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WEB-BASED DISTANCE LEARNING PROGRAMMES: AN EXPLORATORY INVESTIGATION OF ITS CRITICAL SUCCESS FACTORS

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Abstract

Organizations have been making in the last years heavy investments in Web-based distance learning initiatives. Despite the many uncertainties that this involves, part of the teaching and learning processes are moving towards the Internet. These uncertainties bring about difficulties for managers, who face the challenge of keeping the focus on essential and relevant aspects that will assure programmes success. However, what would these factors be? This article aims at answering this question by identifying the critical success factors of Web-based distance learning programmes. With this objective, nine semi-structured interviews with experts were held and two case studies were carried out. Results point to the existence of five critical success factors, namely (1) the experience and background of the program teams, (2) the students' characteristics and behavior, (3) the learning model, (4) the technology and (5) the establishment of strategic alliances.

Key-words: E-learning, Web-based distance learning, virtual learning environments, distance education, asynchronous learning networks.

1 Introduction: context, problem and objective

Even if many researches have shown the merit of technology in learning environments, information technology traditionally has assumed a secondary position in education [1, 17]. In fact, it is not difficult to understand why Alavi, Wheler and Valacich [3, p. 293] said that “although our corporations, industries, and economy have made a transition into the information age, our educational system has been left behind in the industrial age”.

Nevertheless, “advanced and emerging information technologies are increasingly viewed as a key resource in enabling new and effective learning processes and educational innovations” [3, p. 294]. In effect, the situation described above is changing in recent times. More than alternative tools for the traditional classrooms, the new information technologies – specially the Internet – have been pointed as the solution for the creation of virtual learning environments, enabling a flexible distance education as it was never possible before [2, 10, 23, 24].

In the last years, heavy investments in Web-based distance learning have been made by companies and teaching institutions [2, 7, 23] reflecting a favorable context for the development of a Web-based electronic market of learning [10]. Besides the Internet expansion, there are many others factors pointing to this: the demand for continued education, the increased costs of conventional education, the convergence of digital technologies, the development of an e-commerce infrastructure, the rapid obsolescence of knowledge and information, among others [7, 10, 23].

However, research on this subject is still insufficient [2, 18, 21, 23, 24] and organizations acting in this field still have unanswered questions. Despite its evident importance, defining and working on the technological aspects is not enough. It is necessary to analyze a series of other elements related to communication, pedagogical project, instructors, students, technical support team, and so on. The challenge for managers also increases, as there are few experts in the subject. Wrong decisions may jeopardize the success of a program under development, and among the several choices that must be made while establishing a strategy, it is important to keep the focus on the critical success factors (CSF).

But what are the CSF in Web-based distance learning? What problems could they cause? This article intends to be a step towards the answers of these questions as it aims at identifying the critical success factors of Web-based distance learning programmes. The results are meant as a contribution in this direction, also working as subsidies for organization managers in the planning and management of e-learning programmes.

We precise that the CSF of Web-based distance learning programmes are defined as a limited number of areas that must achieve satisfactory result to make an initiative of Web-based distance learning a success. This definition is based in previous studies about CSF [8, 20, 22]. The article is organized as follows. In the next section, we discuss about previous concepts and research from literature, followed by a presentation of the method used (section 3) to obtain the research results (presented in section 4). Conclusions and research limits are dealt with in section 5.

2 Web-based distance learning

The use of Internet technologies for distance learning has been object of attention of professionals and researchers lately. However, since the research is new and fragmented, there is a

“[...] lack of standardized terminology to describe DL [Distance Learning]. The words distributed, distance, online, Internet or Web-based are often used interchangeably to describe training, education, learning, or instruction. [...] In addition, the terms e-learning and cyberlearning are appearing with increasing frequency in the literature” [23, p.137].

These different terminologies are, in essence, the consequence of the multidisciplinary character of Web-based distance learning programmes. These programmes involve different fields of knowledge and each one deal with the phenomenon according to different theoretical bases. However, there are several studies in the MIS (Management of Information Systems) area about technological-based learning environment madden even before the Internet expansion [e.g. 1, 11, 12, 17, 18].

One concept largely used by MIS researchers is *Asynchronous Learning Networks (ALN)*, “a form of e-learning that emphasizes the use of Internet to support class discussion and activities.” It “uses the World Wide Web and the Internet to deliver courses, with emphasis on student-student as well student-teacher interaction” [9, p. 169]. *Virtual learning environment (VLE)* it’s another important concept from IS area. It’s “defined as computer-based environments that are relatively open systems, allowing interactions and encounters with others participants and providing access to a wide rage of resources” [21, p. 403]. Piccoli, Ahmad and Ives [21] use the expression Web-based virtual learning environments to refer to those virtual environments that are built in the World Wide Web.

We can observe in both definitions the emphasis on interaction among participants. Interaction constitutes a key element for the effectiveness of any learning environments [1, 18, 24], and the use of the World Wide Web for delivering courses has the considerable advantage of

allowing rich interactions and collaboration among students and instructors. This is particularly significant once traditionally distance learning presents low levels of interaction.

It is also important to specify that the expression *Web-based distance learning programmes* used in this work refers to the initiatives developed by organizations who have as objective to promote courses formed by *Web-based distance learning environments*. We can say also that they are programmes that promote courses that are *Asynchronous Learning Networks*.

The virtual learning environments can also be defined in terms of time, place and space [21]. These three dimensions are vital because they represent the basic aspects for the distinction between virtual and physical learning environments (see Table 1). Through them, we can understand the flexibility enabled by the VLEs, from where come most of its advantages.

Table 1 – Dimensions of learning environments

Dimension	Definition	Comparison
Time	The timing of instruction. VLEs free participants from time constraints.	When instruction is delivered asynchronously in a VLE, participants retain control as to when they engage in the learning experience. Learners determine the time and pace of instruction.
Place	The physical location of instruction. VLEs free participations from geographical constraints.	Participants access the learning material and communicate with classmates and instructors through networked resources and a computer-based interface, rather than face-to-face in a classroom.
Space	The collection of materials and resources available to the learner. VLEs provide access to a wide array of resources.	While it is feasible to expand the traditional model of classroom-based instruction to include the variety of resource available in VLEs, generally these materials remain only a secondary resource in instructor-led classroom education.

Source: Piccoli, Ahmad and Ives [21, p. 404].

A framework proposed by Piccoli, Ahmad and Ives [21] shows the dimensions of VLE effectiveness. It gives an idea about the number of variables that can affect the Web-based course outcomes and so, about what can be important for the success of a Web-based distance learning programme. These variables are related to two dimensions: (a) the *design dimension* predicts that aspects related to learning model, technology, learner control, content, and interaction can affect the VLE effectiveness, and (b) the *human dimension* predicts that aspects related to students and instructors can also affect the VLE effectiveness.

a) The design dimension: learning model, technology, learner control, content, and interaction

The **learning model** represents the heart of any learning process. They influence the instructional design of virtual learning environments and consequently its effectiveness [21]. In fact,

Leidner and Jarvenpaa [18, p. 266] believe that “the effectiveness of information technology in contributing to learning will be a function of how well the technology supports a particular model of learning and the appropriateness of the model to a particular learning situation”.

A presentation of the existing learning models is beyond the objectives of this study. In a simplified way, we can say that there are two main models: the objectivist or behavioral and the constructivist models. The first one assumes that there is an objective reality which can be represented and communicated. Learning would be absorption of knowledge by learners or the transferring of knowledge from instructors to students. On the other side, constructivism sees the reality as the result of individuals or society construction, and learning would be the development of abstract models to represent this reality. Nevertheless, there are several derivations of the constructivist model, as collaborativism, cognitive processing information, and socioculturism, which have currently many defenders in academy [18]. In effect, several authors [e.g. 1, 3, 13, 24] believe that the virtual learning environments, or even technology-based environments, are more effective when constructed according to the principles of constructivism and collaborativism. An excellent summarized presentation of these learning models can be found in Leidner and Jarvenpaa [18].

Another important element refers to the **technology** involved in distance learning. The quality and reliability of technology, “as well as easy access to appropriate hardware and software equipment, are important determinants of learning effectiveness, particularly students’ affective reaction to the learning experience” [21, p. 407]. Certain technologies are better to support some specific learning models [18], even if others technologies – including the Internet – serve for the construction of learning environment based in different learning models [21].

Between the several technologies needed to develop Web-based distance learning programmes, the software packages available commercially for the construction of Web-based VLEs (e.g. Lotus LearningSpace, Blackboard, Convene, LearnLinc, WebCT and the Brazilian AulaNet) play a central role. These software packages are particularly important once they limit or even define the instructional design of a Web-based learning environment. Moreover, Arbaugh [5, p. 50] also believes that “student attitude toward course software package suggest that an instructor’s skills and experience in conducting Web-based courses could go for naught if students don’t like the course software package”.

The next aspect of the design dimension is **learner control**. It “refers to instructional design where learners make their own decisions regarding some aspects of the path, flow or events

of instruction. More precisely, learner control is the degree of discretion that students can exert over the pace, sequence, and content of instruction in a learning environment” [21, p. 408]. Many researchers believe that there is a positive relation between learning environment effectiveness and learner control. This relation is supported by the constructivism and its derivations, which defend high levels of student control in learning environments [18, 24].

The **content** may also influence the Web-based learning environment effectiveness. It is possible that certain contents adapt better to the VLEs, but until now researchers does not know exactly what kind content is more adjusted to the VLEs. However, once new technologies enables great interaction among the participants, it is possible today to use Web-based VLEs for a distance education that emphasizes discussion, collaboration, and critical thinking. Thus, the virtual learning environments “appear well suited for a wide range of topics and contents” [21, p. 408].

In one of the first studies about VLEs, Hiltz [11] identified that the environments outcomes depend strongly of the **interaction** and collaboration level established among the participants. In addition, “with the respect to the affective dimension, high levels of interaction may ease the feeling of isolation, anxiety, and confusion” [21, p. 409]. This conviction of the interaction importance is sustained by many authors [e.g. 1, 3, 13, 24] and has its theoretical bases in the constructivist model of learning, and specially, in one of his offspring that is the cooperative or collaborativist model. From the interaction point of view, the main difference between both models is that “whereas in constructivism learning is assumed to occur as an individual interacts with objects, in collaborativism, learning emerges through interaction of individuals with other individuals. Learning occurs as individuals exercise, verify, solidify, and improve their mental models through discussion and information sharing” [18, p. 268]. On the other hand, “few studies have evaluated the learning outcomes as a function of participant interaction in VLEs [21, p. 409].

b) The human dimension: instructors and students

Students have a bigger responsibility and control in virtual learning environments than in the physical ones. Thus, they play also a central role to the success of Web-base courses [18, 21]. In effect, the lack of conditions as experience, skills, technology comfort and effort by the students, can annul any profit that the information technology can bring to a learning environment [5, 18].

Hiltz [11] identified, for example, that learning outcomes in virtual learning environments are better if students are motivated, if they have good access to the required equipment, and if they

take advantage of the opportunity to increase the interaction with professors and with other students. The author identified also that students who do not have basic skills such as self-discipline have superior outcomes in traditional learning environments than in virtual ones. Salomon and Almog [24] explain what are the more relevant points about the students according to their opinion:

[...] It appears that at least two psychological forces may constrain the unlimited spread of distance learning in virtual classrooms. One such force is students' need for face-to-face, real (rather than virtual) contact. [...] The second limiting factor is the difficulty many learners have with self-discipline and self-monitoring in the face of routine learning tasks. Students seem to need the boundary-setting, guidance, and motivation-sustaining functions that a regular classroom with its peers group and teacher usually provide (p. 237).

Equally, **instructors** play also an essential role in virtual learning environments. Arbaugh [4] affirms that instructor function in online courses presents differences in relation to the traditional ones. One of the most significant is that they exert more an orientation role, and the success of a virtual learning environment depends more on the collective effort of all participants. Hiltz [11] believes that the success of a VLE depends of the extension in which the instructor is capable in constructing and sustaining cooperative learning groups, being necessary new kinds of abilities to teach in this way. In fact, Coppola, Hiltz e Rotter [9], recognized role changes enacted by instructors in Web-based courses. Changes in cognitive role (e.g. instructors are more reflective and deliberate); affective role (e. g. absence of nonberval cues, such as eye contact, body movement and facial expressions; more formality and less humor); and managerial roles (e.g. instructors spent a lot of time gathering and organizing materials, and planning the course).

All these aspects about human and design dimensions can represent critical success factors of Web-based distance learning programmes, once they can have a deep influence in virtual learning environment effectiveness. However, there are others aspects that may be equally important, as the aspects associated to the programme management. For example, the organization of strategic alliance seems to have an important role in the development of Web-based distance learning programmes. In fact, “the corporate developments and strategic alliances in e-learning could produce a revolution in the way education and training is delivered in the knowledge-based economy, massive ly increasing the distribution of knowledge globally through the Web” [7, p. 267].

2.1 Previous works on CSF on Web-based distance learning

Even if there are several studies questioning, reflecting, dicussing or analyzing experiences in Web-based distance learning, just a few have tried to verify the CSF. Most works call attention for some specific points, but do not use really the concept of critical success factors. Bronfman [6],

for example, presents the success factors of an e-learning initiative in a European bank. But the author focus the study in a factor that considers particularly important: “a pedagogical framework aimed at promoting learning by doing and who structure training material in activities based on the learners' everyday coping at their workplaces” [6, p.1]. In this way, Bronfman [6] does not actually try to identify all aspects that can be critical. On the other hand, we found in the works of Papp [20] and Volery and Lord [25], presented below, the same concept of CSF used in this article.

Papp [20] points out that there are seven CSF in elearning programmes of educational institutions, namely, (1) the establishment of security criteria for organizations to guarantee their intellectual property; (2) the pedagogical approach analysis and the possibility of adapting courses to a virtual environment; (3) the consideration of the necessary time for course development; (4) the content adaptation in order to maximize both the use of available technologies and the student's learning; (5) the preparation to deal with unexpected problems; (6) the decision between using specific software or building one's own Internet learning environment; and (7) the continuous evaluation of the course performance. There are nevertheless some significant limitations to Papp's work, as these factors were determined merely from his perception after the development of three distance learning courses in an American university.

Volery and Lord [25] describe the results of a survey conducted among 47 students enrolled in a Web-based management course at an Australian university during the first semester 1999. The authors identified “three critical success factors in online delivery: technology (ease of access and navigation, interface design and level of interaction); the instructor (attitudes towards students, instructor technical competence and classroom interaction); and the previous use of the technology from a student's perspective” [25]. The main limitation of the study is the small sample size of 47 students.

However, several types of research in this area are still necessary [2, 21, 23]. There are aspects requiring better understanding and critical success factors are not entirely known yet, so needing to be further explored [23].

3 Research Method

To attain the objectives of this study, the research method was based on two case studies [26] and nine semi-structured interviews with experts on the subject in Brazil (Figure 1). This study has an exploratory nature and uses qualitative data fundamentally [19].

Based on the literature review, a semi-structured interview guide was devised with two kinds of open questions. The first one constitutes a group of five generic questions, with the aim of evaluate the spontaneous perceptions of experts about what are the most important points in Web-based distance learning programmes (e.g. What are the most important things that corporations or teaching institutions should consider when they start to work with Web-based distance learning? What are the bigger difficulties in the implementation of Web-based distance learning programmes?). The second type of question is formed by a group of sixteen specific queries about different subjects relating to Web-based courses. The questions were based on the literature review and on the authors' participant-observation in a distance learning center (e.g. The Web-based distance learning programmes that you know utilize specific Web-based courses software packages (e.g. WebCT, Learning Space, AulaNet, etc.)? Do you believe that these systems are good tools for the development of Web-based course? Why?).

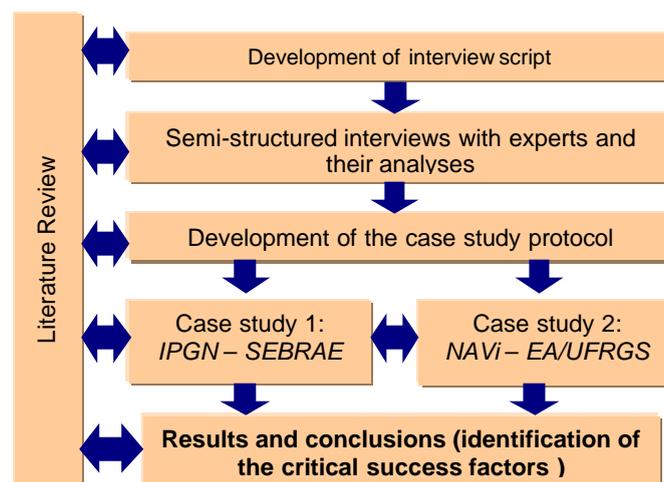


Figure 1 – Research design

Three experts revised the interview guide checking its relevance and clarity. Displaying two profiles, nine interviewees were selected according to their knowledge and commitment to Web-based distance learning programmes:

(1) Five professors with research and publications in the area, also involved with the management of Web-based distance learning programmes.

(2) Four managerial level professionals of organizations that adopted Web-based distance learning for team training, offering courses, or providing services to other organizations. These professionals work in a large telecommunications company, a company that offers e-learning

services, an university that offers undergraduate programmes via the Internet and a sizeable institution that does personnel training.

The interviews were held between August and December 2001 and they were all recorded, transcribed, and analyzed through content analysis. The five generic questions were analyzed together, even if each answer were individually interpreted. The text was decoded in elements (register units), which were classified and grouped. The criterion for the register units' selection was by theme (thematic analysis), according to Bardin's [5] procedure suggestion. In order to identify the CSF, the attempt has been made to verify the elements considered the most important ones for Web-based distance learning programmes and those that could lead to significant problems. It was considered more important the thematic units the respondents had cited that more, accepting the postulate that the importance of a register unit increases with the frequency where it appears [5].

A summary description of this analysis result is presented in table 2, where we can observe that the register units (in form of organizations actions) of the thematic analysis were grouped in seven different themes. The interviewees had made 82 suggestions of action, many of them repeated by up to 6 experts, resulting in 39 different actions recommended. Aspects related to the student, learning model and technology are the most significant ones, and only actions related to the students were suggested by all the nine experts.

Table 2 – Summary description of generic questions analysis result

Groups (elements or register units)	(A)*	(B)*
Student (e. g. to evaluate student self-discipline; to avoid student feeling of isolation and abandonment; to provide student cultural adaptation to a new learning environment, the virtual one)	9	16
Learning Model (e. g. to define a pedagogical model and project to guide the activities)	7	16
Technology (e. g. to evaluate the required technological infrastructure; to avoid focus on the possibilities of the technology; to define softwares for virtual learning environment development)	8	15
Management (e. g. to pay attention on the implementation phase; to look for partnerships and strategic alliances)	6	11
Team background and experience (e. g. to evaluate the capacity of instructors, support team, etc. in developing the necessary activities)	5	9
Objectives (e. g. to define the desired results; to really understand what is a good learning environment in Web-based distance learning)	3	8
Envolvement (e. g. to surpass possibles employee resistances in the organization; to guarantee instructor involvement)	5	7

* (A) Number of interviewees that cited at least one element of the group; (B) Total number of suggestions madden by the interviewees. *Number of interviewees: 9*

The specific questions were not analysed together, but independently. Two kind of analysis were done. First, for all the questions were analysed the general position of each interviewee about

the subject: if he thinks the subject represents a problem or if he thinks the subject constitute an important element in Web-based distance learning programmes, depending of the question nature. In reality, the answers were classified according to three positions (yes, more or less, and no), as the example in table 3. This analysis was also based in Bardin [5]. Following, a more detailed thematic analysis were done in each question, trying to identify the most important elements in the answers, as it was carried through with the generic questions (table 3). Similar analysis as the one presented in table 3 was madden for all the 16 specific questions.

Table 3 – Content analysis example of the specific questions

Question No. 4 of interview guide	Yes, it represents a problem	More or less it represents a problem	No, it does not represent a problem
Many times, the Web-based distance learning is more flexible than the traditional learning, once it makes possible to the student to choose where, when and how to study. However, this flexibility demands a bigger responsibility and discipline from the student. Do you think that this situation might be a problem for Web-based courses?	6	2	1
Elements (register units) from thematic analysis	Number of interviewees that cited the element		
Students must know how to deal with the time	4		
Passivity is a vice of educational system	3		
It is important to prevent students feeling of isolation	3		
It depends of student profile and culture	2		
The student is not used to develop an autonomous work	2		
It is important to motivate the student	2		
Web-based courses demands more active students	2		
It is important to develop attractive materials	1		
It is important to foment interaction	1		
It is important to respect the different levels of students learning	1		
TOTAL	21		

Number of interviewees: 9

Aiming at higher result reliability, two analyses (test and retest) were carried out and then compared, in a process defined as *stability* [15]. A third analysis was performed where the answers were found to be diverging. A protocol contained seven main dimensions of analysis for the case studies was defined from the interview results (see table 4).

The first case study was placed at IPGN - Iniciando um Pequeno Grande Negócio (Starting a Small Big Business), an Web-based distance learning programme of SEBRAE (Brazilian Micro and Small Business Support Service) – a non-profit Brazilian civil society, run privately that provides technical support for the development of small to medium sized companies. It promotes programmes, including several kinds of courses, to stimulate entrepreneurship and the strengthening of small businesses. In the case of the IPGN, data collection was carried out between December

2001 and February 2002, using the techniques of documentation, semi-structured interviews and direct observation. These techniques were used in a corroborative form, in a process called triangulation [26].

Table 4 - Summary of case study protocol questions

Dimensions and aspects analysed in the case studies
The team training and experience in Web-based distance learning programmes (team training; team previous experience in Web-based distance learning; technical support team functioning).
The involvement of employees with the Web-based distance learning programmes (resistances to the Web-based distance learning programme by the employees; instructors' involvement and time availability).
The influence of student's behavior and characteristics (evaluation of students profile; students feelings of abandonment and isolation; student adaptation to the novelties of virtual learning environments; student necessities and desires fulfilness; students lack of time problems; students passivity; motivation actions)
The learning model (definition of a pedagogical project; adequacy of the content to virtual learning environments; courses according with the student culture; existence of not recommended behaviorist practices; focus on interaction and collaboration)
The technological infrastructure (evaluation of the available and necessary technological infrastructure; existence of not recommended focus in the technological resources; evaluation of the Internet transmission capacity; acquisition of equipments).
The precautions with softwares packages for Web-based learning environments (limits and problems with the software packages; actions developed to surpass these limits and problems)
The establishment of strategic alliances (e.g. alliances or partnerships developed; technical expertise source - internal or external; investments in technological development)

The second case study was carried out in the NAVi - Núcleo de Aprendizagem Virtual (Virtual Learning Center), the Web-based distance learning programme of the Escola de Administração (EA) da Universidade Federal do RGS – UFRGS (Business Administration School of the Federal University of Rio Grande do Sul), in Porto Alegre – Brazil. Data collection at the NAVi – EA/UFRGS occurred in a similar way to the one described for the IPGN case, with added participating observation. The data collection also occurred between December 2001 and February 2002 (except the observation, which had started a year before). We do not present in this article all the result description of the case study analysis, but the CSF of Web-based distance learning programmes resulting from the whole research process, i. e. from both interviews and case studies.

4 The critical success factors of Web-based distance learning programmes

The analysis of the research data indicates that there are five critical success factors in Web-based distance learning programmes, related to (1) the qualification and experience of Web-based distance learning programme teams; (2) the knowledge and concern with the student's characteristics and behavior; (3) the learning model; (4) the technology – especially the technological infrastructure and softwares; and (5) the establishment of strategic alliances. Each one

of these CSF is presented below, highlighting interviewees' perception of each factor and the most relevant aspects identified in IPGN – SEBRAE and NAVi – UFRGS case studies.

a) CSF 1 – Team experience and background

The people implicated with Web-based distance learning programmes (managers, computer technicians, educators, instructors, etc.) must have previous experience or specific formation in the area.

This first CSF derives from the existence of important peculiarities about the virtual learning environments that are hardly ever taken into account by people without experience or specific background in this area. These peculiarities are small things, at times details, but which can produce significant impact on the results. A common mistake observed is the attempt to use the same strategies of conventional learning in on-line courses.

Particularly important is the background of the instructors. From their experience, some interviewees state that there are many unprepared instructors working in Web-based distance learning courses. For example, some interviewees have indicated the passive attitude of these instructors in the face of the virtual learning environment. Others have criticized the inadequate search for solutions to decrease their workload, which can be substantially larger in Web-based courses than in ordinary courses if there are high levels of interaction [4, 10].

These findings agree with the propositions of Piccoli, Ahmad and Ives [21] that teaching styles and availability of instructors can affect the effectiveness of VLEs. Arbaugh [4] also found that instructors' classroom behaviors are significantly associated to student learning and satisfaction in Web-based courses. Therefore, Coppola, Hiltz and Rotter [9] confirm that proper training of instructors is an aspect of utmost relevance, since the role of the virtual instructor is particularly complex and different from that of the conventional teacher.

In the case study developed at NAVi – UFRGS, some problems related to the lack of experience or training of its members were identified. None of the NAVi team members had any previous experience or training in Web-based distance learning and even so, they did not attend any specific course or training. Their instruction was informal and happened through their own initiative. However, this was not enough and made it even more difficult to establish a Web-based distance learning programme. Although NAVi had later developed courses that were well estimated by the

students, the process to achieve this result was certainly needlessly difficult and tiring due to the team's lack of experience.

b) CSF 2 – The student: behavior and characteristics

Web-based distance learning programmes must know their students in order to develop actions aimed at fulfilling their needs, helping them to adapt to the virtual learning environments and to acquire self-discipline, and preventing them from feeling isolated or left aside.

This factor is related to students' characteristics and behavior, which exert a strong influence on the effectiveness of a Web-based course [18, 21, 23, 24]. That is why interviewees pointed out that it is necessary to know students' needs and aspirations in order to better elaborate course strategies.

A very important aspect of this factor is the necessity to evaluate students' motivation and self-discipline to attend on-line courses. Since the Web-based courses are usually more flexible than traditional ones, with few pre-scheduled study hours, students must be very disciplined to fulfil their duties without losing heart or even giving up the course. The student must often forego certain habits and leisure activities, being with friends, family and so on. This situation becomes worse with the absence of classmates as these are conceived in conventional terms, once they are a factor of motivation. That is why it is necessary to verify if students are really inclined to incorporate a more individually oriented pedagogical profile, directed towards self-study.

A feeling of isolation is one of the main reasons why students give up Web-based courses. Establishing a strategy of interaction and motivation via course instructors is one possible solution for this kind of problem. Besides, research has proved that virtual learning environments tend to be more successful whenever there is cooperation among students, and that motivation and effort are positively linked to learning [1, 11, 12]. Developing attractive and lively instructional material and respecting students' diverse learning levels, without requiring more than what can actually be given, are other solutions for this problem.

Another difficulty with Web-based distance learning is the required cultural change of the students. Their transition from a conventional learning environment to a virtual one may cause them some troubles, as Interviewee N.3 explains:

In our case, the difficulty we faced in course development and implementation [...] was not giving sufficient value to students' psycho pedagogic circumstances. We simply started by imposing things, without realizing that there must be some time for students to adapt to a

thoroughly new environment. The online student does not exist; you have to create him. So we created online acclimatization programs. From this experience onwards, the output of groups changed completely [...]. This acclimatization process also works as an adaptation to a novelty, and this novelty is not only related to technological resources. The less significant novelty is the technological one, the most significant is the psycho pedagogic one. It is an adaptation to another physical space, a new way of socializing and relating to others, the virtual community. This adaptation demands acclimatization programs [...]. It makes a huge difference for the student in terms of quality and conditions.

The case of IPGN illustrates well the importance of this CSF. Based on the information available on the IPGN website, SEBRAE expected people to rate themselves as being able or unable to take the course. This situation brought about serious problems and it was one of the main reasons of leaving the course. Consequently, lack of time was the main difficulty faced by the students taking part in the IPGN, since the demand for self-discipline to complete the entire program was greater than the participants' interest in concluding the course. The following statement – written in an evaluation document of the IPGN - provides a good picture of the situation:

The required discipline to reach the end of the programme leads to demotivation. Other possibilities of using time impose themselves as external demands or responsibilities. [...] The disciplining factor of committing one's self to a schedule has found no substitute in the programme. On the contrary, the possibility of access at any time (therefore at no special time), in a supposedly easy way, becomes a considerable challenge in terms of self-discipline and organization [14, p.13].

c) CSF 3 - Learning model

Web-based distance learning programmes must define a particular learning model, based on interaction and cooperation, giving special attention to the instructional design and respecting cultural factors related to the students.

This was the most frequently mentioned CSF in the research process, especially in relation to the necessity of defining a pedagogical project, according to a particular learning model (e.g., objectivist, constructivist), to guide the Web-based courses and programmes activities. It agrees with the proposition of Leidner and Jarvenpaa [18, p. 266] that the effectiveness of information technology in contributing to learning is “a function of how well technology supports a particular model of learning and the appropriateness of the model to a particular learning situation”. In Web-based learning environments, this concern was already emphasized by researchers:

Planning for a Web-based distance learning course must be different from planning a traditional course. [...] A corollary is that the developer must rely on a theory of instruction or a model of how education is transmitted via the Web. [...] a prerequisite for quality development and meaningful evaluation is a plan for development supported by an explicit instructional model for the use of the Web. If the outcome is unsuccessful, it is difficult to know what to change in the future if there was no strategy to begin with [16, p. 34].

The interaction and cooperation among instructors and students is once again brought forth. This would be an important evaluation criterion for the learning models of Web-based distance learning programmes:

The interaction between teachers and students is one of the most important criteria when deciding if a learning model is good or not. The more interactive the relation [...] teacher-student and student-student is, the stronger the possibility of communicating in all senses, and the better the pedagogical model will be. It is a very good criterion for you to adapt to the pedagogical model. But it's worth saying that the best pedagogical model is a clear one, even if it's a model that I wouldn't agree on, [...] at least we are doing this, we are not doing it because 'I think that...', something without proper reflection (Interviewee N. 4).

The instructional design is another relevant aspect, mainly when it involves the adaptation of conventional class materials to a virtual learning environment. When developing materials, the fact that this is a completely new experience for the student must be taken into account. Besides, not all students are used to the Internet, and many of them become quickly bored with reading, which makes graphical design even more important. The instructional design defines also the learner control, i. e. "the degree of discretion that students can exert over the *pace*, *sequence* and *content* of instruction in a learning environment" [21, p. 408]. Learner control appears to have an influence in the effectiveness of Web-based VLEs, where it can be particularly high [21].

The last aspect concern to Web-based course adaptation to students' cultural background. In Web-based distance learning, students usually are geographically dispersed, coming from different environments, which makes more complicated to build up courses adjusted to the different learner cultures. This aspect is related to the sociocultural model of learning, from what "knowledge can not be divorced from the historical and cultural background of the learner" [18, p. 269]. The IPGN case is an example. The course is standardized all over Brazil, despite the huge cultural differences among regions: it has the same contents, the same modules, and the same exercises. Thus, the solution to keep the course from seeming alien to the students was to hire instructors from many Brazilian regions, who knew the local reality of owners of small to medium sized businesses.

d) CSF 4 – Technology evaluation

The Web-based distance learning programmes must know how to evaluate the technological infrastructure and softwares that make up the virtual learning environment. Too much focus on the technological aspects should be avoided.

The first aspect of this factor concerns the evaluation or definition of the technological infrastructure, i.e., it concerns to the identification of the potential technological capacity of a

programme in order to know which resources are available and, among them, which ones can be used and which ones should not. For instance, it is crucial to know how to evaluate Internet transmission capacity, checking access speed to estimate the likely amount of time that students will need to access the Web pages and do their tasks, or also to check the possibility of adding graphics, videoconferences and other features.

A second important aspect is the definition of the softwares that will make up the virtual learning environment on the Internet. There are specific software package for Web-based courses besides generic Internet applications that could also be used (e. g. to support interactions, a chat room or a more efficient discussion forum may be purchased). Overall, the opinion of interviewees is that the specific software package currently available in the market, and developed for Web-based distance learning courses, do not represent good learning environments. This is essential, once, as says Arbaugh [4, p. 50] “the significance of student attitudes toward course software suggest that an instructor’s skill and experience in conducting Web-based courses could go for naught if students don’t like the course software package”. An interviewee, for instance, pointed out that behind the concept of a specific software application there are always pedagogical principles, being necessary thus to verify if these principles are in accordance with the learning model desired. The Interviewee N.3 explains his position wich reflect the opinion of the majority of interviewees:

My experience tells me that we can do better without specific software. They are still rough environments. From a technological point of view, they are avant-garde; from the point of view of fulfilling pedagogical demands, thereby providing us with what we need for online education, they are close to nothing. Actually, they are very close to being the technological avant-garde of pedagogical retrogress. This is to say that today you have very sophisticated tools to teach just as you did 30 years ago.

According to interviewees, an often-recurring mistake is the excessive focus on technological possibilities, a tendency to employ all the technological resources available in the market even when they are not necessary. Thus, the planning of some Web-based courses has technology - and not a pedagogical project - as its guideline. Technological resources must be purchased only after a pedagogical project is available and technological needs are identified. This strategy mistake was observed, for example, at NAVi – UFRGS. Most of the activities – including the instructional design – were defined after equipments were purchased, which became a limiting factor of what could be done. Besides, each new course proposal or each changing required a feasibility evaluation, to check if the proposal in question could be supported by the equipment already available.

e) CSF 5 – Creation and management of strategic alliances

Web-based distance learning programmes must evaluate their competences and seek complementation through the construction of strategic alliances.

It has been mentioned that the activities involved in Web-based distance learning programmes are of different kinds. They involve technological, pedagogical, design and communication aspects, among others. Organizations that have the competence to develop all the necessary activities in-house and create a program or even a course of their own are very rare. A public Brazilian university, for instance, will probably face some problems in obtaining the necessary technology and hiring people to operate with this technology, or even to give support to the students. An organization that intends to train its employees will probably not have all the instructors needed to offer a course, not even the specialized personnel to change a conventional course into a Web-based one.

For all these reasons, being capable of establishing and managing good strategic alliances has become a fundamental aspect. Indeed, it is clear that there is a great movement in this direction by organizations developing e-learning [7]. The alliances may be of different forms and intensity and have different goals, but only a few organizations can do without them. Moreover, many alliances are constructed with the goal of extend the market share in certain regions (e. g., several partnerships have been established between American and European teaching institution with Brazilian groups, aiming to penetrate in the national educational market).

In fact, the partnership system set up for technical support to the IPGN course was mentioned as a very important choice for the programme success. In the opinion of one responsible of the programme, without this alliance, within the same period and with the same budget it would not be possible to develop a course of similar quality.

On the other hand, the NAVi decided to perform all of its activities internally. This decision had some positive and negative consequences. One good point was the team's development of knowledge and autonomy. However, on the other hand, the negative points seem to be stronger. The difficulties of technical nature, for instance, tended to draw the attention and consequently the focus away from the main objectives of the Center. Much more time was spent in developing tools and building Web pages than in thinking about pedagogical or strategic questions and content of courses. Besides, there have been delays in the development of courses and some resources were not made

available. Students' support during the courses was also insufficient. Furthermore, the amount of time necessary to develop a course of fair quality was excessively long.

5 Conclusions

The identified critical success factors are elements whose materialization depends on actions by the organizations themselves. Even the aspects pertaining to the students can be further worked on if the people responsible for the programmes are willing to do so. If the five factors identified do not receive due attention, it is likely that serious problems will follow. For this reason, Table 5 presents some questions derived from the CSF, which managers may wish to develop to reflect on and evaluate their Web-based distance learning programmes.

Table 5 - Questions for reflection

CSF 1 <i>Experience and background of team</i>	<ul style="list-style-type: none"> - Are there people capable of performing the necessary activities? What are the team's strong and weak points? - How experienced is the team? Is it possible that some relevant aspect is not being properly taken into consideration? What are the potential errors in the proposed planning? - What are the competences that the team lacks? How could these competences be acquired? Are there good courses or training that might help?
CSF 2 <i>The student: behaviors and characteristics</i>	<ul style="list-style-type: none"> - What kind of people are the courses aiming at? What are their characteristics? - Are the students taking courses on the Internet for the first time? In case of an affirmative answer, how can the adaptation to this new virtual environment be made easier? - How demanding are the courses offered? Are the students willing to face this level of requirements? - What is the feeling between the students who are taking the course? Do they feel as part of a group or isolate while doing a task?
CSF 3 <i>Learning model</i>	<ul style="list-style-type: none"> - Is there a clear pedagogical project? Is the team aware of this project, especially instructors and people responsible for the instructional design? - Is there an awareness of the role of interaction and cooperation in the learning activities? Are the features designed to stimulate interaction and cooperation adequate? - Are the different learning styles respected? Do the courses offer respect the main cultural aspects of the students?
CSF 4 <i>Technology evaluation</i>	<ul style="list-style-type: none"> - Which technological infrastructure is available? Moreover, the students, how do they connect to the Internet? What is the average transmission speed from the course server to the final user? - Which kind of features should not be used due to the limitations in the technology available (for example videoconference, audio conference, etc.)? - Which are the advantages and disadvantages, for the kinds of courses intended to be offered, of the Web-based courses software package comparing to the development of one's own Web-based learning environment? Are there people capable of developing this environment?
CSF 5 <i>Creation and management of strategic alliances</i>	<ul style="list-style-type: none"> - Which are the competences of the organization? Which competences are necessary for the development of the desired Web-based learning programme? Is it possible (and advantageous) to develop internally a missing competence? - Which are the potential strategic partners to complement the missing competences? - What kind of strategic alliance could be established in order to increase competitiveness?

The questions listed in Table 5 are just examples; many others could be posed. The intention here is to help the organizations that plan to act in this field, whether by offering courses

externally or in-house, when training their employees. We want to make it easier for organizations to plan and establish their strategies for the implementation of Web-based distance learning courses, since they will then be able to focus their efforts on the more important factors. For companies already acting in this field, this paper intends to be a contribution for a possible evaluation on the performance and management of the programme.

As a suggestion for future research, we propose the identification of the actions or strategies that may be adopted by the organizations in order to assure that the identified CSF will be properly worked on. Interviews could be also conducted with operational staff. Finally, the confirmation of the results obtained through other corroborative research is another possibility of validating (or not) these results.

As a conclusion, the authors would like to call attention to the fact that this research has some limitations. The most important are: the impossibility of generalizing results, which are mostly related to the Brazilian reality of Web-based distance learning programmes; the limitation of the results reliability of interviews' content analysis, once it was carried out by one single interviewer; the fact that most of the inferences were made on the basis of other people's perception (they are, therefore, subject to a series of influences that evade the scope and control of the research).

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