The Costs, Quality and Scalability of Blended Learning in Postgraduate Management Education

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Abstract

With its combination of online and face-to-face interaction, blended learning is increasingly being employed in postgraduate education. To date, most empirical research on the topic has focused on the design and relative effectiveness of online versus in-person learning. Meanwhile, any exploration of the costs of its delivery has often been neglected. In this study, we propose a framework to assess the costs and cost-effectiveness of alternative designs of blended postgraduate programs, and then empirically apply it to an innovative blended Master of Business Administration (MBA) course as compared with similar MBAs taught at the same institution, with the differences lying in their proportions of online content and the intensity of their use. We applied the Community of Inquiry framework to show that the program with the most intensive use of online learning is also the most effective in terms of student cognitive gain. However, it is not the most cost-effective when compared to other, less online-intensive alternatives. We also found that this result depends on the scalability constraints imposed by the design of the programs. The implications of the scalability versus the quality versus the costs of blended education are then discussed.

Keywords: blended learning, cost-effectiveness analysis, MBA programs

1. Introduction

The learning environment in management education, especially at the professional and postgraduate levels, is increasingly being built around a combination of synchronous and asynchronous online content. In 2016, the EFMD, one of the leading global accreditation bodies for business schools, created a specific accreditation process for online programs on business- and management-related topics. By 2020, it had certified 110 courses across 24 institutions (www.efmdglobal.org). U.S. News listed 335 programs in its ranking of the best online MBAs for 2020, up from 180 in 2017 (www.usnews.com). By March 2019, a total of 11 business and management master's degree programs across the globe were completely MOOC-based (i.e., consisting entirely of Massive Open Online Courses). Two of these were MBAs: one offered by the University of Illinois at Urbana-Champaign, the other by Coventry University (Pickard, 2019).

This increase in the use of online learning applications has proven to be the catalyst for a comprehensive process of evolution within the paradigms for lifelong learning and professional education (Belsky, 2019). A series of reasons triggered this growth, the two main ones being: (i) a demand for flexible and highly accessible learning formats, especially from professionals with fluid working schedules, who are often away on business trips, yet conscious of the need for continuous education; (ii) technological advancements that allow for synchronous and asynchronous educational programs of increasingly high quality capable of actually replacing the traditional standards of teaching to a live audience (Stanton & Stanton, 2017). These aspects have become particularly critical in light of the emergency remote teaching situation that arose in response to the COVID-19 outbreak. The emergency pushed many business schools worldwide to rely on digital technologies and paved the way for further implementation possibilities (Krishnamurthy, 2020). In this context, it is particularly relevant to investigate the

managerial, technological, and economic implications sparked by alternative models and designs for programs.

This growing use of online and blended learning has stimulated research into the effectiveness and costs of programs that harness these tools. It is worth to mention that, by blended program, we mean a combination of online and face-to-face education, in contrast with programs employing a totally online or a totally face-to-face design. In this field, the debate around online and blended programs compared with face-to-face ones is still open in terms of both effectiveness and costs (Miller et al., 2018; Kumar et al., 2019). On the one hand, and similarly to what has emerged for blended education in general, research into the effects of online management programs presents mixed results, indicating a small positive or insignificant impact on student achievement in the case of blended programs (Arbaugh, 2014b; Asarta & Schmidt, 2017; Miller et al., 2018). On the other hand, research into the costs of online education is more limited and scattered than that on effectiveness, and it suffers from the lack of a common approach to identifying and calculating said costs (Bishop & SchWeber, 2001). Despite the great potential of online education in terms of cost savings, the issue of scalability and the trade-off between cost-saving and quality is central and yet remains unsolved (Kumar et al., 2019; Andrade et al., 2020). Addressing this issue is particularly relevant in the context of management education, given the increasing adoption of online and blended formats, whose evaluation keeps being limited at their effectiveness (Belsky, 2019).

Previous research proved the mixed impact that online programs have on effectiveness (e.g., Bowen et al., 2014; Krieg & Henson, 2016); thus, it is pertinent to ask whether the expected cost savings are sufficiently significant to make up for any potential negative shift in achievement, as compared with traditional education. Furthermore, if technological investments and accurate design have a place in engendering a higher-quality online environment, can savings on costs compared to traditional courses still emerge? Our argument

in this research project is that, given the lack of attention to online learning costs, the current debate on the effectiveness of online management education programs is partial, at best.

This paper contributes to this debate by proposing a framework for measuring the costs and cost-effectiveness of management education programs, and then applying it to a unique empirical setting, namely an innovative blended Executive MBA (EMBA) program designed and taught at a leading Italian business school. Within this context, the research objectives are: (i) to establish a framework for the collection of data on costs in the context of blended and online management education, and (ii) to conduct a cost-effectiveness analysis across a selection of alternative programs, as tested empirically by comparing a blended management education program against alternative programs where blended learning is used to a different (i.e., lesser) extent. It is relevant to stress that the terminology "alternative" is used throughout the paper in accordance with the evaluation literature (e.g., Levin et al., 2018), and it refers to the comparison group (i.e., the programs to which the innovative blended MBA is compared).

To address our first research objective, we built an empirical framework to collect cost data - following the ingredients method suggested by Levin and McEwan (2000) - while adopting the Community of Inquiry (CoI) framework (Garrison et al., 2000) for measures of effectiveness. Within this framework, three dimensions - social, cognitive and teaching presence - are combined to make up the overall learning experience. Adopting this type of approach to learning effectiveness allows us to shift from a lecture-based paradigm to a student-centered one (Culpin & Scott, 2011). Moreover, the CoI framework is found to be particularly appropriate for the evaluation of blended management programs, "*given its unique ability to parsimoniously conceptualize the determinants of student learning*" (Daspit & D'Souza, 2012, pp.675-676). Lastly, we performed a cost-effectiveness analysis based on data about both the results and the costs of the programs (Levin & McEwan, 2000). The analysis highlights the importance of considering both cost and outcome measures when attempting to acquire a deep

understanding of the subject under investigation. The findings presented in this research can stimulate an in-depth discussion into the use of online content in blended learning environments in management education, where programs vary in terms of the extent to which the course is delivered online (Hollands & Thirtali, 2014; Miller et al., 2018; Kumar et al., 2019).

The remainder of the paper is organized as follows: Section 2 contains a review of the relevant literature, while Section 3 illustrates the theoretical framework; Sections 4 and 5 present an introduction to the empirical background of the study and the methods used, respectively; Section 6 then presents the results, with the paper's conclusions offered in Section 7, together with an outline of possible avenues for future research.

2. Literature Review

In light of its objective of establishing a framework for cost and cost-effectiveness analysis and empirically applying said framework to alternative MBA programs using a blended learning approach, this paper falls into two streams of research. The first stream includes all studies covering the cost and effectiveness of online and blended tertiary education, usually presented in comparison with 'brick-and-mortar' classrooms. The second stream relates to the properties of management education in an online environment. The latter line of research places a particular focus on describing the work involved in designing online and/or blended postgraduate programs, which is of interest due to its impact on both cost and effectiveness. This study builds on the second stream of research, primarily because of the limited evidence available on the cost and effectiveness of online and blended MBAs. As such, we are specifically contributing to the debate on the cost and effects of synchronous and asynchronous online content in postgraduate management education, providing evidence on both dimensions jointly. The following sections provide a brief overview of the literature, focusing on the evidence that is most relevant to this study.

2.1. Costs and effectiveness of online and blended education

The first area to be considered is the empirical evidence about the costs and effectiveness of online learning in higher education. Most of the debate has been focused on its effectiveness in this setting, without considering the cost of delivery (Figlio et al., 2013; Bettinger et al., 2015; Joyce et al., 2015; Alpert et al., 2016). Over time, several authors have agreed that online learning seems to underperform in terms of student achievement and satisfaction compared with face-to-face teaching in higher education (Bowen et al., 2014; Krieg & Henson, 2016). Blended learning usually makes for a small yet significant positive increase in student achievement, but the evidence is mixed regarding student satisfaction depending on the specific program under investigation (Bernard et al., 2014; Israel, 2015).

For blended education, López-Pérez et al. (2013) ran an experiment on a blended course for undergraduate students in Spain. They showed that the blended format produced a positive effect on the students' grades as compared to traditional education. These empirical results are supported by Bernard et al. in their meta-analysis (2014). They reviewed 96 studies demonstrating that, on average, blended learners perform one-third of a standard deviation better than traditional students. Olitsky and Cosgrove (2016) ran an experiment on two microeconomics classes, assigning one class to a flipped-blended format and the other to a traditional in-person format. They showed that the first group of students performed 7% better in their exams than the control group. Although no cost analysis was incorporated into that study, the authors also concluded that the two most important reasons for running an online program of that kind were to cut costs and improve the students' results.

When looking for studies concerned with implementation costs, we were only able to find two examples: one is given by Bowen et al. (2014), who introduced a cost analysis for blended

courses, showing a significant reduction in cost-per-user compared to the traditional class - mainly because fewer classroom-based lessons result in lower overall sums to be paid out as teacher salaries. The other example comes from Maloney et al. (2012), who performed three analyses (break-even, cost-effectiveness, and cost-benefit) on an online course for health professionals, comparing it with a traditional education program. Their results indicated that the online course performed better in terms of the break-even point. In contrast, traditional education performed better on cost-effectiveness (from the provider's point of view) and cost-benefit (from the user's perspective). As a relevant aspect for our study, some previous research has explored the theoretical definition of the dimensions of cost to be included in a measurement framework. Indeed, Ng (2000) underlined the practical and theoretical difficulties of any such process and stressed the relevance of including infrastructure and support costs, as well as considering, for each cost, who the final payer is (i.e., the institution or the student). Bartley and Golek (2004) divided the costs into one-time and per-session costs, following a breakdown reminiscent of that used to differentiate fixed and variable costs. Finally, the authors suggested the relevant dimensions to be considered, namely design/development costs, implementation costs, and program evaluation costs. These considerations provide a sound basis for the framework proposed in this study.

2.2. Postgraduate management education in online settings

When considering postgraduate education in general and management education in particular, many studies focused on describing the design of the programs, especially the correlation between design and the measures of learner-perceived effectiveness. One of the earliest attempts to a joint analysis of perceived learning and satisfaction in MBAs, Arbaugh and Duray (2002) found that flexibility in the delivery of the program was strongly associated with the students' positive perceptions of it. Arbaugh and Hwang (2006) used structural equation

modeling (SEM) on 191 online MBA students surveyed in the USA to investigate the validity of the "teaching presence" construct and its components - design and organization, the facilitation of discourse, and direct instruction. In another study focused on the connection between the design of a course and its effectiveness, Arbaugh (2014a) investigated 48 online MBA courses and was able to identify which factors of technology, learner behavior, and teachers' practices were the best predictors of the students' results. He found that teaching presence and social interaction were the strongest predictors of students' outcomes, while the technological aspect played a marginal role.

With a specific focus on blended learning, Arbaugh (2014b) performed a systematic review of 68 studies in the literature, confirming the central role of learning flexibility in improving students' results. In addition, he found that graduate students are more capable of selecting the most effective study materials from a course than undergraduate students, which suggests that online and blended learning has a high degree of potential in professional education. Chen and Jones (2007) published their results for two accounting classes offered to MBA students, where the subject matter was taught alternatively through blended and traditional methods. They showed that there was no overall difference in satisfaction for students attending the courses. Drake et al. (2016) conducted pre- and post-test comparisons involving one blended and one face-to-face class of MBA students, finding that, in the knowledge-based tests taken after completing the courses, performance in the finance tests was the same for the two groups. However, the online learners performed better in the accounting tests.

There are significantly fewer studies that examine the cost of delivering blended programs. Miller et al. (2018) performed an analysis of effectiveness and cost-effectiveness on data from the University of Texas at Tyler (UTT) to compare blended courses with face-to-face ones. They showed no significant difference in student achievement, but they demonstrated a negative impact in terms of course satisfaction with the blended format and student achievement

in follow-on courses (i.e., courses for which the blended ones were prerequisite). Furthermore, by considering the costs related to students, teachers, and the university, they found a net saving of $80 per student in the blended format, for a total of $225,000 per year. The net savings were particularly evident at the institutional level, especially over the long term, because of the decreasing impact of fixed costs that would not be repeated if the course were continued or scaled up.

In summary, studies investigating MBAs in online settings have highlighted the potential of learning flexibility for professionals, although there is mixed evidence on program effectiveness. The empirical research into the costs involved is even more scattered. This is the area to which this paper aims to provide a strong empirical contribution, specifically by proposing a framework to support a systematic collection of data on costs, in addition to the determinants of effectiveness.

3. Theoretical Framework

A crucial contribution of this study is to develop a framework for collecting data on the cost of delivering online and blended management programs and allow for the replicability of this framework in similar contexts. Thus, we firstly propose an analytic framework for collecting cost data based on the cost ingredients method (Levin & McEwan, 2000; Levin et al., 2018). Secondly, we present the CoI framework as a guide for identifying the relevant dimension of effectiveness, in line with the final objective of evaluating the relative cost-effectiveness of different management programs.

3.1. The cost ingredients framework

The costs were defined based on the literature on the cost-effectiveness of educational programs (Levin & McEwan, 2000; Levin et al., 2018) and adopted the ingredients method for the cost

categories specifically. As suggested by Levin and McEwan (2000), each of the costs of teaching management programs can be classified under one of four headings: (i) staff, factoring in every person who contributes in any capacity to delivering the program; (ii) materials, factoring in all the equipment of any kind required to offer the program; (iii) services and contracts, factoring in any additional costs resulting from the involvement of external providers; and (iv) facilities, factoring in any physical locations required for the program.

The costs of running the programs can be labeled as 'direct' or 'indirect' costs. The direct costs include all the costs closely linked to and immediately determined by the end object, i.e., the MBA program. As the indirect costs cannot be directly traced back to their respective sources, resource drivers for their allocation should be identified. Within the research, this was carried out in collaboration with experts in the business school's accounting office and the three program directors. Resource drivers are the drivers for allocating a specific cost item to the end object (in our case, the program). For example, indirect costs related to the IT help desk (which relies on contracts with external providers) are allocated according to the number of requests for help/assistance per program, working under the assumption that a higher number of requests equates to higher costs being attributed to the program; however, all learners could access the service, with no distinction made between programs. The complete list of costs defined in agreement with the staff unit coordinators for the specific case under investigation is provided in *Table 1*.

For what concerns the staff, the costs include the lecturers' and tutors' salaries, as well as any royalties paid to lecturers for showing their online videos. In addition to this, the wages of the administrative and support were allocated according to the amount of time (FTE - full-time equivalent) that each person spent working on each program.

The costs for materials include, for instance, the operating costs for the digital platform as well as costs for IT devices and learning material vouchers (allotted to the students). In addition, this dimension includes the costs of student registration and outdoor activities.

The costs for other contracts and services are meant to include costs due to external providers, such as those for the IT help desk and utilities (heating and electricity). Lastly, the facility category includes general costs related to the amortization of building, furniture, and hardware, as well as administrative software licenses and hardware/software maintenance.

[Table 1 around here]

3.2. The Community of Inquiry framework

As a starting point to define the reference dimensions for effectiveness, we used the Community of Inquiry (CoI) framework. This framework evolves from social constructivism and interprets learning as the primary outcome of a process that takes place in a community with shared culture and values (Seixas, 1993; Garrison et al., 2000; Daspit & D'Souza, 2012). This approach is particularly suitable for evaluating management programs, and previous scholars in the field have applied it and tested it empirically (e.g., Arbaugh, 2008; Daspit & D'Souza, 2012). Much of the recent theoretical and empirical discussion on online education focuses on the transactional dimension (teaching and learning) rather than the technology involved (Garrison & Akyol, 2013). Recent research highlights the importance of active understanding and critical learning in management education, combined with the CoI framework (Goumaa et al., 2019). Given that technology is what enables any online learning community to establish itself, the question at hand relates to seeing how students can interact and learn effectively in this context and how this model contributes towards a positive overall educational experience. The CoI framework addresses this point by putting the student experience at the center of the

investigation (Garrison et al., 2000) by examining three interdependent elements: social presence, teaching presence, and cognitive presence.

Social presence indicates how learners are socially and emotionally connected when interacting with the group (Garisson et al., 2000; Daspit & D'Souza, 2012; Arbaugh, 2013). Social presence can be further classified into "affective communication", "open communication" and "group cohesion" (Rourke et al., 2001). As Garrison and Akyol (2013) claim, "*when social presence is established, collaboration and critical discourse is enhanced and sustained*" (p. 108). Moreover, social presence is positively correlated with learning outcomes and satisfaction (Richardson & Swan, 2003; Liu et al., 2009).

Teaching presence is a central building block of the model (Daspit & D'Souza, 2012). It is the key aspect that contributes to achieving the intended cognitive objectives in a positive learning environment (Garrison & Akyol, 2013). On this point, the teacher's role becomes more complex, encompassing a range of responsibilities including design, facilitation, and teaching itself (Anderson et al., 2001; Arbaugh, 2013). As Garrison and Akyol (2013) claim:

> Teaching presence in an educational context is not possible without the expertise of an experienced and responsible teacher who can identify the ideas and concepts worthy of study, provide the conceptual order, organize learning activities, guide the discourse, offer additional sources of information, diagnose misconceptions and interject when required (p. 111).

Cognitive presence deals with learners' abilities to explore, discuss, and integrate ideas until the point in question is resolved, at which point the newly acquired learning is then applied (Garrison & Arbaugh, 2007; Arbaugh, 2013; Warner, 2016). Cognitive presence is closely related to the concept of critical thinking (Garrison & Akyol, 2013) and to an individual's ability to gain knowledge and convert it into higher understanding (Daspit & D'Souza, 2012).

4. Empirical application: background on the design and launch of an innovative blended MBA in Italy

This study focuses on three MBAs offered simultaneously at a prestigious Italian business school, anonymized for confidentiality reasons. These are executive programs designed for experienced working professionals that promote high levels of flexibility, having been designed to include a combination of on-site and online learning. The on-site part of the programs is taught in person by the same lecturers in all three MBAs. All three share an online platform that has been specially developed in partnership with a multinational Information Technology (IT) company (although the material available for access varies from program to program). This is a crucial point, as it rules out any possibility that potential differences in the programs' effectiveness could depend on the varying quality of teaching or online materials. The programs differ only in their design, and even then, mainly in terms of the proportion of material taught online, which is nearly two-third for the blended MBA and one-fourth for the evening and part-time MBAs (further details below). In this respect, while the specific design of the programs somewhat undermines the generalizability of any findings, the identical quality of the teaching and online materials guarantees a high level of internal validity and bolsters the robustness of the study.

The main characteristics of the programs are as follows: the first program is a blended MBA designed to deliver most of the material online, synchronously or asynchronously, and to offer the greatest degree of flexibility. This program still includes a few mandatory on-site classes, which are held on weekends. The second program is a part-time MBA designed to have most courses scheduled as full-time weekend sessions. Finally, the third program is an evening MBA designed for the bulk of the courses to be scheduled on weekday evenings, plus one weekend per month.

The duration of the three programs is the same: nearly two years. The design approach for each of them is very similar and is based upon five main building blocks: (i) Core Courses (13 courses held over a 14-to-16-month period) - these teach fundamental business management skills, such as corporate strategy, processes, operations management, accounting, innovation management, etc.; (ii) Elective Courses (4 to 6 courses, with a total of up to 22 hours each, selected by the students from a catalogue of options) - these include several advanced business management topics (e.g. finance, sustainability management and entrepreneurship); (iii) Leadership Development - a program which combines outdoor sessions and mentoring, where the aim is to work on the students' leadership and networking skills (this part consists of a flexible mix of sessions/activities determined by the student's personal preferences); (iv) Career Development - based on workshops on professional development (five career-focused workshops held on site); (v) Project Work - the final assignment in the MBA, which lasts nearly six months and is to be completed after teaching has concluded. Although the learning model does not explicitly mention inquiry, the pedagogical structure of the building blocks themselves is very much designed around experiential learning and critical thinking.

The intakes covered in our empirical analysis refer to the period from mid-2016 to July 2018. The cohorts consist of 51 students enrolled in the part-time MBA, 43 in the evening MBA, and 40 in the blended MBA. The main difference between the programs relates to the design of the core courses. For the blended MBA, the core courses are online, and the leadership and career development programs involve some online modules. The theoretical elements of these core courses are taught weekly through recorded multimedia clips (asynchronous and offline), each lasting about 15 minutes for a total of two hours per week. These multimedia clips teach basic management concepts, and their objective is to bring the entire class's knowledge on a specific topic into line. An hour-long live question-and-answer session is held every week to clarify any doubts and summarize the key takeaways from the video clips. This part is followed by a two-

hour live online session in which the teachers and students interact and elaborate further on the concepts of the week. Lastly, a one-hour online discussion is held every two weeks to examine further and discuss the themes covered during each course. The mix of synchronous and asynchronous interactive material provides a high level of flexibility to be as effective as possible for busy professionals. The total number of online learning hours in the blended MBA makes up 68% of the overall course time (excluding the students' private study hours), as shown in *Table 2*. Students can also access the video clips in the part-time and evening MBAs, as can some of the synchronous Q&A sessions. However, on-site sessions are still predominant in these two programs, with the online modules making up a mere 24% of the total lecture time. This blended MBA's design raises the question, which we have adopted to guide us in the empirical application of our measurement framework: to what extent does this approach influence the program's effectiveness, and cost-effectiveness, as compared with the other two programs?

[Table 2 around here]

5. Data and Methodology

5.1. Cost of the programs

To assess the relative cost-effectiveness of the three programs under investigation, we started by collecting data on costs. At this stage of the analysis, there was no readily available data. Part of the research was spent on the conceptual definition of the cost dimensions and their corresponding monetary value, as well as an empirical analysis thereof. As anticipated, we followed Levin and McEwan (2000) and classified the costs of teaching these programs into four groups: staff, materials, services and contracts, or facilities. Defining these 'ingredients' is the first step in this data collection process, along with determining the timeframe which, in our case, was between 2016 and 2018. The next step involved organizing individual meetings

with academic and staff unit coordinators (teaching, communication, administration, IT, human resources, etc.) to evaluate the different cost dimensions. Finally, the data were analyzed to define the cost per student in the blended MBA, and this cost was then compared to that of the part-time and evening programs, respectively.

The costs were quantified on a historical basis and limited to the period under investigation. Costs for staff, external services and contracts were based on the business school's total costs for the 'acquisition' of those resources. Where applicable, a figure for annual amortization was also taken into account for materials and facilities.

For the staff, all teaching costs were attributed directly to the programs. As anticipated, these costs included the lecturers' and tutors' salaries, as well as royalties and a proportion of the wages of the administrative and support staff, based on the amount of time (FTE) dedicated to the program. This was determined by asking the staff unit coordinators to fill in the individual timesheets for their team members.

The costs for materials were mainly indirect, thus introducing the need for accounting assumptions. Thus, resource drivers were defined for each cost item; for instance, the operating costs for the digital platform were allocated based on the number of hours of synchronous and asynchronous video sessions conducted per MBA, working under the assumption that the more extensive the program's use of the platform, the higher the consumption of resources and, consequently, the higher the cost allocated. Finally, the total costs for operating the platform were assigned based on an index calculated as the number of hours of synchronous and asynchronous video sessions in the specific MBA over the total number of video sessions conducted. Costs relating to IT devices and learning material vouchers (allotted to the students) are direct variable costs - a function of the number of students per program - and so were easily allocated, simplifying the procedure. The same accounting assumptions used for services and

contracts were applied to the costs of student registration and outdoor activities, where the relative amount depends on the number of students involved in the activity.

The costs for other contracts and services – in our case, those for the IT help desk and utilities (heating and electricity) - were allocated according to the appropriate resource drivers, including the number of requests for assistance and the number of classroom days required by a program.

To conclude, the facility category refers to general costs relating to the amortization of furniture and hardware and administrative software licenses and hardware/software maintenance. Once again, the costs of these items were allocated using specific resource drivers, such as the number of classroom days per program and the number of FTEs in the administrative office.

5.2. Measures of effectiveness

Before moving on to the definition of the effectiveness measures, we first proceeded to carry out a preliminary investigation into the students' characteristics, in order to rule out the possibility that potential differences in effectiveness are driven by students' self-selecting into specific programs. More specifically, we wanted to exclude the role potentially played by observable structural differences between the personal characteristics of the students in the three programs. We had access to the details and microdata available for all the students, including personal and career-related information. The data included all the students in the intake for 2016-2018 (51 in the part-time MBA, 43 in the evening MBA, and 40 in the blended MBA). In addition to descriptive statistics regarding the students, to assess whether the personal and career-related information of the three student groups differed across the MBAs, we ran one ANOVA and one Bonferroni post hoc test for continuous variables, and a comparison test between proportions for binary variables.

The results are shown in *Table 3*. There are no major significant differences between the students taking the blended MBA and those taking the other two programs. The only detectable

difference occurs when comparing the evening and part-time MBAs, with a greater percentage of students holding a master's degree in economics (29%) in the former than in the latter (10%). The lack of available data makes it impossible to check whether students differ between programs in terms of other, unobserved characteristics (such as motivation or family circumstances at the time of enrolment). However, we can assume that the balance of relevant observable variables between programs could reasonably be extended to possible unobserved characteristics.

[Table 3 around here]

Once the students' homogeneity was tested across the programs, we defined the measures of effectiveness concerning the three types of presence that make up the learning experience according to the CoI framework, namely social presence, teaching presence, and cognitive presence.

The primary source of information consisted of a student satisfaction survey taken at the end of each of the three programs. The main areas of investigation were those suggested by the online education literature (Piccoli et al., 2001; Alavi & Gallupe, 2003; Endres et al., 2009): faculty, course material, operations, teaching methods and learning outcomes. These dimensions were then linked to the CoI framework to establish the three dimensions of interest. The surveys were anonymized and all answers were evaluated on a 5-point Likert scale to gauge satisfaction, where 1 denoted the minimum level and 5 the maximum. The values were collected at the student level, so that the average value for each program was used to evaluate that specific program.

For social presence, we used items suitable for measuring the dimensions suggested by the literature, namely open communication and group cohesion, with the aim to create a constructive climate for class discussion (Garrison & Akyol, 2013; Warner, 2016). More specifically, we measured the students' perception of the following items: "Based on your entire

MBA experience, please rate how this program performed in the following areas: (i) quality of study team/study group; (ii) quality of class discussion; (iii) communication with students". In this way, we could capture multiple aspects of the social interaction situation, both online and on-site, in line with a blended learning approach.

For teaching presence, we considered all the questions relating to both faculty and teaching methods, with three sections of the questionnaire covering these aspects. The items included factors related to: (i) facilitating discourse, such as the teachers' ability to draw upon the students' experience and any relevant external events, to be accessible and responsive, and to provide examples connected to the real business world; (ii) course design, as measured by the quality of teaching materials and organization; (iii) direct instruction, as measured by teaching effectiveness (Arbaugh & Hwang, 2006; Warner, 2016).

For cognitive presence, we used two different yet complementary metrics. The first metric measured learning as perceived by the student, across some soft skills considered fundamental for business professionals. These aspects ranged from decision-making skills to knowledge on how to integrate the various business disciplines and skills such as creativity and communication. The data was collected from the end-of-program survey through 12 questions on their perceived learning and may be linked back to the practical inquiry approach, where students make their way through a knowledge-building process by leveraging multiple skills (Garrison & Akyol, 2013). The second metric measured learning as assessed by the lecturers, i.e., the weighted average grade obtained by students in their MBA exams in core management skills. This value was rescaled onto a 100-point scale for ease of interpretation. The use of two metrics is justified by the importance of both "hard" and "soft" skills in management executive education (Culpin & Scott, 2011). Descriptive statistics on the metrics used for testing effectiveness are presented in Section 6.2.

5.3. Cost-effectiveness analysis

The final step combined the data on costs and effectiveness into a succinct indicator of cost-effectiveness. A cost-effectiveness analysis is an evaluative technique to compare alternatives based on the computation of ratios, where the costs and the (non-monetized) effects are summarized into a single value. It differs in this respect from a benefit-cost analysis, where the comparison relates to the difference between the monetary values of benefits and costs (Levin et al., 2018). In this study, the measures of effectiveness are not convertible into monetary terms, and as such, a cost-effectiveness analysis was deemed the most appropriate course of action.

Before carrying out the core empirical analysis, as a preliminary step, we designed a cost-effectiveness graph to identify the solutions that were dominant or dominated. Whenever the reference solution is both more expensive and less effective, it is necessarily dominated by its counterpart. Conversely, a solution in which lower costs are associated with greater effectiveness becomes dominant. The two remaining options are those worthy of further investigation, namely the cases in which lower costs coincide with lower effectiveness and higher costs are combined with higher effectiveness. In the study, the part-time and evening MBAs are the comparison (control) groups acting as counterparts for the blended program. As suggested in the literature on program evaluation (see Levin et al., 2018), we performed an incremental analysis. This involved calculating a cost-effectiveness ratio to compare the blended MBA with each of the two control groups (controls 1 and 2). This operation was repeated for each of the theoretical dimensions of effectiveness in the CoI framework. Specifically, the Cost-Effectiveness (CE) ratio was calculated as follows:

$$CE\ ratio_{1,2} = \frac{C_{BLENDED} - C_{CONTROL_{1,2}}}{E_{BLENDED} - E_{CONTROL_{1,2}}}$$

the differential costs (C) were divided by the size of the differential in effectiveness (E) between the blended program and each of the control groups. As such, the ratio can be interpreted as the cost required to obtain one extra unit of effectiveness. The general decision rule is to choose

the option where each unit of effectiveness costs the least. As Levin et al. (2018) state, "*the ratio is the price of an outcome, and it makes sense to pay the lowest price*" (p.167).

6. Discussion of results

6.1 Cost of the programs

The results of the cost analysis are given in *Table 4*, where for each cost ingredient, we have presented the total sum, the sum per student, and the incidence of that ingredient on the overall costs. If we look at the total cost, we can see that online learning can help to generate savings with the same course structure. The total costs for running the blended MBA come to around €611,000, while this figure rises to €660,000 for the part-time MBA, which is the same program, but with a lower proportion of online learning. On top of this, the evening MBA - which runs on weekdays and involves the same amount of online material as the part-time MBA - has the lowest costs of all three programs (around €577,000). This difference between the total costs of the part-time and the evening MBAs, which have a similar design, may be linked to the number of students enrolled per program. Indeed, the part-time MBA counts 51 students enrolled, against the 43 students enrolled in the evening MBA. As further noted in this paragraph, some of these costs are variable, depending on the number of students enrolled in the different programs. In addition, some indirect costs, like those related to marketing and social media, are allocated based on the number of students per program, generating a further difference between the part-time and evening programs. For this reason, total costs may be useful to compare the programs in terms of cost composition, while the final comparison between programs should be based on the cost per student.

When comparing the various programs, the costs of the ingredients represent different proportions in each one. For example, the most significant savings for the blended MBA relate to staff costs, which make up 45% of the total, while accounting for around 53-54% in the other

two programs. This is a direct consequence of reducing face-to-face classes, which translates into savings for the blended MBA. However, this then incurs the extra cost of an additional tutor to supervise students throughout the program. The situation is reversed for course material, which accounts for 25% of the total costs in the blended MBA as against 16% in the two other programs, mainly due to the cost of the IT devices provided to the students, as well as those required for the operation of the online learning platform. The values of the two remaining ingredients - services and facilities - remain constant across the three programs. Combined, they add up to nearly 30% of the total, with the proportion for facilities being particularly low (around 1%), as the business school leases its buildings rather than owning them. This means that this category only includes the amortization of furniture and hardware.

As a final consideration, when looking at the total cost per student, our data shows that there are no savings linked to teaching courses online. In fact, the blended MBA has the highest cost per student (€15,272), as compared with €13,427 for the evening format and €12,940 for the part-time format. The underlying reasons for this result are rooted in the class sizes involved. Students enrolled in a blended program must receive the same standard of education as those enrolled in traditional formats. Consequently, to ensure effective active learning and interaction through the online platform, it was deemed necessary to reduce the maximum class size of the blended MBA (down to 40 students) compared with the other two programs (whose full size was set to nearly 60 students). It is important to stress that the design choices for each program in terms of class size and specific cost items may vary between organizations, and are merely presented here as a single relevant empirical application of a generalizable framework.

[Table 4 around here]

6.2 Measures of effectiveness

Descriptive statistics for the measures of effectiveness presented in Section 5.2 are shown in *Table 5*. For each dimension of the CoI framework, we have provided detailed information

about the mean per item, as well as the overall mean per dimension. Our results show that attendance of the blended MBA corresponds to significantly higher cognitive results in the tests (i.e., student achievement). It is important to remember that students are tested and graded by the same pool of teachers in the blended, evening, and part-time MBAs to exclude any assessment bias that may arise from different teachers. Moreover, we have performed an ANCOVA (Analysis of Covariance) to explore whether the students' characteristics - particularly their gender - represent an explanatory driver for the higher cognitive results in the blended MBA. Indeed, female students are likely to benefit more than their male counterparts from the higher degree of flexibility of the blended format, and this mechanism could be the driver behind the higher levels of student achievement. When testing jointly by type of program (blended, evening and part-time) and by gender, we can still observe that the blended MBA returns significantly higher cognitive results ($F(3,130)=13.12$, p-value=.00). Therefore, this higher level of student achievement cannot be attributed to gender differences, in a way reinforcing the idea that the difference is due to the design and format of the program itself.

However, the blended MBA performs worse than the two other programs when it comes to teaching presence. As such, we could argue that the strength of the blended program lies in its ability to support learning outcomes, while its weakness is rooted in the lack of a strong teaching presence. Finally, no significant differences were detected between the blended MBA and the other programs from social and perceived cognitive perspectives.

[Table 5 around here]

6.3 Cost-effectiveness analysis

As a final step, we combined the measures of cost and effectiveness to perform a cost-effectiveness analysis of the blended MBA compared with the evening and part-time programs. We started by constructing a cost-effectiveness graph to identify whether some of the cost-effectiveness combinations were dominant or dominated. *Figure 1* gives the differential for

costs and effectiveness between blended and evening programs (in black) and blended and part-time programs (in white). The objective was to determine the relative positioning of the combinations for each of the dimensions presented in the CoI framework (social presence, teaching presence, and cognitive presence, both perceived and assessed) against the differential measure of cost per student. The results show that five combinations are dominated, given that the blended MBA has higher costs per student and lower perceived effectiveness (bottom right quadrant). Despite this, the cost-effectiveness (CE) ratio in the cases where costs are increasing (as the cost per student in the blended MBA is higher than that of the two other programs) along with an increase of effectiveness is worth further investigation.

This procedure gave us combinations worthy of more in-depth exploration. In *Table 6*, we provide the CE ratios, where the cost per student for each option is divided by the measure of effectiveness rescaled onto a five-point scale for the sake of comparability. We calculated the ratio in absolute values (rather than as incremental measures) to compare the values across the programs. The preferred option would be the one in which the cost per additional unit of outcome is the lowest. In the blended program, each additional unit of perceived cognitive presence costs €3,830 per student, and each additional unit of assessed cognitive presence costs €3,180. The part-time MBA provides the same additional output at €2,740 per student, outperforming its blended counterpart. The evening MBA places between the two programs, nonetheless still outperforming the blended program. As such, we can conclude that the blended MBA program has the highest cost for each additional unit of effectiveness. This means that it trails behind the evening and part-time formats in terms of cost-effectiveness.

[Figure 1 and Table 6 around here]

7. Conclusions and future developments

This paper proposes a framework for analyzing the costs and cost-effectiveness of blended and online management programs, applying the model developed to an MBA program offered at an

Italian business school, characterized by a blended format and intensive use of synchronous and asynchronous teaching materials. The program was compared with two other programs offered at the same institution. The three programs share the same digital platform and the same teachers/faculty, but the latter two employ online learning less extensively in their courses. A series of conclusions can be derived from the results illustrated above.

7.1 Costs, quality and scalability: three parts of a whole

First of all, the paper contributes to the definition of a framework for collecting cost data for management programs delivered in different formats, and it demonstrates how a cost-effectiveness analysis could be performed across various programs. In so doing, the paper addresses the challenge of defining generalizable dimensions of costs that may be adapted to fit alternative contexts, also considering aspects related to costs and effectiveness in a single combined measure (Ng, 2000; Xu & Xu, 2019). Given the increasing attention that previous literature has devoted to the application of the CoI framework to management education (e.g., Arbaugh, 2008; Daspit & D'Souza, 2012; Goumaa et al., 2019), proposing a framework that addresses the specificities of an MBA program both in terms of costs and effectiveness is the main contribution of the study to this stream of literature.

Second, our analysis highlights the potential benefits of the blended MBA, at least to the extent that any course's effectiveness can be measured in terms of student achievement. This program concedes more flexibility to professional students, who may find it easier to manage their time and balance their studies with their work responsibilities, thus achieving higher exam grades. In this regard, the potential usefulness of blended learning in professional management education must be considered a key benefit when this format is compared against alternative (more traditional) courses. The main limits on effectiveness have to do with teaching presence,

and this is an area in which online courses underperform compared to their in-person counterparts. This has significant implications for teaching practice and course design, suggesting that lecturers and designers of blended programs should devote particular attention to the design of this aspect within the CoI framework. However, one potential reason for this disadvantage may be a function of students' perceptions rather than actual differences in quality; indeed, this is a topic that deserves further exploration in the future, especially for institutions seeking to center their strategies around online learning.

Third, delivering a course online can result in savings in the total costs of running the program. Despite this, the empirical case under investigation shows that high-quality blended learning may come at the price of scalability. As such, the total number of students for the blended MBA is capped at 40 to guarantee the quality of the learning and a high level of teacher-student interaction in an online setting. Indeed, the scalability of graduate and postgraduate education is a matter of debate, especially where online contexts are concerned (Laws et al., 2003). This translates into higher costs per student than the other two programs (with 43 and 51 students in our study, respectively). Moreover, the higher unitary costs are not matched by a particularly high level of perceived satisfaction in terms of social presence, teaching presence and cognitive presence; as such, any rise in costs cannot be justified as a 'simple' increase in program costs which would result in a commensurate improvement of the effectiveness. This aspect is a matter of debate in the current literature, given that online programs are by design better suited to scalability; in contrast, the question at hand concerns how it affects quality (Xu & Xu, 2019). On this, it is also worth noting that the feasibility of scaling up a given program depends on its specific design, as well as the intended quality outcomes pursued by the institution.

Our data shows that the blended MBA, with its higher proportion of online teaching material, falls behind the other two programs in terms of cost-effectiveness. Analyzing the three elements of the CoI framework separately, we could also argue that the blended MBA is particularly

cost-ineffective in terms of social and teaching presence, which are the weakest dimensions in the blended program. Even so, the results open up possibilities for the effective use of blended learning for cognitive benefits. Given the importance placed on social and teaching presence by the literature (Arbaugh & Hwang, 2006; Daspit & D'Souza, 2012), this is an essential element for discussion which is insufficiently explored in most of the literature focused on student achievement. Any comprehensive evaluation of online and blended programs should consider the role of social and teaching processes to be crucial to the overall success of the educational experience. In other words, well-designed blended programs must ensure that students (i) perceive a high level of engagement with their community, albeit in the online space, and (ii) receive high-quality teaching that is perceived as such.

When considering costs, the results of the study highlight an implication relating to the management of these programs that contributes to the debate on the savings expected from online learning (Hollands & Thirtali, 2014; Miller et al., 2018; Kumar et al., 2019). Our empirical application shows that online delivery cannot be directly correlated with net savings, especially when there is a strong commitment to quality (which requires high investment and recurring costs for tutoring, student support, etc., paired with limited student numbers). Indeed, reducing costs is not possible in isolation - it must necessarily be considered in tandem with any resulting drop in quality (Xu & Xu, 2019). The trade-off between cost and quality could be viewed as a feature of any educational program. The specificity of online learning has to do with the open boundaries that technology introduces in terms of the massification and scaling up of education (thus improving accessibility).

Moreover, costs are not a dimension per se, but rather part of what has been defined as the "iron triangle" (Daniel et al., 2009; Ryan et al., 2021), which sees cost as one of the immovable vertices of a triangle, together with quality and access (scalability). Whenever one vertex moves, the other two are impacted as well. In the context under investigation, locking

accessibility in place makes it impossible to exploit cost reductions. This matter is explored in this paper in combination with the resulting effect on quality. In order to examine the issue of scalability, the following section presents several simulations in which the number of students has been increased to level out the cost per student and relative cost-effectiveness.

Considering our main findings, the contribution of this study is twofold. First, by defining the cost 'ingredients' - cost items and resource drivers - we provide an empirical framework to analyze the costs of online learning management programs that can be adapted to fit different contexts. Second, we assess the effectiveness, costs and cost-effectiveness of an MBA program offering blended learning to professionals. Our empirical evidence is based on the positives and negatives of a blended learning design in management education and suggests areas for improvement within this context.

7.2 Simulating the 'optimal' size for scalability

To complement the discussion about the scalability of an online learning program designed as such, we provide an empirical simulation to identify the 'optimal' number of students, assuming equivalence in the amount of unitary costs across programs. For simplicity's sake, all the costs have been labeled as variable or fixed, although some of them are semi-fixed in nature, i.e., they can be considered fixed up to a certain threshold. Using these values, we ran simulations by increasing the number of students up to a threshold that can be deemed to be a reasonable upper limit given the current state of resources (classroom size, tutoring time, etc.). This upper limit is set at 55 students. In theory, this need not be considered a hard and fast limit as no such upper bound exists, and indeed, one component of scalability can be the ability to enroll and manage a higher number of participants.

In *Figure 2*, we present the unitary cost function for the blended MBA, comparing it to those of the alternative programs. The blended MBA would be preferable to the evening MBA when the number of students enrolled reaches 49, while it becomes the dominant option when at least

51 students enroll. However, this simulation only holds as long as the quality of the program is not affected by the increase in the number of students. In this situation, the blended MBA would be the dominant option when assessing cognitive presence and would be strongly preferable to the evening MBA on the perceived cognitive measure. However, we would need to increase the number of students to 55 to make the blended MBA more cost-effective than its two counterparts in terms of social presence. At the same time, this threshold is still not enough to make the blended program preferable to the others in terms of teaching presence due to a gap in the effectiveness that is not sufficiently counterbalanced by the reduction of costs. From this perspective, the simulation corroborates the idea that teaching quality represents the key challenge in achieving the quality-sustainable scalability of the blended program under investigation.

[Figure 2 around here]

7.3 Future developments and further research directions

This study has some limitations, such as the fact that our measures to estimate effectiveness were traced back ex-post, once the theoretical lens of this study was identified. Future developments could look at how to extract different theoretical concepts directly from the data - for example, through factor analysis or structural equation modeling - to corroborate the theoretical constructs presented in this framework. Moreover, programs do not actually differ in terms of perceived cognitive outcome in precisely the way measured by the survey. However, it may be the case that students in the blended program acquired better digital/soft skills using the online platform, which is not adequately measured or represented on our scale.

Furthermore, the sample size (i.e., the number of students) is relatively small, reducing the study's statistical power. We must acknowledge that the several missing responses to the final satisfaction surveys could have introduced some bias into the analyses. However, as the surveys

were administered over the same period and through the same procedure, there is no reason to believe that the non-respondents differ structurally from program to program, meaning that any potential bias should be limited.

Finally, while the data available only refers to the timeframe of the students' education, future research could complement the existing evidence. For instance, a cost-benefit analysis could provide additional results on the programs' long-term effects on student employability, while other social and educational angles could also be investigated.

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The authors declare that there is no conflict of interest.

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Table 1. Definition of cost ingredients, measures and resource drivers.

Cost ingredient	Cost	Description	Resource driver (if an allocation is necessary)
1. Personnel	1.1 Classroom-based lectures	Total cost for lecturers	
	1.2 Royalties from video clips watching	Total cost in royalties (for viewing videos) to lecturers	
	1.3 Online course tutoring	Total sum paid to tutors	
	1.4 Project work tutoring	Total sum paid to tutors	
	1.5 Administrative and support staff	Classroom coordinator (support staff) (Full Time Equivalent)	
		I.T. support (Full Time Equivalent)	
		Marketing and communication (Full Time Equivalent)	
		Administrative staff (Full Time Equivalent)	
	1.6 MBA Director's Office	MBA Director's Office	Number of MBAs
2. Materials	2.1 MBA online learning platform amortization and maintenance	Platform amortization (if any) and cost of maintenance	Number of video hours + streaming hours per MBA
	2.2 Multimedia clips - production	Multimedia clip amortization (if any)	Number of video hours per MBA
	2.3 IT devices	I.T. devices provided to students	
	2.4 Learning material	Voucher for buying learning material	
	2.5 Marketing, advertising and media relations	Costs for marketing, advertising and media relations (business school level)	Number of students per MBA
3. Services/ Contracts	3.1 IT help-desk	Costs for the I.T. help-desk	Number of help-support requests
	3.2 MBA accreditations and rankings	Costs for services related to accreditations and rankings (business school level)	Number of students per MBA
	3.3 Matriculation taxes	Total sum for student matriculation taxes and costs	
	3.4 Outdoor sessions	Total sum for outdoor sessions	
	3.5 Building rental and utilities	Total costs for building rental, utilities, cleaning services (business school level)	Number of classroom days per MBA
4. Facilities	4.1 Amortisation for furniture, hardware and software	Total costs for furniture, hardware and general software amortization and licenses	Nos of classroom days per MBA
	4.2 Software accounting package maintenance	Total costs for maintenance relating to the Accounting area software	Accounting area Full-Time Equivalent

Note: The definition of cost ingredients is based on Levin and McEwan (2000). Personnel refers to all the costs related to the teaching and administrative staff. Materials refer to any equipment needed for the program delivery. Services/Contracts refer to the provision of specific third-party services. Facilities refer to costs related to the physical spaces used for running the programs.

Table 2. Description of the in-person and online teaching hours across MBAs.

Program	Face-to-face contact hours	Synchronous Q&A and virtual class sessions	Multimedia clips (15' long)	Forum discussions	Private study hours	Total
Part-Time MBA	368	22	96	0	1031	1517 hours
Evening MBA	368	22	96	0	1031	1517 hours
Blended MBA	136	135	94	56	1092	1513 hours

Note: Excluding private study hours, the online part of the blended MBA makes up 68% of the total program and 24% of the other two programs.

Table 3. Descriptive statistics of students' characteristics across MBAs.

	Pooled mean	Blended MBA	Evening MBA	Part-Time MBA
Gender (Female)	16%	25%	14%	10%
Sector of occupation: General Management & Consultancy	17%	20%	14%	18%
Sector of occupation: Sales and marketing	33%	23%	36%	39%
Yearly salary	€ 67,963	€ 64,950	€ 66,940	€ 71,196
Education: secondary diploma	8%	3%	12%	8%
Education: Degree in Economics	17%	13%	28%*	10%*
Education: Degree in other scientific subjects	65%	70%	52%	71%
Job Experience (Years)	13.31	12.13	13.69	13.92
No.	134	40	43	51

Note: The pooled mean refers to the mean of the total population. Differences across groups tested through ANOVA (Bonferroni test) or comparison tests between proportions. * refers to p-value<.05.

Table 4. Costs per program by cost ingredient and in total.

	Blended MBA			Evening MBA			Part-time MBA		
	Total costs	Cost per student	Incidence on total	Total costs	Cost per student	Incidence on total	Total costs	Cost per student	Incidence on total
1. Personnel costs	€ 277,267	€ 6,932	45%	€ 308,669	€ 7,178	53%	€ 359,278	€ 7,045	54%
2. Material	€ 155,769	€ 3,894	25%	€ 90,226	€ 2,098	16%	€ 108,668	€ 2,131	16%
3. Services/Contracts	€ 173,866	€ 4,347	28%	€ 168,783	€ 3,925	29%	€ 184,741	€ 3,622	28%
4. Facilities	€ 3,965	€ 99	2%	€ 9,674	€ 225	2%	€ 7,230	€ 142	2%
Total costs	€ 610,867	€ 15,272	100%	€ 577,352	€ 13,426	100%	€ 659,917	€ 12,940	100%

Note: Cost per student is calculated taking N=40 for blended MBA; N= 43 for evening MBA; N=51 for part-time MBA.

Table 5. Measures of effectiveness related to the Community of Inquiry framework.

	Blended MBA (a)		**Evening MBA (b)**		**Part-time MBA (c)**	
	Mean	*No*	*Mean*	*No*	*Mean*	*No*
Social presence						
Based on your entire MBA educational experience, please rate how this program performed on						
quality of study team/study group	3.6	18	4.0	34	4.0	34
quality of class discussion	4.2	18	4.0	34	4.3	34
communications with students	4.3	18	4.4	31	4.2	34
Mean	4.0		4.1		4.2	
Teaching presence						
Based on your entire MBA educational experience, please rate how this program performed on						
ability to draw upon the experience of students	3.6	18	3.7	34	3.8	33
ability to incorporate issues/events	3.5	18	4.1	34	4.0	34
accessibility	4.2	18	4.0	34	3.8	34
real-world industry experience	3.2	18	3.8	34	4.2	33
responsiveness to students' needs	3.5	18	3.8	34	3.9	34
teaching effectiveness	3.9	18	4.2	34	4.4	34
quality of case studies	3.8	18	4.1	34	4.2	34
quality of guest speakers	3.2	18	3.9	34	4.2	34
quality of individual projects	4.0	17	3.9	34	4.1	34
quality of lectures	3.9	18	4.1	34	4.1	34
quality of team projects	3.8	18	3.9	34	4.2	34
relevance of allocated course material	3.9	18	4.2	34	4.0	34
Mean	3.7	(b,c)	4.0	(a)	4.1	(a)
Cognitive presence (perceived)						
Please consider the impact of your MBA educational experience on your professional development. For each attribute, please tell us how much you have improved regarding that attribute since entering this program.						
Communication skills	3.9	18	3.7	34	4.0	34
Creativity/Innovation	3.8	18	4.0	34	4.4	34
Critical thinking	4.2	18	4.3	34	4.5	34
Decision-making skills	4.0	18	4.1	34	4.3	34
Entrepreneurship/Intrapreneurship	4.0	18	3.9	34	4.2	34
Ethical awareness/Corporate responsibility	3.5	18	3.6	34	3.9	34
Global perspective	4.3	18	4.3	34	4.5	34
Integration of business disciplines	4.3	18	4.4	34	4.7	34
Leadership skills	4.1	18	4.0	34	4.2	34
Quantitative analytical skills	3.8	18	3.4	34	3.9	34
Team building skills	3.9	18	4.0	34	4.1	34
Understanding the influence of new technologies	4.1	18	4.1	34	4.4	34
Mean	4.0		4.0	(c)	4.3	(b)
Cognitive presence (assessed)						
Mean	96%	(b,c)	94%	(a)	94.3%	(a)

Note: Letters in parentheses refer to a statistical significance between groups as measured through ANOVA (Bonferroni test), with p-value<.05. Test run on the mean value of the Community of Inquiry dimensions.

[a] indicates the blended MBA

[b] indicates the evening MBA

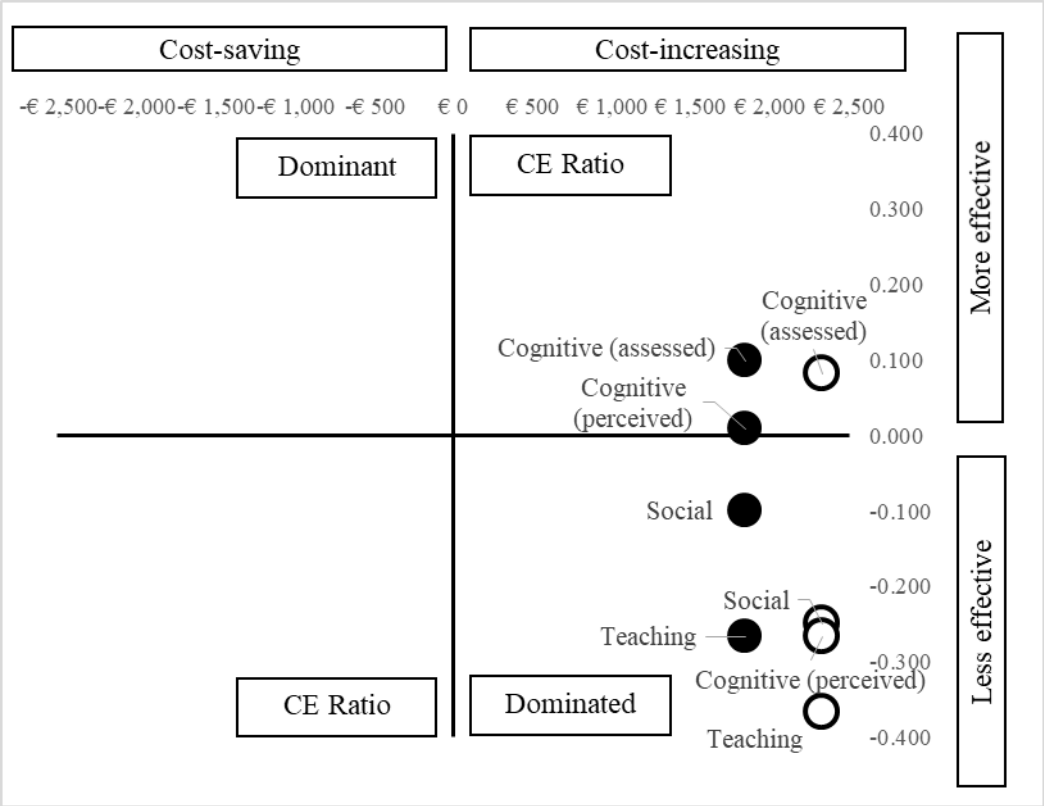
[c] indicates the part-time MBA.

Table 6. Results from the cost-effectiveness analysis.

	Blended MBA	**Evening MBA**	**Part-time MBA**
Cost measures			
Total costs	€ 610,866	€ 577,352	€ 659,917
Cost per student	€ 15,272	€ 13,426	€ 12,940
Effectiveness measures			
Social presence	3.90	4.00	4.15
Teaching presence	3.71	3.98	4.08
Cognitive presence (perceived)	3.99	3.98	4.26
Cognitive presence (assessed)	4.80	4.70	4.72
Cost-effectiveness ratio (per € 1,000)			
Social presence	-	-	-
Teaching presence	-	-	-
Cognitive presence (perceived)	3.83	3.37	-
Cognitive presence (assessed)	3.18	2.85	2.74

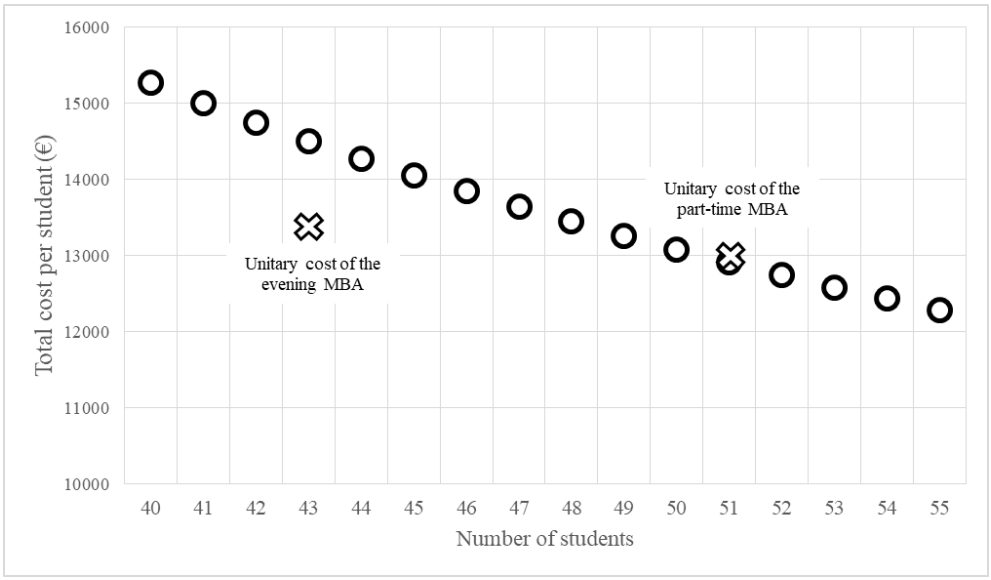
Note: The cost-effectiveness ratio is not computed when, in the incremental analysis, the alternative is dominated – i.e., it is both more expensive and less effective.

Figure 1. Cost-effectiveness graph: blended MBA versus evening and part-time MBAs



Note: CE Ratio stands for Cost-Effectiveness ratio. Black dots show the differential costs or effectiveness of blended – evening MBAs. White dots show the differential costs or effectiveness of blended – part-time MBAs.

Figure 2. Simulation of the unitary cost in the blended MBA by increasing the number of enrolled students.



Note: The cost per student is obtained by dividing the fixed costs by the number of students and adding the unitary variable costs.