

Personalization of content selection in an enterprise LMS

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Abstract — A learning management system (LMS) is considered appropriate for company training. It is increasingly used in companies or organizations as a tool to manage their online training. The company or organization should consider the implementation of an LMS that provides ease in training content selection to achieve the best use and satisfaction of its employees in the learning process. From this perspective, the present study aims to investigate the implementation of a personalized LMS to facilitate the formative content selection tailored to employees' roles. A Survey research methodology was used to achieve this objective. Based on the literature and survey results, we propose an approach to reach the personalization of content selection.

Keywords – content selection; employee's role; LMS; personalization; professional training.

I. INTRODUCTION

Currently, the training system in the company is considered essential for its growth, facilitates the achievement of its objectives, and increases its competitiveness.

The author in [14] describes that training within the company allows employees to develop their knowledge, capabilities, and professional skills. Allow them to pursue their professional activities with greater efficiency, effectiveness, and satisfaction.

The primary objective of training in the organization is to acquire and develop the necessary skills to perform the role. In this viewpoint, there is a need to develop and implement a method with personalization within the enterprise training systems that provides a quick and easy adaptation to the conditions and requirements of any company and its employees [4].

To ensure training in organizations, some different modalities and strategies can be adapted to each context, such as traditional face-to-face training, distance training using technology (e-learning), and mixed training (b-learning) [17].

A company can consider the advantages of an e-learning system. Its implementation in the company, supported by a learning management system (LMS), can help employees develop their skills, at their own pace, without leaving the workplace. The use and development of an LMS must adapt to the company's characteristics to fulfil its training needs [17].

The problems that can arise in training are its inadequacy of employees' needs and the respective selection of training content, which can demotivate the trainees and lead to training rejection, resulting in training costs and loss of working time.

In this perspective and considering the individual role of training, the employee's characteristics and profile are considered as important in an e-learning platform implementation.

To succeed in the training process, the company must consider the importance of a learning system that allows adaptation to the characteristics of each participant and the selection of content adjusted to different training groups [12].

According to [11], personalization can increase the efficiency and quality of training. In this sense, it is considered a necessary concern and strategy to adapt the e-learning platform to the role of employees.

Despite personalization being allowed and part of LMS features, companies are not fully exploiting it [1].

Previous research evidenced a lack of guidance in companies' training systems, an example, for who and what it is designed, and the system does not enhance employee interest [6].

In a study by [5], the author appointed that the type of training in a group implies employees must follow training unrelated to their duties (e.g., logistics employees must follow the training on invoicing).

Analyzing the referred limitations and according to the literature, exist a reduced number of LMS that facilitate the training content selection relevant for employees' roles.

Considering the problem mentioned, this research aims to investigate the implementation of a personalized LMS to facilitate the formative content selection tailored to employees' roles.

To achieve the objective of this investigation and understand the factors that reflect the need for a company to personalize its LMS, the Survey methodology was used. The questionnaire was realized to collect the data.

This paper is organized as follows: introduction, theoretical backgrounds, methodology of investigation, extraction, data

analysis and survey report, approach to personalize content selection, conclusion, and future considerations.

II. THEORETICAL BACKGROUNDS

A. Training system in the company

Corporate training programs are essential for the strategic development of companies and organizations. From another perspective, training within the organization is a vital and integral part of the daily activities of the business [3] & [11].

The effectiveness of the corporate training system can lead to reduced training costs. It is considered necessary to create a separate structure of the training system with a mission, clear objectives, and a regulated structure [7].

In order to develop a training program in an organization, one must first analyze and identify the problems, budget, and needs of human resources.

According to [16], the analysis should have considered some factors: objectives of the company, culture (e.g., policies recruitment and hiring, current and desired level), the competence and the needs of employees, and the tasks to be performed.

From this perspective, developing a corporate training centre involves selecting the training type that most adapts to the company [15] and implementation of specific learning management system [9].

Considering the advantages of e-learning, it can be a viable solution for professionals, and bring significant benefits to companies and their employees.

Adopting the e-learning system in the company, as the training type, can facilitate the learning process and helps employees to learn in their preferred way while performing their tasks and during or after working hours [4].

B. Learning management system in company

E-learning training is generally supported by technologies that require the registration of users to have access to training and resources, and it refers to the learning management system [2].

LMS is widely used in global educational systems to develop, manage, and provide learning content online.

LMS can be described as a server-based software system that can manage and provide various types of learning, particularly asynchronous e-learning [6]. It is used to plan, implement, and evaluate a learning process in e-learning systems.

Two types of LMS are known, namely open-source and commercial versions. An open-source LMS are generally suitable for companies operating in technology, start-ups, and SMEs. Moreover, the commercial version is fit for organizations that do not have software technologies and without budget problems [18].

Choosing the right system that meets companies' needs should consider some aspects. One is extensibility, which refers to how the provided services can be customized or extended to meet changing business demands. Another aspect is a generality,

which refers to the adaptation and integration of an LMS into the organization's overall architecture, and how it can be adjusted and support other specific business needs that do not relate to the organization's learning system. [6].

The authors in [4] proposed improving the system according to employee paths. Therefore, it needs to develop a specific information system, that allows: the creation and editing of employee profiles; choosing the various roles in the company and outlining the employee's training path; displaying the differences between the requirements of each, including the current route; providing a list of required skills that must (or can) be acquired by the employee and plan the training path to gain the skills.

According to [10], a personalized learning system aims to provide learning resources that correspond to the characteristics of trainees. Inadequate management of e-learning can cause a cognitive overload of the participant, reducing performance, prolonging learning time, and affecting the willingness to learn.

The authors report the lack of a general format that can meet the needs of learners. Demonstrate a gap that is essential to investigate personalized learning.

The synchronization of e-learning systems with a third-party management system that manages users' databases is essential to achieve personalization, improve learning efficiency and increase interest in learning [4] & [10].

We can summarize that facilitating the training process in a company using an e-learning training model is taking a primordial place today. An LMS is essential to manage e-learning training. The personalization of LMS can ensure efficiency, effectiveness, and success in the system and training process.

III. METHODOLOGY OF INVESTIGATION

In this study we used the survey methodology, and a questionnaire was realized to collect the data. We followed four phases described by [13]: design; instrument development; execution; and data analysis and reporting of results.

A. Questionnaire survey design

Population and Sample

The population for this study is those working in companies or other organizations in general scope that use LMS in their online training system.

Thirty-eight (38) responses from the distributed questionnaire were obtained, which we considered our study sample.

B. Questionnaire instrument development

Usually, a questionnaire consists of the following types of questions: identification questions that refer the respondent to a specific group (e.g., age, gender, profession); information questions to gather data on facts or opinions; rest questions that serve to introduce the questions with the greatest difficulty and often the answers without further treatment; and control questions that serve to verify the veracity of other uncertain questions elsewhere in the questionnaire. The questionnaire may consist of closed, open, or mixed questions [8].

To facilitate the distribution of the survey, we used Google Forms.

Our questionnaire consisted of twenty-four (24) questions and was constructed in Portuguese and English to reach as many people as possible in various European countries.

C. Questionnaire execution

The final questionnaire was distributed and sent to the target audience through email, social networks, and private and professional contacts.

To reach the largest number of participants, we did not apply a restriction on the target audience. Anyone who works in a company or organization in general scope that has an online training platform can participate in the questionnaire. That allowed us to obtain the data of different names/types of LMS implemented in companies or organizations.

IV. EXTRACTION, DATA ANALYSIS AND SURVEY REPORT

We present in this phase the report of the questionnaire analysis results. We focused this report on data about the personalization of content selection.

Thirty-five (35) participants (corresponding to 92%) of the 38 participants that started the questionnaire answered the questionnaire completely, and three participants (corresponding to 8%) did not answer it completely.

A. Characteristics of participants

All participants who have answered the questionnaire completely have ever attended e-learning training in their company.

Most participants are female (52,6%), between 31 and 45 years old (50%), and 68% have a university educational qualification, about 66% live in Portugal, have the profession as administrative agents, logistics employees, and GNR (10,5%) and perform the function as logistics operator (15,8%).

B. LMS in the companies/organizations of the participants

It appears that Moodle is the most implemented LMS in the companies or organizations of the questionnaire participants (Fig. 1). More than 28% of participants named Moodle to answer the question about the name of the e-learning platform. Moreover, 20% named Qollab, while more than 11% did not answer the question.

Most Moodle users (20%) that participated in the questionnaire stated that the LMS offers training in their current role. Furthermore, 17% of Qollab users affirm the same opinion (Tab. I).

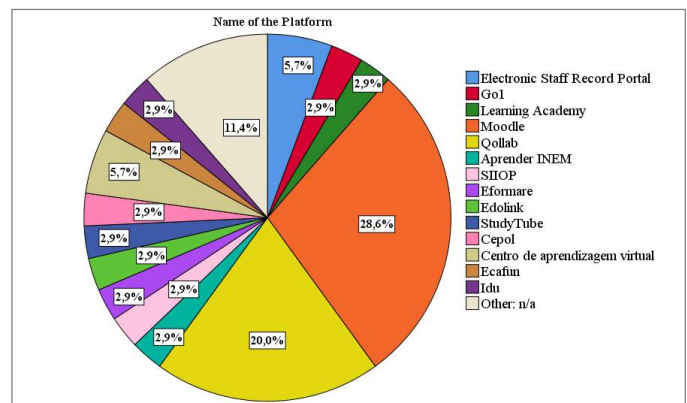


Figure 1. Training Platform name of Participants

TABLE I. DATA CROSSING: NAME OF PLATFORM, ROLE OF PARTICIPANTS AND TRAINING IN LMS

Name of Platform	Current role of participants	LMS offers training in current role?	
		Yes	No
Electronic Staff Record Portal	Radiology (CAT and X-ray)	2	
Go1	Head of ERP Systems	1	
Learning Academy	Trainer	1	
Aprender INEM	Pre-hospital emergency technician	1	
SIHOP	Operational - Patrolman	1	
Eformare	Manager	1	
Edolink	Human resource	1	
StudyTube	Sales development		1
Cepol	GNR	1	
Moodle	Administrative		1
	Commandant	1	
	University Professor	1	
	Technical Director	1	
	Tuberculosis specialist nurse		1
	Trainer	1	
	Operational - Patrolman	1	
	Gym teacher		1
	Senior technician	1	
	IT technician	1	
Total in percentage		20%	8,6%
Qollab	Manager	1	
	Logistic operator	5	1
	Total in percentage		17%
Centro de aprendizagem virtual	Senior technician	1	1
Ecafun	Administrative	1	
Idu	Administrative	1	
Other: n/a	Administrative		1
	Analyst	1	
	Economist		1
	Director	1	
Total		27	8
Percentage		77%	23%

C. Personalization of content selection

To understand how the types of training content that can be accessed affect the ease of content selection suited to employees' roles, we asked participants to answer the questions as follow:

“which training content that can you access?” and “based on your previous answer, do you find it easy to select the formative contents that are adequate for you?”.

Tab. II shows that 71,4% of the participants opined that easy to select the formative content on their training platform, while 28,6% think it is not.

Furthermore, 34,3% of the 45,7% of participants who have access to specific content (i.e., relevant to their functions) consider that personalized access facilitates the selection of relevant content. In comparison, 11,4% of participants affirm that is not easy to select the contents, despite personalization.

TABLE II. THE CONTENTS ACCESSED AND THE EASE OF CONTENTS SELECTION

Which training content can you access?	Easy to select the formatives contents?		Total
	Yes	No	
All (same for all employees, without personalization)	14,3%	8,6%	22,9%
Specific (relevant to your current role, with personalization)	34,3%	11,4%	45,7%
Both	22,9%	8,6%	31,4%
Total	71,4%	28,6%	100,0%

Tab. III shows that 57% of participants think that the e-learning platform of their companies/organizations offers training content selection personalized and adapted to their roles. In comparison, 43% of participants do not have the same opinions.

We verified that nine (9) participants could access the same training content for all employees. Seven of them agree on the non-existence of personalization. Despite that, they are satisfied with the training content selection personalization.

Thirteen (13) participants can access the specific content (relevant to their role). Ten (10) of them think that the content selection on their e-learning platforms is personalized according to their role and indicated the level of satisfaction as "satisfied".

Another thirteen (13) participants have access to both training content, 8 of them think that the content selection is personalized, and 7 participants indicate the level of satisfaction as being “satisfied”.

It is also verified that the level of satisfaction “very unsatisfied” and “unsatisfied” is indicated by seven participants who have access to all training content (without personalization) and both (all and specific/with personalization). Moreover, all those unsatisfied (5 participants) think that the content selection is not personalized according to their roles.

TABLE III. DATA CROSSING: LEVEL OF SATISFACTION, TRAINING CONTENT AND PERSONALIZED CONTENT SELECTION

Level of satisfaction – content selection	Which training content can you access?	Content selection personalization according to the current role?		Total
		Yes	No	
Very unsatisfied	Both	2		2
	Total	2		2
	Total in percentage			5,7%

Unsatisfied	All (same for all employees, without personalization)		2	2
	Specific (relevant to your current role, with personalization)		1	1
	Both		2	2
	Total		5	5
Total in percentage				14,3%
Satisfied	All (same for all employees, without personalization)	2	5	7
	Specific (relevant to your current role, with personalization)	8	2	10
	Both	4	3	7
	Total	14	10	24
Total in percentage				68,6%
Very satisfied	Specific (relevant to your current role, with personalization)	2		2
	Both	2		2
	Total	4		4
Total in percentage				11,4%
Total	All (same for all employees, without personalization)	2	7	9
	Specific (relevant to your current role, with personalization)	10	3	13
	Both	8	5	13
	Total	20	15	35
Percentage		57%	43%	100%

The existence of personalization in the content selection was also verified by observing how employees identify themselves to access their e-learning platform.

Tab. IV shows the different ways to access e-learning platforms. Most participants (20% of 23%) who access their platform with the employee’s identification (ID) think the formative content selection is personalized to their current role. Half of the participants (37% of 74%) who access the LMS platform with the login + keyword think that the selection of formative content is not personalized.

TABLE IV. LOGIN IDENTIFICATION AND PERSONALIZED CONTENT SELECTION

How to identify to log into the online training platform?	Content selection personalized according to the current role?		
	Yes	No	Total
With your employee ID (e.g., employee id, department/section name, ...)	20%	2,9%	22,9%
With your login + keyword	37,1%	37,1%	74,2%
Do not need to identify	0	0	0
Other: LDAP authentication		2,9%	2,9%
Total	57,1%	42,9%	100,0%

V. APPROACH TO PERSONALIZE CONTENT SELECTION

Based on the results of this study, we underline that the training manager or parts involved in the company's training project should have a clear perspective in the process of LMS implementation and takes into consideration some aspects, namely: the objective of implementation, strategy, and management.

- The objective of LMS implementation within the company
 - What objective does the company want to reach with the implementation of LMS; provide training content or improve employee performance?
 - Which training content does the company intend to provide? general (e.g., over the company's core business, relation with stakeholders) or specific content.

- The strategy for personalization

If the objective of the LMS implementation within the company is to improve employee performance, a training manager should consider the following strategies:

- Provide specific/personalized training content; classify the training content according to the employee's role and list the competencies that need to be reached by the employee.
- Provide ease of content selection; this can help the employees to select relevant training content to better perform their roles instead of losing between the hundreds of formative content and accelerating the training process.
- Personalization oriented to employees' roles; permits employees access to the training content that is relevant to their role.
- Management to reach the personalization.
 - Create an Employee Information System; constantly in actualization to include all current information (e.g., new employee, new role). This system is necessary as a tool for the previously described personalization strategy.
 - Synchronization of the employee information system with LMS; enables LMS to recognize and provide a content classification for each employee's role.
 - Content classification and actualization; the classification of training content in metadata must be actualized constantly to align with the recent information of employees.

Based on these three aspects, the following description enables us to present in Fig. 2, an approach to personalize content selection.

The approach presented is a global view to orient the training manager and other parts within the company involved in training projects to reach the personalization of formative content selection tailored to employees' roles.

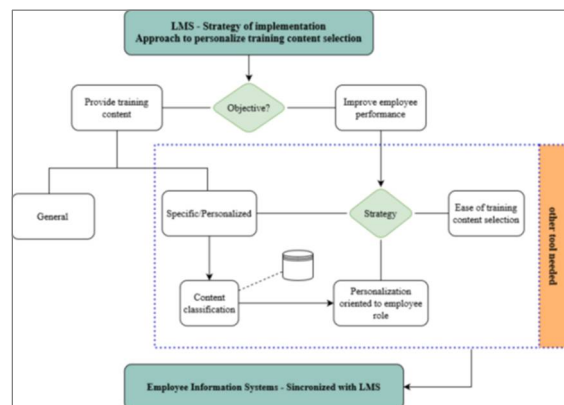


Figure 2. Approach to personalize content selection.

VI. CONCLUSIONS

In this investigation, evidence was found regarding the lack of a single format that can meet the needs of all trainees, thus demonstrating a gap essential to investigate personalized training.

The study evidence that the personalization feature of LMS generally does not provide the personalization that guides the employees to select the formative content relevant to their role.

Personalizing LMS based on characteristics, knowledge, skills, or employees' role makes it possible to provide personalized training content. An LMS with personalized content facilitates personalization in content selection suited to the employees' role.

It is important to consider synchronization between third-party systems that store relevant data to employees' training paths in the company's e-learning system (i.e., department name, function, realized training). These resources must be considered to personalize content selection, trainees' best satisfaction and autonomy, leading to effectiveness and efficiency in the training process.

A. Main limitations

The first limitation faced by this research was the sample size, which concerns the number of employees of companies/organizations participating in the questionnaire and the interviewees in the interview survey. It faced a lack of resources to reach companies/organizations that use the LMS, the experts, and limited time to execute the questionnaire and interview.

The second limitation concerns the understanding of most participants about the personalization of an LMS or their e-learning platforms. They may have no previous experience as LMS users other than the LMS of their current companies. Moreover, we could not verify whether the participants' LMS provided the personalization as the term in this investigation.

The third limitation of this study was that we could not verify the history of participants as users of LMS and their experiences with or without personalization in content selection.

B. Future considerations

The history of LMS users is a critical factor. The opinions of employees who experienced and used e-learning platforms with and without adaptation and personalization can provide more reliable information for a better understanding and comparison of benefits.

Therefore, in the future, it is worth studying the implementation of an LMS without and with the personalization of content selection to get the opinions from the same sample (users).

Additionally, it is challenging to implement personalization in this scope as a pattern of the LMS features.

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