DISTANCE LEARNING AND ACADEMIC PERFORMANCE IN ACCOUNTING: A COMPARATIVE STUDY OF THE EFFECT OF THE USE OF VIDEOCONFERENCING*

EDUCACIÓN A DISTANCIA Y RESULTADOS ACADÉMICOS EN CONTABILIDAD: UN ESTUDIO COMPARATIVO DEL USO DE VIDEOCONFERENCIA

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ABSTRACT

Background. The specific needs of some universities (attending several campuses), as well as the demands of adapting to the EHEA (in order to achieve better coordination among universities in joint programmes and projects) could be efficiently solved by using Information and Communication Technologies and distance learning tools. In this context, the efficiency of such solutions is a relevant question.

Aims. The evaluation of the relative efficacy, in terms of academic performance, of videoconferencing in the teaching of accounting at university level.

Method. A large dataset, including current academic performance, previous academic performance and other relevant factors, for students in groups using videoconferencing and traditional methods was built. Multivariate analyses were performed in order to test whether students at videoconferencing groups presented significant differences in performance.

Results. The results indicated that videoconferencing does not negatively affect students' performances.

KEYWORDS: distance learning, videoconferencing, academic performance, accounting education.
JEL Classification: M49, A22

RESUMEN

Las necesidades de determinadas universidades (atendiendo docencia en varios campus) así como las demandas resultantes de la adaptación al EEES (coordinación inter-universitaria, promoción de programas y proyectos conjuntos, etc.) pueden resolverse de forma eficiente utilizando herramientas de educación a distancia y tecnologías de comunicación. En este contexto, la eficiencia de estas soluciones es un factor relevante.

El principal objetivo de este trabajo es evaluar la eficiencia de la videoconferencia, en términos de rendimiento académico, en su uso en educación superior en contabilidad.

Como método, se comparan los resultados obtenidos por grupos siguiendo un esquema tradicional con otros grupos que han utilizado videoconferencia.

Los resultados indican que el uso de videoconferencia no afecta al rendimiento de los alumnos que han utilizado este método.

PALABRAS CLAVE: formación a distancia, videoconferencia, rendimiento académico, formación en contabilidad.
Clasificación JEL: M49, A22

1 | INTRODUCTION

Moore and Thompson (1997) described distance learning (DL, hereinafter) as any instructional arrangement in which the teacher and learner are geographically separated to an extent requiring communication through media.

Keegan (1980) suggested the following six defining characteristics of DL:

1. Separation of the teacher and the student.
2. The influence of an educational organization (e.g., department or college) in the planning, preparation, or delivery of material (vs a stand-alone professor responsible for content generation and delivery of course information). This is a component not typically found in most on-campus courses.
3. The use of technical media.
4. The provision for two-way communication.
5. The possibility of an occasional seminar.
6. The evidence of a division of labour.

Later, Keegan (1995) highlighted one of the key aspects of DL: the technological separation of teacher and learner. This frees the actors from the necessity of travelling to a fixed place, at a fixed time, to meet a fixed person.

Why is DL relevant in our context? As Freeman (1998) states, many universities now face a problem of delivering subjects, programmes and courses across more than one campus. This question is not new, but the adaptation process to the EHEA brings new challenges that are, in nature, similar to that problem. Thus, in all formal declarations (from the Sorbonne in 1998 to Leuven/Louvain-la-Neuve de 2009) a series of objectives could be found:

– The institutional mobility, of both students and teaching staff.
– Life-long learning.
– The intensive use of advanced technologies.
– The fostering of joint programmes at undergraduate and graduate levels.
– The opening of universities to students of any region of the world.
– Joint research projects.

Joint programmes and projects, as well as the need to be present at several geographical could lead to significant costs due to teaching and administrative duplication (Freeman, 1998) and travelling costs. Relevant DL alternatives offer potential to achieve economies of scale, reducing costs and making the effort more productive.

In a context in which Universities are feeling the pressure to control their costs, improve their quality of instruction, focus on customer needs, and respond to the competitive pressures (Basom and Sherritt, 1992; Horgan, 1998), DL technologies have the potential to assist in solving these problems (Valentine, 2002). It allows educational institutions to multiply the number of people served with the same resources and allows widespread access to the best instructors and educational resources (Jaeger, 1995; Spooner, Jordan, Algozzine and Spooner, 1999).

However, the main constraint of DL is related to the quality of learning (real or perceived).

Webster and Hackley (1997) stated that successful implementation and use of any technology depends on factors connected with user attitudes and opinions, and (Christensen, Anakwe and Kessler, 2001) believed students will have a more negative than positive attitude toward DL for several reasons, including the fear of the unknown. Merisotis and Phipps (1999) also raised this issue when indicating that, generally, students are inexperienced with using technology, particularly educational technology. In the same line, Allen, Bourhis, Burrell and Mabry (2002) point out that students may resist the use of DL technology for several reasons: technology seems more likely to break down, students may be unused to working with machines, and students may feel that the mediated experience cannot fully replace the live classroom.

Spooner et al. (1999) focused on this last aspect: although education obtained via DL is viewed to be effective by some, in the eyes of others it has been seen as something less than education received on a college or university campus. Allen et al. (2002) confirmed this idea: their meta-analysis indicates a slight student preference for a traditional educational format over a DL format and a decline in student satisfaction with the quality of the educational process.

Despite this preference, the critical question for teachers is (Allen et al., 2004) whether the change in the format of communication will impact the level of learning, or, in the words of Jaeger (1995): Is technology-assisted personnel preparation as effective as traditional face-to-face teaching? This is the main research question of this research. The rest of the paper is structured as follows. The next section deals with the concept, advantages and limitations of videoconferencing as the DL resource used. After that, the research question is formally stated, and the sample and methodology used are presented. Finally we put forward the results, and the concluding remarks, including the limitations, implications and prospectives.

2 | VIDEOCONFERENCING

Videoconferencing[1] is a communication system the permits the meeting of people located in different places as if they were in the same room (Oliver, 1995; Cabero, 2000; Sánchez, 2001). This communication is synchronous, in real time and bi-directionally transmits images and sound. It allows not only verbal communication, but also non-verbal language.

As Christensen et al. (2001) indicate, this is an interactive form of DL that approximates the advantages of face-to-face interaction better while preserving the convenience of DL. However, there are specific circumstances that make a difference between presence and VC. Our own experience in the use of VC shows us that the participation of remote students could be constrained (they are talking by using a microphone and looking at a camera). It is more difficult for the teacher to control the remote classroom or to motivate students to participate.

There is the impossibility of the teacher to move between the students to control the progress of an activity or to increase the students' attention. Freeman (1998) indicated a similar list of constraints, adding the increased potential for disruptive behaviour and the question of remote students perceiving unequity by.

Accounting classes necessarily include examples and problem solving that need intensive calculations, tables, charts, etc. Teaching accounting via VC could add some constraints: the blackboard is replaced by a camera that is able to transmit an image of books, printed sheets, etc., but the maximum area covered is around the size of an A4 sheet, therefore, the problems must be solved on paper sheets, or in an electronic format (text processor, etc.). Some of these shortcomings seem to affect the rhythm of the class, creating a sensation of a lack of dynamicity when quick student – teacher interactions are needed.

Finally, at least in our experience, the teacher needs to solve the technical issues, choosing which images, cameras, or devices are transmitted at each moment to the remote videoconference rooms. Therefore, the teacher must be aware of these aspects at every moment, and not only concentrate on the explanation of the contents. Valentine (2002) highlights that malfunction can be of great detriment to the effectiveness of distance learning.

The need for specific training in this environment is a key issue (Isla and Ortega, 2001; Valentine, 2002), given that familiarity with the media (not only the technical aspects, but the way of talking, moving, non-verbally expressing etc.) influences the quality of the

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[1] VC will be used hereinafter for videoconferencing or videoconference.

communication process. This training is not only needed for the teaching staff, students also need to know how to behave and to be aware of the capabilities and constraints of VC.

For instance, Fillion (1999) raises various issues. Among them are the increased tiredness in comparison with other media (much time looking at a TV image that, in many cases, is not of the best quality) or the need to get used to different tempos and ways of speaking and behaving in interactive situations.

However, despite the limitations indicated, VC is becoming more common and inexpensive and therefore, is an available multimedia resource (Oliver, 1995) that could be used to attain some of the EHEA objectives pointed out above at a reasonable cost. In this line, many educational institutions are using this resource and a relevant increase in its use could be expected (Salinas, 2002).

3 | OBJECTIVE

As a key point in order to assess the efficacy of VC is to gather evidence about the incidence of the limitations on the quality of learning, this paper has, as its major aim, the evaluation of the relative efficacy of VC in the teaching of accounting at university level.

From more than a decade, the University of the Balearic Islands, from its central campus in Mallorca, has been offering several degrees (Business, Teaching and Nursing) to students living in other islands of the archipelago (Menorca and Ibiza) by using VC. Within this context, we compare the academic performance of students taught by VC with students enrolled in traditional accounting courses.

In this framework, the research question could be stated as follows: Is the academic performance of students taught by VC affected in comparison with students enrolled in traditional courses?

4 | SAMPLE AND METHODOLOGY

The sample is composed of students enrolled in the subject of Financial Accounting II –a compulsory subject in the Business Degree–. In order to avoid distortive factors, comparison groups were enrolled in the same subject with the same teacher. All students enrolled in the selected groups were included in the sample.

A database covering the academic years 1998-99 to 2005-06 was created for all students enrolled in the selected groups. A total of 2,098 students were included in the database, 630 in groups taught by VC.

The variables included in the database were:

a. *Id:* We used the official ID number of students as a key matching variable, given that this is the same in every database and does not change during the student's life.

b. *Group:* This variable allows us to identify if the student is enrolled in a videoconferencing or traditional class, and therefore permits the definition of the main independent variable VC a binary variable that takes the value 1 for VC groups and 0 for traditional groups.

c. *Grades obtained.* As students can sit at two exams every academic year, two different variables were initially included, one for each exam. If the student did not sit at any of these exams, the value is treated as missing. In our system, the grades could fluctuate from 0 to 10, 5 being the minimum grade to pass.

d. *Age.* Age of the students at the beginning of the course.

e. *Previous educational background.* Students can access the university from different educational backgrounds. Secondary education (comprising two main specialities: Sciences, and the Arts & literature), professional training and special access exams for mature students. This classification leads to the definition of other binary variables:

   – *Secondary education* (sec_education): 1 for secondary education, 0 for technical training.
   – *The Arts & literature* background (arts&lit): 1 for secondary education with the background described, 0 for the other cases
   – *Mature students access* (mat_access: 1 for students accessing through special exams, 0 for the other cases)

f. *Selectivity exam grade* (selectivity): Students accessing from secondary education must pass a selectivity exam before entering the university. This variable is the grade obtained in this exam. As there are two attempts: the first one in June, when students that passed their secondary education exams can sit the exam, and a second attempt in September, another variable was included: June, taking value 1 if the student passed the selectivity exam at the first attempt, 0 otherwise.

i. *Repeating*: This variable indicates if the students are repeating the subject. Students that do not pass a subject in an academic year can enrol again in this subject.
All the data were obtained from the University's official databases.

The research question is to know if the academic performance of students taught by VC is affected in comparison with "traditional students".

In order to test this question three dependent variables related to academic performance were defined and obtained from this database:

– PASS_COURSE. Binary variable that takes value=1 if the students pass the course in any of the two exams and 0 if the students did not sit or fail. There is not a difference in this variable if the students, for instance, pass with the minimum grade in the second exam or with honours in the first attempt.
– PASS_EXAM. Binary variable that takes value=1 if the students pass the exam and 0 if the student fail. Each exam is treated as a separate case and takes a missing value if the student does not sit the exam.
– GRADE. Continuous variable that can vary from 0 to 10. The grade of each exam is treated independently. The variable presents a missing value when the student does not sit the exam.

The main independent variable is VC, but in order to control for other factors that could affect academic performance, the following control variables (defined above) were used:

Educational background	– sec_education
	– arts&lit
	– science
	– mat_access
Selectivity exam	– Selectivity exam grade (selectivity)
	– June
Age	

The statistical method used to test the research question differs depending on the nature of the dependent variable. As PASS_COURSE and PASS_EXAM are binary variables the model used is a Probit. As GRADE is a continuous variable, ordinary least squares regression was considered to be a suitable method[2].

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[2] More information on these methods can be found in Greene (1999), Gujarati (1997) and Otero (1993).

5 | RESULTS

5.1. Results for the probability of passing the subject (PASS_COURSE)

From the original dataset, a database in which the observation was defined in student-academic year terms was built.

A Probit model was defined in the following terms. The explained variable (E_{it}) is the probability of the student i passing the course t, and is defined in the following terms:

$$E_{it} = 1 \text{ if and only if } x_{it}\beta + \beta_i VDCF_{it} + \varepsilon_{it} > 0 \text{ and } E_{it} = 0 \text{ contrariwise. [1]}$$

Where β are the parameters to be estimated, Xit are the control variables, and $VDCF_{it}$ is videoconferencing that indicates if the student i was enrolled in a videoconferencing group in t the year t. ε_{it} represent the error term –all the other variables and characteristics not explicitly included in the model–.

The results obtained are presented in Table 1.

TABLE 1. PROBIT 1 – EXPLAINED VARIABLE: PASS_COURSE

Variable	Coef.	Stand. Dev.
Constant	-1.08***	0.28
Arts&lit	-0.86**	0.43
Mat_access	-0.27	0.28
Sec_education	-1.28**	0.57
Videoconferencing (VC)	0.01	0.08
Selectivity	0.26***	0.07
Age	0.00	0.01
June	0.,07	0.08
Repeating	0.75***	0.09

(***) significant at 1%, (**) significant at 5%, (*) significant at 10%.

As shown in Table 1, VC is not significant in the model. In fact, the coefficient is close to zero, indicating no influence at all in the probability of passing the course. It is to be noted that two educational background variables present negative and significant effects. Students that

did their secondary education in an institute had a lower probability of passing accounting subjects in comparison with the students who came from a technical college. In the same line, students with an arts and literature background had less probabilities of passing accounting subjects than those with a numerical –science background–. Two other factors appear to be positively and significantly related to the probability of passing the course: previous academic performance, measured by the selectivity grade, and repeating the course.

Considering the research question, the results indicate that VC does not have any negative (or positive) effect on students' academic performance, measured as the probability of passing the subject.

5.2. Results for the probability of passing any exam (PASS_EXAM)

This dependent variable measures the success in the event of passing an exam.

The Probit model is defined in a similar way as for PASS_COURSE, but changing the event.

The results, presented in Table 2 follow a similar pattern to those in Table 1.

TABLE 2. PROBIT 2 EXPLAINED VARIABLE: PASS_EXAM

Variable	Coef.	Stand. Dev.
Constant	-0.79*	0.43
Arts&lit	-1.02	0.85
Mat_access	-0.06	0.42
Sec_education	-1.42	0.94
Videoconference (VC)	0.11	0.11
Selectivity	0.32***	0.09
Age	0.02*	0.01
June	-0.04	0.11
Repeating	0.61***	0.12

(***) significant at 1%, (**) significant at 5%, (*) significant at 10%.

VC does not affect the probability of passing an exam. Only previous academic performance and repeating courses appear to have a significant effect.

Ordinary least squares regression: grade

The last model tests the influence of the factors and the independent variable on the academic performance measured by the grade obtained in the exam. The estimated model is a linear regression.

$$y_{it} = x_{it}\alpha + \alpha_i VDCF_{it} + v_{it} \quad (2)$$

Where y_{it} represents the grade obtained in the exam by the student i in the year t. As previously, x_{it} represents the control variables, and *VDCFit* identifies those students being taught by VC.

The results in Table 3 indicated that there is no influence of VC on the grade obtained by students. In fact, the coefficient is close to zero. Only three variables affect the grade. Students that previously studied in a secondary school present lower grades than their counterparts that studied in technical colleagues. This difference is quite high, around 2 points in a maximum grade of 10. The selectivity grade is positively related to the grade: for each extra point in the selectivity grade half a point extra is expected to be obtained in the exam. Again repeating students are expected to perform better than new students.

TABLE 3. EXPLAINED VARIABLE: GRADE

Variable	Coef.	Stand. Dev.
Constant	3.52***	0.59
Arts&lit	-1.36	1.15
Mat_access	0.38	0.60
Sec_education	-2.24*	1.13
Videoconference (VC)	0.07	0.15
Selectivity	0.48***	0.13
Age	0.02	0.02
June	-0.01	0.16
Repeating	0.62***	0.16

(***) significant at 1%, (**) significant at 5%, (*) significant at 10%.

6 | CONCLUDING REMARKS

The literature, as well as experience, indicated that VC could present some limitations that finally affect academic performance. The present paper aims to shed some light on this question by measuring the effect of the use of VC on academic performance. Our results indicate no empirical evidence of negative effects of this method in comparison with traditional classes in accounting subjects. Therefore, as a main implication, VC could be considered as an appropriate teaching tool. This result supports the opinion of Bernard et al (2004): good DL is relatively equal to good classroom instruction, regardless of the media used. It is also in line with the results of Allen et al. (2004) who indicated no clear decline in educational effectiveness when using distance education technology.

Valentine (2002) suggested that mature students could be more likely to succeed with DL. Our results indicate no clear relationships. Age is not a significant variable in two of the models (grade and passing the subject) and has a moderate influence (sig. level: 10%) in the probability of passing the exam at the first attempt.

Previous academic performance systematically appears to be a relevant variable to explain academic success. This result leads to a clear implication: a key for good results in university education is to look for, attract and retain good students.

Another interesting result arose from this study. There are two main ways to access to the university: (I) conventional secondary education and a selectivity exam and (II) vocational training (usually in administration). Students accessing through the second way have more probabilities of passing the subject and obtaining a higher grade (around 20%).

Limitations

Although the number of years and students allows the obtaining of reliable results, the present study is focused on a specific subject. Particular circumstances associated with each knowledge area and with the contents to be covered could have an influence on the efficacy of any educational method. Therefore, further research, widening the scope of the present study to other areas, is needed. In the same line, all the courses were taught by the same teacher. The personal characteristics of the teaching staff could have an influence on the success efficacy of any educational method, including VC.

Data were obtained from the University databases. This fact limited the variables to use to those available. For instance, no information on gender could be obtained and, therefore, included in the models.

Prospectives

This study gives an answer to one of the questions raised by Spooner et al. (1999). Other questions remain unanswered and represent future lines of research: What are the characteristics of students and teachers who profit from distance education experiences? How important is interpersonal communication in distance education classes, and what factors increase the likelihood of positive teacher-student and student-student interaction? Other authors suggest research lines linking the personal characteristics of the students and the preference or efficiency of DL: Allen et al (2002) suggest that learning style may impact as a form of individual difference, Valentine (2002) proposes tolerance for ambiguity, the need for autonomy and the ability to be flexible and Bernard et al. (2004) indicates a possible link between DL and motivational dispositions or approaches to learning.

Finally, VC is the method at present in use in the institution where the study took place. The suitability of different DL methods, such as the use of podcasting (see Evans, 2008 or Fernández, Simo and Sallan, 2009) –that allows the teaching staff to focus on the development of higher level abilities– is a promising future development.

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