How to choose the most performant LMS in terms of mediatization? Mediatization as an essential criterion for the choice of an e-learning platform

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Abstract. Distance learning during the COVID-19 crisis has involved the use of information and communication technologies and e-learning platforms. Faced with the rapid growth of the learning management systems market, training managers are confused about which LMS is the most suitable. Confronted by this problem and taking into account the importance of mediatization as an indispensable process in the design and development of online learning environments, it is necessary to know how to choose an LMS for proper mediatization. In this work, we assume that mediatization has an impact on the choice of platform. The objective of this article is to guide the choice of an LMS for proper mediatization. To this end, we have adopted a method consisting of an analysis and comparison of the criteria for choosing an LMS, developed by the FFFOD in its guide published in 2022, in relation to mediatization. This was done in order to determine the most effective LMS in terms of mediatization. The results showed that one LMS outperformed the other in mediatization. In conclusion, the choice of a platform varies according to the need, the type of training organization, and the training context. This choice is influenced by several factors; mediatization is therefore an essential criterion.

Keywords: Mediatization, Comparison, LMS, FFFOD, Moodle, Chamilo, ICT.

1   Introduction

This contribution is part of the current context where the market is characterized by an abundant offer that complicates the choice of the appropriate platform for training institutions due to the appearance of new learning management systems that offer advanced features. Therefore, the importance of mediatization as an indispensable process in the design of training systems, especially after the changes imposed by the pandemic on instructional design.

The research question of this research is "How to choose an LMS for proper mediatization?". This paper aims to assist educational designers in choosing the LMS that best suits their training needs and strategies, considering the impact of mediatization.

The authors apply a methodology of analyzing and comparing criteria for selecting open source LMS to determine which one performs best in terms of mediatization. Moodle and Chamilo are chosen for comparison. In addition, the criteria and sub-criteria related to mediatization are identified and are based on the eight mediatized teaching functions in the context of a virtual campus, as mentioned by the researcher Daniel Peraya (2010). Most importantly, this paper provides a rationale for the commonalities between each criterion and the mediatized function.

This research paper provides a methodology for selecting an LMS based on mediatization criteria. This can be useful for instructional designers looking for the best platform for their training needs. Moreover, a reputable organization's (FFFOD) guide is used as a basis for comparison, lending credibility to the results. This article articulates criteria and sub-criteria relevant to mediatization and provides a comprehensive overview of the factors to consider when choosing an LMS. However, this study is limited to open-source LMS features and does not consider proprietary LMSs, which can be a disadvantage for organizations that prefer commercial solutions. The authors relied solely on the criteria of the FFFOD's guide and did not take into account additional factors crucial for specific organizations or instructional designers. Furthermore, the research did not fully evaluate the usability and functionality of Moodle and Chamilo. This is also an important aspect to take into consideration when choosing a platform. Finally, the costs and technical requirements associated with implementing and maintaining the chosen LMS were not addressed.

2   Theorical framework

Distance teaching and learning imposes the following constraints on designers when designing an online learning environment: the requirement to plan and design learning activities as well as their mediatization and that of the online learning system [4]. Along with those constraints, instructional designers have to choose the most appropriate mediatization tool for the learning activities. Additionally, the ADDIE model is used to design and create online learning environments. The choice of mediatization tools and the LMS should be made in the design phase of the ADDIE model. While mediatization is an important part of the development phase. Mediatization involves the use of ICTs. In fact, the LMS can be considered a mediatization tool. Indeed, the authoring tools on e-learning platforms allow the development and mediatization of resources and activities. Taking into account this context, we propose this contribution that helps guide the choice of a platform for proper mediatization.

3   Practical framework

3.1   Materials and methods

In this paper, we adopted a methodology consisting of an analysis and comparison of the criteria for the choice an open-source LMS, in relation to mediatization, in order to

determine the most performant one in terms of mediatization. This comparison is supported by the criteria developed by the FFFOD[1] in its 2022 guide entitled "LMS: How to choose your platform?".

Our methodology is to determine the LMS that has the highest overall score in terms of mediatization [7]. This is accomplished by assigning scores within the range of 0 to 5 to sub-criteria as outlined in this guide. Then, in a table, we will gather and sum up the sub-criteria scores to determine the subtotal score for each criterion. Finally, the subtotals will be added together to obtain the overall score of each LMS. This will allow us to specify the most efficient platform in terms of mediatization. In addition, for sub-criteria that have a "yes or "no" rating (not quantifiable), we will assign 1 point for yes and 0 for no.

3.2   Reasons for choosing Moodle and Chamilo

We chose Moodle because it was the most performant LMS in 2020 according to the FFFOD in its guide. On the other hand, Chamilo is a recent platform that has been able to develop and progress in the last few years.

Moodle was among the most used LMS to teach remotely in 2021 during the COVID-19 crisis, especially in Moroccan universities. This platform, which is inspired by the learner-centered social constructivist approach, is based on the construction of knowledge and not on the simple transmission of information.

In addition to this, Chamilo has a simple and modern visual interface consisting of icons symbolizing what they represent. Some LMSs support a unique and specific learning or teaching paradigm. In fact, Chamilo allows all educational paradigms to be implemented using the different combinations of tools offered by the platform [1]. Unlike Moodle, which adopts socio-constructivism.

3.3   Criteria and sub-criteria in relation to mediatization

What is the basis for determining that the criterion of choice is related to mediatization?

To determine which criteria is in relation with mediatization, the study is based on mediatization functions.

The 8 mediatized functions of teaching in the context of a virtual campus, mentioned by the researcher Daniel Peraya (2010), are: 1) Inform and give resources; 2) Interact socially; 3) Accomplish a task (produce, etc.); 4) Manage; 5) Auto and hetero-evaluate; 6) Support and guide; 7) Awareness of the signs of presence of other distant members and their activities; 8) Develop meta-reflection [5].

The criteria and sub-criteria in relation to mediatization

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[1]   FFFOD: French Forum for Open and Distance learning

We will check if there is an intersection between the LMS criteria and these 8 mediatized functions.

Table 1. Criteria for choosing an LMS in relation to mediatization

Criteria and sub-criteria in relation to mediatization	Intersection with functions	Justification
CREATION AND ORGANIZATION OF TRAINING	F1 « Give resources » F3 « Produce » F4 « Manage »	For proper mediatization, the training should offer adapted pathways to learners (F4), containing catalogs (F4) and various and interactive pedagogical activities (F1). Authoring tool: F3 Training management: F4
INDIVIDUALIZATION AND COMMUNICATION	F2 « Communicate » F6 « Support and guide »	Individualization allows the adaptation of learning to different learning styles based on the positioning tool. Communication and tutoring (F2+F6) make learning more active and help avoid the isolation of learners. Those are among the bases of successful mediatization.
COLLABORATIVE LEARNING	F2 « Communicate and collaborate » F3 « Produce » F5 « Auto and hetero-evaluation » F8 « Develop meta-reflection »	Collaborative work (F2) develops meta-reflection (F8), a perception that one has of one's own reflection, by confronting one's own ideas with those of other learners. In this context, learners can evaluate the productions of their peers. The shared ideas are evaluated, and the learner makes a self-assessment (F5) to check the compatibility of his ideas with those of his peers. For a more social and dynamic experience, learners can collaborate, via social media discussion groups, to produce and complete activities (F3).
Sub-criteria 1,2 and 3 of COMPETENCIES AND BADGES	F5 « Auto and hetero-evaluation » F7 « Awareness »	For proper mediatization, it is better to gamify the learning environment through the awarding of badges at the end of the achievement of competencies. These badges can be thought of as signs of distant members activity (F7). Competencies are related to assessment: in a graded activity, when the minimum score to pass is reached, the competency can be marked as achieved either automatically or after validation by the teacher (F5).
TRACKING ET REPORTING	F1 « Give resources » F4 « Manage »	Tracking and reporting allow the traceability of the learner's progress and the generation of monitoring reports. Exported reports can be used in Learning Analytics (F4). The integration of activities in SCORM format (F1) allows traceability too.
DESIGN AND ERGONOMICS		Even if there is no intersection between the functions and this criterion. Ergonomics and design are always taken into consideration during mediatization. It is good to have the option of customizing the appearance of the LMS. In addition, having a responsive interface, which adapts according to the width of the screen of each device, and

		having a mobile application are more important. The diversity of languages is also important, the user can choose his preferred language during the course.
Sub-criteria 2 and 4 of INSTALLATION AND HANDLING	F2 « Communicate and collaborate »	In an LMS that has a global community of users, they can help each other and exchange via multilingual community forums (F2). In addition, quality documentation helps in mediatization.
ACCESSIBILITY	Even if there is no intersection between the functions and this criterion. Well-mediatized training is accessible to all learners with disabilities.	

3.4   Comparison of the two LMSs in terms of mediatization

The criteria and sub-criteria and their scores can be found in the open-source LMS sheets of the guide.

The following table presents the scores of the criteria in relation to mediatization and the overall scores of Moodle and Chamilo:

Table 2. The overall scores of the 2 LMSs

Criterion 1: Creation and organization of training	**Sub-criterion**	Training Management	Creating catalogs	Creating pathways	Presence of authoring tools	Diversity and interactivity	**Subtotal**
	Moodle	5	4	3	3	5	20
	Chamilo	5	5	5	4	5	24
Criterion 2: Individualization and communication	**Sub-criterion**	Positioning tool	Individualization of pathways	Individualization of contents		Communication and tutoring	**Subtotal**
	Moodle	No (0)	3	5		5	13
	Chamilo	2	4	3		4	13
Criterion 3: Collaborative Learning	**Sub-criterion**	Working Groups		Collaborative Production		Social Media	**Subtotal**
	Moodle	2		2		3	7
	Chamilo	5		5		5	15
Criterion 4: Competencies and badges	**Sub-criterion**	Competency frameworks		Automatic validation of competencies		Badge Assignment	**Subtotal**
	Moodle	5		5		5	15
	Chamilo	5		5		5	15
Criterion 5: Tracking and reporting	**Sub-criterion**	Standards SCORM / XAPI		Statistical tracking	Individual tracking	Exporting data	**Subtotal**
	Moodle	4		5	5	4	18
	Chamilo	4		5	5	3	17
	Sub-criterion	Graphic customization		Language	Responsive design	IOS and Android Apps	**Subtotal**

Criterion 6: Design and ergonomics			customization			
	Moodle	5	5	4	Yes (1)	15
	Chamilo	3	5	5	No (0)	13
Criterion 7: Installation and handling	Sub-criterion	Quality of documentation		User Community		Subtotal
	Moodle	5		5		10
	Chamilo	4		3		7
Criterion 8: Accessibility	Sub-criterion	Interface compatibility with assistive technologies	Understanding of links	Understanding Form Fields	Using the keyboard interface	Subtotal
	Moodle	3	4	3	2	12
	Chamilo	1	4	1	4	10
Total of the criteria of the 2 LMSs				Moodle		Chamilo
				110		**114**

Results of the summary table:

The comparison shows that Chamilo is more performant than Moodle in terms of mediatization: the overall score is 114 against 110. Moodle surpasses Chamilo in four criteria. While Chamilo gets the first scores in two criteria (C1, C3). On the other hand, there is a tie in two other criteria (C2 and C4). In conclusion, Chamilo exceeds Moodle.

Other factors to consider before choosing the LMS

Before choosing an LMS, the following factors should be taken into account:

- Does the LMS support the integration of new technologies: serious games, virtual reality, metaverse, etc.? Are there solutions that allow the integration of immersive environments into the LMS? Do these solutions allow the use of VR headsets and the sending of tracking data to the LMS from these headsets?
- Is it possible to connect the Metaverse platform with the LMS through the installation of packages? Does the LMS receive and share data with the metaverse platform? Does this platform allow the export of the virtual environment as a SCORM package that can be integrated into the LMS?
- Does the LMS support Learning Analytics (LA)? Does the LMS have a built-in LA tool? Is it possible to use the traceability reports generated by the LMS in LA to personalize the training?
- Is it possible to export a serious game as a SCORM/XAPI package and implement it in the platform?
- Does the LMS offer both an LMS/LXP tool? Is it possible to integrate the LMS with an LXP?
- Does the LMS meet certain criteria and indicators of the QUALIOPI quality certification?

- Does the LMS last a long time? The quality guarantee of the daily operation of an LMS is called Maintenance in Operational Condition [3]. Does the LMS have a functional offer to promote the MCO for each of its 5 axes?

4   Conclusion

In addition to the FFFOD's criteria for the choice of an LMS, we have added other factors to consider before choosing a platform. They ensure proper mediatization of the training. In addition, the choice of an LMS should be made after the choice of mediatization tools in the pedagogical scripting phase, which means before starting the mediatization. For example, if some activities are developed with H5P or VR, it is better to check if the LMS supports the formats of these activities before choosing them to avoid problems in the implementation.

The results showed that Chamilo outperformed Moodle in mediatization. In conclusion, the choice of a platform varies according to the need, the type of training organization, the context, and the strategy of the training. Indeed, this choice is influenced by many factors, and mediatization is also an essential criterion that impacts it. Finally, the choice of an LMS for proper mediatization should be based on the FFFOD's criteria in relation to mediatization. As well as on the other factors that we have mentioned.

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