Personalized Training in Romanian SME's ERP Implementation Projects

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Many practitioners and IS researchers have stated that the overwhelming majority of Enterprise Resource Planning (ERP) systems implementations exceed their training budget and their time allocations. In consequence many Romanian SMEs that implement an ERP system are looking to new approaches of knowledge transfer and performance support that are better aligned with business goals, deliver measurable results and are cost effective. Thus, we have begun to analyze the training methods used in ERP implementation in order to provide a solution that could help us maximize the efficiency of an ERP training program. We proposed a framework of an ERPTraining module that can be integrated with a Romanian ERP system and which provides a training management that is more personalized, effective and less expensive.

Keywords: *ERP Systems, Training Methods, Blended Learning*

1 Introduction

Nowadays global business environments are characterized by unprecedented competitive pressures and sophisticated customers who demand innovative and speedy solutions. Over the past few years, many companies have embraced planning and resource management software systems to integrate processes, enforce data integrity, and better manage resources. These package systems are broadly classified as Enterprise Resource Planning (ERP) systems [15].

Research studies and industry reports indicate that both practitioners and information systems (IS) researchers place a lot of interest in this software [22]. Yet, despite the popularity of ERP systems globally, many adopting organizations have come to realize that the deployment of such systems were not as effective as expected [35]. The main reason is that an ERP system implementation is a complex process, and it is considerably different from any traditional information system implementation [5].

To avoid costly failures, much effort has been expended to identify the key factors necessary for successful ERP implementation [30], [17], [1]. Researchers have identified a list of 22 critical success factors (CSFs) among which are: 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 [4] [8] [24] [36].

Many practitioners and IS researchers have stated that user training, education and user involvement [21] are critical success factors in the implementation of an ERP system because they are expensive, time consuming and require an accurate human resource management [37] [32].

Due to its complexity, an ERP system quality of use is often limited and the organization members often prove to have a decreased individual performance [2]. Because the personnel reduced efficiency on the job affects the overall quality of the ERP system implementation, in this paper, we investigated the training methods used in this kind of projects. We highlighted the advantages and disadvantages of applying these training methods in an ERP system implementation project. Then we propose a training method that could help maximize the efficiency of a training program. This study reveals a construct of an ERPTraining module worthy of further development and investigation.

2 ERP systems training

Education and training refers to the process

of providing management and employees with the logic and overall concepts of ERP system. Training in an ERP system implementation project is a difficult task because the entire staff has to assimilate knowledge about both the interface of the ERP system as well as about the new business process emerged from the BPR (Business Process Reengineering) [14]. In consequence, training strategies should be developed in advance and continually updated during the implementation [27]. To make end user training successful, the training should start early, preferably well before the implementation begins and continue during the latter stages of ERP system implementation in order to enhance employee skills. This can be achieved by selecting an appropriate plan for end-user training and education [31] that should consider all the difficulties emerged from global ERP system implementations, for example language and cultural barriers [20].

2.1 Training methods used in ERP systems implementations

Usually ERP vendors offer to the organizations several options concerning training forms. The most common ones are computer based training or on-the-job training. They also often offer training modules that aim to train the organization members.

By studying the IS literature we identified 26 training methods that can be used in an ERP implementation to support the training activity.

The diversity of these training forms is analyzed from 5 different perspectives (as it is shown in Table 1):

- *Retention.* Usually the level of retention is higher when the user is studying at his own pace. Many people learn well in a face to face environment, but the retention is limited due to the fact that if a user misses a step in the training program the overall learning experience is compromised. Yet, in a web based learning environment a user has the opportunity to study at his own pace and re-access the training content as many times necessary to reinforce his knowledge.

- *Flexibility.* In a face to face environment the trainer does not pay too much attention to each individual learning style, is pushed to meet the time allocation and usually assumes that the user has or has not a pre-existent knowledge. In comparison, other environments are particularly flexible because are developed using the principles of the Adult Learning Theory, are usually based on interactivity and demonstrations and do not rely on the personal skill of any trainer.

- *Availability.* Face to face training needs a lot of planning because of staff requirements and significant extra costs in multi-site ERP system implementations (due to travel costs and language barriers) and it cannot be organized at a short notice to meet specific user requirements. Computer based learning environments offer to the organization member the possibility to study whenever he wants or has time to do so.

- *Investment.* Face to face training is an ongoing expense while other environments are long term investments that allow new users to immediately access learning content at no extra costs.

- *Expandability.* If an organization is expanding face to face training is the most expensive option while new business processes can be easily incorporated in other learning environments without generating significant costs.

Table 1. Analysis of the current training methods.

Perspective / Training method	Retention	Flexibility	Availability	Investment	Expandability
Classroom instruction	Limited	Limited	Limited	Ongoing expense	New costs and staffing requirements
Print-based material	Improved	Flexible	Limited	Ongoing expense	New costs
e-Learning (asynchronous)	Improved	Flexible	Always available	Extra costs	Relatively easy to achieve
Conference calls	Limited	Limited	Limited	Extra costs	New costs
Email	Limited	Flexible	Always available	Extra costs	New staffing requirements
In person mentoring tutoring	Good	Limited	Limited	Ongoing expense	New costs and staffing requirements
Online assessment and testing	Improved	Flexible	Always available	Extra costs	Easily achieved
Online references	Improved	Flexible	Always available	Extra costs	New costs
e-Learning (synchronous)	Limited	Limited	Limited	Ongoing expense	New staffing requirements
Simulations	Improved	Flexible	Limited	Extra costs	New costs
Portals	Improved	Flexible	Always available	Extra costs	Easily achieved
Video broadcasts	Limited	Limited	Limited	Extra costs	New costs
Learning management systems (LMS).	Improved	Flexible	Limited	Ongoing expense	New costs and staffing requirements
Learning content management systems (LCMS)	Improved	Flexible	Limited	Ongoing expense	New costs and staffing requirements
Knowledge management systems (KMS).	Improved	Flexible	Limited	Ongoing expense	New costs and staffing requirements
Instant messaging	Limited	Limited	Limited	Extra costs	New staffing requirements
Online mentoring tutoring	Limited	Limited	Limited	Ongoing expense	New staffing requirements
Electronic Performance Support Systems (EPSS).	Improved	Flexible	Limited	Ongoing expense	New costs and staffing requirements
Games	Limited	Limited	Limited	Ongoing expense	New costs and staffing requirements
Communities of practice	Improved	Flexible	Always available	No extra costs	Easily achieved
Wikis	Improved	Flexible	Always available	No extra costs	Easily achieved
Virtual laboratories	Improved	Flexible	Limited	Extra costs	New costs
Chat rooms	Limited	Limited	Limited	Extra costs	New staffing requirements
Mobile learning	Limited	Limited	Limited	Extra costs	New staffing requirements
Blogs	Improved	Flexible	Always available	No extra costs	Easily achieved
Podcasts	Improved	Flexible	Always available	No extra costs	Easily achieved

eLearning Guild research has made a comprehensive study in 2008 (by interrogating 3000 respondents), regarding the trends in using the above mentioned training methods for corporative training. The results prove that traditional training methods like classroom instruction or with print-based materials are still widely used compared with the computer based training methods [12].

Many researchers and practitioners stated that none of these training methods guarantees the success of an ERP training program [38]. Yet, some of them believe that maybe a combination of these techniques is required to guarantee the success of ERP project [11]. After studying the academic literature we compile that the efficiency of the training and education activity in ERP implementation projects comes from applying training strategies that:

- Mix the training methods mentioned above;
- Are based on the learning by doing theory [19], a concept that was initially proliferated by Kolb in his Experiential Learning Theory (ELT).

2.2. Kolb's ELT

Most researchers favor the idea of personalized training [28]. In consequence we choose to focus on Kolb's model as the concept of individual learning style proliferated by Kolb seems to be extensively applied in theoretical and empirical studies. ELT defines learning as „the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience".

The ELT model portrays [23] [34] [33]:

- Two dialectically related modes of grasping experience:
  1. Concrete Experience (CE) where learning from feelings or reactions to experience influence your learning;
  2. Abstract Conceptualization (AC) where

learning from thinking or analyzing problems in a systematic method influence your learning;

- Two dialectically related modes of transforming experience:
  1. Reflective Observation (RO) where learning from watching and listening influence your learning;
  2. Active Experimentation (AE) where learning by doing or results driven influences your learning.

„Experiential learning is a process of constructing knowledge that involves a creative tension among the four learning modes that is responsive to contextual demands. This process is portrayed as an idealized learning cycle or spiral that will vary by individuals' learning style and learning context" [13].

Kolb's Learning Style Inventory (LSI), as defined by Kolb, includes four learning styles [9] [6] [26]:

- Converger who can be classified as someone who wants to solve a problem and who relies heavily upon hypothetical-deductive reasoning to focus on specific problems;
- Diverger who can be classified as someone who solves problems by viewing situations from many perspectives and who relies heavily upon brainstorming and generation of ideas;
- Assimilator who can be classified as someone who solves problems by inductive reasoning and ability to create theoretical models;
- Accommodator who can be classified as someone who solves problems by carrying out plans and experiments and adapting to specific immediate circumstances.

The researchers identified the training methods that appeal to the users in correspondence to the classification of the individual learning styles that Kolb proliferated [3] [16] [18].

Table 2. The correlation between individual learning styles and training method

Individual learning style	Training method	
	First option	**Other options**
Converger	computer based training (CBT)	small-group discussions, simulations, virtual labs, on-line assessment and testing, classroom participation
Assimilator	print-based materials	CBT
Diverger	classroom instruction	print-based materials, lectures, CBT
Accommodator	CBT	simulation, games, communities of practice

Also, based on Kolb's LSI, Simon conducted a study to reveal the existence of a direct link between the individual learning style and the training method. His study showed that this correlation has a direct impact on the user's performance [7] [29].

In an ERP system implementation it is likely to encounter users with all four learning styles Kolb described. Applying training methods that are not correlated with the individual learning styles will probably be rejected by the ERP systems users.

To conclude, the individual learning style and the training method have a significant impact on the organization's members performance during the implementation process of an ERP system and therefore major implications on the quality of use of the ERP system in general, which can lead to fatal consequences to the whole ERP implementation project.

3 ERPTraining system framework
In the attempt to personalize the training and education of ERP system users during the implementation process and after, we state that this cannot be achieved by applying one training method, but several, because the training necessities are diversified from different perspectives: time, space, individual learning style and learning content. The mix of training methods has as primary purpose to reach the training program goals by applying technologies that can promote the personalization of the training activity and a proper knowledge and skills transfer to the right user at the right time. By mix of training activities we understand a combination of several training methods categories: synchronous and asynchronous, on-the-job, on-site off-the-job, and off-site off-the-job [10], in-

dividual and collaborative, structured or not.
In order to meet the training goals an organization has to possess the means and knowledge necessary to provide an effective instruction to his members.

By studying the IS literature we compiled that a major part of the initial investment made in the training activity of an ERP system implementation project is centered on the end users training, thus this paper focus is to provide a computer based training method that aims to diminish the training activity significant resource consumption.

Considering our experience during several Romanian ERP systems implementation projects, we can state that the training activity efforts and results are difficult to measure. In consequence we propose a system that monitors the training activity developed during and after the implementation of an ERP system by which we aim the reduction of both training costs and instruction time by applying a computer based training method adapted to the ERP system that facilitates the knowledge transfer and the control of the training activity along with the collecting and processing in real time of all the pending ERP implementation projects training data.

Considering the inferences made above, we propose a framework for an ERPTraining system that will help us apply the principles of the Adult Learning Theory in an ERP implementation environment. This module is based on a training delivery method that favorites the training process personalization and also delivers the right knowledge in real time for the ERP user. The ERPTraining system is adapted to the framework of the SM (Sales Management) module of a Romanian SME's (small and medium sized enterprise) ERP system presented in Figure 1.
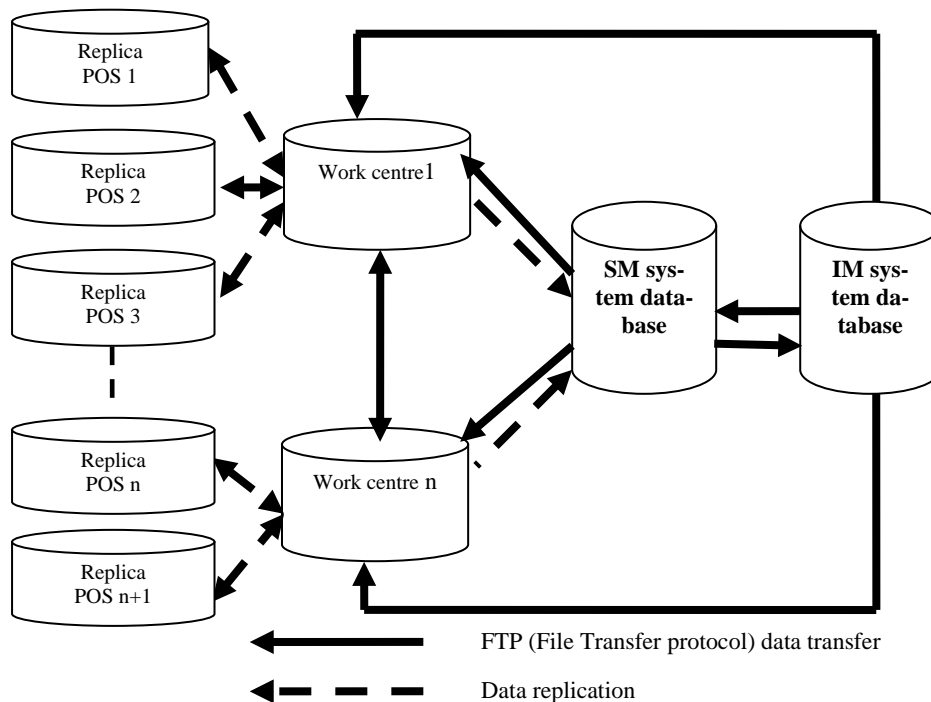
Fig. 1. The data transfer mechanism from the SM to the IM (Inventory management) system.

The system we propose will be developed using the same technology used to develop the SM module and a replication technology to ensure the training data real time access. The replication mechanism [25] will function in an asynchronous manner, bidirectional between the replicas and the SM module database and the ERPTraining system database.

We designed the entire ERPTraining system using UML (Unified Modeling Language) technology and created all the necessary models to reinforce the idea that personalized training in a Romanian ERP environment is not a utopia. This system is design to:

- Automatically evaluate the individual learning style of each user by applying Kolb's Learning Style Inventory as depicted in Figure 2
- Automatically deliver a training method adapted to the user's role and individual learning style;
- Allow the ERP training project manager to define any training method and attach to it training schemas (TS) for each business process users should be able to understand;
- Allow the user to automatically view the

training schema documentation (made by a consultant and sent via FTP) which will guide him in order to properly select the fix and variables parameters and introduce data in the ERP system in a correct manner; a training schema provides a standard that the user should follow while introducing a specific business process data in the ERP system. A training schema is defined by fix and variables parameters. The fix ones represents a mandatory selection that a user should make while introducing data and a variable parameter depend on the selection of one or more fix parameters or other constraints stipulated for a certain business process.

- While the user is operating the ERP system will automatically detect any exceptions from the training schema the user is generating while introducing data; 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;
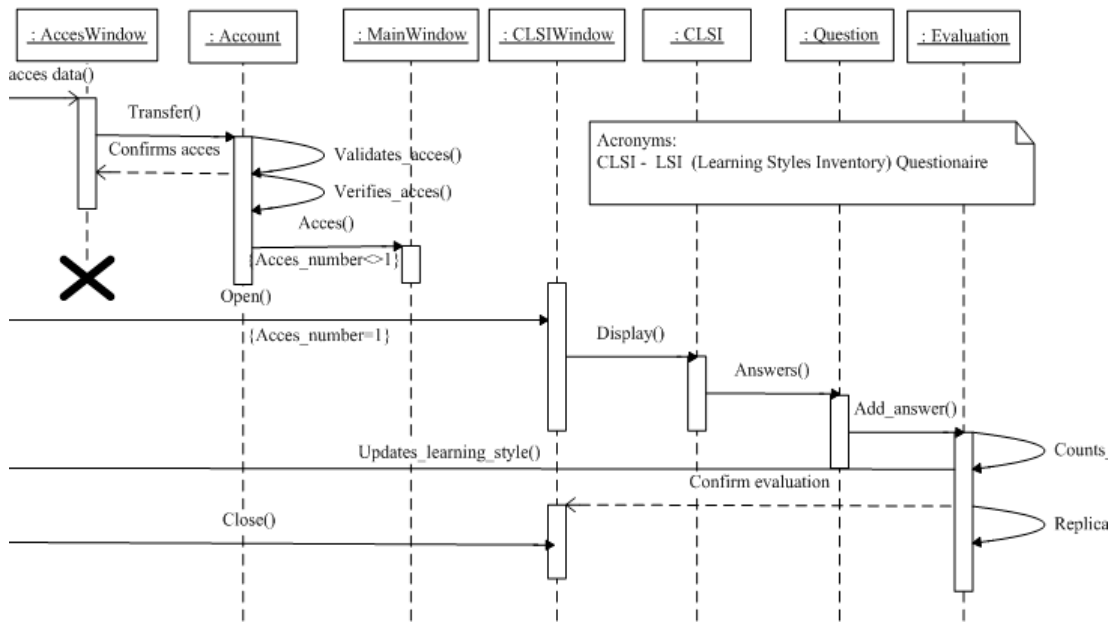
Fig. 2. Applying Kolb's theory in the ERPTraining system. Automatically evaluate the users learning style.

- Allow the exceptions from the training schemas to be replicated from the ERP system database to the ERPTraining database using a replication system;
- Allow the real time monitoring of the cost and time it takes a consultant to teach an user (for example, if the user wants to participate in tutorial sessions) or the cost and time a user needs to be trained to use a certain ERP system command;
- Provide the ERP training manager and the organization's management with reports and indicators that show the advances made in the training process in real time.

The training schemas will be created by the project manager in the ERPTraining module, and after the replication, will be updated by the consultant in the SM module. The training schema documentation is developed by the consultant and afterwards will be FTP transferred in a specific ERP implementation project replica and in the ERPTraining module database. The training schemas can be updated during the pre-instruction phase. After this phase is over, the final version of the training documentation is replicated in all the projects replicas. The training schemas exceptions and the necessary time to conduct instruction (regardless of the applied training method) will be counted and replicated in the ERPTraining database in order to evaluate final instruction costs. We present the process of defining a training schema in the activity diagram from Figure 3.
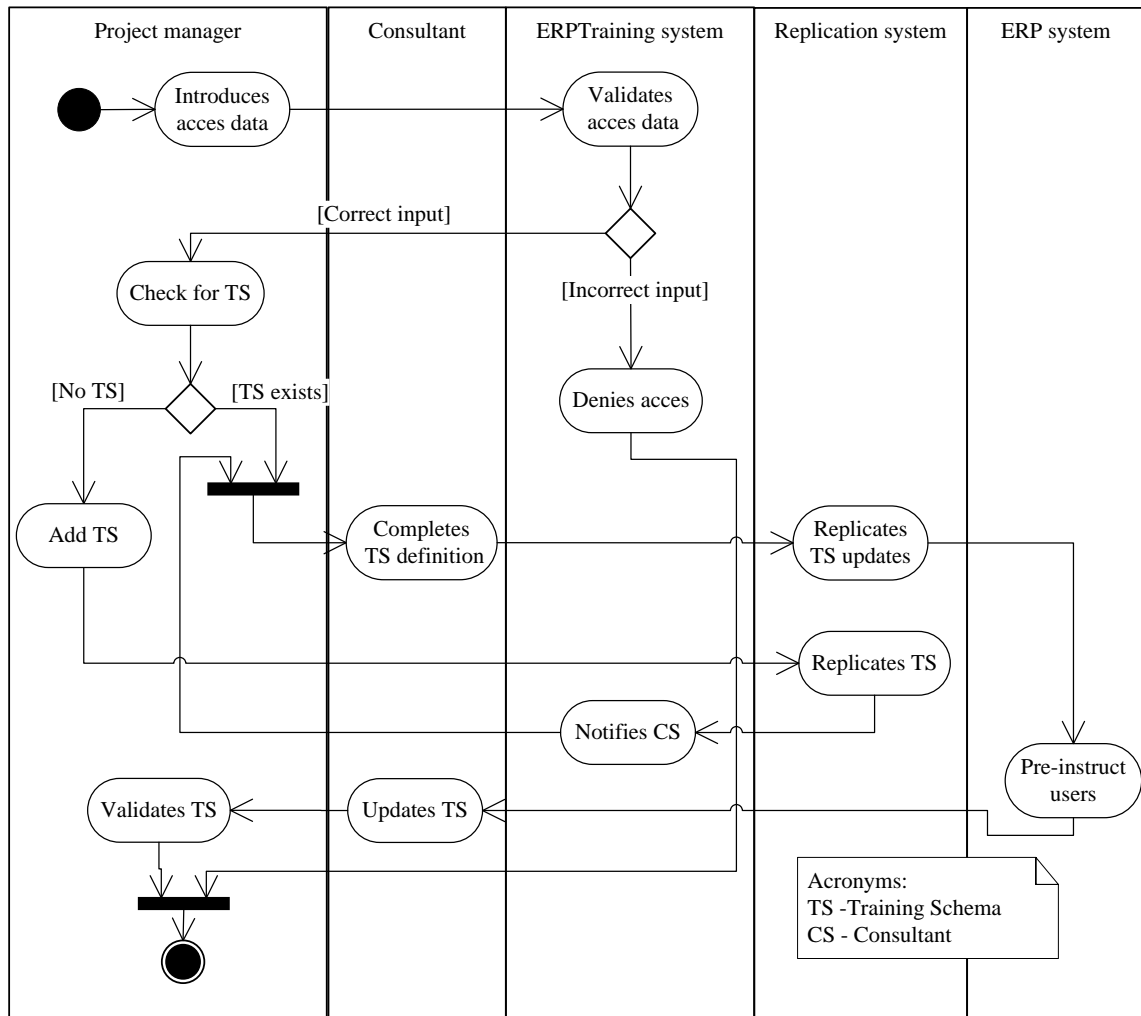
Fig. 3. The process of defining a training schema.

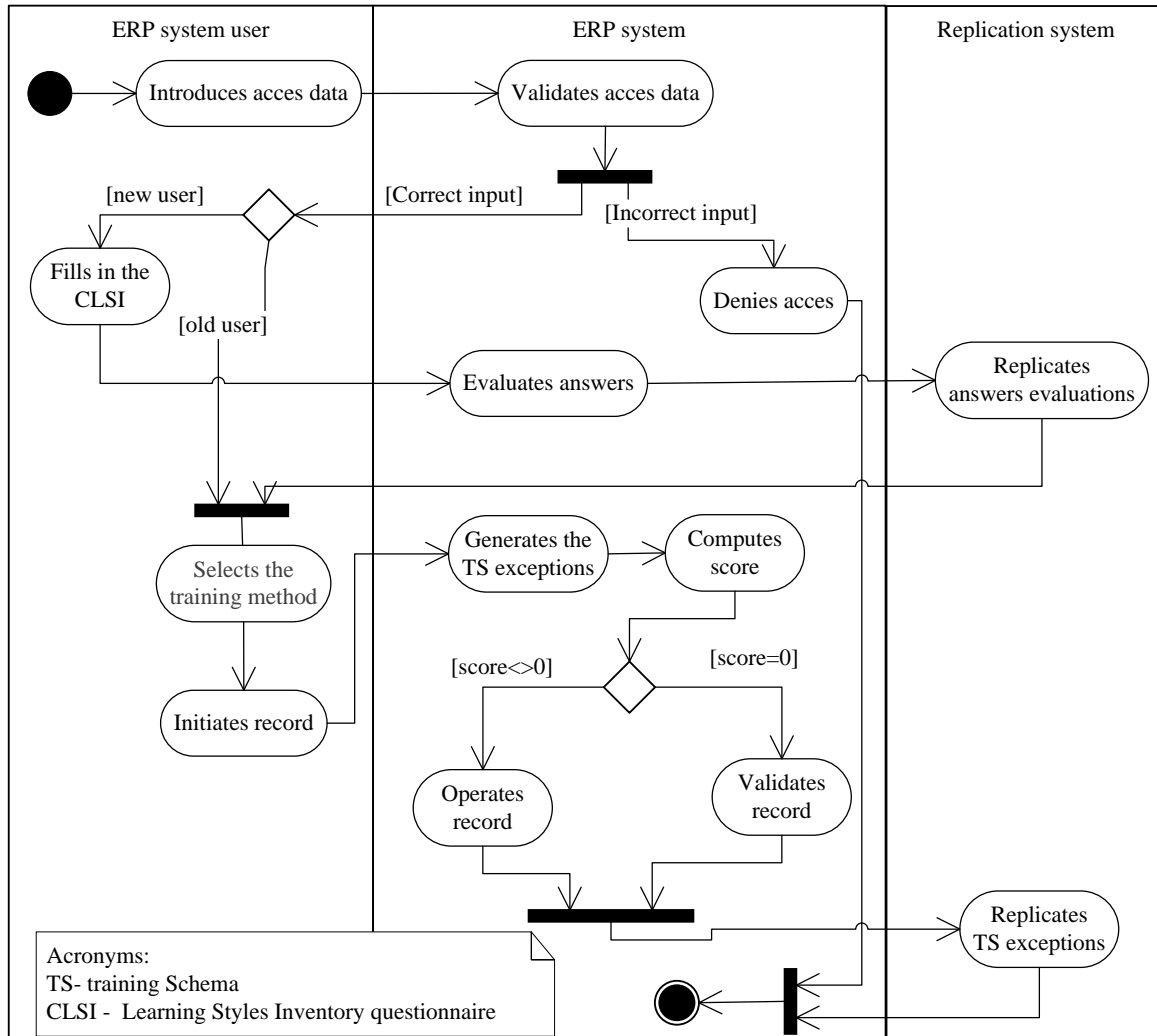The instruction process takes place as described in the activity diagram presented in Figure 4.

Fig. 4. The ERPTraining system instruction process.

The ERPTraining system was designed in order to provide the following features when implemented:

- 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;
- 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;

4 Conclusions

In this paper we highlighted the importance of providing a personalized training during ERP systems implementations in order to enforce the system's quality of use and therefore the individual performance of each member of the organization.

We started by marking out the importance of training as a critical success factor in ERP implementation projects, than we addressed several issues concerning the corporate training methods currently used in ERP implementation projects. By studying the advantages and disadvantages of these corporate training methods we concluded that a proper ERP system training ca not be achieved by implementing only one training method but a mix of training methods.

Afterwards, in order to meet our purpose of delivering a framework for personalized training we focused our attention on Kolb's ELT because this model was extensively applied in theoretical and empirical studies. We studied several inferences made in IS literature concerning the link established between the corporate training methods and Kolb's individual learning styles and as a result we attached to each Kolb learning style a predilect training method.

Than we focused our attention on developing an ERPTraining system framework that demonstrates a real possibility of introducing new features on how to achieve a better knowledge transfer in an ERP implementation environment by applying the concepts mentioned before.

We presented several UML diagrams we developed in order to highlight the most important concepts of the system.

To conclude, this system proposes a significantly improved alternative of monitoring the training activity in an ERP implementation environment which creates added value for both organizations involved in the implementation process. As future work we propose to develop and implement this SME's

ERPTraining system.

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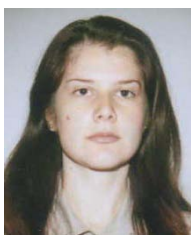
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