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TECHNOLOGY-SUPPORTED EDUCATION: OLD QUESTIONS FOR NEW STRATEGIES

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Abstract

Technology-supported education (TSE) is raising a growing interest in management education. Many business schools are introducing TSE in their programs, undertaking significant investments, but often complaining about actual returns.

In this paper, we underline the importance to root TSE in a clear-cut, traditional strategic view. Building on the literature review, we develop a framework to support the technology adoption process. As a starting point, we propose a typology of technological applications, among which choices should be based on their strategic value. Main indications to evaluate each option are provided, so that a road map is developed according to the specific goals and context, aiming at making the strategic rationale of TSE choices explicit. To better develop this approach, we also analyze as a case study a new international executive education program to point out the key variables that have been taken into account and the matters that have been addressed. From a managerial point of view, adopting the proposed road map should lead to choosing the best technological tool both with regard to the efficiency and the efficacy dimension.

Key words: technology-supported education, technology-mediated education, ICT strategies, distance learning.

1. Introduction

The development of a society is grounded in educational structures and procedures, and among them higher and executive management education can be regarded as the most critical. Indeed, since managers run business organisations and are in charge of economic development and growth, business schools can be considered amongst the ultimate makers of the future.

This is the reason why considerable attention has recently been paid to the effectiveness and efficiency of education policies for management and business (Pfeffer & Fong, 2002). Such policies are increasingly investigated not only in terms of their content – i.e. *what* business schools teach – but even more in terms of the underlying structures and processes that are used to transfer this content – i.e. *how* business schools teach.

Moreover, educational tools have become increasingly relevant because of the changes involving concepts such as knowledge and learning (Wankel & De Filippi, 2002). According to Zagzebski (1999), knowledge is the process through which a relationship is established between human beings and the world; this relationship changes shape and substance in every single interaction taking place. That relationship is empowered by the new tools available in learning, which is now an endless process. It requires people to be always ready, permanently "switched on", and which calls for them to play an active and collaborative role.

According to this perspective, information and communication technologies (ICT), "hardware, software networks, and media for collection, storage, processing, transmission, and presentation of information (voice, data, text, images)" (World Bank Group, 2002) are among the main sources of

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innovation that can exploit this process of knowledge generation. Indeed, they are shaping business schools' new approaches to management education (Eastman & Swift, 2001; Salmon, 2000), according to a trend common to several industries. But contrary to other industries, business schools should combine their educational mission with business strategies, making their decision even more complicated and asking for a balanced choice.

With regard to management education, Alavi, Wheeler & Valacich (1995) have already pointed out that new technologies can add new power and value to collaborative learning, thanks to their impact on conversation, discussion, and any kind of debate. Similarly, it is interesting to note that a field of research has already adopted a social constructionist perspective to interpret networked management learning (Hodgson & Watland, 2004). According to these studies, new technologies help to increase the level of learning, building on continuous discussion and debate.

Previous research has already focused on the reasons behind such a trend, highlighting the impact of technological advances on software and computing capacity, of the diffusion of Internet access and of the quest for alternative sources of education.

However, we are still far from a clear understanding of the possible uses and benefits of these powerful technological tools to improve the performance of business schools' educational programs (Arbaugh, 2000; Arbaugh & Duray, 2002). In fact, we still lack a general framework, which could be used to compare the many available options. One of the reasons for this situation is the fact that hitherto researchers have aimed at identifying the main benefits of ICT, and, as a consequence, they have focused their attention on specific applications, domains and contexts, without discussing any general framework (Alavi & Gallupe, 2003). Hence, they have pointed out "what technology can deliver" (Thorpe, 2000: p. 146), by carrying out field studies, which are usually characterised by the adoption of a deep but limited perspective. In their explorative studies, these researchers have also applied a wide range of methodologies, with high heterogeneity as regards educational contexts (Pollard & Pollard, 2004), and a variety of standpoints (Lauman, 2000). In conclusion, we can say that this topic has been studied insufficiently and with fragmented perspectives (Webster & Hackley, 1997). Specifically, previous studies do not provide a business school or a single professor with the guidelines to drive the process of applying new technologies in educational programs, in order to improve their performances. Indeed, it is not easy to decide which option would be the most suitable for a specific educational program. In our paper, we suggest a possible solution to this problem.

2. Research Aim

The aim of this contribution is to provide a plain framework to support business schools in evaluating strategic opportunities eventually opened by new information and communication technologies. Indeed, since the range of available technological solutions is broad and heterogeneous, educators should compare the benefits offered by the technological options according to their specific strategic goals firstly, and only after that they should plan their ICT investments. Surprisingly, our literature review points out a strong interest only in technological applications both in real life and in scientific papers. We argue that evaluating technology without clearly taking into account the specific educational goals of the business school as well as its resources and competences can lead to unsuitable decisions both because the gained benefits are too low or because costs are oversustained. Hence, this paper aims at helping educators and educational managers in making the rationale for TSE decisions explicit and consistent with their specific goals. Specifically, we address the following research question:

How should the technological solutions for the TSE be compared and evaluated?

3. Methodology

To address the proposed research question, we follow a sequential research plan, which also represents the basis for the paper structure.

First of all, we review the literature on this topic, looking at identifying the best practices that eventually have been developed both by education managers in existing cases as well as academicians in their contributions. According to previous contributions, we try to define a range of possible benefits which constitute the reasons why there is a growing interest in TSE, and which justify these investments. Having identified the benefits commonly attributed to technological applications in education (section 4), we propose a wide typology of ICT options (section 5). The typology is strongly derived from previous literature, and it is built on three key variables:

1. Dependency from a remote source (stand-alone Vs. online solutions),
2. Level of interaction (no interaction, interaction with the machine, interaction between people), and
3. Kind of media used (TV-based, PC-based, and mobile device).

That typology aims at presenting the whole set of (non-concurrent) ICT applications that can be used in educational programs, and comparing them according to their critical differences. It constitutes the starting point of any decision-making process related to TSE.

Once we define why business schools are adopting ICT in their programs, and what kind of technological solutions they apply, to address the core of our research question – namely, how they should choose among the wide range of available options – we apply the consolidated strategic approach to our case. Indeed, we strongly believe that the basic rationales of management decisions are not subverted in the information age. In this sense, our article wants to be a useful reminder of that. The result is a map similar to a decision tree. The eight different paths that we identify try to be exhaustive, but they are not mutually exclusive. Further, we try to provide qualitative guidelines in discriminating among the market potential for the eight different options (section 6). The result is a road map, which should support education managers in identifying consistent ICT solutions for a particular program, given one's strategic goal that the framework helps to clarify. In fact, according to our proposal, the technological solution to be chosen should be driven by the specific strategic value proposition, not the other way round. Hence configuring TSE can be regarded as any other strategic choice, and it can be supported by a simple decision tree. Anyone in charge of applying ICT to education should firstly address a few but critical questions.

Finally, to better illustrate the strategic value of a strict decision-making process we present the results of a case study analysis (section 7). The case refers to a new international executive educational program, which applies ICT to expand its potential market. This analysis focuses on the decision processes that a new educational program has adopted in order to configure its value proposition. This case presents the solution which has been chosen by the involved institutions, discussing also a broad range of issues that have been addressed by their managers. Further, it also points out well the benefits of adopting a strategic approach towards choosing the ICT application, being based on a strict evaluation of the pursued goals, the expected benefits and the competences on which the project relies.

4. The Diffusion of ICT in Education and Its Benefits

According to some scholars, the application of ICT to education dates back to the introduction of computers, which took place in the Seventies (Pollard & Pollard, 2004). In particular, one of the first projects was known as "Plato", and was based on the connection of 4,000 rented terminals to a central computer via telephone lines (Cawkell, 1998).

However, according to others, the departure point for this phenomenon should be linked to the development of ICT, or rather to a technology revolution characterised by very fast and disruptive innovations in the information and communication technologies (Alavi, Wheeler & Valacich, 1995; Webster & Hackley, 1997). These interpretations differ, because the former takes into account the early origins of computers, while the latter focuses on the most relevant technological aspects (this is the case, for instance, of the widespread and swift diffusion of the Internet). Whichever interpretation one accepts, we still lack a general perspective and consensus on the benefits of ICT application to the educational industry. Unfortunately, education has barely started

to appreciate the benefits of ICT, while other industries have already begun to take advantage of them. If business schools are late in realising projects in order to enjoy the potential benefits of ICT application, scholars are late in studying the best practices of these application, resulting in a general underestimation of the informative benefits (Alavi, Wheeler & Valacich, 1995). As a result, business schools do not comply with their institutional mission, to the extent that they do not provide learning processes which respond to employers' requirements; firms, on the other hand, are increasingly getting used to working with ICT (Alavi, Wheeler & Valacich, 1995).

Recently, the application of ICT to learning processes has been widely investigated (Alavi, Wheeler & Valacich, 1995; Cawkell, 1998; Shih *et al.,* 2003; Webster & Hackley, 1997). These studies have highlighted the fact that applying technology to learning does not necessarily require the creation of new educational contexts. Indeed, experiments have been carried out in traditional universities and business schools, but also in virtual universities, which have created a completely new business model (Shih *et al*., 2003). It is interesting to note that, with regard to the more traditional educational institutions, in any case they have only partly invested in this area, without completely replacing their conventional offering.

Indeed, ICT are particularly important as one of the factors that enable knowledge to develop further. According to Friga, Bettis & Sullivan (2003), education must rethink its processes after a long, static period. Technological applications can be one of the drivers of innovation, as well as powerful and competitive new instruments (Leidner & Jarvenpaa 1995; Alavi & Gallupe, 2003). As cutting-edge organisations are already adopting ICT to enhance their own learning processes (Schreiber & Berge, 1998), higher education must also reconsider its programs (Hamilton, McFarland & Mirchandani, 2000). This process of rethinking is greatly innovative, but also very risky. Therefore, it is very important for education managers to know which available options could be applied, to compare them, and choose the right one for their specific goals and contexts. Many interesting benefits might result, if the decision problem is solved correctly. By analysing case-studies found in previous contributions, we have identified four main advantages deriving from the use of ICT in management education: two of them refer to the efficiency dimension, and the remaining two relate to the effectiveness dimension. Figure 1 presents these benefits.

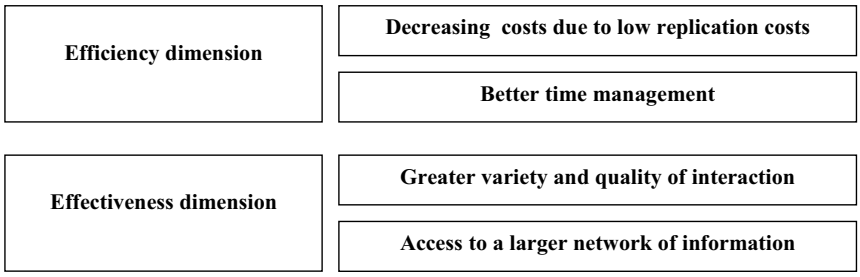

Fig. 1. The benefits of ICT for educational programs

First of all, the adoption of ICT in educational programs has been proven to decrease costs in repeating programs. Using a technological platform as a kind of memory for information can reduce the amount of replication costs. However, the costs for the first copy are usually very high, so it is much more convenient to spread those costs over a large number of programs (Webster & Hackley, 1997; Alavi & Gallupe, 2003; Brower, 2003). Since replication can be achieved both across time and space, educational programs can be offered both by a single institution (replication across time) or by a network of educational institutions which share some of their technological skills for a common interest in ICT (replication across space). Secondly, ICT produces an increase in the efficiency of time management by students and managers. Since time is the one limited resource in Western societies, we should also take into account the strong benefits ICT has on the time dimension (Biolghini & Cengarle, 2000). These benefits clearly refer to the efficiency dimension.

Apart from these benefits, other advantages can be highlighted with regard to the second relevant dimension of any project, its effectiveness. Here we should consider two further issues: the first one refers to the fact that the effectiveness of educational processes may be enhanced by the use of information and communication technologies, allowing deeper interaction between instructors and students (e.g. Brower, 2003). Moreover, a program using multimedia can provide students and managers with several channels of interaction, depending on the specific characteristics of the content of the information. According to this second dimension, it is clear that both teaching and learning effectiveness can be increased by ICT applications.

In order to take the utmost advantage of these benefits, according to the rational decision making process, an educational institution should carefully evaluate every single option, compare it with others, and then choose the one that really fits the context in which it will be used and which is better suited to management's goals. Hence, the rest of the paper is devoted to supporting education managers in solving the decision problem. We present and discuss our framework, which is articulated into two instruments, starting with a general typology of ICT applications derived from previous contributions. After introducing and discussing each of the options, we proceed to present a decision tree, useful in the process of choosing the right option for any specific situation. Further, the presented analysis focuses on the strategic aspects of this relevant decision. That is usually driven by many other factors, such as the resistance to change that could characterized faculty as well as staff, and many political issue, as well as budget constraints. However, within the broad range of drivers and contrary to many of them, the management of the business schools is in charge of the strategic definition and its implementation, and, ultimately, of the development of the whole society.

5. A Typology of ICT Applications

Shih et al. (2003) have recently proposed an interesting categorisation of the automatic mechanisms that can be used in learning processes and which can therefore be replaced by technology-supported learning:

- Communication technology. This category includes technological applications of a strongly communicative nature, from those which allow or favour two-way communication to more complex types of networks. Of course, network technologies can be further divided into subcategories, as defined by the ISO Standards. These communication technologies either take the form of network-based tools (such as the new ATM technology), broadband communication technology, agent-based architecture (such as mStar), two-way video, real-time interactive Web-based systems, and even the real-time interactive virtual classroom, or middleware systems, such as chat rooms, shared whiteboards, distance lecture supporting systems, and the Java-based network educational system. Furthermore, this category also includes virtual communities, virtual reality, virtual libraries and mobile agent technologies.
- Intelligent technology. Beginning with studies on artificial intelligence, it is possible to build autonomic systems, able to support students in their learning processes. According to these studies it is possible to distinguish between two directions of research: computational logic and neural network. Whilst the first direction foresees the possibility of analysing knowledge through symbolic representation, the second direction of research deals instead with analysing knowledge whenever it is not possible to attribute a symbolic form to it. In any case, the application of these technologies to learning processes takes on the form of intelligent tutoring, individualised learning, behaviour analysis, as well as auto-reply to frequently asked questions.
- Educational technology. Finally, this category groups together all technological applications which support users in their interaction with the technology-supported learning system, such as multimedia teaching and learning technologies, information models facilitating human-computer communication, and user acceptance tools.

According to the same authors (Shih et al., 2003), the support systems and instruments used in learning programs can be divided into two groups:

- Traditional tools: videotapes (S-VHS), public and cable television, video conferences via satellite, teleconferences, and textbooks;
- Computer-assisted and network tools: CD-ROMs, Web Browsers, Whiteboard, chat rooms, Real Player, video conferences on broadband, WebCT, LearningSpace, and Blackboard.

This classification relates exclusively to the media used. However, if we focus on the communication tools in terms of the level of collaboration and interaction involved, the type of communication and the dependence on space and time variables, we encounter another typology. Indeed, according to these criteria, Biolghini & Cengarle (2000) distinguish between "traditional" distance learning and on-line learning.

In an attempt to systematize and re-organize many contributions on this issue, we propose a typology of ICT applications in educational contexts. It is based not only on the media which are used, but also on their level of interaction in the specific application, and also on the general mode in which they are used. Figure 2 presents a table illustrating different ICT instruments that may support education in different ways, each with its pros and cons, to be evaluated once that our strategic objectives and targets are clear. Hence, this typology provides users with a broader perspective on the range of possible media.

			MEDIA		
MODE	**LEVEL OF INTERACTION**		**TV-Based**	**PC-Based**	**Mobile devices**
"Off-line" (the user is independent of a remote source)	No interaction		*Videtapes (video lectures)*		
	Interaction with the machine		*DVD (audio and video archives, test)*	*CD-ROM & DVD (hypertext, audio/video/text archives, test/exercises)*	*JAVA applications*
On-line/On-Air (the user obtains data from a remote source)	No interaction (one way, 1-to-many communication)		*Video lectures via satellite, cable, or air*	*Video-streaming "live" via Internet*	*Video-streaming "live" via 3G*
	Interaction with the machine		*Video-on-demand & iTV (via cable or sat and DTT + return channel)*	*Hypertext, audio/video/text archives, test/exercises via World Wide Web*	*Hypertext, audio/video/text archives, test/exercises via WAP on 3G*
	Interaction between people	1-to-1 synchronous	*Video-conference*	*Audio or video calls via Internet Chat/Instant Mess.*	*Voice call or video call via 3G SMS-Chat*
		many-to-many synchronous		*Voice/video-conference Chat room*	*Voice-conference*
		1-to-1 asynchronous	*Email via iTV*	*Email*	*SMS, MMS, email via mobile phone*
		many-to-many asynchronous	*Forum via iTV*	*Forum Mailing-list*	*Forum via WAP Mailing list via mobile phone*

Fig. 2. A typology of ICT applications available in educational contexts

Firstly, it is possible to split ICT supporting tools according to their dependency on a remote source: we can have tools, such as a videocassette or a java application, that can be used anywhere,

without any access to a network. An appropriate device is the only necessary equipment: in our previous examples, a VCR or a mobile phone. We call this tools "off-line", as opposed to "on-line/on-air" tools that require the availability of some connection to a remote source: for example, this may be the case for a video lecture or an Internet mailing list.

At another level, then, a further distinction is required. This refers to the kind of interaction allowed by ICT educational instruments. There might be no interaction at all, as is the case for video streaming; there can be interaction only with the medium, as in the case of CD-ROMs; and, finally, there can be interaction with other people through the medium.

Moreover, it is useful to specify that there are different kinds of interaction with other people: one-to-one (email), or many-to-many, as in a forum; also, interaction can be synchronous, meaning that the individuals involved are simultaneously connected, as in a videoconference, or asynchronous, as with a short message service.

A final distinction concerning our ICT tools relies on their supporting devices. Even though converging trajectories are blurring the borders between different kinds of equipment, we can still classify our tools as primarily PC-based (e.g. a CD Rom), TV-based (e.g. a CATV educational channel), or mobile-based (e.g. videostreaming on 3G networks).

The resulting grid is presented in Figure 2. Each tool can be classified in the most appropriate cell: the examples provided, of course, are not exhaustive. Indeed, a complete TSE platform should be based on several of them.

To sum up, the literature places strong emphasis on technological applications, which are very heterogeneous. Once the reasons why they differ are clearly identified, their evaluation should rely on their utility according to the educator's or manager's specific goals. Indeed, the ICT uses are driven only a little by their technical features, but most of all they depend on the pursued goals. Their strengths and weaknesses must be evaluated relatively to the specific educational context. Therefore, a clarification of these aims is needed, and since there is a lack in the literature on this topic, we try to apply the classic strategic process to solve this decision problem. As a result, we define a road map that could be useful to identify which solution should be applied.

Whatever specific goal is pursued, the adoption of technology-supported education programs requires significant changes in the capabilities and competencies of instructors and more generally of the educational institution (Leidner & Jarvenpaa, 1995). In fact, as educators embrace ICT-based educational models, they undertake significant investments in institutional resources and are required to change their own culture considerably in order to implement technology-supported education programs successfully. However, very few educational institutions carefully evaluate such implications, and even fewer focus on the strategic choices underlying the adoption of TSE programs (Alavi & Gallupe, 2003). Yet a similar approach seems to be important in that it may cause a shift from the perspective of mere cost reduction to that of delivering greater value to the end user, improving the overall performance of business schools (Arbaugh & Duray, 2002): Applying ICT in educational contexts is much more than a technological solution. It rather implies reconsideration of the underlying strategy of the business school, from its competence profile to the educational product profile and target market.

6. A Strategic Framework for Technology-Supported Management Education

The adoption of ICT in education can be interpreted, above all, as an innovation process leading to a significant variation in the underlying features of the educational product. Accordingly, it requires the development of teaching skills and management knowledge in order to fit into a progressively new business model, conducive to a resource-based diversification path (Penrose, 1959).

In order to interpret this process, we propose a straightforward scheme to map and then evaluate some of the strategic options that ICT offers to traditional educators. In drawing this map, we have focused on a mono-product traditional educator, dealing with a set of strategic options concerning

the use of ICT to integrate, replace or extend his/her current educational offer. Of course, educational institutions are often structured into different business units (e.g. executive education, MBA, undergraduate education) and therefore a more analytical framework should account for strategic decisions on managing the whole portfolio of educational products. While the proposed framework might be expanded to include other relevant variables at the corporate level, it still constitutes an important point of reference to assess the strategic options available at the business unit level, and, to the best of our knowledge, has never been developed in the literature.

In order to identify and organise the alternatives, we have designed a scheme similar to a decision tree. Indeed, the decision tree model can be useful to study the choice and implementation of a technological educational project. Deterministic outcome nodes are not part of the analysis: the main goal here is to emphasise the importance of building one's own tree, given one's own strategic priorities, market conditions and therefore one's own stochastic outcome nodes. In order to drive this process, we propose some indications and key competitive questions that should be answered by education managers before proceeding with their ICT decisions.

The general approach proposed here, although a simplification of the overall process, allows the strategic rationale behind educators' ICT choices to be made explicit: we are strongly persuaded that this is particularly important today, given a context where most decisions seem to be driven by heuristic, visionary, or imitative behaviours. Indeed, it has been already shown that a system of measures able to evaluate the performances and returns of this kind of investments is still very far from been developed. Further, the spurious stream of research on this topic has found not consistent results, sometimes even contradictory (Banks, Cresswell and Ainley, 2003; Fuchs and Woessmann 2004; National Center for Educational Statistics, 2001a; 2001b; Wenglinsky 1998), providing no empirical support for any rational decision-making process.

Starting from a traditional educator's current competences profile, and moving on to the market and product dimensions underlying diversification processes, we can map eight different paths for adopting technology-supported education. The strategic options (the leaves of the tree) are meant to be exhaustive but not mutually exclusive.

We have already mentioned that a proper way to deal with these alternatives is to consider technology for educational programs as a dependent variable: once the most suitable strategic options for our institution have been evaluated, we could then shift our attention to the best technological platform to adopt, i.e. the most consistent with our strategic goals. Indeed, selecting a technological solution is just a consequence of other strategic issues that should be addressed by management: firstly, they should define their aims, their target and the expected benefits; the technological application should follow these more relevant decisions. Although our considerations may appear obvious, it is astonishing to note that this still does not happen in most current experiments while it is gathered by technological solutions in themselves, regardless their context of application.

Starting with the first option (1.1.1.1. – Using ICT to strengthen our position in our *current market* and *current segments*, by adopting *stand-alone* ICT solutions and only innovating on how the educational offer is *delivered*), it must be noted that current evidence suggests that a mere transposition of *traditional contents* and *traditional methods* to ICT supports (either online or offline), generally results in poorer educational products. This option, then, is extremely risky, since the impact on the value proposition for our current customers would most likely be negative, unless some special circumstances might occur, which should be explored for every specific case. Otherwise, paradoxically, we would weaken, rather than reinforce, our competitive position with our current target market by making the wrong strategic choice.

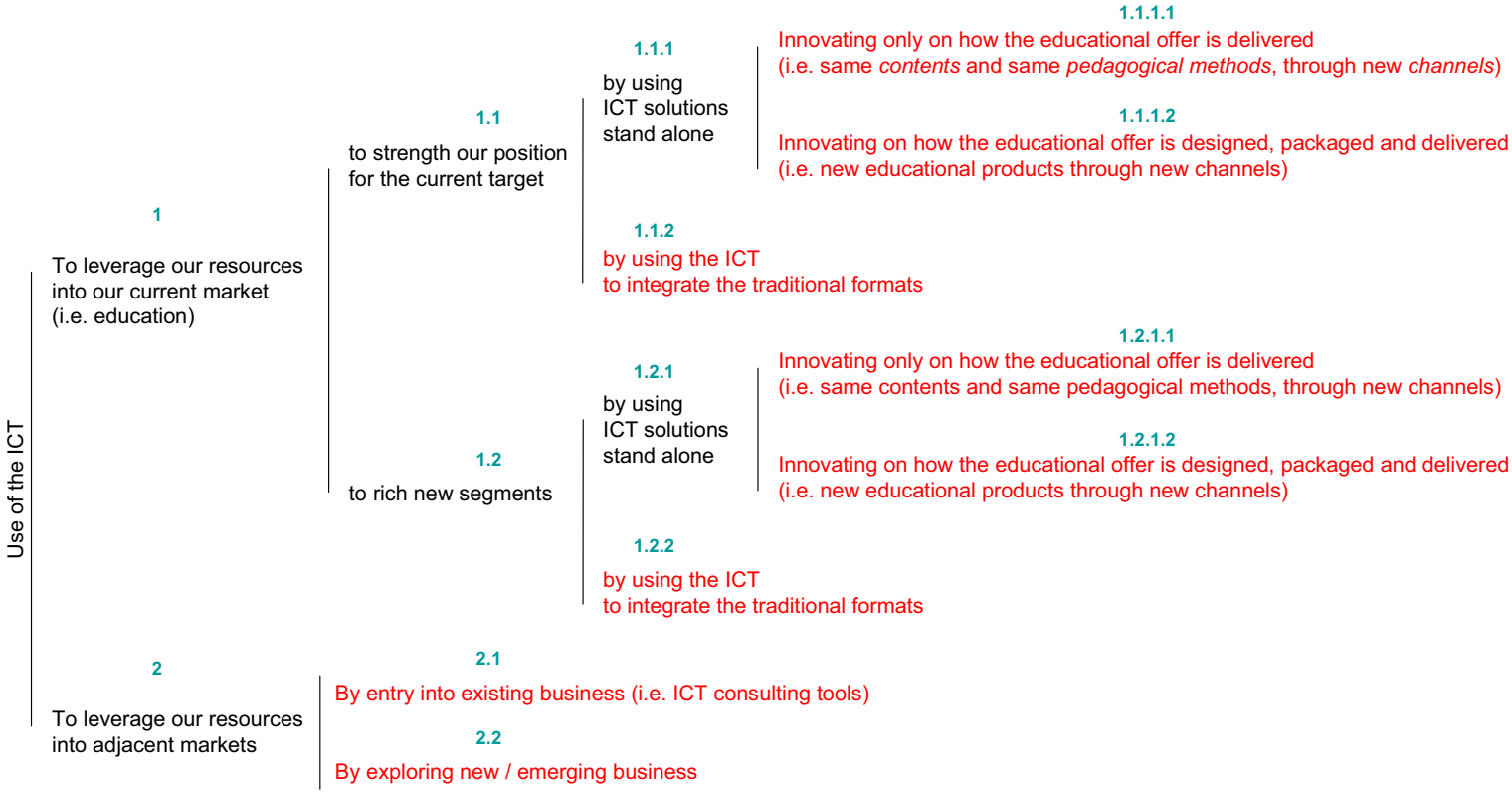

Fig. 3. Mapping the strategic options that ICT can offer to a traditional educator

With regard to the second option (1.1.1.2. – Using ICT to strengthen our position in our *current market* and *current segments*, by adopting *stand-alone* ICT solutions *and* innovating on *the design and packaging of the educational offer*), the critical question is different: are we going to replace or cannibalise our traditional offering? This seems to be the case almost by definition, but not a problem in itself. What is important, in fact, is to be clear about the following issue: what reasons do we have to assume that profits, after replacement, will be higher? In other words, we should clarify if and why, by substituting part of our current offer with new stand-alone ICT products for our current target market, we would experience either lower costs with similar revenues or unvarying costs with increasing revenues. In general – but not necessarily – these conditions might be quite hard to prove. In this case, the option cannot be defined in retrospect as a valuable strategic choice. It is evident that the second option strongly relies on the vision of the future shared by the business school's managerial board.

Moving to the third option (1.1.2. – Using ICT to strengthen our position in our *current market* and *current segments*, by adopting new ICT tools and methods *to integrate* our traditional in-class format), the critical question becomes whether we are choosing the right ICT instruments for the right kind of knowledge being transferred. This has already been discussed in the previous sections, when we speculated upon the different value of ICT according to the type of content being taught. More generally, it is important to determine whether and how we are increasing either the efficiency or the effectiveness of our courses through ICT. An increase in efficiency may result from time or cost savings for the participants. Is this the case? An increase in effectiveness, on the other hand, may result from better/easier learning experiences for the specific kind of knowledge. Is this the case? And, if so, is such enrichment communicated to and perceived by our current target? And last but not least, what is the expected impact on costs and overall profits? In many cases, following these guidelines, ICT may become an interesting strategic option or even a necessary evolution when competitors have already started along this track.

As regards the fourth option (1.2.1.1. – Using ICT to strengthen our position in our *current market* by targeting *new segments*, adopting *stand-alone* ICT solutions and only innovating on how our traditional offer is *delivered*), we need to reaffirm how the general evidence suggests that not reconfiguring traditional contents and methods is extremely risky in terms of the value offered to learners. This means that, before proceeding, we should consider whether there is a relevant segment for this poorer version of the product. The question is essentially the same for the fifth option, discussed below, except that here our ICT offering might be especially inadequate, making a rigorous answer particularly critical before considering this strategy as a valuable one.

The fifth option, as mentioned above, (1.2.1.2. – Using ICT to strengthen our position in our *current market* by targeting *new segments*, adopting *stand-alone* ICT solutions as well as innovating on how the educational offer is *designed and packaged*) requires a similar analysis, starting from the kind of benefits we could deliver to a new segment (e.g. people ready to accept a poorer educational experience in exchange for more flexible time of "consumption" or lower costs; as well as people with specific needs that can be satisfied in a more effective way using ICT), and then asking whether this is a relevant segment. As we already know, this means understanding whether the number of customers and their willingness to pay would cover our fixed and variable costs (plus the expected profits) if we chose this option. Similarly, it is necessary to understand the future profitability of this particular segment, checking, first of all, whether it is actually growing. Moreover, it might be more important to consider whether this is a defensible segment, that is, whether potential competitors may have better resources for providing the benefits we plan to offer. Only after clarifying these issues can this be considered an interesting strategic option.

As regards the sixth option (1.2.2. – Using ICT to strengthen our position in our *current market* by targeting *new segments*, adopting new ICT tools and methods *to integrate* our current in-class format) the basic point to address is the effect of this strategy on the value proposition for our original target market. The question we should ask is: would this policy lower our standing? Indeed, if business schools start integrating their current format with ICT solutions in order to make novel programs more attractive to a new segment, they might discredit their perceived image in the eyes of their previous customers, especially if the two segments have different needs. Bearing in

mind this possibility (better value for the new segment, lower value for the original target market), a more rigorous analysis should be carried out to understand what the overall competitive effect would be on the customer base. As in the previous case, in order to evaluate the strategic relevance of this option, the issue should be analysed both in current and future terms.

The last two options relate to the use of ICT to move into adjacent markets. In particular, the seventh option (2.1. – Using ICT to enter *adjacent*, *existing markets*) stems from the literature on market diversification. Without pretending to be exhaustive, we should ask, for example, whether there are common costs or synergies with our core business. Whether, other than that, we have the specific competence required by the new market. More generally, we should consider whether we possess all the necessary resources to overcome any barriers and to face possible retaliation from the incumbents. Retaliation may also take the form of an agent from this market (e.g. the consulting market) entering our main market (the education business), for example by using the same ICT potentialities that we have been discussing in this article.

Finally, the eighth option (2.2. – Using ICT to explore *adjacent*, completely *new markets* or emerging markets) – partly reflects what we have said about analysing new segments and, in part, what we have explained about penetrating an existing market. How important is the untapped market? Is it also relevant in future terms? Is this position defensible against future competitors? Do other firms/institutions/competitors possess more suitable resources for this new business? A certain degree of risk, of course, is implicit in any new enterprise. Nonetheless, the business school will take a more conscious decision, if it faces these thorny issues in advance. This is something happened in the "International Executive Market" case, as the following pages reveal.

7. Applying the Framework to Understand a Real Case: The International Executive Market

Design of the field study

In order to explore how the framework could be applied in reality, we investigated the case of the launch of an executive master in marketing and sales coordinated by a primary business school, *Instructa*[1] ranked in the top 40 of the Financial Times MBAs list.

Since the purpose of this analysis is exploratory, we have chosen a highly significant case, whose analysis is able to provide us with new knowledge on this topic. Hence, the specific case has been selected because of three main reasons at least:

1. The case regards a well-known business school, regarded as a competent player in the executive education in general, and particularly in the application of technology-supported educational programs;
2. The case refers to a start-up project, allowing us to get access to the assessment of the strategic decisions taken by the program managers before appreciating the outcomes of its implementation, which otherwise could have affected the managers' analysis of the strategic process;
3. We have been able to get both the access key managers of the program to obtain their endorsement and the access to primary data easily.

These requirements lead us to the "*International Executive Market*" program, to be launched in January 2007 by *Instructa* in collaboration with another leading European business school, *Tegenda*. The program targets the international market of post-experience education in marketing and sales, and it will last for 13 months. Most important for the purpose of this study, it draws heavily from technology-supported education, being based on distance-learning sessions using

[1] For confidentiality reasons, names of business schools surveyed in this study and of their programs are fictional. The choice of maintaining fictional names is mainly due to the fact that the program investigated in this study is in its start-up phase, and therefore the analysis of the underlying strategy in using technology-mediated education includes highly-sensitive information that the interviewees requested not to be disclosed before the effective launch of the program, which will take place after printing this article.

information technology for about 52% of the workload, and on in-class sessions also leveraging on information technology tools.

Data were collected through in-depth interviewes to the program managers, using a semi-structured protocol of questions as recommended in qualitative field study researches (e.g. Bourgeois and Eisenhardt, 1988; Yin, 1984). The interviews were tape-recorded and their transcription cross-checked among the three researchers participating to the survey. Whenever inconsistencies were discovered or gaps resulted unfilled, we returned to the interviewees to ask for further questions with purposes of clarification.

Data presentation and analysis

The "*International Executive Market*" program fits into a broader strategy of *Instructa*, whose mission has been revised in recent years to stress the impelling needs of expanding its presence from the domestic market of executive education – where the business school is maintaining for over three decades a leading position – to the international market – where the business school is rapidly expanding its market share but still needs to strengthen its competitive positioning.

In complying with this mission, the managers of "*International Executive Market*" have been asked by the Dean of the school to design a program with a clear positioning, articulated in two main features:

1. It should target international participants;
2. It should involve leading international partnering schools in the production and delivery of the educational product.

A few results from this case appear to be relevant. First of all, grounding conditions are extremely useful in setting the field for the school choices on ICT. Indeed, the use of ICT in the "*International Executive Market*" program seems extremely consistent with this strategy, as it helps in facilitating the implementation of the market strategy, both on the demand side and on the supply side. Specifically, the managers have paid great attention to defining the target:

> *"We considered to target both prior students of Instructa that normally would have not considered to come back to this school investing in time because they still maintain a valuable position in their company. But we also wanted to go beyond the traditional target market, expanding our geographical reach. The approach was mainly to use ICT to go beyond the current market, to segments we weren't able to access".*

That definition allows them to primary focus on exploring new market opportunities, reaching segments that could have found too little interest in traditional programs. In order to avoid a risky overlapping of positioning, *Instructa* and its partner pay great attention to the targets' needs and define a completely different value proposition accordingly. Hence, even if the use of ICT-based educational model is deeply grounded in technological skills, it is driven by a well-defined strategy that looks at the market potential as the key criterion:

> *"People that are working for many years do not want to leave their workplace for one year, or for several weeks or several months to gain new tools and techniques that management education can offer them, but if you design a program that allows them to come to the Instructa location and experience the life within the campus for a shorter period – e.g., staying with us for a week – while being able to get those tools and techniques while staying for longer period at their location, then we though a program for senior managers might have sense.....I think a key reason for making an application to this course is exactly that they do not need to leave their workplace but still they can study, learn and obtain their master degree. The only way you can do this is if you put emphasis on distance learning. It isn't distance learning why the opt for this program, but it's distance learning that allows them to reach apparently conflicting objectives. So for them, albeit if indirectly, it's really important".*

Of course, in pursuing this strategy, *Instructa* heavily draw upon existing competencies accumulated over the years and past experiences. Indeed, the critical role of ICT is acknowledged over the years in this business school, which decided to invest heavily in proprietary applications of technology-supported education, as potential sources for competitive advantage:

> *"We have a platform which is quite standard, but for specific learning sessions Instructa has developed an internal information technology center which is working heavily to design interesting, applicable and exciting distance learning session....there are different types of distance learning sessions, synchronous and asynchronous ones....Instructa has set up proprietary technologies together with other educational institutions, allowing us to have synchronous sessions where the participant sees in real time the instructor explaining the concept, he can interact sending messages through the web with him, and the instructor can reply to the message also involving other students in the discussion".*

Further, from a supply-side perspective, this strategy allows the development of distinctive skills that facilitated the implementation of a collaborative strategy with a well-respected international partner. The latter sees the alliance as a mean to exchange not only a privileged access to the local market, but even more an access to consolidated technology-supported education routines and procedures considered difficult to be replicated in a stand-alone strategy. Hence, the analysis shows the competitive role of ICT investments, highlighting how the accumulation of skills in technology-supported education can be considered as a core competence by competitors targeting similar markets, leading to a conversion of competitive tensions into converging forces of collaboration.

Another important finding of this study refers to the sequence of strategic choices, which, even if mostly implicit, is consistent and it mirrors *ex-post* the proposed strategic framework:

> *"It's difficult to say that we had an explicit and well-defined strategic intention when we started to conceive this programme, even if examining a posteriori our activity the underlying rationale implicit in our choices is what we discussed so far".*

However, the interpretation of this process as the typical strategic decision supports the overall internal coherence of the educational product. *Instructa*'s managers are not only able to exploit their skills to configure advanced solutions for the "*International Executive Market*" program, but also work explicitly to adapt them to the specific needs of the selected market. Indeed, they draw heavily upon a variety of technological options, including advanced communication technologies (such as real-time interactive virtual classroom), educational technologies (information models facilitating human-computer communication, and user acceptance tools) and network tools (web browsers, chat rooms, video conferences on broadband, and LearningSpace), as they state:

> *"We have a platform which is quite standard, but for specific learning sessions Instructa has developed an internal information technology center which is working heavily to design interesting, applicable and exciting distance learning session....there are different types of distance learning sessions, synchronous and asynchronous ones....Instructa has set up property technologies together with other educational institutions, allowing us to have synchronous sessions where the participant sees in real time the instructor explaining the concept, he can interact sending messages through the web with him, and the instructor can reply to the message also involving other students in the discussion. […] Asynchronous sessions go from very simple ones, where the participant can access a webspace to download documents and post questions or assignments, to more advanced ones, including the possibility to download videotapes, and so on...the main goal is to allow participants not to spend time at the business school but to be able to be spread over the world, in their office, leverage on the tools and technology that Instructa and Tegenda make available to them to get access to excellent and effective teaching material without the need to be here physically".*

Further, they focus their efforts according to the specific needs of the market segment, to exploit the potential of available ICT options, by designing the most suitable solution:

> *"We have integrated solutions rather than stand-alone because we think that to raise interest in the topic it's important to start with face-to-face sessions. You set a common understanding, a common text, in some cases you bring interest in why it is relevant to focus on that topic...it's not that you cannot do that in distance but starting with face-to-face is very valuable. We start by teaching concepts and models in face-to-face sessions and then we move on tools and techniques for applying the models through distance learning. We think spending time in understanding and learning conceptual models in distance is not effective, and that they perceive as not appropriate to pass time in class for seeing the application of the models through exercises".*

While the presented findings seem to support the argument that technology choices logically follows the well-established sequence of the strategic analysis – product configuration, working alternatively as an integrative or substitutive tool for education, there is some evidence in our analysis that seems to push further this argument, by disclosing a co-evolutionary dynamic between traditional and technology-supported educational products. This evidence is implicit in the following quotation:

> *"Basically for us ICT becomes the core part of the course. The use of ICT also changes the face-to-face sessions, because for each face-to-face sessions you also have on the platform you have a bunch of resources that widen you flexibility in teaching concepts. Moreover, the use of ICT does not only require you to think carefully to the design of your distance learning session but also requires you to re-think at your face-to-face session, becoming an integral part of the hole course and program set-up."*

As the case of *Instructa* suggests, the widely discussed dichotomy between integration vs. stand alone use might become less relevant when adopting a market-based view of technology-supported learning. Indeed, the merge between face-to-face teaching approaches and the on-distance ones, when coupled with a specialization per type of topic, could eventually result in an overall improvement of both the effectiveness and the efficiency of the learning process. Moreover, while allowing the participants greater flexibility in the management of time, the integration of ICT also provides novel sap into the traditional format, widening the spectrum of resources available to the instructor in soliciting cognitive processes of the participants, and enabling innovation on how the educational offer is designed and delivered, besides packaged.

8. Conclusions

In this paper we have explored the strategic process of adopting technology-supported programs in management education. ICT have reached a considerable diffusion in management education in recent years, yet there has so far been little development in analytical models to assess whether ICT can contribute to creating better educational products and how. Indeed, most of the attention has been gathered by emphasizing the technical features of these solutions, without questioning their values and without providing a general framework for the benefits analysis.

In order to address this issue, we have shifted the focus from a technology-driven view to a technology-supported view of educational programs which includes ICT, claiming for an instrumental role for technology in the broader educational strategy of business schools.

Firstly, we identified and discussed the main advantages of ICT applications for educational programs, clarifying the reasons why business schools should pay great attention while choosing the most suitable application. Secondly, we proposed a typology of ICT options based on their mode, interaction and media used. Thirdly, we applied the traditional strategic marketing process to identify the key issues that should be addressed by business schools when considering implementation of technology-supported education. A simple but easily generalised framework links technological

choices to the competence profile of educators and market conditions, allowing education managers to detect the rationale behind educators' strategic choices on ICT. We have thus highlighted the key issues facing educators when starting the process of implementation of technology-supported education programs. Finally, we present the case of *"International Executive Market"* and we apply the proposed framework to interpret their decisions and processes. Specifically, the empirical evidences provide a deeper analysis of the strategic approach, with particular regard to expanding the market.

Our study contributes to existing literature on TSE in several ways.

First, it contributes to expanding the scope of analysis about the effects of TSE programs, by focusing on the effectiveness as well as the efficiency sub-dimensions of TSE outcomes. Secondly, it clarifies ICT educational applications, by presenting a holistic typology. Thirdly, it contributes to current research on ICT adoption in management education, by providing an integrative framework where different technologies are chosen according to a strategic analysis of various educational models. In this model, technology emerges as a bridge between an inside-out perspective based on the educator's competence profile and the outside-in perspective based on the needs of our target market.

Two main managerial implications arise from this analysis. On one hand, when considering how technologies could fit into their educational programs, managers should reframe the sequence of the adoption process, by looking at technology as a dependent variable, which follows strategic choices about the exploration/exploitation of their competence profile and about the specific characteristics of the target market. In other words, technology by itself will not be effective or efficient if simply inserted into an educational program which is either managed by poorly-skilled educators, or not suited the target market's characteristics. On the other hand, when looking at technologies as a specific component of larger educational products, which must be coherent with the overall educational strategy, business schools' managers should pay less attention to technology's effects per se, focusing instead on the systemic effects of ICT, including issues such as consistency with the present portfolio of activities, the imitability of the new educational offer, or the possibility of defending their position from new competitors. As the *"International Executive Market"* case illustrates, a strict use of ICT can be regarded not only as the basis for new competencies, but also as a driver of greater value for traditional critical areas.

Our framework is intended to support those who wish to design an effective technology-supported educational system. We are aware that, in order to do so, business schools need to consider the specific features of their institutions, by analysing the particular system of knowledge at their disposal. At the same time, we are persuaded that, as for any other managerial issue, it is important to adopt a general framework when trying to define the path and the sequential steps of the process.

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ANNEX – LIST OF QUESTIONS USED DURING THE INTERVIEW

In this study, we are interested in understanding what kind of growth options the new ICT can open to business school like yours, and what are the key issues in the adoption of ICT in educational programs. Here are some questions we would like to ask you to begin the discussion.

1. Are you planning to use ICT applications in your program? If so, why?
2. What types of ICT applications are you planning to use in your program?
3. What are your goals in the adoption of ICT applications in your program?
4. How does the targeted market influence, if so, the choice of adopting ICTs in your program?
5. How does your previous skills influence, if so, the choice of adopting ICTs in your program?
6. May I ask you to re-construct the process that led you to decide the adoption of ICTs in your program?
7. What are in your perspective the potential benefits of the ICTs you will adopt in your educational programs?
8. Are you planning to use ICT-based stand alone solutions during your program (no traditional teaching associated with them?) If so, why?
9. Are you planning to use ICT-based solutions integrated with traditional teaching in your program? If so, why?