

Gilfus Education Group

Educational Research, Strategy, and Implementations

Intelligence Emerges from Enterprise Education Platform

Integration thrives.
Intelligence prospers.
Everyone benefits.

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About the Gilfus Education Group

The Gilfus Education Group delivers education innovation by bringing refreshing clarity to academic and corporate enterprises through educational, technology, and business consulting. The company provides a wide array of services to clients across the United States and around the world, offering insightful and diversified expertise to the education industry. Since 1997 the Gilfus Education Group team has served thousands of universities, colleges, schools, academic content providers, and education and technology companies in meeting their mission-critical planning and technology needs.

Our group consists of individuals of the highest caliber talent and experience in educational research, strategy, planning, and technical implementation services representing capabilities for meeting organizational objectives and compliance, evaluating education quality and outcomes, and supporting technical integration, infrastructure, and delivery.

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Foreword

The Gilfus Education Group predicts that over the next few years, educators will make great progress in achieving institutional efficiency and accountability hand-in-hand with improved academic performance, predictive analytics and overall student success. Converging technologies can mitigate many existing challenges while providing greater capabilities to education institutions, especially improving the ability to generate and disseminate critical intelligence to all constituents. We are excited to share how the immersive experiences made possible by the Enterprise Education Platform can simplify and enhance many aspects of the education experience to generate new dimensions of intelligence.

– Stephen Gilfus, Gilfus Education Group



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College Goes High Tech

As the end of the first decade of the 21st century draws to a close, it is incredible to witness the almost ubiquitous presence of computers on college campuses. One of the most remarkable phenomena is that almost every student on campus routinely uses a laptop, mobile phone or a PDA device as a daily part of the college experience. This is quite incredible considering that during the last decade of the 20th century in the 1990s, computer use for most students was either nonexistent or a special event that often required a trip to an on-campus computer lab.

Even more amazing is that only a decade earlier, during the 1980s, most college students did not use computers in the learning process. For most students of that era, the closest tangible association with computers was test taking by coloring bubble sheets with number 2 pencils and collecting a punched card for each class during each semester's course registration process.

Today, one of the primary drivers of student computer usage is a college's Learning Management System (LMS) combined with high-speed wireless Internet access. For most students, the LMS is the online gateway to each semester's set of courses.

For each course, an online environment within the LMS is typically used by students to obtain and turn in assignments, perform online exercises, participate in class discussion boards, access required readings beyond the textbook, and check grades. At a growing number of schools, students will also find the instructor's notes and slides used during each class session and supplementary materials not covered in class sessions, as

well as audio and video records of each class session.

The primary driver of education computer usage is the preparation and distribution of assignments and lecture materials using word processing, spreadsheet, and presentation applications such as those found in Microsoft Office. Other drivers are student online applications such as email, text messaging, and World Wide Web (Web) browsing both for assignment, research, and entertainment purposes, and for interacting with friends within social networks such as Facebook and MySpace.

Over the past few years, higher educators have pondered whether the tremendous wealth of student-behavior information, that can be collected during routine LMS usage and analyzed to identify trends, can be combined with the vast amount of data found in traditional institutional Student Information Systems (SIS) and campus Enterprise Resource Planning (ERP) systems. Not only can more robust data provide richer analyses of student performance, it also can help in predicting potential student success and failure, identifying at-risk students, and recommending appropriate corrective remedies for faltering students. Using critical data to support institutional and student success is extremely important because over the past few years, colleges have faced mounting concerns over decreasing budgets and staff shortages as they grappled to improve student-retention rates to boost graduation rates and preserve important tuition revenues.

Campus Computing Evolution

During the 1970s and 1980s, when the closest exposure to computers for most students was taking tests on bubble sheets and signing up for courses via a registration system driven by punched cards, mainframe computer systems were being installed on major college campuses in the United States. During this era, numerous standalone batch computer programs and packages were introduced for applications such as accounting and budgeting, payroll management, human resources (employee database), inventory management, library management, student information (student database), course registration systems, grade (report card and transcript) systems, statistical packages, and programming language compilers.

Although these programs and packages were based on the same solitary mainframe system, for the most part they existed as separate isolated entities because data was configured in proprietary databases and data formats. Because of newfound abilities to amass and organize large volumes of data, the old adage “information is power” began to take on new dimensions.

During the early 1990s, ERP systems which had their origins in manufacturing and production planning systems were introduced to higher education. The college ERP leveraged client server architectures to begin to integrate information and business processes into a common set of databases to enable the sharing of data and information throughout the collegiate organization. The early scope of college ERP offerings was financial management,

asset management, and human resources management, but expanded by the late 1990s to include SIS, grading (report card and transcript), grants management, financial aid, course registration, marketing automation, and supply procurement. Although ERP introduced efficiencies through centralized databases and common formats, “information is power” isolation continued to thrive on college campuses because user interfaces for various ERP applications were far from intuitively obvious, and typically required specialized training.

*“...the old adage
‘information is power’
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dimensions.”*

LMS vs. ERP

While collegiate ERP systems were gaining momentum and proliferating in the 1990s, the Internet and the Web began to blossom. The most visible and dramatic impacts on colleges were the introduction of Web sites to promote the college institution, the explosion of email, and the emergence of Course Management Systems (CMS) for faculty course Web sites and as a basis for e-learning.

Instructors rapidly created online classroom environments in which students and instructors communicated via email, shared documents, submitted homework and took tests. Unlike ERPs, early CMSs were embraced first by techno-savvy faculty, graduate students, academic computing researchers, and academic technology organizations, typically not under the direct jurisdiction of the Chief Information Officer (CIO).

By 2001, the Web had become well established and embedded into North American culture. A growing number of colleges deemed e-learning as an important learning format with ground-breaking pedagogies within their institutions, and Course Management Systems grew into institution wide Learning Management Systems.

Some colleges asserted that the LMS was critical to the institution's core mission of teaching and learning, and that it was just as important to the daily operations of the college as email and the voice phone system. The notion of anywhere, anytime learning proliferated among campuses and colleges began to perceive learning technologies as a competitive advantage for their institution.

Additionally, there was an enormous degree of innovation regarding new curriculum specific tools, dynamic content, learning objects, communication widgets, and broadband technology to meet the diverse needs of instructors and students within various education disciplines. Also notable is that primary Web sites of many colleges evolved from brochure ware to institutional portals for both the public at large and the major constituent segments of the college.

By this point, colleges were beginning to enjoy the efficiencies and cost savings generated by their ERP system investments. In the ERP spirit of improving operations, it became clear that the integration between LMS and ERP, especially the SIS, could generate additional labor efficiencies and cost savings.

Early integrations seemed straightforward:

- 1) Before the beginning of the semester, load the student enrollment lists from the registration system to the appropriate course sections within the LMS, and
- 2) After the end of the semester, load the final course grades for each student from the LMS to the SIS.

Tying together the ERP and the LMS appeared relatively straightforward, by simply interchanging a few pieces of information.

However, as the need for more sophisticated integrations grew, the challenges multiplied because of a host of factors:

- The ERP system was typically managed by centralized administrative staff, whereas the LMS was managed disparately by academic staff across a number of departments.
- The ERP was built on client/server architectures while the LMS was built on rapidly evolving Web application technology.
- Security policies varied widely, with the LMS providing open access to a wide number of typically undefined users, and the ERP providing specific access to a smaller group of well-known users.
- Variations proliferated to satisfy

administrative staff and faculty while meeting the needs of the student user in a rapidly changing and significantly growing technology environment.

- The software code of ERPs and LMSs was radically different making integrations complex, challenging and often unsustainable because of individual vendor upgrades.
- The maturity level of the applications and the unique attributes of organizations forced customizations, making any extension to either system more challenging.
- Colleges often did not upgrade to the latest releases of an ERP or LMS in a timely manner, making it difficult to support newer capabilities.

And moreover;

- “Information is power” fiefdoms related to specific ERP and LMS applications flourished within individual organizations that were focused on owning and leveraging data but not sharing it.

Unfortunately, for many colleges the effort, cost, and resources required to establish and maintain the reliability of the integrations approached the level of maintaining and operating the core ERP systems and LMS. In addition, some higher educators suffered from system downtime or complete system data loss sparked by faulty integrations.

Today, with growing wireless capabilities and advanced mobile devices, information applications within colleges continue to grow exponentially. Departments and individual faculty members often have the latitude to

“...the landscape of various technologies within a single college has become confusing, unmanageable, and untenable.”

introduce technologies and applications to meet their own unique needs.

Needless to say, the landscape of various technologies within a single college has become confusing, unmanageable, and untenable. Because of this, college technology ecosystems are typically fraught with redundant data, information ambiguity, disconnected processes, and gaps in security, and provide little to no ability to create reliable continuity among institutional information and end-user experiences.

Traditional ERP systems have evolved to provide more complete functionality for institutional operations and individual user capabilities and LMS functionality has moved from that of a course support tool to that of an enterprise wide teaching and learning application that encompasses the pragmatic operations of a course while extending itself into other areas of the institution. Ironically, the most dominant and visible system on college campuses today, the LMS, has been neither effectively integrated with nor embraced within the ERP system, and there is greater and greater overlap of the two systems.

**Costs of Fragmented
LMS/ERP
vs.
Benefits of
Enterprise Education Platform**

Desire

Consistent and predictable user experience.

Data consistency and integrity.

System interface simplification, consistency and integrity.

Higher degree of security.

Reporting reliability and timeliness.

User independence from IT.

IT economies of scale.

Synchronized platform backups and upgrades.

Lower total costs, better efficiencies and higher return on investment.

Costs of Disparate Systems	Benefits of Cohesive Enterprise Education Platform
<ul style="list-style-type: none"> • Different approach and orientation for each application. • User training for nuances of each application. • Functions, searches, and queries yield unexpected or inconsistent results. 	<ul style="list-style-type: none"> • Common method of user interaction throughout all applications. • Contemporary user interface throughout ensures robust use of the solution. • Higher user productivity through simplified interactions with content, processes and data.
<ul style="list-style-type: none"> • Higher margins of error due to redundant keystroke and data feed inaccuracies. • Ambiguity of information. • Different data definitions and processing logic. • Various systems store different values for same item. 	<ul style="list-style-type: none"> • Institutional leadership has “one version of truth” from which to make confident decisions. • Assurance that data is accurate, reliable, and accessible. • Holistic views of students, faculty and curriculum through centralized intelligence.
<ul style="list-style-type: none"> • Myriad of interface methods across different systems. • Intersystem communication creates risks. • Batch process and transmission delays cause unsynchronized data across systems. • System upgrades may trigger unexpected changes. 	<ul style="list-style-type: none"> • All modules use the same business logic and database logic. • Eliminates the need for staff to constantly update and synchronize disparate solutions. • Enables a single platform of action.
<ul style="list-style-type: none"> • Data security risks across systems. • Accidental or deliberate loss of data and information. • Security risks caused by faulty integration and various workarounds to accommodate data flows. 	<ul style="list-style-type: none"> • Data and information remains intact. • Increased trust of information, applications and other users. • Better FERPA compliance.
<ul style="list-style-type: none"> • Physical and logical movement of data required for robust reporting. • Data and information may need formatting, translation, and massaging to produce meaningful reports. • Multitude of inconsistent report formats across applications and/or misinterpretation of reports. 	<ul style="list-style-type: none"> • Allows the organization to anticipate problems and respond with ample time to impact results. • Enables consistent report designs with easier trend identification and analysis. • Engenders a culture of grounded evidence and performance standards.
<ul style="list-style-type: none"> • Users rely on IT to obtain routine data and information. • Valuable IT staff focused on tactical operations rather than strategic initiatives with a need for larger IT staff. 	<ul style="list-style-type: none"> • Optimize IT staff for value creation within the institution. • Develop well informed users who manage through data-informed decision making.
<ul style="list-style-type: none"> • Each system and technology stack requires specialized technical and operations expertise. • IT staff needs training and expertise on multiple application environments. • Difficult to maintain a fully staffed multi-environment technology organization. 	<ul style="list-style-type: none"> • Deeper IT staff proficiency and experience levels within one technology and applications platform. • Easier cross training and staffing across applications. • Better economies of scale for software licensing, development, testing, operations and training. • IT more responsive to expanding user needs.
<ul style="list-style-type: none"> • Comprehensive central backup highly unlikely. • Each system on separate backup, maintenance and upgrade schedules. • Upgrading one system can adversely impact other systems. 	<ul style="list-style-type: none"> • Backup, archiving and preservation more efficiently managed from a central perspective. • Successful application upgrades more likely with increased availability and uptime for applications. • Higher degrees of user satisfaction.
<ul style="list-style-type: none"> • Higher ongoing and recurring expenditures: IT staff hours, user support, training, software licenses, hardware upgrades, integration upkeep, maintaining business processes. 	<ul style="list-style-type: none"> • More predictable expenditures and platform evolution. • Holistic organizational efficiencies and empowering intelligence throughout the downtime institution. • Repurpose funds to address institutional priorities. • College can focus on mission of teaching and learning.

Costs of Fragmentation

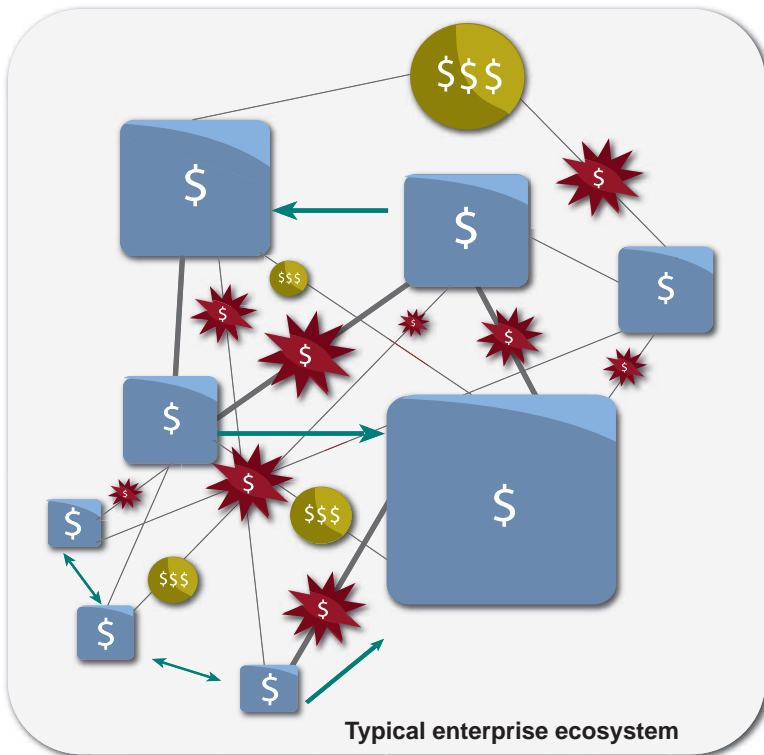
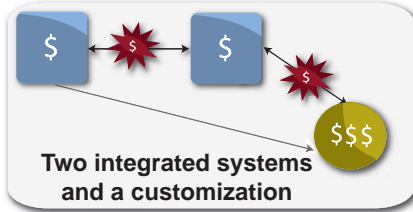
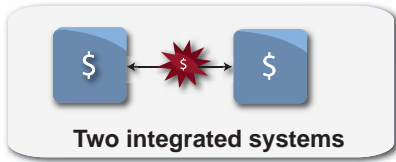
Even with significant advances in Enterprise Application Integration (EAI) techniques and Service Oriented Architecture (SOA) methodologies for system integration, one of the most acute information technology gaps at colleges today is the huge discontinuity between the LMS and the ERP. At many colleges “integration” is limited to single-sign-on (SSO) capability to allow users to have the same login and password credentials for the learning management system, ERP and email systems. At other colleges integration is still a rudimentary batch program that is run occasionally during the semester. Colleges that have attempted substantial integrations have found that the cost of creating and maintaining a secure, reliable set of system interfaces can be more expensive than the costs of the LMS and ERP themselves.

Not only are technology integrations and customizations that tie together disparate systems that are unique to an individual college expensive to implement, they also create ongoing challenges for the institution to maintain a reliable set of system interfaces and still provide cost effective support to internal and external constituents. Colleges continuously struggle with unforeseen and hidden IT costs that are a result of making so many technologies work together on campus. Many CIOs, directors of technology, and heads of academic technology are all too familiar with the integration tug of war between two vendors. There are struggles to determine which part of a broken integrated component is the responsibility of a specific vendor.

Each vendor claims that the underlying problem is the fault of the other vendor, often leaving an academic institution holding the bag in supporting the most complex items itself. Every semester, The Gilfus Education Group receives panicked calls from academic institutions looking for emergency assistance to help recover after a rogue system integration component has overlaid data, or taken down their LMS and/or ERP during the first week of classes.

Despite substantial investments in integration, many colleges continue to suffer from the pervasive “costs of fragmentation” that affect people, processes, and technology. Sample fragmentation costs include batch process delays causing data and information to become unsynchronized across systems, ambiguity of information produced by multiple systems storing different values for the same item, questionable timeliness and accuracy of reports caused by the need to physically and logically move and then massage data, risks of accidental or deliberate loss of data and information, and unexpected intrusion risks and breaches caused by security exceptions to accommodate data flows.

There is a clear need for continuity and convergence to reduce administrative efficiencies, improve return on investment, and support the continuum of the education process.



$$\begin{array}{c}
 \text{Red Starburst with \$} + \text{Green Circle with $$$} \\
 = \\
 \text{Cost of Fragmentation}
 \end{array}$$

"Cost of Fragmentation"

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Cost of Fragmentation

"...the cost of creating and maintaining a secure, reliable set of system interfaces can be more expensive than the cost of the LMS or ERP themselves."

Rise of Collegiate Intelligence

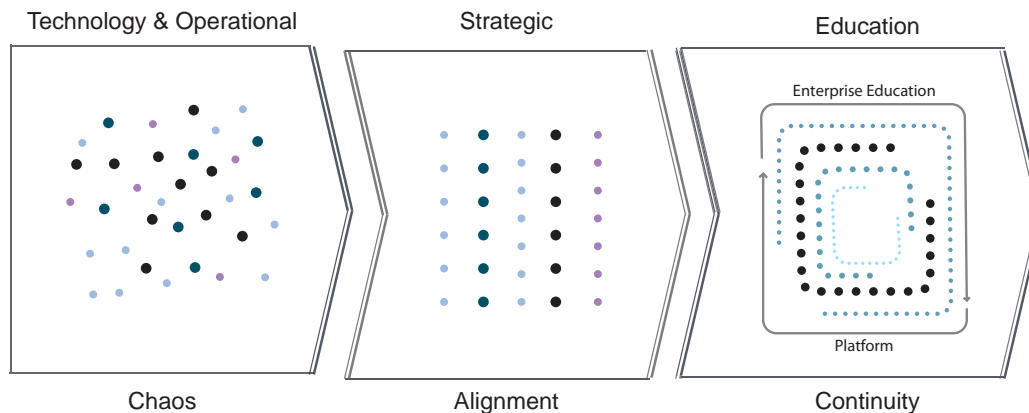
Critics argue that at many colleges, education has become somewhat depersonalized, leaving many students feeling that they are fending for themselves. Thankfully, advances in information technologies have made it feasible for colleges to present students with a cohesive but individualized approach to their education. It now is possible for colleges of all sizes to create a centralized folder for each student, with a consolidated view of student records, interactions with faculty members and advisors, and measurements of academic growth, including assessments of strengths and gaps for specific knowledge areas and skills.

Most of the advanced analytics techniques and technologies that can be used to improve academic success for individual students were perfected as business intelligence methodologies in the quest to optimize business marketing, sales, manufacturing, and operations processes. The same types of

key performance indicators found in business performance dashboards and scorecards can be repurposed to monitor student success. Analogously, data-mining and information-cubing techniques used for statistical and predictive analysis can be used to detect students in need of remediation, honors enrichment or academic counseling. Many colleges already have begun to use business intelligence tools and reporting, either within or as extensions to ERP systems.

The overall result is that information isolation is being replaced by integrated intelligence allowing more effective decision making in key areas, such as:

- Student-life-cycle management (recruiting, admissions, enrollment, graduation)
- Alumni development and donor nurturing (fund-raising activities, contribution campaigns, donor-population and segmentation)



“From Chaos to Continuity”

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- Financial management (accounting systems, budgeting, actual fiscal performance)
- Human resources management (recruiting, compensation, benefits and career paths for faculty and staff, affirmative action and equality standards)
- Federal and state government compliance (financial-aid statistics, student applications and allocations of student loans, grants, scholarships)

Paradoxically, most of the business intelligence applications currently used by colleges focus on creating relationships to attract students and on managing relationships with alumni. There has been very little focus on using those tools and techniques to improve academic achievement and lifestyle while students are actually enrolled in courses at the college.

Three contributing factors for this awkward discrepancy are:

- 1) Administrative and academic computing have been managed separately, often with vastly different objectives;
- 2) Collecting student performance data from LMSs has been difficult and most of the time performance data is not even tracked; and
- 3) Building and maintaining robust, reliable, sustainable, deep integrations between administrative systems and LMSs has been challenging and cost prohibitive because of misalignment among vendors of these systems.

“Information isolation is being replaced by integrated intelligence.”

“Many colleges already have begun to use business intelligence tools and reporting, either within or as extensions to ERP systems.”

Introducing the Enterprise Education Platform

For many years, higher educators have been yearning for a platform that cohesively unites the traditional LMS with the traditional set of ERP applications. With advances in information technology, stabilization of LMS requirements, improved user interfaces for ERP applications and the evolution of business intelligence methodologies, such a platform now is possible. The Gilfus Education Group believes that higher educators are demanding a new solutions category: the Enterprise Education Platform.

The Enterprise Education Platform consists of an interconnected set of application modules within a consistent information technology framework and architecture. Consequently, the Enterprise Education Platform combines the traditional collegiate ERP system with the traditional learning management system.

Because the learning management components can now leverage the business intelligence characteristics from the other applications, they replace and surpass the traditional learning management system to become the Intelligent Learning Platform. In other words, the learning applications traditionally included in a standalone LMS are now incorporated into the Intelligent Learning Platform which is embedded within the greater Enterprise Education Platform.

Because the Enterprise Education Platform allows colleges to consolidate into a cohesive framework the data and information that conventionally has been scattered across academic and administrative systems, administrators, faculty and especially students

are natural beneficiaries.

Not only can the learning applications within the Intelligent Learning Platform leverage data and information generated by the other rich set of applications within the Enterprise Education Platform, but the learning applications also can interact smartly with other applications within the Enterprise Education Platform to proactively engage students.

Integration Thrives

For example, when Emily Glover, a student, adds a course, Biology 102, during the third week of the semester, the registration module within the Enterprise Education Platform synchronizes with the Intelligent Learning Platform. Within moments, Emily automatically is added to the class roster for Biology 102 in the learning management module. The biology instructor, Thomas Green, is notified that a new student has joined the class and needs a lab partner. Emily is automatically granted access to Biology 102 within the learning management module. Emily can view all readings and submit all missed assignments. In addition, because Emily missed the first few weeks of class and is making up for lost time, the Intelligent Learning Platform will allow late submissions of assignments from Emily during the first three weeks of the semester without imposing late penalties.



“For many years, higher educators have been yearning for a platform that cohesively unites the traditional LMS with the traditional set of ERP applications.”

Intelligence Prospers

Consider a more compelling example that demonstrates the advantages made possible by a more, holistic continuum:

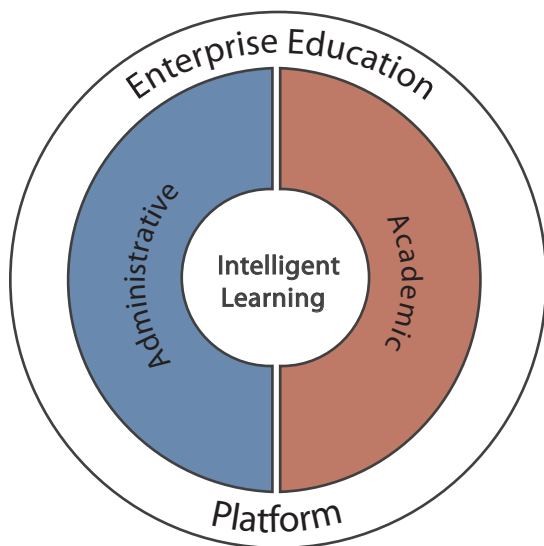
When Pat Adams, a student, receives a below-average grade on a Calculus 103 midterm, the Intelligent Learning Platform can alert her advisor as soon as the midterm grades are posted to the online grade book for the course in the learning management module. The Intelligent Learning Platform can trigger the student-advising system to schedule a meeting automatically via the college calendar system, between the advisor and Laura Sheppard, the calculus instructor, as well as a meeting between the advisor and Pat.

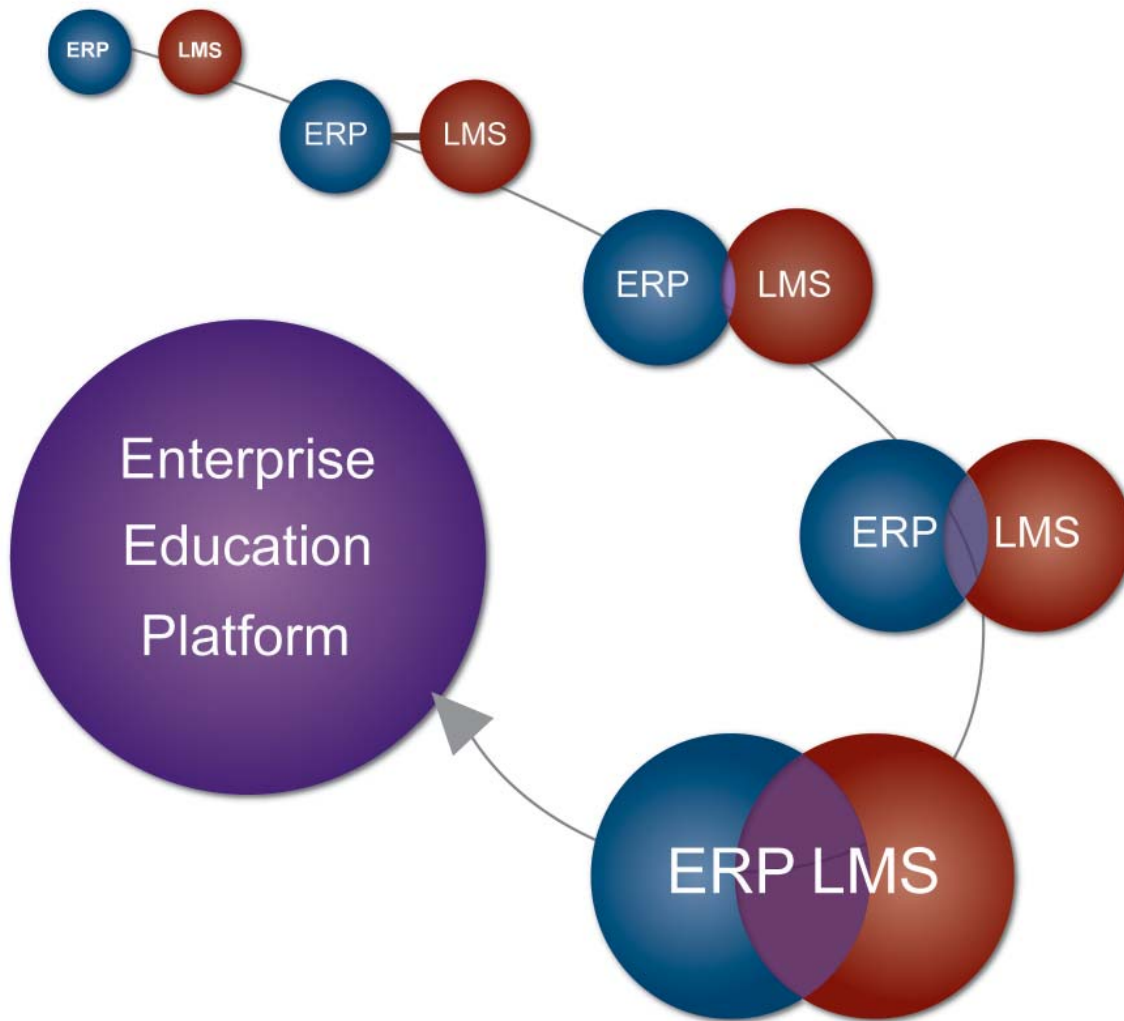
In addition, whether the grader is an instructor, or an automated grading process, there can be immediate identification of both mastered concepts and knowledge gaps. Pat can then be prescribed and presented with a series of immersive online learning units

and practice exercises to help overcome the knowledge gaps. If Pat is in danger of failing the course, the Intelligent Learning Platform can also recommend certified tutors for the course and alert the course registration module that Pat may need to repeat the course next semester. If Pat proceeds with the online learning units or meets with a certified tutor, the Intelligent Learning Platform can automatically update the student's centralized folder within the Enterprise Education Platform and notify both the instructor and advisor of Pat's progress.

Although this scenario might sound like science fiction for most colleges, the underlying business intelligence technology and techniques have been deployed for over a decade within commercial industry. They are used to generate efficiencies and uncover trends during business cycles, provide input for day-to-day decision making, and monitor real-time performance. Applications are widespread across functions and industrial sectors such as marketing, manufacturing, retail, pharmaceuticals, telecommunications, transportation, and financial services.

With the Intelligent Learning Platform entrenched within the Enterprise Education Platform, it now is feasible to apply business intelligence methodologies to the core production of human knowledge and intelligence, within programs of study at colleges: indeed, the very business of creating human intelligence. Furthermore significant costs of fragmentation either are significantly reduced or eliminated completely.





"Convergence to an Enterprise Education Platform"

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Convergence toward an Enterprise Education Platform

"...it now is feasible to apply business intelligence methodologies to the core production of human knowledge and intelligence..."

Everyone Benefits

From a user perspective, pragmatic benefits of the Intelligent Learning Platform abound for the entire college community, such as:

- One continuous platform for everyone: students, faculty, staff, and other constituents;
- One login per user to access everything relevant to the user;
- Consistent user experience and information architecture;
- Easier collaboration among users;
- Increased timeliness of communications and information;
- Centralized calendar system for all users;
- Greater user independence for information searching and reporting;
- Improved learning efficiencies and outcomes;
- Better overall sense of community via common experience of using one platform;
- Enhanced individual and organizational intelligence; and
- Ongoing improved student success.

The emergence of the Enterprise Education Platform enables the existence of the Intelligent Learning Platform. Students can more productively use their laptops, mobile phones, and PDAs to experience new learning applications.

As students use the Intelligent Learning Platform within their daily education regimes, not only can students grow smarter about their studies, but higher educators can also grow smarter about their students, improving institutional multidimensional meta-intelligence and increasing the overall prospects of student success. Simply put, everybody can know more about everything.

The Enterprise Education Platform provides a wealth of intelligent benefits and efficiencies, as well as time and cost savings to college students, faculty, staff, alumni, potential students, parents, employers, donors, and most other constituents in the continuum of education. Information is power. Intelligence is empowering.

“Information is power.
Intelligence is empowering.”



“...everybody can know more
about everything.”

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