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# EMPIRICAL EVIDENCE OF KEY SUCCESS FACTORS IN WEB-BASED CORPORATE TRAINING

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## ABSTRACT

Web-based corporate training is increasingly being used by virtue of the fact that companies need to train their personnel equitably by imparting large amounts of knowledge in an affordable manner. However, it is difficult to establish the precise nature of the key success factors in these endeavors. In other words, companies are not aware of what factors actually influence the final outcome of this kind of initiative. Therefore, this research seeks to investigate some critical success factors associated with a Web-based corporate training program deployed by one of the largest insurance groups in Brazil. As a result, one may conclude that constructivist pedagogical philosophy, authentic task orientation and integral metacognitive support, applied in conjunction, are critical factors for the success of these endeavors. Furthermore, one may also conclude that an intrinsic source of motivation as well as open structural flexibility, applied singly, have some influence on the success of Web-based corporate training.

**Keywords:** Web-based Corporate Training; e-Learning; Distance learning; Key success factors in e-Learning; Brazil

## INTRODUCTION

In the current world scenario where the dynamics of change in organizations are intense – either due to strategic orientation and the pressing need to adapt to new market demands, or the requirements to conform to prevailing legislation – it is of paramount importance for companies to be agile, as well as achieve low costs and high returns on investments associated with their employee training programs. On the other hand the high costs of face-to-face corporate training programs, as well as the logistic hurdles linked to their deployment and the increasing speed of obsolescence in training content, are major challenges to their implementation.

It is in this context of extremely swift change, with massive volumes of information and the increasing demand for training programs, that Web-based corporate training, also known as e-Learning, comes into its own. Internet technology can solve most of the problems and limitations associated with the technology previously used, rendering the implementation of corporate training programs viable (Powell, 2000; Rosemberg, 2001).

Notwithstanding this observation, the design of Web-based corporate training programs is not a straightforward task, as the set of key success factors involved are not yet fully consolidated (Carey, Rogers, Sharp, Benyon and Holland, 1998; Pennuel and Roschelle, 1999; Costa, 2003; Mehlenbacher, Bennett, Bird, Ivey, Lucas, Morton and Whitman, 2005).

This paper seeks to investigate precisely what these critical factors are by analyzing a Web-based training program, in which the research question is: “What are the critical success factors associated with the implementation of a Web-based corporate training program?”

## THEORETICAL REFERENCES

In order to analyze the theoretical aspects related to distance training, it is necessary to examine three interrelated topics, namely psychology, education and information technology (Wilhelmsen, Stein and Øyvind, 1998). More specifically, it is necessary to examine the main pedagogical approaches and the aspects of utilization of information technology as a way of applying them.

## Pedagogical Approaches

With respect to pedagogical approaches, the two paradigms that became fundamentally influential from the 20<sup>th</sup>. century onwards will be tangentially analyzed. These paradigms do not only include the vision of how the learning process is achieved, but also offer an insight into the very nature of knowledge – essentially, if knowledge exists in an absolute form, or if it is something that is constructed and relative. These two approaches are traditionally referred to as instructivism and constructivism (Wilhelmsen et al., 1998).

For the purposes of this work, the most important aspects of the instructivist approach are the concepts that the student must adapt to the environment and that learning is a passive process in which there is no explicit treatment or interest in the mental processes. The student, in this case, merely responds to the demands of the environment (stimuli). Knowledge is therefore seen as something absolute and immutable (see, for example, Skinner, 1968; Wilhelmsen et al., 1998).

Thus, an instructivist approach works well for a given training program, provided that it has clearly defined objectives and that its results are easily measurable (Rosemberg, 2001, p.20).

Unlike the instructivists, the constructivism theorists are of the opinion that learning is an active process. Constructivism is based on the concept that students construct their own knowledge, rather than the idea that the teacher passes on information and knowledge to the students (Piaget, 1952 and Papert, 1993).

For the constructivists, the learning plan should always place emphasis on the student – rather than on the content and format of the program, or the instructor. In this way, one progresses from a model in which the instructor is the center of the teaching program to a model in which the student is the center of same.

## Evaluation of e-Learning Programs

In order to conduct the analysis of Web-based training programs it is necessary to adopt a specific model. In this work the model proposed by Reeves and Reeves (1997) will be used. Martin (1998) and Joia (2001) suggest the use of this model for the identification and characterization of ten different dimensions involved in Web-based training.

It is important to stress that the Reeves and Reeves (1997) model does not propose to evaluate the result of a Web-based training program, nor does it attempt to predict its success or failure. The objective of this model is to characterize the different aspects of this type of program (Reeves, 1997).

The model adopted includes ten dimensions of interactive learning on the World Wide Web, namely: (1) pedagogical philosophy; (2) learning theory; (3) goal orientation; (4) task orientation; (5) source of motivation; (6) teacher's role; (7) metacognitive support; (8) collaborative learning; (9) cultural sensitivity; and (10) structural flexibility.

Each of the ten dimensions in this model is presented as a double-ended continuum with contrasting values at either end, ranging from a fully aligned instructivist approach at one end of the spectrum to a fully aligned constructivist approach at the other (Joia, 2001).

Table 1 below depicts the ten dimensions defined for analyzing training programs. For each dimension (in the central column of the table), the opposite poles of the continuum are described and their meanings explained.

## RESEARCH METHOD

The simple case study method as described and conceived by Yin (1994) was adopted in this research.

In this manner, the basic premise in the choice of case study was to enable the author to investigate a training program that had already been finalized, as well as apply questionnaires both with the distance program manager and with the respective students.

In line with the above, the unit of analysis chosen was a basic training program in “Internal Controls and Compliance” for employees of the Brazilian insurance company XPTO (fictitious name) available on the company's intranet. All of the training was conducted in the Portuguese language, involving staff employed and headquartered in Brazil.

0 ←	Dimension	→10
<b>Instructivism</b> Knowledge is imparted by the instructor	<b>Pedagogical Philosophy (PP)</b> 0 - 10	<b>Constructivism</b> Knowledge is constructed in the mind of the student
<b>Behaviorist</b> Emphasis on observable behavior	<b>Learning Theory (LT)</b> 0 - 10	<b>Cognitivist</b> Emphasis on internal mental states
<b>Specific</b> Direct instruction focusing on desired behavior	<b>Goal Orientation (GO)</b> 0 - 10	<b>Generic</b> Simulations with more than one solution for the problem
<b>Academic</b> Emphasis on traditional academic exercises	<b>Task Orientation (TO)</b> 0 - 10	<b>Authentic</b> Emphasis on exercises outside the scope of the student in authentic environments
<b>Extrinsic</b> Motivation independent of the student and the learning environment	<b>Source of Motivation (SM)</b> 0 - 10	<b>Intrinsic</b> Motivation lies in the student and the learning environment
<b>Didactic</b> The teacher is considered to be the repository of knowledge	<b>Teacher's Role (TR)</b> 0 - 10	<b>Facilitative</b> The teacher is a study facilitator and guide for the students
<b>Unsupported</b> There are no student progress tracking mechanisms or adjustments to individual needs	<b>Metacognitive Support (MS)</b> 0 - 10	<b>Integrated</b> Student progress tracking mechanisms are implemented. as well as adjustments to individual needs
<b>Unsupported</b> Students work alone	<b>Collaborative Learning (CL)</b> 0 - 10	<b>Integrated</b> Students work together in pairs or in small groups
<b>Unsupported</b> Training is prepared irrespective of the culture and diversity of the learners it seeks to address	<b>Cultural Sensitivity (CS)</b> 0 - 10	<b>Integrated</b> Program adapted to the cultural differences of the students
<b>Fixed</b> Program limited to specific places at specific times	<b>Structural Flexibility (SF)</b> 0 - 10	<b>Open</b> Program independent of time and/or location constraints

**Table 1: Dimensions to evaluate the characteristics of Web-based distance training**  
(Adapted from Martin, 1998 and Joia, 2001).

In order to validate the “evaluation of Web-based corporate training programs” construct, multiple data sources were used and an attempt was also made to establish a chain of evidence related to the research questions investigated.

Consequently, documents relating to the case under scrutiny supplied by company XPTO were used, in addition to corporate pages on the company's intranet and Internet sites. The relevant data for elaborating the survey regarding the company and the course in question were obtained in October 2007, and are described in the section below entitled: “The Case of Company XPTO”.

The fieldwork was conducted from January through February 2008, when questionnaires were applied to a sample of thirty-three students who participated through to the end of training chosen for the study of this case. These questionnaires sought to obtain their insights regarding the characteristics of the training program, in accordance with the dimensions proposed by the

Reeves model (1997), as well as their perceptions about the degree of attainment of the objectives proposed by the training program.

For the questionnaire associated with the perception of users on the ten dimensions of the program, a semantic differential bipolar scale from 0 to 10 (Malhotra, 2001) was adopted, in accordance with table 1. In relation to the final evaluation of the program, the students were asked to evaluate it using a scale from 0 (objectives not achieved) to 10 (objectives fully achieved).

In addition to this, the program manager was also asked to complete the questionnaire for final evaluation of the training, to check the possible existence of cognitive dissonance between the students and the manager of the training program.

Quantitative data were imported into SPSS software, from which the statistical analysis was run. The data used and the statistical results were also stored in a directory on CD-ROM.

Despite the predominantly exploratory nature of this work, the presence of explanatory elements makes it necessary to describe the procedures that ensure its internal validity. In order to achieve this, a statistical analysis was made of data obtained via the questionnaires completed by users.

The starting point for analysis of the results obtained in the course was to verify the existence of convergence between the averages for the investigation obtained through the evaluations of students on the achievement of objectives and the corresponding assessment of the manager, in order to verify whether, in the perception of both the students and the manager, the course had achieved the proposed objective.

In order to identify the key factors in evaluating the Web-based training course entitled "Internal Controls and Compliance", multivariate linear regression was performed using the degree of attainment of the objectives of the training program in the perception of students as the dependent variable, and the scores assigned by users to each of its characteristic dimensions as independent variables, according to table 1 presented. In accordance with Hair, Andersdon, Tatham and Black (1998), before processing this regression, the assumptions of normality, homoscedasticity, absence of errors and linearity were verified (in this case by plotting of data and visual observation). The results obtained ensured the continuity of the work.

Thus, the levels of significance of each of the regression coefficients associated with the ten independent variables were analyzed, i.e. each of the dimensions analyzed. The coefficients that showed no sign of linear correlation with the dependent variable (achievement of objectives) were discarded.

The above procedure highlighted the dimensions that could be considered critical success factors for the training program analyzed.

Lastly, as a final quantitative validation, a simple linear regression was performed on each of the dimensions of the model (dependent variable) in relation to the accomplishment of the objectives. The objective was to verify, by means of simple regressions, the existence of a linear correlation between them and the attainment of the objectives, in isolation.

## **THE CASE OF COMPANY XPTO**

### **The Company**

The company XPTO has a track record of solid growth and success with a position of importance in the insurance, capitalization and private supplementary pension market in Brazil.

In the strategic planning of the company, the goal of developing a policy of operational controls was established, by setting up risk assessment and mapped process compliance verification practices.

For this purpose, the Internal Controls and Compliance department was set up with the mission of ensuring, together with all other areas, the adequacy, strengthening and operation of a system of internal controls, seeking to mitigate risk in accordance with the complexity of its business, as well as disseminate the culture of controls to ensure compliance with existing laws and regulations.

In order to disseminate the new culture within the organization with regard to the new practices, the need to set up a corporate training program for employees was perceived.

A portfolio of Web-based training programs was created for company employees, under the management of the Human Resources area of the corporation

In company XPTO, when a new training program is created, a working group is established, comprising representatives of the area of Human Resources, namely the overseer that requested the training, the Information Technology manager and an instructional designer for defining the content of the course and sequence of the project, with a view to making the program viable.

### **The “Internal Controls and Compliance” Course**

The “Internal Controls and Compliance” course is a corporate training program, which is available on the company intranet and is compulsory for all employees of the corporation involved in administrative and operational activities of the business.

The training aims to build awareness and instruct the employees on the need to assess risks in accordance with a new procedural methodology, encouraging action and commitment in relation to the new culture.

It is a course with traits of informative and instructivist training, thanks to the large amount of information presented on principles and controls. However, a constructivist approach was also pursued with respect to the aspect of awareness about standards and the need for employee involvement.

The program lasted six weeks, between September and October 2007. To achieve the objective, training was provided on the company intranet in the form of a self-instruction tutorial. Students were expected to take the program after work hours, within the company. At the end of the module, the student took a multiple-choice test on the Web and was expected to score no less than 70% correct answers on questions randomly chosen by the system. There was no collaborative work among students via the Web. A channel for users via e-mail was provided, through which professional facilitators were available to students, in order to clarify any doubts or problems.

### **Data Gathering and Analysis**

As per the interview conducted with the manager of the "Internal Controls and Compliance" course using the research form developed as a frame of reference, this training program was considered a success, having achieved its objectives satisfactorily, being given a score of 8.00 in terms of evaluation of the course.

In the assessment regarding the attainment of objectives from the viewpoint of the students of this training program, the average score was 7.59 with a standard deviation of 1.70. This assessment by the thirty-three students who responded to the questionnaire provided a result that was consistent with the manager's analysis, thereby confirming the positive result of the training program.

After that, multiple linear regression analysis was performed, using the ordinary least squares concept, in order to study the training characteristics in accordance with the Reeves model (1997). This regression used attainment of objectives as the dependent variable and the ten dimensions analyzed in the model as independent variables. These dimensions are: Pedagogical Philosophy (PP), Task Orientation (TO), Metacognitive Support (MS), Learning Theory (LT), Goal Orientation (GO), Source of Motivation (SM), Teacher's Role (TR), Collaborative Learning (CL), Cultural Sensitivity (CS), and Structural Flexibility (SF).

The final model obtained, based on the application of the stepwise approach (Field, 2005), includes the following as statistically significant independent variables: Pedagogical Philosophy (PP), Task Orientation (TO) and Metacognitive Support (MS). This result is presented in the second column of Table 2, under the title Model 1.

In other words, from the data obtained it can be seen that the Pedagogical Philosophy (PP), Task Orientation (TO) and Metacognitive Support (MS) dimensions showed evidence – at a confidence level of 95% – of a positive and significant linear relationship with the ‘Attainment of Objectives’ dependent variable.

One can therefore affirm that approximately 62.5% of the total variation of the Attainment of Objectives variable was explained by the dimensions present in the regression (adjusted  $R^2$ ), showing good predictive capacity of the model.

It should be stressed that in accordance with Model 1 and considering 5% level of significance, the Learning Theory (LT), Goal Orientation (GO), Source of Motivation (SM), Teacher's Role (TR), Collaborative Learning (CL), Cultural Sensitivity (CS) and Structural Flexibility (SF) dimensions showed no evidence of a significant linear relationship with Attainment of Objectives.

Another important issue, related to Model 1 described in Table 2, was the finding of possible multicollinearity between variables. Analyzing the VIF (Variance of Inflation Factor), the presence of multicollinearity in the model was not found, as all indicators (VIF) were lower than 10 (Ryan, 2003).

Simple linear regressions were then performed with each of the dimensions taken in isolation as independent variables, and Attainment of Objectives as the dependent variable, in order to corroborate the results of this regression. The results of these regressions are also presented in table 2, in the columns relating to Models 2 through 11.

Indep.Var.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
<b>Coefficient</b>	3.102 (0.000)	5.432 (0.000)	5.077 (0.000)	4.831 (0.000)	7.239 (0.000)	7.513 (0.000)	5.041 (0.000)	7.032 (0.000)	7.207 (0.000)	6.951 (0.000)	6.053 (0.000)
<b>PP</b>	0.180* (0.028)	0.346** (0.001)	-	-	-	-	-	-	-	-	-
<b>TO</b>	0.195* (0.020)	-	0.369** (0.001)	-	-	-	-	-	-	-	-
<b>MS</b>	0.349** (0.000)	-	-	0.473** (0.000)	-	-	-	-	-	-	-
<b>LT</b>	-	-	-	-	0.060 (0.619)	-	-	-	-	-	-
<b>GO</b>	-	-	-	-	-	0.018 (0.878)	-	-	-	-	-
<b>SM</b>	-	-	-	-	-	-	0.404** (0.002)	-	-	-	-
<b>TR</b>	-	-	-	-	-	-	-	0.107 (0.337)	-	-	-
<b>CL</b>	-	-	-	-	-	-	-	-	0.094 (0.330)	-	-
<b>CS</b>	-	-	-	-	-	-	-	-	-	0.138 (0.204)	-
<b>SF</b>	-	-	-	-	-	-	-	-	-	-	0.271* (0.016)
<b>R<sup>2</sup></b>	0.662	0.298	0.329	0.451	0.008	0.001	0.282	0.031	0.032	0.053	0.177
<b>Adjusted R<sup>2</sup></b>	0.625	0.274	0.307	0.433	-0.025	-0.033	0.258	-0.002	-0.001	0.022	0.150
<b>F</b>	18.243**	12.722**	14.718**	24.658**	0.252	0.024	11.799**	0.950	0.979	1.690	6.458*
<b>F Sig.</b>	0.000	0.001	0.001	0.000	0.619	0.878	0.002	0.337	0.330	0.204	0.016

**Table 2 - Summary of the linear regressions of the corporate training dimensions**

Note 1: In line 2, the intercepts ( $b_0$ ) are presented.

Note 2: In lines 3 to 12, the angular coefficients ( $b_i$ ) are presented with the respective p-values (sig) between brackets.

Note 3: dependent variable – Attainment of Objectives.

Note 4: (\*) p-value significant at 5%

(\*\*) p-value significant at 1%

Note 5: KEY TO DIMENSIONS

PP - Pedagogical Philosophy; TO - Task Orientation; MS - Metacognitive Support; LT - Learning Theory; GO - Goal Orientation; SM - Source of Motivation; TR - Teacher's Role; CL - Collaborative Learning; CS - Cultural Sensitivity; SF - Structural Flexibility.

As can be seen from the coefficients of determination of the simple regression models, none of the dimensions, in isolation, showed a strong linear relationship with the Attainment of Objectives variable, since all the determination coefficients ( $R^2$ ) were lower than 50%.

Judging from the statistical tests to verify the linear relationship between the dimensions of the Reeves model and the Goal Orientation variable, one can conclude that the dimensions that were particularly influential and most strongly characterized the outcome of the training program analyzed are Pedagogical Philosophy, Task Orientation and Metacognitive Support.

The Source of Motivation and Structural Flexibility variables, when analyzed in isolation, show a limited linear relationship with the Attainment of Objectives variable. However, in the multiple linear regression model, which features the Pedagogical Philosophy, Metacognitive Support and Task Orientation variables, the Source of Motivation and Structural Flexibility variables do not bring any relevant additional gain in relation to the explained percentage variation, which is why they are not included in the multiple regression model.

Consolidating the results obtained, it can be said that the following relationships were found:

$$\text{EVAL} = 3.102 + 0.18 \cdot \text{PP} + 0.195 \cdot \text{TO} + 0.349 \cdot \text{MS} \quad (1)$$

$$\text{EVAL} = 5.051 + 0.404 \cdot \text{SM} \quad (2)$$

$$\text{EVAL} = 6.053 + 0.271 \cdot \text{SF} \quad (3)$$

Where:

EVAL = Evaluation of training according to the perception of users – ranging from 0 (worst result) to 10 (best result);

PP = Pedagogical Philosophy of the training – ranging from 0 (Instructivism) to 10 (Constructivism);

TO = Task Orientation – ranging from 0 (Academic) to 10 (Authentic);

MS = Metacognitive Support – ranging from 0 (Not implemented) to 10 (Integral);

SM = Source of Motivation – ranging from 0 (Extrinsic) to 10 (Intrinsic);

SF = Structural Flexibility – ranging from 0 (Fixed) to 10 (Open).

## CONCLUDING REMARKS

With respect to the identification of some of the critical factors in the construction of Web-based corporate training programs, which are the scope of this work, it was established by statistical analysis that Pedagogical Philosophy, Task Orientation and Metacognitive Support, jointly – and Source of Motivation and Structural Flexibility, in isolation – are key factors for success in Web-based corporate training programs. Furthermore, it was seen from equations (1), (2), and (3) that all the significant angular coefficients are positive, which implies that the more these dimensions are associated with the pure constructivist paradigm, the greater the chances of success of Web-based corporate training programs.

Thus, some managerial implications can be consolidated from the results obtained, duly emphasizing the relevant dimensions, the typologies associated with them to be pursued by the instructional designers, as well as the characteristics that the Web-based training system must have for attaining these objectives. Table 3 below consolidates and clarifies what was presented.

A fact that deserves attention is the joint influence of three main factors, namely Pedagogical Philosophy, Task Orientation and Metacognitive Support. In fact, from equation (1), the more all three are rooted in the constructivist paradigm, the better the program evaluation, though it is difficult to imagine that there is not some kind of reciprocal influence between them (not large enough to be detected by the VIF). Thus, the existence of portfolios, blogs, wikis, chats, self-evaluation environments, etc., tallies with the vision of the student as a participatory element in the creation of knowledge, as well as its assimilation and accommodation (Piaget, 1955). Similarly, the quest for contextualizing training and giving it relevance, is precisely what was always preached, for example, by Freire (1975). In other words, it is perceived that the introduction of features related to what is today called Web 2.0 (O'Reilly, 2005) would be useful. Similarly, the provision of tools for the construction of “webfolios”, for evaluating the performance of Web users would be useful, such that the students could monitor their own progress during training (Nevado, Basso and Menezes, 2004; Campbell, Melenyzer, Nettles and Wyman, 2000).

Contrary to the above trend, Source of Motivation and Structural Flexibility are factors that are uncoupled between themselves and from the others. This may be explained as the first factor is heavily dependent on the idiosyncrasies of the user, i.e. intrinsic motivation depends fundamentally on the perception of the individual in relation to the training per se (von Krogh, 1998), rather than on the characteristics of the system. The second dimension, however, is strongly dependent on the division of labor of the professional in training as well as the technological characteristics of the system (socio-technical approach), since these two factors permit this dimension to be more or less open (Mehlenbacher et al., 2005).



<b>DIMENSION</b>	<b>TYOLOGY</b>	<b>CHARACTERISTICS OF THE WEB-BASED SYSTEM</b>
<b>PEDAGOGICAL PHILOSOPHY (*)</b>	<b>CONSTRUCTIVISM</b> Knowledge as a construction in the student's mind	Chats, discussion lists and groups, non-sequential approach, emphasis on hypertext navigation
<b>TASK ORIENTATION (*)</b>	<b>AUTHENTIC</b> Emphasis on exercises outside the reach of the student and in authentic sets	Exercises through online simulations, contextual games and practices based on a hands-on approach
<b>META-COGNITIVE SUPPORT (*)</b>	<b>INTEGRAL</b> Full monitoring of the progress of students and adjustments to individual needs	Portfolio and Web-based performance evaluation, blogs, wikis, content management tools, adaptable to the user. Use of the Web 2.0 paradigm
<b>MOTIVATION</b>	<b>INTRINSIC</b> Motivation from the student and the learning environment	Irrespective of the characteristics of the system (idiosyncratic aspects of the user)
<b>STRUCTURAL FLEXIBILITY</b>	<b>OPEN</b> Program not limited to specific places and times	Asynchronous activities and intranet/extranet networks for access anytime, anywhere.

(\*) **Jointly-present dimensions**

**Table 3 – Relevant Dimensions and their Implications for the Corporate Web-based Training System**

The construction of Web-based corporate training programs with constructivist characteristics is not an easy task, as is asserted and detected by Costa, Fagundes and Nevado (1998), Nevado, Magdalena and Costa (1999) and Joia (2001). However, the results indicate that this is the path to be followed, as opposed to instructivist training based on programmed instruction and self-teaching tutorials, which are still the norm in the majority of companies.

Finally, this is not cross-cultural research, as this paper presents data collected from a single company in Brazil. Therefore, cultural differences between Brazil and other countries related to Web-based corporate training programs should be included in the discussion into further research.

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