

A LEARNING MANAGEMENT SYSTEM'S EFFECT ON PEDAGOGY

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Abstract

A study of a learning management system (LMS) used by two secondary school teachers to deliver a unit of work to middle-school students was conducted to examine the planning and development of a virtual learning environment (VLE) and determine the LMS's effect on pedagogy. Data was elicited via observation of the teachers' planning sessions, interviews and a survey rating teachers' perceptions of their VLEs. The study revealed that pedagogical design using an LMS was governed by three key factors: teachers' philosophies about teaching and learning, teachers' teaching styles and repertoires, and the LMS's pedagogical bias and usability.

Introduction

The widespread use of learning management systems (LMSs) in educational institutions has prompted the need to investigate pedagogical design of the virtual learning environments (VLEs) created by using such software. Especially when examining the usability of LMSs and VLEs, it is important to make the distinction between an LMS and a VLE (particularly in light of the fact that the two are often confused or interchanged in literature); an LMS is the tool used to create a VLE – as explained in the Definitions, following.

This paper reports on the results of a study that examined the effect on teachers' pedagogies when using an LMS, revealing that the way the developers designed the software influenced the way that teachers teach. This, coupled with the teachers' philosophies on teaching and the teachers' teaching styles, governed the pedagogy implemented when using an LMS.

Educational institutions have adopted web-based LMSs to be used as both administrative systems and as pedagogical tools. Used as administrative tools and as general content management systems (CMSs), LMSs have the potential to be extremely convenient for both student administration and for content management, but there is strong criticism of their use as pedagogical tools; research indicates that "passive models of teaching and learning" are encouraged by using LMSs in their current state, rendering them "page-turning tools" (Steel, 2009, p. 400). The notion of LMSs as simplistic platforms that fail to adequately provide the environment for sophisticated pedagogical practices has been expressed by researchers who have critically examined the effects of LMSs on teaching and learning (cf. Coates, James, & Baldwin, 2005, pp. 26-27). Criticism has subsequently led to a less teacher-centred emphasis in LMS design as LMSs become more adaptive and learner-oriented by "putting student's expectations, motivation, habits, learning

styles, needs, etc., in the focus of interest” (Despotović-Zrakić, Marković, Bogdanović, Barać, & Krčo (2012).

Whether LMSs become more sophisticated and learner-centric and overall more adaptive, the teacher-developers of the VLEs still develop the content and largely drive the pedagogy; thus, a comprehensive examination of an LMS requires examining teacher-developers’ own styles, philosophies and their techno-pedagogical skills to reveal the effectiveness or limitations of LMSs.

Definitions

An *LMS* refers to a (proprietary or open-source) program used to develop, assemble and deliver personalised learning content. LMSs are sometimes referred to as *content management systems*, *learning content management systems*, *course management systems*, *portals*, *courseware*, *instructional management systems*, *e-learning suites* or *online delivery platforms*. Popular open source LMSs such as *Moodle* or *Claroline* and commercial LMSs such as *Blackboard* or *Scholaris* are examples of LMSs. While there is no agreed terminology for these terms and their differences (LMS cf. CMC, for instance), Alfadly (2013) claims the “primary objective of LMS in educational settings [...] is to manage learners, i.e., to track their implementation and performance across different types of learning activities. In contrast, CMS or LCMS manage the content provided to the learner” (Ahmad, 2013, p 158).

While an LMS is sometimes referred to as a VLE, in this study an LMS is a software program that has been developed for educational institutions to use as a content management *tool* for online learning; it does not contain any *curriculum content*. Once it does contain curriculum content, (that is, teachers have used the LMS to create lessons, courses, or resources for their students) then that area of the LMS is said to be a VLE. The interchanging of terms most likely stems from the fact that LMSs contain in-built, scalable pedagogical design features (such as quizzes and assignment tasks) which would imply that the LMS is a *learning environment*; however, learning will not necessarily occur if the pedagogy and the content have not been developed. If a student enters an empty classroom or lecture hall, she is no more in a learning environment than she is anywhere else (arguably, any space – real or virtual – has the potential to be a learning environment). A VLE does not need to be created using an LMS; it can be created using any programming or software that can integrate tools that support various learning functions (such as communication and collaboration).

The developers of an LMS are usually not the developers of a VLE. Indeed, there are at least two levels of development for a VLE created by using an LMS: there are the developers of the LMS who have designed the program and its architecture and functional attributes, and there are the developers of the VLE who are the teachers who have designed the learning material, resources and tasks for their students. To ensure that the distinction remains clear, the terms *LMS developers* as opposed to *teacher-developers* (or *VLE developers*) are used in this study. The teacher-developers (of the VLE) are the primary end users of the LMS (as opposed to the students or learners who

are the secondary end users of the LMS). The teacher participants' roles, therefore, can be termed as *developers*, *designers*, *creators*, or even *VLE managers*. The significance of the relationship between the LMS's developers and the teacher-developers of the VLE using the LMS is displayed in Figure 1.

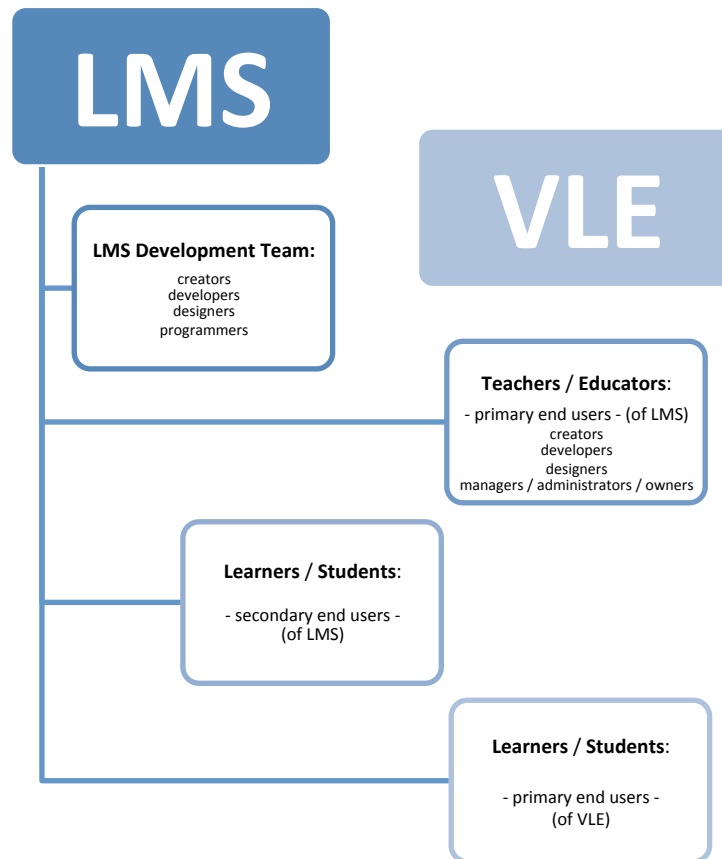


Figure 1. Program developers' relationship to end-users.

The Study

Context

A study of an LMS used by two secondary school teachers to deliver a unit of work to middle-school students was conducted to investigate the planning and development of a VLE using an LMS. The study took place in a secondary school in Victoria, Australia with two English classes of students. The school's LMS was used by the teacher participants to create a VLE on a unit of work specifically chosen for the project. The experiment was carried out with the aim of collecting data from all aspects of the design, development and execution of a VLE.

Origins

In previous research (Karvelas, 2004), *myclasses*, an LMS being used at a state secondary school, was tested for its technical usability. In spite of being found falling short of meeting standard practice usability criteria, the software

continued to be used as the school's LMS because it seemed similar to other options available at that time. Questions, however, were raised about the efficacy of using that LMS (or any other LMS); for instance, was using the LMS helping *teachers teach* and *learners learn*? This prompted a need to examine *how* the teachers were using the LMS to create VLEs for their students.

Brief History of the LMS

As proprietary software specifically developed for secondary school teachers by Australian company *myinternet* Limited, the LMS, *myclasses*, experienced some business success in Australia and the United Kingdom since its launch in 2003. In 2006, the company changed its name to Editure (having also operated under the names *CSM Technology* and *Schoolsnet*). By 2010, Editure released *myPLS* –which effectively replaced *myclasses* (Editure, 2012). The newer LMS is similar to *myclasses* and is used by K-12 schools in several countries, including Australia.

Research Questions

The central questions of this paper relate to the LMS's impact on pedagogy: how does using an LMS to develop and deliver online learning affect teachers' pedagogies? Furthermore, what factors not directly related to the LMS contribute to pedagogy when creating a VLE?

Study Design and Methodology Rationale

The focus of the research was on the use of the LMS by teachers (who were not software experts and relied on an LMS specifically developed to cater for their levels of technical literacy), rather than on the effectiveness of the VLE *compared to* face-to-face (f2f) instruction; therefore, a comparative analysis was not necessary. Furthermore,

The flaws inherent in conducting comparative analysis of different media types have been cogently articulated (Saloman & Clark, 1977; Hagler & Knowlton, 1987; Clark, 1983; Niemiec & Walberg, 1987; Belmore, 1983; Welsh & Null, 1991). These researchers concluded that effects resulted more as a result related to the teacher's instructional method than the software. (Stirling, 2005, para.4)

Thus, when examining an LMS, it is more useful to focus on the teachers' *instructional method* instead of just the effects of the software on learners.

Methodology

The four data collection methods used in this study to examine the impact of using an LMS on teachers' pedagogies are summarised in Tables 1-4.

Table 1

Précis of Data Collection Method 1

Method	1) Preliminary Interviews
Format	• semi-structured interviews with the teacher-developers
Duration	• two hours per participant (4 hours total)
Aim	• to elicit rich qualitative data pertaining to the teacher participants' perceptions and methods of learning and teaching
Significance to the research questions	<ul style="list-style-type: none"> • data pertaining to the teacher participants' existing pedagogies, teaching styles and understanding of their students' learning styles were used to examine the ways the teacher participants established the pedagogical aims of the VLE • data were used as the basis for understanding <i>why</i> the teachers used the online teaching methods that they devised for the VLE

Table 2

Précis of Data Collection Method 2

Method	2) Development of the VLE
Format	• informal meetings with the teacher participants who developed the unit of work collaboratively (the same content was used by both teachers in their VLEs)
Duration	• 8 meetings over a 3-4 week period each lasting 30-90minutes (8 hours total)
Aim	• to design and create a VLE to be used with the learner participants
Significance to the research questions	<ul style="list-style-type: none"> • understanding the <i>process</i> of developing the VLE was crucial to the research questions which examined how teachers create VLEs in real-world situations • the data were collected for three main reasons: first, to assess the level of teacher computer proficiency and competency as developers of VLEs; second, to highlight differences in the planning of the VLEs; and, third, to underscore the limitations (or value) of the LMS that was used

Table 3

Précis of Data Collection Method 3

Method	3) Survey
Format	• 16-item Likert-scale Survey rating teacher participants' perceptions of the VLE
Duration	• 15 minutes per participant [15 minutes x 2 participants] (30 minutes total)
Aim	• to obtain data on 'user satisfaction' of the teachers as developers of the VLE and users of the LMS
Significance to the research questions	• examining the impact upon the teacher participants of developing the VLE in terms of factors that were not strictly technical or pedagogical – such as fatigue and confusion - were linked to the LMS's usability and the Development Process of the VLE

Table 4

Précis Of Data Collection Method 4

Method	4) Final Interviews
Format	• structured interviews with the teacher participants
Duration	• approximately 20 minutes each (40 minutes total)
Aim	• to elicit qualitative data pertaining to the teacher participants' satisfaction with the VLE
Significance to the research questions	• the data pertained to the teacher participants' perceptions of the success (or failure) of the VLE course in terms of: <ul style="list-style-type: none"> → their satisfaction with the VLE → the pedagogical goals and effectiveness of the VLE → the usability of the VLE.

Findings

Teaching Philosophies

The teachers' philosophies about teaching and learning played an important role in the VLE's pedagogy because they provided a context for the pedagogical considerations implemented in the VLE. The integrity of the pedagogical goals of a VLE largely depend upon the teacher-developers' concepts of the nature and purpose of learning. The results of the study indicated that the teachers did not share the same foundational concepts of learning even when developing a VLE in collaboration (for example, defining or explaining terms such as *knowledge* and *skill*). This meant that when setting the pedagogical aims and goals of their VLE, the two teachers were in agreement in general terms ("to teach students about bias in news media"), but were not in agreement about the specific goals because their understanding of *learning* and *teaching* differed (one teacher believed learning was "Taking information from the outside and putting it inside," and the other teacher believed learning was "The gaining of skills and discovering how to do things"). Furthermore, both teachers claimed that they were not familiar with any learning theory (other than Gardner's Multiple Intelligences Theory in the case of one teacher). With respect to the teachers' inability to articulate the learning theories which underpin their pedagogy, this is not unusual and is supported by Shulman (1987) who highlighted how tacit knowledge is difficult to deconstruct and teachers have difficulty in voicing what they know and how they know it. The fact that the teachers lacked learning theory knowledge, however, is significant for at least two reasons. First, the teachers' usual pedagogical repertoire may have lacked the rigour required to deliver the unit of work irrespective of the method used (*viz.* whether it was delivered online or in a traditional f2f setting). Second, if they were more trained in, or aware of learning theory, they might have been more conscious of the LMS's pedagogical bias or designed their VLEs differently. Regardless of the teachers' lack of theoretical knowledge, the LMS remained biased because it still influenced the pedagogical design of the VLE, to some extent. It has been suggested:

Perhaps the pedagogical possibilities are linked to teacher knowledge and expertise. More experienced technology-using teachers may be less constrained by the use of LMS as they are able to work around the technology to express their pedagogical vision. On the other hand, beginner and novice technology-using teachers may be significantly challenged to express their intentions in systems that are pedagogically biased. (Steel, 2009, p. 400)

Teaching Styles

The teachers’ teaching styles and repertoires played an important role in the VLE’s pedagogy. The teachers’ individual teaching styles were ascertained using the Grasha-Riechmann (Grasha, 1996) “Teaching Styles Survey” (TSS) (a 40-item tool used as an adjunct to the preliminary interviews). This tool was used because the teacher participants’ teaching styles were anticipated to be largely reflected in the ways they chose to present their learning materials in VLEs. Both teachers rated HIGH for the Formal Authority and Personal / Demonstrator styles on the TSS and both also characterised their teaching styles as *Demonstrators*; this supports the teachers’ philosophies on teaching in which they emphasised the importance and necessity of the role of a “real” (f2f) teacher (as opposed to a virtual facilitator).

Table 5

Teaching Styles Survey Results

	Expert	Formal Authority	Personal / Demonstrator	Facilitator	Delegator
Teacher 1	MODERATE	HIGH	HIGH	MODERATE	HIGH
Teacher 2	HIGH	HIGH	HIGH	MODERATE	MODERATE

By definition, the Demonstrator model is teacher-centric, and both participants strongly defended the need for the physical presence of a teacher in the classroom. Indeed, in response to being asked what one teacher saw as the *school of the future*, he believed computers should never take over the role of a teacher:

I think it’s really important that human interaction is maintained in education particularly. I think a big part of education is – at high school education, school education – is about learning to be a grown-up. And I think you learn that from other people. So, it’s important that technology stays in its place [...] as long as it doesn’t take over f2f teacher-student and student-student interaction.

The TSS results ranked the teachers HIGH for the Formal Authority style, which is less suited to delivery via a VLE; the teachers *transferred* their pedagogical styles to the VLE. In the final interviews, teachers acknowledged that students generally did not read the prescriptive and lengthy instructions, and this was evident in the results. The teachers had converted their f2f instructions to text verbatim because: firstly, they were inexperienced at creating VLEs and therefore appropriated their current teaching methods of giving lengthy verbal instructions to students; and, secondly, they could not

think of any strategy to keep students following the linear structure of the VLE other than using guiding adverbs such as *now* and *then* as signposts in the instructions.

In theory, VLEs encourage teachers to adopt a more facilitator role in the teaching and learning process, but the teachers in this study exhibited strong elements of the *Expert* role. A sports coach does not flex an athlete's muscle, but encourages the athlete to perform certain physical exercises; the coach designs a routine or training circuit with the athlete's particular needs in mind and monitors that athlete's progress until the desired goal is achieved. Similarly, a teacher should, ideally, design a VLE mindful of learners' needs and encourage students through the process. In their personal repertoires in f2f teaching environments the teachers did not apply learning theory or best practices, and this was also the case in the development and planning of the VLE's content production, which was more of a didactic design than constructivist. The rigid sequential structure of the VLE did not cater for varying learning styles of students. Since the teachers saw learning as a *process* they designed the tasks to have a cumulative cognitive effect where one section of the VLE depended upon another one being completed *first* in the way that the teachers taught in f2f environments. The study showed that the teachers' teaching styles were a contributing factor in making the VLE less learner-centric than it might have been if teachers had considered constructivist learning theory and their students' learning styles in the pedagogical design of the VLE.

LMS Bias and Usability

The LMS's pedagogical bias, including its usability, played the largest role in determining the pedagogy of the VLE. The low technical usability of the LMS (as per Karvelas, 2004), had a direct impact on the pedagogical design of the VLE. Put simply, if a user of an LMS cannot adequately use the LMS, it has a negative impact on the sophistication and overall pedagogical design of the VLE. The study showed that the LMS's low *learnability* (a key element of technical usability) had a profound effect on the pedagogical usability of the VLE. The study showed a significant relationship between VLE activity (student VLE participation rate) and usability: the greater the techno-pedagogical error rate, the less likelihood for VLE completion (Karvelas, 2013). Related technical usability problems, such as the *findability* of key features of the LMS (e.g., Property Box for individual submission of work), changed the pedagogical design of the VLE. For instance, teachers instructed students to submit completed work (*answers*) in Property Boxes designed for collaborative discussion instead of Property Boxes for private submission of work. This re-shaped the pedagogical design, as public posts of answers enabled cheating by copying.

Although the misuse of the LMS's tools was the result of the teachers' lack of experience in teaching with VLEs, the LMS's technical usability was a significant contributing factor, as the tools were not explained clearly in the user manual (which was not read by the teachers as it was over 140 pages long and deemed unusable). Some of the LMS's tools that were more user-friendly, but not necessarily more usable, were included in the pedagogical design

during the VLE construction stages, even though they were not part of the original pedagogical design. For instance, the Vote tool was used by teachers simply because it was available and gave the VLE a semblance of more interactivity, which the teachers believed was evidence of an interactive VLE. This revealed the extent to which the LMS guided teachers' pedagogical design. The LMS's tools options had a significant impact upon the final construction of the VLE; this showed that LMS software plays a role in pedagogy - it is part of the teaching process because the VLE depends upon the functional options and tools of an LMS.

Conclusion

This study examined the impact upon teachers' pedagogies of using an LMS to design a VLE. It did so by delineating the teachers' philosophies on teaching and learning, as well as determining their teaching styles; then critically examining the teachers' methodology as developers of the content and its pedagogical execution. An LMS is designed to be used by teachers – the primary end users of the software. If the primary end users find significant difficulties using the LMS, then regardless of how advanced the level and pedagogical effectiveness of the features of an LMS are *theoretically*, the LMS is not highly usable and does not possess high educational value as such features are simply not used:

A recurrent message arising from the study of educational technologies, however, is that it is not the provision of features but their uptake and use that really determines their educational value. It seems that, to this point, LMS have been largely based on training-type models, even though many have emerged from universities. (Coates et al., 2005, p. 26)

An LMS is not pedagogically neutral, and while it may be useful in some cases to have the technology drive the pedagogy, an LMS should be purpose-built for teachers' needs, rather than lead teacher-developers to create VLEs that limit instructional design. Instead they need to address the variations of teaching and learning philosophies, individual teaching styles and the differing technical skills of teacher-developers to provide a system that adequately allows for sophisticated pedagogy to underpin online learning.

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