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# TRAINING ISSUES IN ERP IMPLEMENTATIONS

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**ABSTRACT**

*One of the critical success factors (CSF) of an ERP (Enterprise Resource Planning) implementation project is user training. In consequence, in this paper we focus our attention on compiling a list of CSFs that affect the ERP implementation training phase. Then we analyzed the training methods used in ERP implementations in order to provide better solutions than the ones identified in the IS literature. We studied the documentation of several implementation projects conducted at a Romanian ERP system vendor targeting SMEs (Small and Medium Sized Enterprises) and identified a series of problems concerning the way the training activity was conducted and monitored. Thus, we proposed a framework for a system that resolves the identified problems and provides several other features that significantly diminish the resource consumption (time and money) associated with the training activity, by integrating a computer based training method (CBT) that enables more personalized, effective and less expensive training sessions. We believe that several ideas that we used in developing this system can also be applied in other ERP environments.*

*ERP implementation, ERP training, ERP training CSFs, training methods, blended learning.*

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## INTRODUCTION

IS researchers are placing a lot of interest in the ERP systems implementation topic (Al-Mashari, 2002; Verville and Halingten, 2003; Ifinedo *et al*., 2010). Shanks and Parr defined ERP implementation as "the process of developing the initial business case and planning the project, configuring and implementing the packaged software, and subsequent improvements to business processes". Many adopting organizations have come to realize that the deployment of such systems were not as effective as expected (Wang *et al*., 2008). The main reason is that an ERP system implementation is a complex process, and it is considerably different from any traditional information system implementation (Chang, 2004).

To avoid costly failures, much effort has been expanded to identify the key factors necessary for successful ERP implementation (Somers *et al*., 2001; Bhatti, 2005; Metaxiotis *et al*., 2005; Kalbasi, 2007; Adam *et al*., 2008). We compiled a list of 22 relevant CSFs associated with project/system implementations derived through a process that involved identification and synthesis of those critical requirements for implementation that have been recommended by practitioners and academicians through an extensive review of the literature (Esteves, 2000; Somers, 2000) among which: top management support, clear goals and objectives, communication, effective project management, business process reengineering, data accuracy and integrity, suitability of software and hardware, vendor support, education, training and user involvement (Ferratt *et al*., 2006; Scorţa, 2006; Wang *et al*., 2006; Carton *et al*., 2008).

User training, education and user involvement are critical success factors in the implementation of an ERP system because they are expensive, time consuming and require an accurate human resource management (Noudoostbeni *et al*., 2010; Aristomenis, 2006; Tsai *et al*., 2008; Wu *et al*., 2006; Smit, 2001).

## 1. TRAINING CSFs

User training and education is considered the third most important factor in generating ERP implementation failure because of one main reason: training is significant in an ERP implementation project not only to adapt users to the new ERP system but also to help in the organizational change process (Zornada, 2005). Getting people educated/trained and keeping them informed throughout the implementation process must be addressed to achieve the benefits of an ERP system (Dorobăţ *et al*., 2010).

The concept of critical success factors in the IS literature is well established for numerous contexts but the theoretical development or empirical research of CSFs influencing the training process in an ERP implementation are limited.

We compiled a list of 9 relevant CSFs emerging in the ERP training process:

1. Top management support: ERP implementation projects engender large training requirements that are expensive. A training program may easily involve 10 to 20% of an organization's personnel and an average 10% to 20% of the overall ERP implementation project's budget. The commitment of top management it is extremely relevant when it comes to sustaining such an ERP training plan (Esteves *et al*., 2002).
2. Project management: several practitioners and academicians focus the importance of beginning the training program with an analysis of the needs of users. The purpose of this analysis is to understand what to present and how to deliver the information, what is the number of users to be trained, their locations, the number of days for each course, the number of courses to be delivered, and the number of trainers needed. All this data is very important when managing the planning process of the ERP training activity (Esteves *et al*., 2002).
3. Training Curriculum: when an ERP system is first introduced, employees will require a large amount of training and support in order to become comfortable with the system's command language and the new business processes introduced with the ERP implementation.
4. The users training commitment. Trainees need to feel that the training course is relevant to their jobs. Therefore, is important at the beginning of the ERP training program to explain to users what are the objectives and benefits of training.
5. Personnel skills and competencies: in order to deliver proper training the company's roles must be defined and training must be delivered at individual levels of competence required. In an organization ERP training must be delivered for several groups: the managerial personnel, key-users, end-users and the trainers.
6. Training Schedule: some case studies of ERP implementations have shown the importance of effective training at all levels that should be synchronized with the overall implementation project (Esteves *et al*., 2002): „In the ASAP realization phase the most critical work packages are: prepare end-user documentation and training material, sustaining the organization change management process, conduct project team training"; „In the ASAP final preparation phase the most critical work packages are: project management of the final preparation phase, end-user training and detailed project planning". The training should be scheduled in an order to minimize the problems arisen from the time lag between the actual training and the commencement of ERP going into production.
7. Training Budget: training is the near-unanimous choice of experienced ERP implementers as the most underestimated budget item. Training expenses are high because:
    1. Users have to learn a new set of processes, not just a new software interface;

2. They are correlated with the training delivery methods;
3. The costs of training are correlated with the competencies of the personnel;
4. Extra training and support must be available for new employees.

In order for the training budget to be realistic and well justified special attention must be given to corporate culture and change management efforts (Scorţa, 2006).

8. Training Evaluation: a good training evaluation should be able to prove that the program offered:
   - Effective knowledge transfer;
   - Cost effective knowledge transfer;
   - Training coupled with corporate strategy and business objectives;
   - Competitive advantage;
   - Organizational change acceptance and organizational benefits.

   Training evaluation can be analyzed at least at two levels: project level and organizational level. Project level concerns to the training program as a whole while organizational level concerns to the people involved in the training and the effects on the organization (Esteves *et al.*, 2002). There has been developed an ERP training evaluation framework focused on monitoring and evaluating training plans in an ERP implementation context and the metrics were interpreted taken into consideration three dimensions (Esteves *et al.*, 2002).
9. Training Methods: there are several training delivery formats that are utilized during ERP systems implementation/utilization and support phase. Even so, training involving hard-to-understand concepts or difficult issues (dealing with employee resistance) is best presented in a classroom setting. As well as which format to use for training, companies must also consider which language. When a company goes global with an ERP implementation, training courses should be available in languages spoken by its employees.

## 2. ANALYSIS OF THE CURRENT TRAINING METHODS

The traditional training delivery formats that are utilized during ERP systems implementation/utilization and support phase are: tutorial, courses, interactive training manual, resident expert, help component, external and CBT. All these traditional techniques have been used by most of the ERP system vendors.

We identified 26 training methods that can be used in an ERP implementation to support the training activity (Paulsen, 2002; Zornada, 2005; Dorobăţ, 2010): classroom instruction, print-based material, e-learning (asynchronous), conference calls, e-mail, in person mentoring tutoring, online assessment and testing, online references, e-learning (synchronous), simulations, portals, video broadcasts, learning management systems (LMS)**,** learning content management systems (LCMS), knowledge management systems (KMS), instant messaging, online mentoring tutoring, electronic performance support systems (EPSS), games,

communities of practice, wiki, virtual laboratories, chat rooms, mobile learning, blogs, podcasts .

We analyzed the diversity of these training forms from 5 different perspectives: retention, flexibility, availability, investment, expandability (Dorobăţ, 2010). We can state that traditional training methods are less flexible (reduced availability) and significantly more costly in comparison with the newest CBT methods.

Regarding the trends in using the above mentioned training methods for corporative training Karrer stated that traditional training methods like classroom instruction or with print-based materials are still widely used compared with the computer based training methods (Karrer, 2008).

Thus, we ascertain that none of these training methods guarantees the success of an ERP training program (Yellen, 2006) and that the efficiency of the training and education activity in ERP implementation projects comes from applying training strategies that (Dorobăţ, 2010):

1. Mix the training methods mentioned above;
2. Are based on the learning by doing theory, a concept that was initially proliferated by Kolb in his Experiential Learning Theory (ELT). The ELT provides four individual learning styles (ILS): converger, diverger, assimilator, accommodator which relate to the approach that people use in order to solve problems or learn new concepts. We have detailed Kolb's ILSs on a previous study (Dorobăţ, 2010). We found that the training methods that appeal to the users correspond to the classification of the individual learning styles that Kolb proliferated (Manochehr, 2006):
   a. The converger has as first option, from the all the training methods, the CBT while the secondary options are: small-group discussions, simulations, virtual labs, online assessment and testing and classroom participation;
   b. The assimilator is learning by using mainly print-based materials and as a second option can appeal to CBT;
   c. The diverger prefers classroom instruction but can also learn by using the following training methods: print-based materials, lectures, CBT;
   d. The accommodator favors the CBT and relies on the following secondary options: simulation, games and communities of practice.

   There are also studies that reveal the existence of a direct link between the individual learning style and the training method. These studies showed that this correlation has a direct impact on the user's performance (Simon, 2000).

To conclude, we establish that in an ERP system implementation project the training methods could be rejected by the ERP systems users if these are not correlated with their individual learning styles. The individual learning style and the training method have a major impact on all the users' performance and in consequence on the use of the ERP system in general.

## 3. RESEARCH METHOD

We analyzed the documentation of several completed ERP implementation projects at the Romanian ERP vendor premises, specialized in targeting Romanian SMEs, and conduct a series of interviews among project team members that possess substantial involvement in the ERP training process. We also actively participated in several implementation projects of the DataLight Enterprise ERP system and thus studied in detail the framework and the technology used to develop the ERP system (Dorobăţ, 2010).

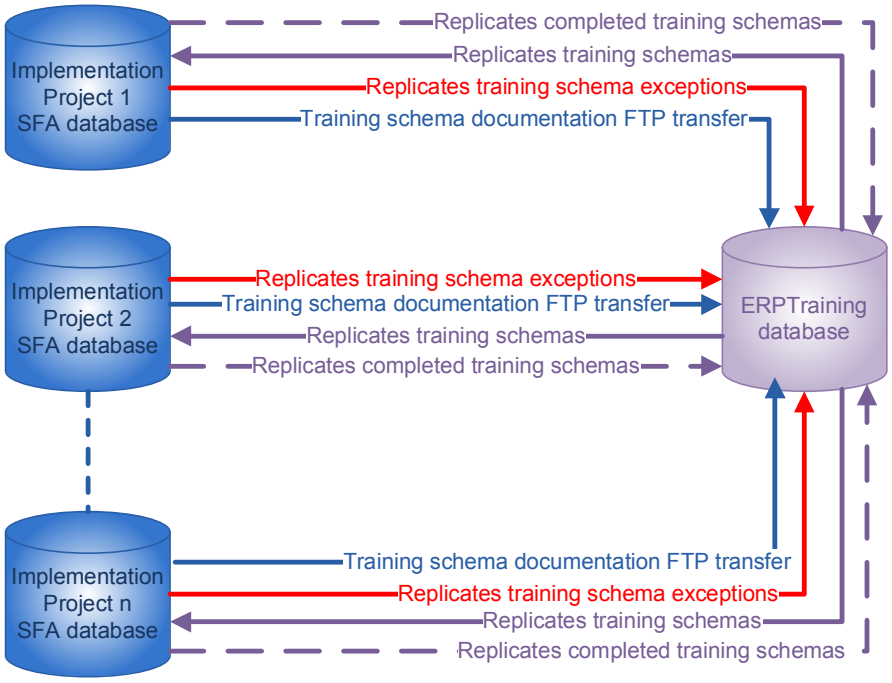
## 4. THE PROPOSED SYSTEM FRAMEWORK

By processing the information we collected, using the above mentioned methods, we identified a list of problems concerning training process:

1. We observed a lack of interest from the SME's managers concerning investments in the staff's training during the implementation or operational phase of the ERP system.
2. Training managers underestimate the cost of training, the time and effort of ERP training.
3. The level of outside ERP training expertise required is higher than anticipated but hardly ever asked for.
4. Training managers usually neglect key-users and end-users participation on "I know it all" basis, which often produces delays and additional costs.
5. Training curricula is oriented in order to achieve knowledge about system commands and interfaces and not to understand new business processes.
6. The training process is conducted via traditional training techniques, and there is poor or no evidence of using LMS or LCMS systems in order to improve organizational training.
7. The staff needs not only to be ERP trained but also to learn computer skills and in consequence there will never be enough training.
8. The training evaluation is stated in all training plans but it is not as frequently applied in practice and it involves usually only one training criteria: knowledge transfer.

In order to address some of these problems we developed an ERPTraining system based on the framework of the Sales Module (SFA) of the DataLight Enterprise ERP system and we used the replication technology (the same technology used for the development o the SFA module) to ensure the training data real time access. The replication mechanism (Scorţa, 2008) will function in an asynchronous manner, bidirectional between the replicas and the SFA module database and the ERPTraining system database as shown in Figure 1.

*Figure 1.* **A simplified view of the ERPTraining system framework (Scorţa, 2009)**

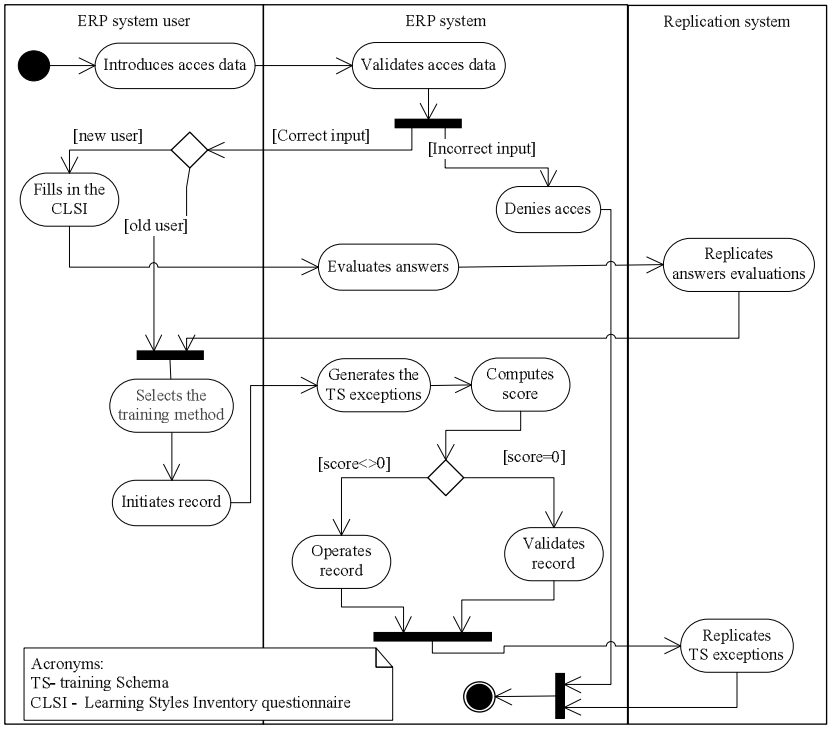



During the ERP implementation process and after, the training necessities are diversified (Dorobăţ, 2010), and in consequence, applying only one training method may not be the best choice. If we personalize the training activity in an ERP implementation by adapting the training method to the individual learning style than we might deliver a better knowledge and skill transfer to the user and thus increase its performance.

We deducted, from studying the documentation of several completed ERP implementation projects, that major part of the costs of delivering proper training are related to the end-user training, and thus, we focused our attention on providing a computer based training method that will help diminishing them.

The CBT method we propose aims to reduce both the training time and costs associated with the end-user training activity by collecting and processing training data in real time. Based on the reports we obtain we are able to better adapt to the individual training needs of all end-users involved in the ERP implementation process and achieve a better control of the entire training process. We present a simplified view of this training process in Figure 2.

*Figure 2.* **A simplified view of the training process (Dorobăţ, 2010)**




This CBT method we propose for the ERPTraining system incorporates the principles of the Adult Learning Theory. In the process of determining the ILS of each user involved in the ERP system implementation we utilize the questionnaire presented in Table 1 adapted from Kolb's Learning Style Inventory (Terzi, 2001) and thus we can state that this training delivery method allows training process personalization.

*Table 1.* ***The questionnaire used to determine the user's ILS in the ERPTraining system.***

Sequence I:
Choose the statement that describes you best. Mark the statement code in the empty cell.

| No. | Statement | | Code |
|---|---|---|---|
| 1. | You Often elaborate ideas that at first seem silly or infant | AE | |
| | I am meticulous and orderly | RO | |
| 2. | Usually I am the one who starts the conversation | AE | |
| | I love to watch and to observe human behavior | RO | |
| 3. | I am flexible and responsive to new things | AE | |
| | I am careful and cautious | RO | |

| No. | Statement | | Code |
|---|---|---|---|
| 4. | I like to get involved in different and new activities without too much preparation | AE | |
| | Before I try something new, I thoroughly research the topic/activity | RO | |
| 5. | I am happy when I have access to new things | AE | |
| | Before starting a new project, I do sketches and elaborate a plan for future actions | RO | |
| 6. | I love being involved and actively participate in various activities | AE | |
| | I like to read | RO | |
| 7. | I am always involved in various activities | AE | |
| | I am shy and quiet | RO | |
| 8. | I make decisions quickly and boldly | AE | |
| | I make cautious and logical decisions | RO | |
| 9. | After deliberation I speak slowly | AE | |
| | After deliberation I speak fast | RO | |

Sequence II:
Choose the statement that describes you best. Mark the statement code in the empty cell.

| No. | Statement | | Code |
|---|---|---|---|
| 1. | I conduct investigative inquiry when I am learning a new topic | AC | |
| | I am very good at gathering techniques and ideas from others | CE | |
| 2. | I am logical and rational | AC | |
| | I am practical - "down to earth" | CE | |
| 3. | I plan events to the last detail | AC | |
| | I like realistic but flexible plans | CE | |
| 4. | I like to know the correct answers before trying something new | AC | |
| | I check the functionality of original and new activities by practicing them | CE | |
| 5. | I analyze the exposed information in order to identify the basic principles and contradictions | AC | |
| | I communicate with other persons so that they display the essence of information | CE | |
| 6. | I prefer to work alone | AC | |
| | I like team work | CE | |
| 7. | People would describe me as serious, reserved and formal | AC | |
| | People would describe me as talkative, expressive and informal | CE | |
| 8. | I use facts to make decisions | AC | |
| | I listen to my senses when making decisions | CE | |
| 9. | I find it hard to understand | AC | |
| | I understand easily | CE | |

After the administration of the questionnaire (Figure 3) we compile:

1. The total number of AE (Active Experimentation) and RO (Reflective Observation) answers given by the user, from sequence I, and thus, we determine the user's favorite method for fulfilling his duties and obligations;
2. The total number of CE (Concrete Experience) and AC (Abstract Conceptualization) answers given by the user from sequence II, and thus, we determine if the user grants a higher priority to his logic or sensibility.

We determine the user ILS in the following manner:

1. The user's ILS is accommodator if we compiled higher scores for AE and CE answers;
2. The user's ILS is diverger if we compiled higher scores for RO and CE answers;
3. The user's ILS is converger if we compiled higher scores for AE and AC answers;
4. The user's ILS is assimilator if we compiled higher scores for RO and AC answers.

Based on these determinations the ERPTraining system is designed to provide the user with the proper training method as it can be seen in Figure 4.

We designed the entire ERPTraining system using UML (Unified Modeling Language) technology. Some of its functionalities are:

1. Apply Kolb's Learning Style Inventory and determine the individual learning style (ILS) of each user;
2. Provide a training method adapted to the user's role and ILS;
3. Allow the training project manager to select a proper training method and attach to it training schemas (TS) for each business process users should be able to understand;
4. Automatically deliver the TS documentation;
5. While the user is operating the ERP system will automatically detect any exceptions from the training schema the user is generating while introducing data (Figure 4); any document the user is processing will be validated in the ERP system only if the data was introduced in the ERP system according to the training schema standard, otherwise the document will be invalidated and the user will be informed about the mistakes he made (Dorobăţ, 2010).
6. Determine the time and costs it takes a consultant to teach an end-user;
7. Provide the training manager with reports and indicators that show the advances made in the training process in real time. The system also provides a series of indicators that allow us to determine if in the training process it manifests a dependency between the individual learning styles and the type of training schema error. Also we were interested in measuring the degree of adaptation of a training method to the individual learning styles. Some of the most relevant reports and indicators are subsequently presented:

*Figure 3.* **The determination of users ILS in the ERPTraining system (Dorobăţ, 2010)**

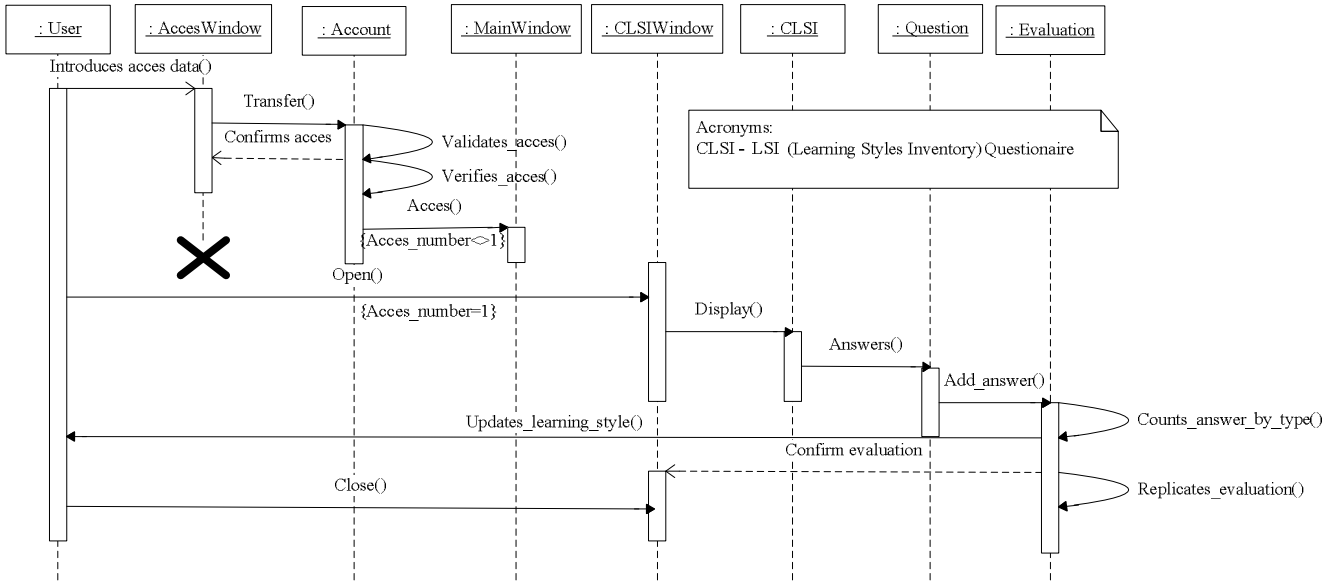
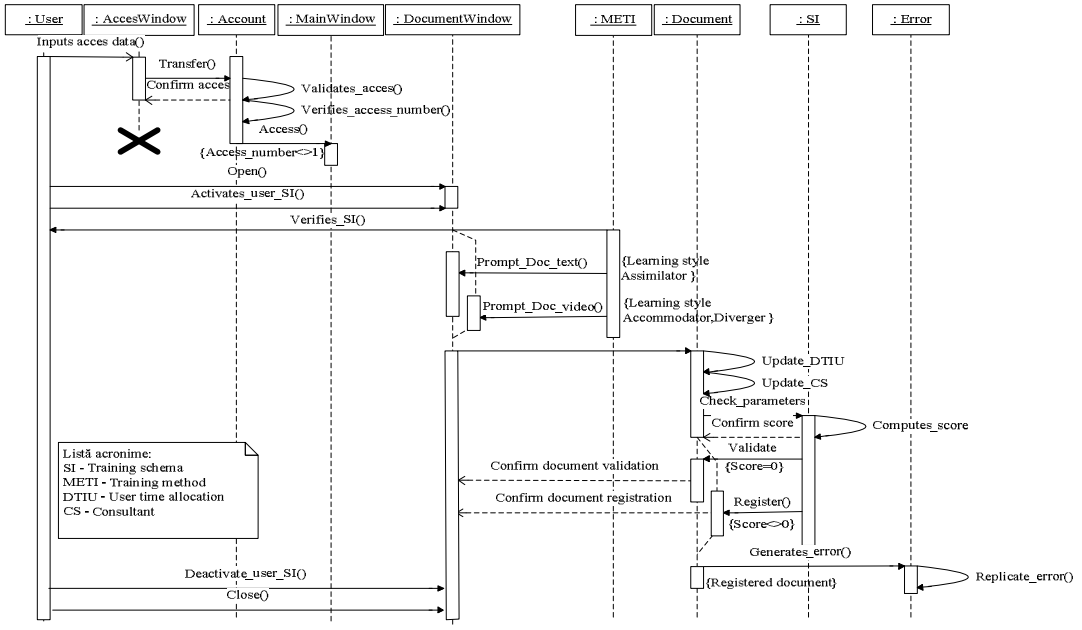


*Figure 4.* **A simplified view of the sequence diagram "Training schema application"**



a. User efficiency

$$E_U = \frac{NA}{NI} * 100;$$

Where:

- NA represents the number of errors an user makes when utilizing the training schema;
- NI represents the number of documents successfully operated or validated by the user.

b. Consultant efficiency

$$E_C = \frac{NSA}{NS} * 100$$

Where:

- NSA represents the number of updates a consultant makes on the training schemas he created;
- NS represents the total number of training schemas a consultant created.

c. A consultant level of expertise in a certain domain of activity

$$E_U = \frac{NP_D}{NTP} * 100$$

Where:

- NPD represents the number of implementation projects in a domain named D in which the consultant has actively participated;
- NTP represents the number of implementation projects in a domain named D.

d. An ERP implementation project training quota

$$RI = \frac{NUI}{NU} * 100$$

Where:

- NUI represents the number of end-users that have not started the training session;
- NU represents the total number of end-users to be trained in an implementation project.

We designed the ERPTraining system in order to provide the following features when implemented (Scorţa, 2009; Dorobăţ, 2010):

1. Indicators and reports for the organization's management members, that will help them:
   - Have a clearer evidence of the personnel professional quality and efficiency;
   - Apply training methods adapted to the individual learning styles of the employees;

- Notice if the personnel manifests resistance in approaching new business processes;
- Justify in real time the time and the costs for training each employee to use the ERP system;
- Justify in real time the time and the cost for the entire ERP implementation project;

2. Indicators and reports for the ERP training team and project manager that will help them to:
   - Monitor each consultant daily activities;
   - Identify the level of experience each consultant has in a certain domain;
   - Notice possible inaccuracies in the consultants professional training;
   - Compare the level of professional training of consultants;
   - Identify domains in which the company requires additional expertise;
   - Identify possible improvements in the user training process;
   - Identify possible improvements in the ergonomics or functionalities of the ERP system;
   - Properly evaluate the time and costs for new ERP implementation projects based on previous experience.

## CONCLUSIONS

This paper addresses issues concerning the importance of providing for the end-users involved in an ERP training project a CBT adapted to their ILS. We started by studying the IS literature and compiling a list of the CSFs emerging in the ERP training process. We concluded that the end-users training is time consuming and involves significant investments.

Then we addressed the issue of the training delivery methods used in ERP projects and deducted that for an increased performance of the ERP system end-users is best to corroborate the training method with their ILS. We selected a Romanian ERP system targeting Romanian SMEs and actively participated and analyzed several implementation projects to determine the actual impact of the above mentioned findings. We identified several problems concerning the training activity conducted in the selected ERP system. Finally, we proposed a framework for an ERPTraining system that allows significant improvements concerning the training activity. We consider that these ideas can be applied in other ERP systems as well.

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