I. The Role of the LMS

A. Core Functions

As its name implies, the original function of the Learning Management System (LMS) was to provide a package of online digital tools to facilitate the management of the various tasks associated with running a course. It focused very heavily on automating tasks that had long been part of teaching, but for which online delivery provided an ease of use for faculty, administrators, or both. The core LMS tools, which mainly involve sharing digital materials and tracking data, are:

- roster - a dynamically-updated list of the students registered for a class, normally pulling from a University's Student Information System.
- announcements/email - a means to post communications for students to read on the course site and an easy means to email all the participants in a course or some subset of them.
- file-sharing - a means for sharing documents in a variety of formats, both from the instructor to the students, and to course participants by the students. Often, these are mere file warehouses; users must download the document to their own desktop and open it with a desktop program (such as MS-Word or Adobe Acrobat) in order to read it. An LMS does not typically provide a means for opening and working in documents online (as in cloud-based platforms like Google Docs).
- syllabus - minimally, a posted document in a standard format; normally, there is also a way to build a more dynamic syllabus (including, eg, links to course materials, images, attachments, etc.) within the LMS.
- gradebook - a means for recording and averaging grades; normally, the gradebook also allows instructors to keep students apprised of their average over the course of the semester.
• tests/quizzes - a means for administering and automatically scoring objective assessments in standard formats (multiple choice, true/false, etc.) and feeding the scores to the gradebook.

While the core learning management functions do more to ease the administrative burdens on an instructor than to allow students to learn in ways not possible without digital, internet technology, the spring 2014 survey of NYU instructors establishes that these core functionalities remain the most important to a large majority of instructors. It is imperative that they be easy to use, but flexible enough to support widely divergent use-cases.

B. Extended Learning Functionalities

In the period between roughly 1995 and 2010, the LMS grew to include more and more specialized tools that were bundled into the platform; the LMS attempted to provide tools that would fit the needs of all instructors in all circumstances, so that there was no recourse to online platforms outside the LMS itself. The model operated on similar lines to a software package like MS-Office (and, like MS-Office, the tool menus became increasingly complex). Among the functionalities the LMS came to provide were:

• discussion forums - asynchronous discussion on questions posed by the instructor or by students, often with options like threading, moderation, etc.
• assignment tools - delivery of assignments within the LMS that could be private between the individual student and the instructor, with the grade feeding to the LMS gradebook
• blog tools - tools for chronological posts with rich text-editing options (including insertion of images, video, etc.)
• calendars - digital online calendar in which to post assignment due dates, etc. The calendar in some cases might generate notifications of upcoming important dates.
• chat - a tool for spontaneous, synchronous online communication, normally without rich text-editing features
• dropbox - for delivering files from the student to the instructor (only), with ownership of the file being transferred to the instructor
• RSS feeds - dynamically updated items from an external website; e.g., headlines from a news service like AP
• portfolio - a collection of student artifacts extending across semesters, often with tools for rubric-based assessment by evaluators outside the parameters of an individual course. (Most LMS-bundled portfolios do not provide rich display tools).
- **link curation** - display of links to external websites (google docs, youtube videos, etc.), often with the option to open either in the LMS frame or in a new tab/window.
- **learning modules** - instructional materials (text, video, etc.) interspersed with questions sets to test mastery of the material before proceeding further in the module
- **web-conferencing** - means for video connection with students online

This approach ultimately proved problematic. The all-in-one LMS has proven untenable in the expanding software environment created by the online delivery of software that offers more choices and greater specialization than an LMS can possibly provide. An analogy is the eclipse of the Microsoft model of a bundled software package by the rise of the App Store metaphor, in which third-party apps with highly specialized functions provide flexibility and ease-of-use that the all-things-to-all-users bundles cannot.

A few examples: while the discussion forum tool in an LMS may provide options for threading discussions (that is, allowing participants to reply to a particular comment rather than the initial question, letting participants spin off sub-topics, etc.), a third-party discussion tool like Piazza that is built to perform a very specific function gives users an easy way to surface the correct answer to a factual question that a professor can then endorse. A discussion tool like VoiceThread, on the other hand, allows direct comment on individual slides in a presentation. No LMS could provide all these specialized functionalities without becoming an unwieldy monster. In addition, an institution may provide a tool that is used outside the specific context of courses, such as the Google calendar at NYU, that makes the competing tool in the LMS inconvenient to use; the whole point of a calendar is to have all one’s appointments in a single place. Finally, third-party tools typically have real-world uses, unlike tools within the LMS; a blog tool like WordPress is used professionally, so that students who use it begin to develop professional digital competencies, while students are unlikely ever again to use a blog tool bundled into an LMS.

Custom tools, in short, best serve the purposes of particular disciplines (and almost all learning goes on within disciplinary boundaries; indeed, different disciplines construct knowledge itself differently). Thus, specific tools for particular kinds of courses have proven to be more effective than all-in-one solutions. Conversation in the UAG has increasingly focused on specialized tools desired by the departments/faculty because they address very specific competencies (in, for instance, Math, Chemistry, Language Instructions, or Business). Tools that enable collaboration and social networking and are thus relevant to a broad variety of programs, on the other hand, often require focused development that an LMS cannot provide (some examples are Piazza, Google Apps for Education, Polling and Quiz apps, Attendance tools, etc.)
For the last several years, the leading LMS providers have responded to these developments by embracing a software standard called LTI (Learning Tools Interoperability) that allows users to route third-party tools that comply with the standard through the LMS. Specialized LTI tools:

- better address learner’s needs and faculty objectives within a specific discipline or competency
- often focus on learning and the learner rather than content and/or automation
- often give specific and measurable feedback to the teacher/advisor rather than broad data sets that are difficult to interpret

Given their more focussed feature set, LTI tools tend to mature more rapidly than comparable LMS functionalities (when an LMS even offers a comparable functionality) and so are able to support student learning more effectively.

Depending on the level of compliance, LTI tools may share full analytic data on their use that can be accessed by the Institution through the LMS. While Canvas rapidly expanded its market share by taking the lead on the integration of LTI tools, the ability to integrate such tools is becoming common to all the leading LMSes. In effect, this transforms the LMS to a kind of hub or portal that provides certain core tools, but accommodates a great deal of choice and flexibility in meeting specialized instructional needs. It is within these third-party tools that truly innovative instruction can best occur, because they focus on taking full advantage of what is possible in online, digital technology that is not possible with paper and ink, rather than automating tasks that have long been part of the business of teaching. The process of concentrating LMS development on core tools while integrating with third-party apps to provide functionalities that were formerly (and often inadequately) included in the LMS bundle is called disaggregation.

C. Out-of-Scope: What the LMS is Not

Because an LMS concentrates on delivering course-based instruction, there are certain educational needs it does not address (or does not address well). An LMS cannot provide a networking platform either for students or faculty - though some LMSes have made mild attempts to include profiles, a course-based system does not serve well as a networking platform, which depends on activity feeds and on robust search and directory features for its vitality. Similarly, while some LMSes have attempted to build in or tightly integrate with blog or portfolio tools, none have provided the range of functionality and ease-of-use common to stand-alone tools in those areas. While they may successfully be routed through a LMS, these and
other tools (e.g. for streaming, editing, and annotating video; for social reading; for delivering specialized content like case studies, etc.), will never best work as specially-designed native elements of the LMS bundle. Because these tools have real-world applications, it will be impossible for the LMS community to compete with software giants like Google and the army of developers who design iOS apps to create the best tools in these categories.

In sum, an LMS is neither a tool that every faculty member *must* use nor the *only* tool that most faculty members would ever need to use. At its best, an LMS provides:

- a customizable front page for courses, providing centralized access to the tools an instructor needs for his or her particular courses and teaching style.
- an easy and consistent means for performing basic administrative tasks, like sharing files or maintaining a gradebook.

However, national surveys conducted by Educause show that, despite the high percentages of LMS adoption, relatively few faculty members use its more advanced features. (NYU’s own survey of faculty LMS use, conducted in S14 by the UAG under TTC sponsorship, showed the same result). This leads to the conclusion that the LMS on the university campus has been successful in enabling the administration of courses but less so in enabling learning.

II. Market Survey of Digital Learning Tools

III. Conclusions and Recommendations

The primary lesson of the Gartner Report is that the LMS market is currently unsettled, as the product itself has experienced a paradigm-shift over the last few years. Disaggregation is no longer an idea on the horizon of LMS development; it is here. The LMSes that provide the most flexible and coherent platform for accessing a suite of third-party tools will win the future, but it is far from clear which of the existing platforms will best achieve that goal, or whether a product not even currently on the market will eclipse many of the current players. If the LMS has a more restricted role as a kind of wrapper for other platforms, then useability may create the most profound separation between them (of course, users tend to favor familiar designs as being more useable for them than learning a new system, even if the initial investment in time more than pays itself back over the long run. And, in technology, there may be no long run).

Disaggregation and the triumph of the app metaphor means that the most innovative uses of educational technology are now occurring outside the LMS itself. As the Gartner Report further establishes, the baseline functionalities common to the LMS - that in fact define what constitutes an LMS - are indeed *common* across all platforms. Every LMS provides tools for maintaining
grades, sharing files, making announcements, and so forth, that the other major products on the market also provide (see “Capability Analysis,” pp 32-39). Nor is it clear that what are now generally considered baseline LMS functionalities will not themselves hive off into 3rd-party apps in the future, leaving the sole function of the LMS to serve as a wrapper for a diverse set of tools - a WordPress course site, a Google Drive folder for sharing files and commenting on in-progress drafts, an SIS-delivered roster and gradebook, and so forth.

Nor does the experience of faculty and students correspond. Students, as consumers of the LMS sites their instructors create, are less interested in advanced functionality than consistency across all their courses and ease of use. If what instructors do in an LMS is limited to baseline tasks like sharing files, posting grades, and giving multiple-choice tests, the student perspective is understandable; the instructor works in the LMS and needs particular functions to be available in order to set up the site as they want it to be, but all that work is invisible to the student, who merely wants, e. g., to be able to find the files they need to download organized in one place.

What students overlook is that merely consuming what an instructor posts in the LMS does not help them to develop any of the digital competencies that are increasingly necessary to working successfully across a wide variety of fields after graduation. Thus, the disaggregation of the LMS argues indirectly for departments and programs to make a greater effort to define digital competencies in their field and ensure that students use the tools that develop those competencies. These tools will not be an integral part of any LMS - while a student will very likely use WordPress or Google docs after graduation, it is unlikely he or she will ever see the inside of an LMS again.

In this climate, it will be wisest for NYU to continue exploring various LMS options, but not to commit to a new university LMS. While it must continue to provide an LMS that fulfills the baseline functionalities that the majority of faculty members need in order to teach at all, it will do its best to support innovative teaching if it devotes resources to LTI-compliant tools that integrate with, but are not directly part of, the LMS. University efforts and investments in the LMS will be best targeted at developing our learning environment into one we can build on in multiple potential directions, as opposed to narrowing down our choice to a single product or platform.

NYU would further be well-advised to use its leverage as a large Research One University with a well-earned reputation as an educational technology leader to push the expansion of LTI standards to the range of e-texts and courseware solutions that Gartner describes in pp 40-53 of its report. Disaggregation need not mean the dispersal of the data that’s necessary for
program assessment and learning analytics; strong LTI standards should make it possible to reveal as much or more about student learning in a disaggregated LMS than it ever was in an all-in-one LMS.