.28$, $t = 2.07$, $p < 0.01$), and between autonomy and effort expectancy ($\beta = 0.41$, $t = 5.48$, $p < 0.01$) were significant for students aged 20 years and younger, but not for students aged 21 years and older. Table 7 presents the hypothesized results.

Discussion

The present study contributes to the understanding of online courses, and specifically DVC in online courses. The aim of this study was to provide

Table 6 The significant differences between the coefficients β according to gender and age

Path	Gender		t[a]	Age		t[b]
	Female	Male		20 years and younger	21 years and older	
H_1: PE → BI	0.24**	0.39**	1.30	0.29**	0.29**	0.08
H_2: EE → BI	−0.01	−0.18	1.72*	−0.02	0.02	0.59
H_3: General SI → BI	0.20	0.42**	1.81*	0.24	0.37**	1.04
H_4: Peer SI → BI	0.10	−0.14	2.10*	−0.04	0.03	0.58
H_5: FC → BI	0.37*	0.23	1.08	0.28**	0.16	1.00
H_6: Aut → BI	−0.09	0.21**	3.09**	−0.07	0.08	1.79*
H_7: Aut → PE	0.28**	0.09	2.01*	0.15	0.26**	1.08
H_8: Aut → EE	0.30**	0.35**	0.47	0.41**	0.22	1.77*

BI behavioural intentions, *PE* performance expectancy, *EE* effort expectancy, *General SI* general social influence, *Peer SI* peer social influence, *FC* facilitating conditions, *Aut* autonomy

* $p < 0.05$; ** $p < 0.01$

[a] These results are for one-tailed t tests

[b] Idem

Table 7 Hypothesized results

Hypotheses	Finding
H_1: Performance expectancy positively affects behavioural intentions to use DVC	Supported
H_2: Effort expectancy positively affects behavioural intentions to use DVC	Not supported
H_3: General social influence positively affects behavioural intentions to use DVC	Supported
H_4: Peer social influence positively affects behavioural intentions to use DVC	Not supported
H_5: Facilitating conditions positively affect behavioural intentions to use DVC	Supported
H_6: Autonomy positively affects the behavioural intentions to use DVC	Not supported
H_7: Autonomy positively affects performance expectancy	Supported
H_8: Autonomy positively affects effort expectancy	Supported

DVC desktop video conferencing

administrators and higher education faculty members with guidance for how to implement DVC in online academic courses based on empirical data regarding factors derived from the UTAUT model (Venkatesh et al. 2003) that influence academic student use. Therefore, this study contributes to the technology acceptance literature by testing the UTAUT model using DVC, in the academic setting, which is a rarely studied environment (with the UTAUT model). Overall, the results of the present study suggested that the UTAUT model, including autonomy, was able to provide an empirical explanation of academic students' acceptance and use of DVC. Note that in this study we used the acceptance of DVC as a predictor of use: the path analysis performed on the data shows that the factors of the UTAUT model explain the intention to use DVC. For faculty members and administrators who want to increase the use of DVC, it is important to address these acceptance factors, as this empirical study shows.

The UTAUT model used in the present study is ten years old (Venkatesh et al. 2003) and was developed from a combination of much older models, as noted earlier in this paper (Table 1). Technology has moved significantly since this but the UTAUT model seemed to be a good measure in the present study as the contemporary research is still using it (e.g. Cheng et al. 2011). Moreover, some studies are integrating other variables to the UTAUT model to make it more integrative and comprehensive (i.e. Bakar et al. 2013; Lin et al. 2013; San Martin and Herrero 2012; Tan 2013), as the present study did. Indeed, the model proposed by this study is innovative, as it considered two subdivisions of social influence (general social influence and peer social influence, Bourbon and Hollet-Haudebert 2009; Brown et al. 2010; Eckhardt et al. 2009; Martins and Kellermanns 2004) and it incorporated the construct of autonomy. This construct is not taken into account by the UTAUT model (Venkatesh et al. 2003). It was retained by the present study as it was considered to be an important variable in acceptance and use of technology by its users (Roca and Gagné 2008; Sorebo et al. 2009). Moreover, in this study, autonomy was an important variable in understanding whole picture of acceptance and use of DVC. Thus, together with the direct influence of autonomy on behavioural intentions to use DVC, this model considered the moderating influences of performance expectancy and effort expectancy on the relationship between

autonomy and behavioural intentions to use DVC, based on the literature review and on the construct specifications of each of the psychological variables considered in the present study. The inclusion of this new variable improved the predictive value of the UTAUT model. The overall model considered in the present study was also examined by gender group and age group. The results indicated different patterns of strength and significant relationships between males and females, between students aged 20 years and younger and those aged 21 years and older, and in each of these cases with the overall model. Note that eight research hypotheses and two research questions were stated in the present study. These hypotheses and research questions are discussed later in this section.

The overall model

The empirical evidence of the present study indicated that the main drivers of the behavioural intentions to use DVC were, in order of importance: performance expectancy, facilitating conditions, general social influence and autonomy mediated by performance expectancy. Thus H_1, H_3, H_5, H_7 and H_8 are supported. However, the relationships between respectively effort expectancy, peer social influence, autonomy and behavioural intentions to use DVC were not significant. H_2, H_4 and H_6 were not supported. Thus the results partially confirmed the validity of the UTAUT model in explaining the behavioural intentions to use DVC by business students.

According to the direct effects on behavioural intentions to use DVC, when students expect that using DVC will help them improve their academic performance, when they are convinced that they possess the adequate resources (in terms of skills and prior knowledge) and that they would be supported in this use by an adequate organizational and technical structure, and finally, when they perceive that important people for them in general believe they should use the system, the more likely they are to accept and use DVC. According to the indirect effects, the more autonomous students are and the more they expect DVC to enhance their academic performance, the more likely they are to accept and use DVC. Administrators and faculty members in higher education should take these factors into account if they wish to successfully implement DVC in academic courses. Moreover, based on the strength of the relationship between facilitating conditions and intent to use DVC, technical problems encountered should be resolved rapidly, otherwise, they may interfere with student learning (Wang and Hsu 2008) and thus, with the likelihood of using DVC. Furthermore, students' level of technological skills should be known at the beginning of the course, in order to help those who do not possess adequate capabilities. Ideally, students' level of technology skills should be similar (Wang and Hsu 2008), otherwise, some students might need to spend additional time improving these skills, which may discourage them unless they have adequate support.

The model according to gender

For females, the most important drivers of the behavioural intentions to use DVC were facilitating conditions, followed by performance expectancy, and autonomy

mediated by performance expectancy. However, as compared to the overall model, the relationship between general social influence and behavioural intentions to use DVC was not significant. These results are innovative, as previous studies reported that the effect of facilitating conditions on usage intentions were moderated by age and experience but not by gender (Venkatesh et al. 2003). These results are important for administrators and faculty members in higher education who want to implement DVC in online academic courses. They suggest that if the majority of their students are female, they should put more emphasis on facilitating conditions in order to ensure the acceptance and use of DVC by their female students.

The male model revealed different significant relationships than the female model, (answering to the research question Q_1). For males, general social influence was the most important variable explaining the behavioural intentions to use DVC, followed by performance expectancy and autonomy. The more they perceive that important people for them in general believe they should use the system, the more they expect that DVC will help them enhance their academic performance, and the more autonomous they are, the more likely they will be to accept and use DVC. In contrast to the female model, facilitating conditions did not have a significant effect on behavioural intentions to use DVC.

The results reported in this study are not in line with those of previous studies, according to which females are more sensitive to social influence than males (Cheng et al. 2011; Venkatesh and Morris 2000). These results could be explained by the characteristics of business students who were found to be more extroverted than students from other academic majors (Lounsbury et al. 2009). The trait of extroversion is positively related to social influence, therefore more extroverted students are more susceptible to social influence (Harms et al. 2006). However, Lakhal et al. (2012) revealed no significant differences between male and female business students on the extroversion trait. Thus, female business students should not be more influenced by important people for them and by their peers than males. This fact could explain the findings pertaining to female students in the present study. However, the explanation of extroversion is relevant only for peer social influence, as general social influence was found to be significant for males but not for females.

The model according to age groups

For students aged 20 years and younger, performance expectancy and facilitating conditions were the only variables that explained the behavioural intentions to use DVC. For those aged 21 years and older, the predictors of behavioural intentions to use DVC were, in order of importance: general social influence, performance expectancy and autonomy mediated by performance expectancy. Thus, the two models per age group presented different patterns of significant relationships, (answering to the research question Q_2). These results are important for administrators and faculty members. According to the age of the students enrolled in a particular online course, some factors are more important than others. Moreover, if the students are predominantly aged 20 years and younger, more emphasis should be put on facilitating conditions, if they want them to be more

willing to use DVC. Furthermore, if the students are predominately aged 21 years and older, more significance should be given to general social influence. Note that in this study, general social influence includes what people think in general of the use of DVC as well as the support provided by the faculty and the organization of this use. Therefore, faculty members and administrators should be helpful and supportive, if they want to increase the likelihood of the use of DVC by older students.

The results of the present study according to age group are concordant with those reported by previous studies (Bandyopadhyay and Fraccastoro 2007; Cheng et al. 2011; Lu et al. 2009; Venkatesh et al. 2003; Venkatesh and Morris 2000) by which age plays a moderating role in the relationship between the psychological variables considered by the UTAUT model and behavioural intentions to use DVC. More specifically, for older students, general social influence had a positive effect on acceptance and use of technology (Cheng et al. 2011; Lu et al. 2009), while this effect was not significant for younger student, those aged 20 years and younger.

The three models together

In line with previous studies in the area (Venkatesh et al. 2003), performance expectancy appeared to be a determinant of intentions to use DVC. However, in all cases, effort expectancy failed to explain the intentions to use DVC. This result may be due to the characteristics of business students who were found to be more conscientious than students from other academic majors (Lounsbury et al. 2009). As such, students who rate high on conscientiousness are tidy, self-disciplined and determined. They are known to perform well at university, are scrupulous, punctual and reliable (Costa and McCrea 1992a, b). Therefore, they are not afraid to work hard to achieve successful outcomes, and doing so, effort expectancy would be minimised by these students: they had the perception that learning would be easy, interaction with DVC would be clear; that it would be easy to be skillful, and to use DVC. This result may be also due to the small variability in this personality trait among business students.

The role of social influence has been controversial in the literature, as some authors integrated this construct in models of adoption of technologies, while others excluded it (Venkatesh et al. 2003). Moreover, some argued that social influence was significant only in mandatory settings (Venkatesh and Davis 2000). Even though the use of DVC was compulsory in the distance course considered in the present study, only general social influence emerged as a predictor of intentions to use DVC, as opposed to the findings pertaining to peer social influence. According to Martins and Kellermanns (2004), the incorporation of peer social influence in research designs could help expand the understanding of factors affecting successful implementation of instructional technologies in management education. These authors added that students were strongly influenced by what their peers did in the adoption of a technology. However, in the present study, peer social influence failed to emerge as a correlate or predictor of behavioural intentions to use DVC. In the present study, the definition of peer social influence was associated with the student perception to be more prestigious, higher profiled and higher status when using

DVC. This result might have been due to the particular situation of distance students who do not meet with other students in a classroom, and thus, they are less likely to be influenced by others in their choice to use DVC. Another explanation pertains to the fact that DVC were used in several distance courses, they were no longer perceived as a mean of prestige, as they were democratized and available to everyone enrolled in these courses.

Autonomy had an indirect effect on behavioural intentions to use DVC in some cases. This result is in line with those reported by Roca and Gagné (2008). Autonomy was hypothesized to positively affect behavioural intentions to use DVC. However, it had a direct effect only in one case: that of males. According to Sorebo et al. (2009), autonomy is assumed to enhance the level of intrinsic motivation. As such, the more autonomous the male student is, the more he is intrinsically motivated to learn, and the more likely he is to use DVC.

Limitations and directions for future research

The voluntary nature of the sample used in this study raises questions regarding the existence of differences between those who responded and those who did not respond to the online questionnaire. Therefore, the results of this study must be generalized with care and the study must be replicated on larger randomly selected samples of business administration students in other cultures and different ethnic groups. Moreover, this study was conducted among undergraduate business students in a large accredited faculty of business administration in Canada. The use of DVC is widespread in other academic majors such as medicine (Stein et al. 2010; Wang et al. 2010), education (Agnes 2012) and engineering (Cheng et al. 2004). Further studies should be conducted among students from other academic majors and among business students in other contexts for comparative analyses. The effect of performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions and autonomy on behavioural intentions to use DVC may vary from one academic major to another and from a particular context to another.

Given the small sample size, we were not able to verify the combined mediating effect of gender and age on the other psychological factors, as did Venkatesh et al. (2003) and other previous authors. Future studies may use a multiple linear hierarchical regression model with interactive effects to test the same research hypotheses. Note that the model tested included: the direct effects of performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions and autonomy on behavioural intentions to use DVC as well as the moderating effect of performance expectancy and effort expectancy. Besides, the interaction effects of gender and age should also be considered. However, we were not able to run a moderator regression because of the power of the test. Indeed, running a moderator regression means that we would consider 17 variables (PE, EE, General SI, Peer SI, FC, Aut, PE x Aut, EE x Aut, PE x gender, EE x gender, General SI x gender, Peer SI x gender, PE x age, EE x age, General SI x age, Peer SI x age, FC x age). Given the low sample size ($n = 177$) and its effects on the number of variables possible to be studied (15×17 according to Field 2005), we preferred to use the Partial Least Squares Analyses.

The present research did not address the link between behavioural intentions to use DVC and academic outcomes, such as student satisfaction and academic performance; even though it is generally assumed that usage intentions are positively related to successful student outcomes (Venkatesh et al. 2003). Future research may wish to extend this research by adding these outcomes to usage intentions of DVC. In the present study, we did not differentiate between students who never use DVC and those who do. Future research may wish to deepen the understanding of psychological factors considered by the present study, by taking into account this differentiation. Finally, in this study, we enriched the UTAUT by an additional individual construct, that of autonomy. Future research may consider other individual variables, such as approaches to learning (Biggs 1979), personality (Costa and McCrea 1992a, b), etc. These new variables might improve the predictive value of the UTAUT model, in explaining students' behaviour in the use of DVC.

Conclusion

This study aimed to explore the psychological variables that explain the behavioural intentions to use DVC by academic students. Based on the UTAUT theory, this study tested a theoretical model encompassing six explanatory variables: performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions and autonomy. The empirical results indicated that the main drivers of the behavioural intentions to use DVC were, in order of importance: performance expectancy, facilitating conditions, general social influence and autonomy mediated by performance expectancy. The theoretical model was further tested according to gender and age group. The results suggested that these latter variables played a moderating role.

From a theoretical standpoint, the results of the present study add support to scientific literature on technology acceptance and use by partially validating the UTAUT model in a new context, that of business students, and by adding a new construct, that of autonomy. They respond to the request for identifying additional constructs to add to the prediction of intention to use technology in the UTAUT model. In this regard, Venkatesh et al. (2003) claimed that "future research should focus on identifying constructs that can be added to the prediction of intention and behaviour over and above what is already known and understood" (p. 471). From a practical perspective, this study offers several avenues of reflection for both administrators and faculty members. This research could help them clarify their vision and improve their actions and decisions about the use of DVC in online courses, by informing them about the most influential factors in the students' intentions to use DVC. Previous studies reported significant content gains for distance students using DVC, as opposed to those attending face-to-face classes or online courses without synchronous interactions (Myers and Schiltz 2012), possibly because this technology allows students to achieve course material for personal review or even to review a session which they could not attend in real-time (Wang and Hsu 2008). The results of the present study makes it possible for researchers,

administrators and faculty members to go a step further as they are provided with new elements that should be considered for a wider adoption of DVC in the academic setting.

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