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Chapter

Perspective Chapter: The Learning Management System of 2028 and How We Start Planning for This Now

Michael David Sankey and Stephen James Marshall

Abstract

It has been said for years that, in the near future the Learning Management System (LMS) will become a thing of the past. Some suggest this should already be the case, but it has not been possible to break our institutional dependence on this technology. In the meantime, institutions have developed sophisticated networks of tools, largely built off the back of LTIs and xAPIs to seamlessly make the LMS a pervasive convenor of learning. These tools include media streaming, virtual classrooms, collaboration tools, plagiarism checking, ePortfolio, voice interaction, peer-review/learning, brainstorming, H5Ps and the list goes on. All that is left for the traditional LMS to do is to mediate these tools, house and collate assessment and scaffold the different learning scenarios. Admittedly it also helps the institution link to other organizational tools such as student management and curriculum management systems. This chapter looks at the future implications and examines a range of views from technology enhanced learning professionals from across the sector. The views being canvased may provide institutions with a framework to help them consider their future directions and how the evolving technology landscape may see newer ways of using emerging technologies to better support or student cohorts.

Keywords: technology enhanced learning (TEL), learning management system (LMS), virtual learning environment (VLE), higher education, artificial intelligence

1. Introduction

It has been proposed and mused over for more than 15 years now that, in the near future the Learning Management System (LMS) or Virtual Learning Environment (VLE), if you are in the UK, will become a thing of the past. Or in other words, “Is the LMS dying?” [1, 2]. Even back in 2007, Stiles [1] was suggesting that the VLE “has become fixed in an orthodoxy based on traditional educational approaches” (p. 31). However, the LMS seems to have proved itself to be more resilient than this, as institutions and LMS vendors have developed quite sophisticated networks of tools, largely built off the back of LTIs (learning tools interoperability) and xAPIs (experience

application program interface) interfaces that somewhat seamlessly, but increasingly make the LMS a more pervasive convenor of learning. This is similar to what we experience with our mobile devices (phones and tablets), that have a core functionality, but then rely on apps (independent applications) to enhance their functionality. This then frees up the device from having to house a full range of application that may never be used by the user. I will return to this point later.

But for the LMS, as we know it today, for those conversant with contemporary technology trends, particularly around the management of online experiences, suggest this is because “The LMS is not a digital classroom, it is a digital bookshelf: resources for consumption and not creation” [3]. That is, the advanced functionalities that the LMS can provide, when linked with other cloud-based tools, are not really being used to their full advantage, and when this is done it usually comes with large price tag for those institutions employing this approach. That is because the functionality that is required does not reside in the one tool, rather in the combination of online tools that must all be licensed separately. Countering, but also aligned with this are some early, but discernible trends that we see emerging, based off more enterprise-based systems approaches, and that is a shift towards the notion of productivity platforms to help mediate learning. This is very similar to what large corporations use to help their staff become more productive and is based around seamless integration and pervasive communications.

This chapter will first explore some of the history of the LMS and consider how it has evolved to where it is today. It will propose that we do not have to be constrained by our traditional approaches to learning, rather that today’s technology provides new opportunities that have not previously existed for the higher education sector. This is particularly important, as this sits in that important nexus between school and work, and we need to take advantage of these affordances as we prepare our graduates for the workforce and more particularly, the future of work.

Based on current literature, it is hoped that the following discussions will provide institutions with a framework in which to consider their future directions and how the evolving landscape of learning and teaching may see newer ways of thinking around emerging technologies and the role they may play in this dynamic space to better support or student cohorts.

2. A contemporary technology enhanced learning ecology

To exemplify the premise that the LMS/VLE is now a more sophisticated networks of tools, the following illustration (**Figure 1**) suggests that the LMS/VLE on its own cannot support an institutions approach to learning and teaching, rather it is part of a complex ecosystem of interconnected technologies providing a range of services to faculty, students, and universities. Common connections include systems operating content management, including copyright compliance; visual media recording and delivery; assessment and feedback processes; student records management; collaboration tools; social media; and student services and support. Interestingly, and more recently, the technology that is making significant inroads into academic practices have been the advent of productivity and communication tools, such as Office 365 Teams, Slack and Trello, and most importantly, since COVID is the use of environments that facilitate the use of synchronous video collaboration such as Zoom and Teams [4]. Beyond this, there is the vast array of general and educational tools and services available from hundreds of vendors that are able to be used by staff and

A Contemporary Technology Enhanced Learning (TEL) Ecology

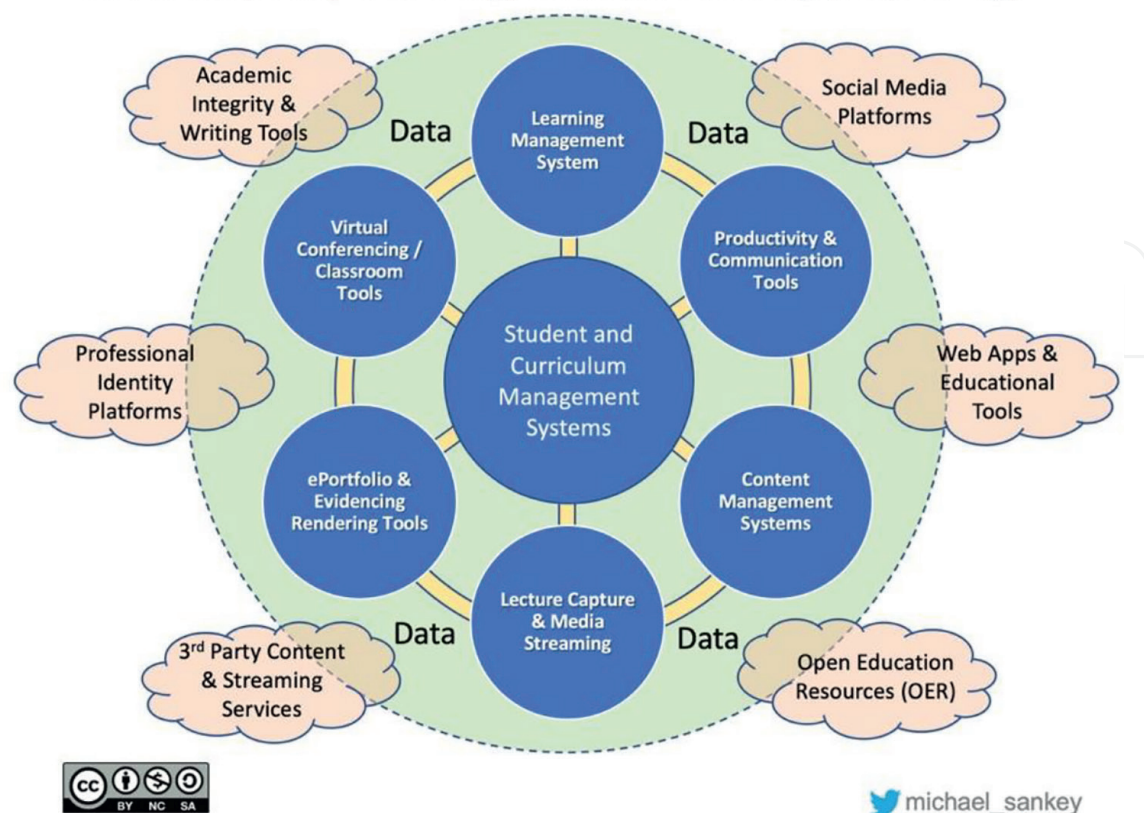


Figure 1.
The ecology of tools used for technology enhanced learning.

students for learning activities and assessment. These tools include media streaming and lecture recording platforms, virtual classrooms, collaboration tools, plagiarism checking, ePortfolio, voice interaction, peer-review/learning, brainstorming, H5Ps and the list goes on.

Brown [5] similarly considers the complexity of the evolution of university learning environments. The functionality they identify includes the LMS within a web of systems enabling course material delivery, content discovery and creation, data warehousing, analytics, dashboards, student advising, student progress monitoring, assessment, adaptive learning, social networking, and competency-based learning. All of these needing to address a complex array of requirements including accessibility and universal design, collaboration, personalization, and interoperability. Really, all that is left for the traditional LMS to do is to mediate these tools, house and collate assessment and scaffold the different learning scenarios.

3. A changing digital ecology

It is interesting to note the shifts that have occurred in both the technology that sit beneath the LMS and the evolving teaching practices that have emerged that are illustrated in **Figure 2**. In the early 2000's, as the LMS began to come into its own [6], we saw these systems largely as a piece of software to be hosted on an institutional server and later-on an institutional cloud, that would like other software's to be updated from time to time, as the discretion of the institution. This has evolved over

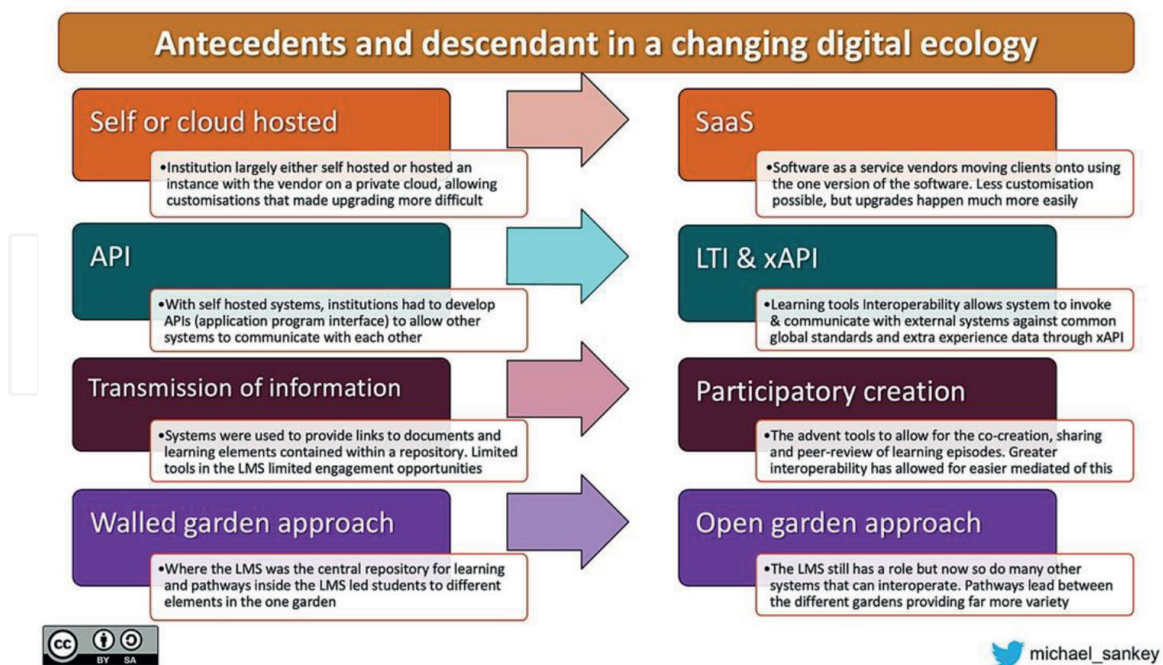


Figure 2.
The antecedents and descendants of the TEL ecology.

recent years (and is still evolving) to a model where the LMS vendor hosts the institutional LMS on their own server and provides this as a service to the institution. This is known as a Software as a Service (SaaS) model of delivery and is quickly becoming the predominant model within western higher education institutions [7].

Aligned with this shift has been the need for these SaaS systems to allow other technologies to communicate and interoperate with them. Previously, if an institution wanted to link to another system to share information it had to use an application programming interface (API). These APIs were and still are bits of computer code largely written by programmers within the institution, or by the LMS provider, under direction or auspices of the institution. However, with the LMS vendor taking on responsibility for these interfaces there was a need to evolve to some more common standards, so as not to support lots of bespoke institutional software applications. This led to the development of global standards for learning tools interoperability (LTI) and what became known as experience application programming interfaces (xAPI).

Not surprisingly, one of the criticisms of the LMS has been that it has not allowed for a replication of what could be done in the classroom in the virtual space. This was certainly true in earlier versions of the LMS where it was seen to be simply a place to link to files and recordings (transmission model of education) and then have students asynchronously participate in discussion forums. Notwithstanding, some people still use it in this way, even though the LMS has evolved significantly, largely due to what was discussed in the previous paragraph and the affordances that this has allowed through the linking to more interactive tools. What this new functionality has enabled is for teachers to engage students with far more participatory work, through just-in-time, synchronous and quasi-synchronous interactions [8]. This is linked with new forms of pedagogies that have been developed in tandem to the affordances that the new technologies provide. Though one could argue equally that the new technologies have evolved due to the increased demand to teach in more collaborative ways [9]. However, that is a debate for another paper.

The final shift to occur has been that of the freeing up of the learning space to embrace external sources. Where previously the learning environment was very controlled (a walled garden) and only the materials the institution provided their students would be considered appropriate (the textbook, the list of readings, with supplementary materials from the library) we have seen almost the reverse occur. We now expect our student to source materials from the big bad world and interact with others to co-create their learning [10] through a variety of Heutagogical and Paragogical approaches [11]. Kind of like what happens in the real world.

If this is the case, the question then becomes, is the LMS still the best way to mediate these newer forms of pedagogy into the future.

4. Considering a future state

Unlike school-based (K-12) systems that run subjects over an entire year, built on an agreed curriculum, the use of the LMS in a University is largely based around a semester model that sections off discreet subjects into blocks or 12–14 week, and that are led by a lecturer who may not ever interface with a particular student again for the entirety of their studies. This approach lends itself to what is described as a ‘building blocks’ approach, rather than it being focused on the student learning journey. What the LMS does is try to add some consistency to this experience, particularly in relation to collaboration and assessment tools, but then leaves core learning and teaching processes largely unchanged, as simply providing content that supports the assessment [12–14].

However, as we have seen, the role of the LMS has been changing and is now seen as a tool supporting user and the management of their learning across a range of contexts, as a more expansive concept of the system. Whereas the traditional LMS was conceived as a tool to support the administration of a campus-based university education, the next generation is much more concerned with the management of and access to information and the mediation of content from across associated platforms and used as a way to authenticate these users [15]. These features relate more to contemporary learning design practices based around the ‘experience’ that are then supported by the more rudimentary provision of basic communication and assessment tools.

This need to provide more interoperability largely evolved due to the perceived pedagogical limitations of the traditional aspects of online education that had its roots in the correspondence model of distance education [16], and this provided the impetus to find mechanisms to provide additional tools to be integrated into the LMS as supplementary features. Examples include the integration of tools/functionality such as:

- Turnitin (or similar academic integrity tools) for assessment of written work,
- Readings and content repositories for the management of copyright materials and inclusion of other library resources,
- Lecture capture systems and streaming media services that can be used by students and teachers alike.
- Peer-review and group work tools.

- ePortfolios and evidence rendering functionality to support placements and work-integrated learning.
- More recent AI-based writing assistance tools.

However, these additions to the LMS, in reality are somewhat limited as they tend to ignore more work-based learning applications. That is, those tools that students may be exposed to in the workplace and use on a daily basis. Most of the above functions are implemented by linking to external systems, with the LMS operating simply as a portal for identity management and as a channel for information interchange (such as assessment information). This essentially means that the pedagogical functions of LMS, despite the recent gains we have made, remain somewhat passive and aligned to a transmission pedagogy that is increasingly questionable in a more information dense and connected world subject to rapid changes. As a consequence, institutions are starting to experiment with the use of, what are known as, productivity tools (as seen in **Figure 1** at about 2 o'clock). These are collaboration-based systems such as Office 365 Teams, Slack and Trello, that are now extensively used in modern workplaces, and this linked with an institutional perspective on wanting to embrace more active learning pedagogies, there is an increasing attention to the potential of these systems [17].

While there are many online tools used to promote engagement that associate themselves with the LMS, the most common and persistent native feature of the LMS is the online discussion forum, which began to emerge the late 90s. This is the default tool for discussions in the LMS platforms and one of its mainstays. Even today, the online forum is still the most commonly used tool for class discussions and announcements for online courses and now hybrid courses [8]. However, over the COVID lock-down years, in which face to face classes were forced to move online, we have seen teachers adopting a combination of synchronous and asynchronous approaches to ensure some continuity for their classes. One of these has been using the workplace productivity tool, Microsoft Teams (Teams). Although Teams has largely been created to service the business community since its launch in 2017 [18], educational value and use, and the research into its use, although only very recent, the results thus far are encouraging [19].

Some recent, but early studies using student evaluation data of their perceptions of using Teams has found that they largely like it, and have found it easy to use and useful [20]. In formal learning contexts, Teams has been found to be superior to social networking sites [21], supportive of student–student and student-teacher interactions [22] and for some better than their universities LMS for chat, video conferencing and screen sharing and content creation [23]. On the negative side, some student surveys have found it difficult to keep track of assessment items in Teams, and that it is not as good as the LMS for the presentation and organization of course content [23]. So far, and it is early days yet, the negative findings are far outweighed by the positives. However, it was seen that during the enforced COVID lockdown periods, students did respond in positive ways to a use of Teams as an alternative way to connect with each other.

Importantly many teachers have equally enjoyed using Teams. One teacher commented that it was a 'a great tool' [24], another reported that she had 'a good laugh together' with her students and that the student feedback was 'overwhelmingly positive' [25]. Surveys of teachers have indicated that using Teams was 'user-friendly' and an effective way to promote networks with their students [26], and interestingly,

it was also seen to improved staff morale [27] and was 'very good' for the grading of student assignments, student-teacher interactions and classroom organization [28]. As mentioned, this is still very early days, however, based on some of these early findings, Teams, or more generally the notion of using a productivity tool, has been a well-liked and an effective option for handling the transition to online. For example, the use of Slack is also preferred by other institutions for the same purpose [29].

Supporting this view, at least from the Australasian perspective, in a workshop held in April 2021 with 32 university leaders in the area technology enhanced learning, participants undertook an online survey and held discussions on virtual collaboration and groupwork in online learning and assessment. When asked which tools could be better utilized in learning and teaching, they identified the potential of Teams, reporting numerous benefits such as its currency in the world of work, proximity to other Office 365 applications and its potential for 'conversation-centric' collaboration [30]. This is largely because TEAMS is first and foremost a tool for collaboration, which is in contrast to the LMS, which is content centric. This hints at a different type of teaching approach that can be afforded by TEAMS to what more traditional LMS users are familiar with. Martin and Tapp [31] in their report of using Teams to teach a law subject, argue that Teams promotes a social constructivist approach to collaborative learning. They also acknowledge that this is still early days in this work, but they did find that the unique affordances of Teams and the fact that it is a technology that many graduates will encounter in their first job begs the question, could Teams promote a more effective and relevant teaching and learning experience than the solidly entrenched LMS?

Interestingly, not only are these tools used in the workplace but are also being used in K-12 ahead of using an LMS, and as early as elementary school [32]. So, we find ourselves in a situation where students are using Teams at school and they are using it in the workplace, but not so much at university. By extension, we also do not see a lot of use of LMSs in the workplace, at least not the ones that are used by universities. We also do not see workplaces using things like discussion forums, but we do see them using productivity tools. But ironically, we also hear universities wax lyrical that they are preparing their students for the workplace. Based on this, one could suggest that it may be a good idea for universities to use the tools that the workplace uses as part of their teaching.

Figure 3 seeks to illustrate this point and suggests that universities should seek to work students towards the use of the tools they will be using with in the workplace,

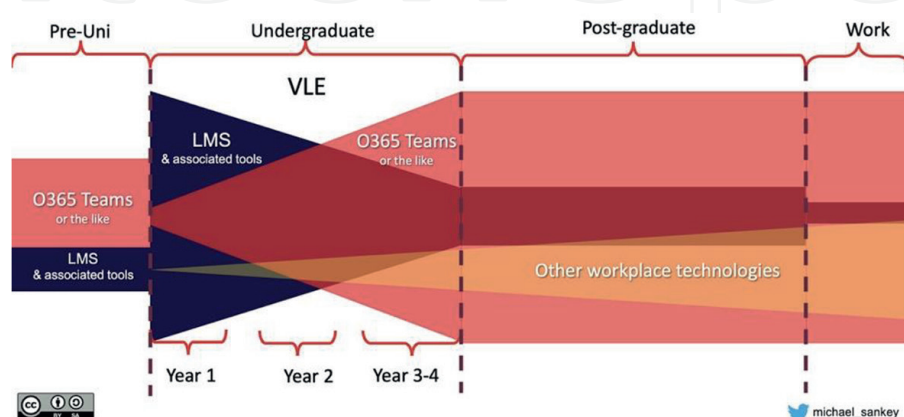


Figure 3.
O365 Teams usage from pre-university through to world of work.

as part of their teaching. We prepare our students with the discipline knowledge they need, but often fail to prepare them with the practical skills they need to be productive in the workplace from day one. Interestingly, could this also flag the possibility that students could be considered productive in and through their studies?

From this point on we should consider that the LMS as a term, may then include the notion of productivity, and that when it is signaled in the literature, that there is a need to consider greater collaboration and partnerships between themselves and their students. This points to the need to increase the deployment of systems designed to use the cloud, artificial intelligence, improved analytics, and increased use of models drawn from social media and gaming [33, 34] all of which are being well used in the workplace.

Increasing, mobile access to systems that may mediate learning, whether that be an LMS or a productivity tool will be essential moving forward, to enable active learning, social and gamified learning and microlearning are recognized as a key feature of both modern learning and teaching and the workplace [35]. Other ideas from the game space include badges and other social features aimed at building and sustaining communities of learning, are increasingly mainstream features of these systems [36].

5. The role of artificial intelligence (AI) in learning management

Linked with the shift of university systems to cloud-based platforms and to SaaS (illustrated in **Figure 2**) is the increased ability for these platforms to introduce more cognitive services, such as artificial intelligence (AI) to assist both staff and students in the practice of teaching and learning. AI has the potential to move the learning management, on whatever platform one uses, from a teacher-focused institutional infrastructure to the “exoskeleton of the mind” [12]. This is not a new concept but it is one that is only now becoming possible due to the rise in the ability to process large data-laden problems using the concentrated computing resources of multiple systems working in parallel (supercomputing). This is seen very clearly in the recent advent of ChatGPT from Open AI, but more generally across a plethora of AI based systems now available to students and educators alike [37].

The beauty of these cloud-based and SaaS systems is that they have ready access to major data sources across institutions to allow AI features to be used in a wide variety of ways [38]. This leads us then to the prospect of artificial intelligence-enhanced learning management systems, or expert systems that are integrated into the design of a platform for on-line learning [39]. Such a system has the potential to enable adaptive/personalized learning, learning supports [40], dynamically link to the achievement of learning outcomes, and direct engagement with learners through intelligent tutoring [41].

In the same way, AI driven adaptive learning systems that draw on user data are seen to have the ability to adapt to students’ learning strategies, to sequence tasks based on a student’s demonstrated abilities, and provide preprogramed feedback where appropriate [40]. More recently, we have seen the rise of AI chatbots, a feature that is now heavily deployed in major businesses, but for education, where answers to complex questions are often more nuanced, the uptake has been slower. Recently we have seen this technology deployed in conjunction with Microsoft Teams, most notably by David Kellermann from the University of New South Wales. Kellerman uses large student datasets collected within Teams to make individual student predictions associated with future exam performance. This is used to then provide personalized

study packs for every student in his course. As a result of this initiative Kellermann witnessed the pass rate for his course jump from 65–85% [42].

Probably the most challenging of the recent AI developments for institutions is the recent release of ChatGPT, based on the OpenAI GPT-3 network, that has made significant strides forward in providing not just chat functionality, but informed semantic reasoning as part of this. At the time of writing this chapter it is very early days as to describe the potential affordances to higher education of this tool, but they will be significant. Not the least as to how the LMS or tools like Teams may look to work with this and similar tools.

6. Organizational considerations

All of these advancements will clearly influence the ongoing development of the LMS, or whatever comes after the LMS. But even if an institution were to move much of what it does towards something like a productivity tool, these tools are still controlled by a vendor. However, while all of these areas of active development reflect important new capabilities for universities, teachers and learners, they are all still essentially sustaining the same operational, business and pedagogical model that was defined by early iterations of the LMS. Increasingly, with the need to employ many and varied systems around the LMS, as seen in **Figure 1**, there are huge cost implications for institutions, not just in the cost of these systems but also in relation to the human costs of maintaining the complexity and in sustaining the capability to change.

Organizationally the reality of the future LMS is a complex web of systems integrated locally with others operated by a range of vendors (as seen in **Figure 1**). University systems have evolved from single functional products deployed locally, into interconnected services that enact business functions using complex information architectures. Increasingly these have moved from locally hosted servers to unbundled services operated in remotely located computing hubs operated by companies like Amazon and Microsoft. This is more than a shift of hardware to the virtual cloud environment or outsourcing of complex technical functions, with many vendors moving from hosted software solutions to SaaS, to maintain more control over their product. It reflects a desire to have systems that sustain current activities but also allow for rapid shifts in focus, scale and context without the historical constraints of sunk investment in traditionally constructed systems, reflecting a more ecological [43] understanding of the university.

The characteristics of ‘platforms’ also align well to the dominant models of university change and operation, as the pressure to do more with technology to replace human interaction increases. This shift suggests the possibility of a further leap in our conception of the LMS designed to encourage agility, responsiveness and diversity of learning models, pedagogies and contexts, while still retaining coherence, sustainability and management of the whole – a platform rather than merely a system. A platform that can in essence observe, integrate and frame learning so as to:

- Connect people both inside and outside the organization;
- Placing an emphasis on different resources and the exchange of knowledge;
- Creating value through platform interactions;

- Able to streamline existing offerings as well as enable new ones; and
- Creating and sustaining an environment for collaboration by all users [44].

At the end of the day, the platforms that allow or learning management systems to thrive are an ecology of tools and help us to conceive new ways of operating and enhance how they influence organizational change. This ecology of systems potentially shifts the power hierarchies at play here to ones of engagement and productivity, thereby looking to increase the efficiency of educational activities to enabling more rapid and contextualized learning to occur [45]. Rather than the institution considering a supplier model for the learning platform, the nexus of control moves towards a vendor where the systems architecture modules delivering a data driven standardized service. The new conception opens the door for greater interoperability with collaboration and productivity platforms offered by Microsoft, Google and others without losing strategic control of the future models of education operated by the university.

7. Conclusion

Globally, there has been a massive shift in different models deployed by higher education providers to deliver what is seemingly a seamless experience for their students over the last two decades. However, the complex ecosystem that has evolved largely employs a complex web of commercial educational service providers [46]. The aspirations, however, of our institutions to harness technology and to partner with companies to create platforms for university education provide us opportunities to reconsider the educational fundamentals to be addressed by institutions who are increasingly working in the virtual space. This has largely been facilitated by the shift to vendor platforms based in the cloud that now link to large data sets that can enhance the capacity to provide more personalized learning experiences. As companies like Microsoft have demonstrated, modern productivity platforms can rapidly redefine the expectations being placed on education. These players that have significant market dominance and control over their partners who willingly operate within their ecosystems need to be considered, not necessarily with suspicion, but certainly with caution.

So what will the learning management system of 2028 look like? It is a space that enables our students to participate in education with the knowledge that the system will assist them where needed. It will provide them with the tools they need to be ready for the world of work and this is handled in such away as to be seamless and connected to their peers. It is a system that enables our teachers to choose a suite of tools that will match the expectation of the employers they are preparing their students to engage with. It is a system that is intelligent, in that it learns, extends and supports the aspirations of those who use it in a personalized way.

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