It’s Time for Learning to Go Back to School: Next-Generation Approaches Enrich the Student Experience

Major structural shifts in offline and online learning delivery will lead to integrated systems that enable adaptive and holistic higher-education learning environments that harness the capabilities of social, mobile, analytics and cloud – the SMAC Stack. ‘Digital footprints’ point the way for schools and, eventually, employers to discover learners’ competencies and interests and match them with their own offerings and talent needs.
Executive Summary

How students want to learn – and institutions need to teach – is undergoing a total digital transformation. Today’s higher education students demand more flexible, personalized models of learning that offer a higher return on investment and preparation for employment in the 21st century workplace. All stakeholders in the educational value chain stand to benefit from this overhaul; the more data that is collected and analyzed, the better synergy that can be created among students, educational institutions, areas of study, approaches to learning and employment opportunities.

The catalyst for the transformation is generational. Millennial students and their younger counterparts expect learning options that utilize the advanced technologies that they, as digital natives, use every day, as well as learning experiences that are tailored to their particular needs and objectives. Toward that end, institutions are employing social, mobile, analytics and cloud technologies (a.k.a., the SMAC Stack™) to develop the insights that lead to personalized and engaging learning experiences.

The transformation toward personalized and adaptive learning experiences will be achieved by collecting and applying analytics to the data surrounding students and other entities in the learning lifecycle. These digital footprints (what we call a Code Halo™) are generated by the online behaviors of and existing data about individuals, institutions, learning processes and devices. The meaning that can be derived in this data is a ripe source for understanding and even predicting student needs and optimally matching students with schools, learning models and employers.

Code Halo thinking will enrich every aspect of the learning lifecycle, from admissions to coursework to job placement and lifelong education.
Forces Driving the Transformation of Learning

Traditional educational models are at a crossroads. With less than half of full-time students at public four-year colleges and universities in the U.S. graduating within four years, the higher education learning landscape is in need of serious modernization, if not a full transformation.

Public spending on education is lower than it has been historically, as is parental satisfaction with cost, graduation rates and return on investment. With high unemployment levels among recent college grads, the perceived ROI for a traditional college education is under intense scrutiny. The value of higher education will remain an open question for the foreseeable future unless all stakeholders recognize that change is needed today. All roads to the future of work in the U.S. – and the developed world – pass through the education sector.

Indeed, the signposts of change are already visible, with new-breed educational providers entering the market with affordable and innovative learning solutions. For example, massive open online courses (MOOCs) address a growing customer segment looking for an enriched, cost-effective approach to learning. Of course, this is not just about earning a degree or certification but also about obtaining verifiable skills that lead to employment and higher pay.

Not only is technology altering core business processes, but the ways in which individuals use technology to learn are shifting, as well.

Evidence is also growing that adaptive learning models that are personalized to student needs are key to optimizing student performance. In one study, students who completed a course that matched their learning style spent significantly less time in the course and achieved, on average, the same grades as students who took a course that was mismatched with their learning styles or included all available learning content.

Even for traditional players, interacting with students today requires utilizing and managing more channels of interaction than ever before. The result of all these changes: Higher education business models – tuition and net revenue models, marketing, enrollment strategy, content distribution and engagement of alumni networks – are evolving drastically. Not only is technology altering core business processes, but the ways in which individuals use technology to learn are shifting, as well. Figure 1 (next page) illustrates the new higher education learning ecosystem.

Higher education is being disrupted by the intersection of several forces:

- **The new student mindset.** Millennial students want learning opportunities delivered via a wide range of channels – especially online – and they want more input into their own learning processes.

- **Leveraging the SMAC Stack.** Institutions are implementing SMAC technologies to deliver a learning experience that employs familiar technologies that students use in their everyday life. They are also using the SMAC Stack to capture, track and analyze Code Halos to obtain insight into the student’s needs, preferences and desires (see sidebar, page 6).

- **The advancement of adaptive learning.** Adaptive learning is personalized to the student’s abilities, interests, preferences and learning style.

- **The emergence of new learning delivery models.** This includes blended models (which mix online and classroom instruction) and flipped models (in which classroom lectures can be accessed virtually, such as through videos or online).
The Future of Learning

Radical personalization will become the new norm.

Schools will adapt themselves to new forms – self-organized.

Learners will create individualized learning playlists, reflecting goals, interests.

The workplace will evolve so rapidly that continuous career readiness will be the norm.

Diverse forms of credentials will reflect the many ways in which people learn.

New-Age Learning Ecosystem

Educators' jobs will diversify as learning agents.

A variety of digital networks, platforms & content resources will boost learning.

Inception of rich data into learning tools will enable learning transformation.

Communities will take ownership of learning in new ways, blending with other activities.

Social innovation will help address resource constraints & other challenges.

Figure 1
Reinventing the Student Experience

Growing volumes of information are available across the digital landscape and learning lifecycle, including:

- **Public information** from social platforms, such as personal interests and hobbies (including musical tastes and trips taken). Social data imbues the learner with color and dimension, which drives new insights.

- **Data obtained through student interactions with online coursework**, including from learning management systems (LMS). This includes data such as last log-in and time spent on content; course progress and time spent on course modules; intra-student communications; and scores/teacher feedback. Such data can track student performance and whether intervention is needed.

- **Information from third-party and government sources**, including educational statistics (such as educational spending, institutional policies and rank, majors, infrastructure, campus life, etc.).

Institutions of higher learning can use this data to gain insight into student preferences and learning styles (see Figure 2, next page). By tracking, capturing and building upon the information gathered at every stage of the student lifecycle, educational institutions can create a “student persona,” which they can then use to provide tailored services that benefit the student at various stages of his or her educational and professional life (see Figure 3, page 8).
The Code Halo Effect in Higher Education

**Personal**
- 18 years old, in first year of college, pursuing an undergrad degree. Major undecided.
- Listens to Busted, McFly, JLo, Xtina tracks.
- Likes to travel and blog her experiences.

**Educational**
- Completed Grade 9 and 10 with AP in Mathematics and English.
- Completed high school with 3.6 GPA; SAT 1680.
- Scholarship awarded.

**Information**
- Last logged-in and time spent on content
- Course progress and time spent on course modules
- Intra-student communications
- Teacher scores/feedback
- Enrollment status

**Retail**
- Personalized marketing content
- Billing information
- Behavior records
- Events attended by prospective students
- Packages and other pricing options

**LMS**
- Student data/demographics
- Grades and transcripts
- Behavior records
- Scheduling/attendance
- Health and medical records
- Special education needs
- Fees records/calculation
- Student lifecycle details

**SIS**
- Last logged-in and time spent on content
- Course progress and time spent on course modules
- Intra-student communications
- Teacher scores/feedback
- Enrollment status

**CRM**
- Personalized marketing content
- Billing information
- Behavior records
- Events attended by prospective students
- Packages and other pricing options

**Social and Behavioral**
- Learning style through LMS history, library track history, assessment scores, queries posted, scholarships applied for, financial aid, demographic data.
- Understanding of social patterns through blogs, discussion forums, tweets, posts, online book purchases.
- Entertainment patterns (interest around probability and trigonometry through online movies, games interacted with).
- Increased learner engagement through gamification patterns.

**Fees records/calculation
- Student lifecycle details

**Code Halo Analytics – Insights Generated**
- Learning style through LMS history, library track history, assessment scores, queries posted, scholarships applied for, financial aid, demographic data.
- Understanding of social patterns through blogs, discussion forums, tweets, posts, online book purchases.
- Entertainment patterns (interest around probability and trigonometry through online movies, games interacted with).
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A New Role for Learning Management Systems

Even with the vast changes occurring in education, the LMS will remain central to educational institutions. In their current state, however, LMSs are used more as a tool for administrative efficiency, with teachers primarily using them to distribute course content, broadcast announcements, initiate discussions and send e-mail. The interactive learning component of the LMS does not customize the learning experience or promote the student’s everyday communication, productivity and collaborative abilities.

For students, these systems provide minimal adaption to learning styles, are constrained by institutional boundaries and don’t make use of insights from the student’s social activities or other third-party data sources to construct the student persona.

When LMSs interact with Code Halos, however, the learner’s experience can be enriched, from selecting the right college, to choosing a major, to identifying a mentor during school, to finding a job after graduation. In addition, next-generation LMSs will include an adaptive learning component that tailors learning objects to the individual learner.
Adaptive Learning and LMS

According to the Felder-Silverman learning style model (FSLSM), learners fall into three basic categories: active/reflective, sensing/intuitive and sequential/global. Under this model, courses can be broken down into elements such as exercises, examples, content objects and self-assessment.

The three different learning styles require content to be presented in different orders. For example, an active learner would prefer to learn by trying things and completing exercises and self-assessments at the beginning of the course module, followed by accessing content objects, with very few examples given. A reflective learner, on the other hand, prefers to learn by contemplating the material, so she would prefer content objects at the beginning of the course, with less focus on exercises. Figure 4 (next page) illustrates how learning style should inform the individual's unique learning path and type of content delivered.

Yet another dimension of learning style is content preference: audio, video or text, which can be deduced through a standard questionnaire. Based on these student inferences, institutions can design custom courses that suit individual needs.

In order to align with an adaptive learning style, future LMSs will need to be built on a Web Services framework from the ground up to ensure tight integration with many of the Web 2.0 tools that students already use. Also, adherence to emerging standards such as the IMS LTI framework will be critical to enabling data and app interoperability. The integration of these features will encourage students to remain within the purview of the LMS for the majority of their learning activities, enabling institutions to capture, measure and infer some of their strengths, weaknesses and preferences.

Quick Take

Privacy and Ethics Issues Surrounding Code Halos

Code Halos provide an immense opportunity to add value to all stakeholders involved in the educational value chain. But because they involve the collection and use of student data, they also raise privacy concerns as to what code can and should be shared to advance the learning process – and how it should be protected to prevent misuse, identity theft or worse.

Institutions and individuals alike must ensure the privacy of student information; those that don’t will lose trust with their student body. Openness and transparency are paramount. Learners must be able to know what data is being captured about them, how it is being used and which hands it’s passing through. They also need the flexibility to either delete their Code Halos or opt out of their data being mined. President Obama recently proposed the Student Data Privacy Act, which would prohibit technology companies from profiting from information collected in schools as teachers adopt tablets, online services and Internet-connected software.

Trust is the currency of the Code Halo generation. We recommend taking the following steps to ensure learner privacy protection:

• Give your Code Halo a “delete” button.
• Act with transparency: “Show me you know me.”
• Demonstrate value: What does the learner receive in exchange for sharing his data?
• Calibrate your approach for the global stage as necessary.
• Hard-code organizational self-control.

Different Strokes for Different Folks

The New Dynamic Learning Stack

Inputs to the LMS

- Sample Course
  (Course breakdown)
  - Learning content
  - Examples
  - Exercises
  - Self-assessment

- Traits/Preferences
  - Active/reflective
  - Sensing/intuitive
  - Sequential/global
  - Audio/video/text preferences

Analyzing

- Decipher the behavioral traits (active/sensing...)
- Identity content preferences
- Social persona (collaboration scores, etc.)
- Engagement patterns
- Mastery levels for different subject matter

Unique Learning Paths—Based on Each Persona

Active
- Exercises
- Self-assessments
- Learning material
- Examples

Global
- Self-assessment
- Exercises
- Learning material
- Examples

Sequential
- Learning material
- Examples
- Self-assessment
- Exercises

Intuitive
- Self-assessment
- Exercises
- Learning material
- Examples

Colliding Code Halos

Everyone in the learning value chain—educators, institutions, students and employers hungry for credentialed talent—can benefit from the insights gleaned from Code Halos. For instance:

- **Student Code Halos**: Students’ Code Halos can reveal insights based on their social media interactions, reading lists, interests, study habits, collaboration preferences, learning aptitudes, scholarships applied for/obtained, degrees and credentials earned, and the stage of their education or career path. These patterns can illuminate insights about the best subject area for the student, his motivations for learning and even her potential career path.

- **Educator Code Halos**: Code Halos can dramatically transform the role of professors and mentors in the learning process. Code Halo-based experiences can help students and professors connect with each other based on learning needs, the professor’s expertise, the pace of learning and necessary interventions wherever and whenever needed. The flexibility to reach mentors and teachers at any stage of the learning process increases student trust. Additionally, professors can enrich the learning experience by providing real-time feedback and necessary interventions during challenging moments in the learning journey.

- **Educational Product Code Halos**: The insights generated from the information surrounding learners, teachers and institutions are enabling smart system and course design, as well. Software manufacturers and institutions can use these insights to bring continuous innovations to course curricula, course design and the user experience.
- **Institutions’ Code Halos.** Schools’ Code Halos could include alumni networks, reputation information, location, graduation rates, vocational alignment and the quality/depth/breadth of the curriculum. For employers, Code Halo attributes such as location and volume/quality of demand are also applicable.

Institutions are already leveraging Code Halos to add value to their students’ learning journeys. For example, the Signals project at Purdue University utilizes the data collected from student information systems, LMSs and the grade book for a specific course to track students’ performance and identify at-risk students in real time.12

The interplay of the stakeholders’ Code Halos will define the next generation of learning. For instance, something akin to Match.com from the world of online dating may best exemplify the power of the convergence of student, institution, educator and employer Code Halos (see Figure 5). When student Code Halos intersect with institutional Code Halos, for example, it can reveal best matches of students with schools. Educator Code Halos intersecting with employer Code Halos can pinpoint opportunities for collaboration. Student Code Halos connecting with employer Code Halos can show fruitful matches, just as when educator Code Halos interconnect with institutional Code Halos.

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**Code Halo Thinking at Work**

**Institution Code Halo**
- University ranking.
- Specializations offered.
- Teacher/professor research contributions & publications.
- Student profiles, performances, activities.
- Alumni course/career path and success.
- Application data, student preferences.
- Social feedback, profile of the university.

**Student Code Halo**
- Areas of strength, collaboration, contribution.
- Social & behavioral traits, likes, dislikes, preferences, interests, contribution.
- Student academic & extracurricular – historic & current.
- Aspirational universities, degrees, courses.
- Interests, improvement areas.
- Application data, student preferences.

**Educator Code Halo**
- Academic qualification and areas of interest.
- Research and collaboration with peers.
- PoV & insights: Contribution to content editorial teams or learning pedagogies for educational publishers.
- Online discussion on topics and enabling focus group discussions.
- Social & behavioral traits.
- Mentoring junior teachers.

**Employer Code Halo**
- Ranking (i.e., Fortune 500, Forbes).
- Awards (i.e., best companies to work for; top employers, popular employee perks).
- Job openings (i.e., LinkedIn, TheLadders., Monster.com, Glassdoor).
- Company & stock performance (stock price, dividends, splits, quarterly and full-year earnings).
- News, events & social sentiment (i.e., Twitter, Facebook, news channels).
- Company profile (i.e., diversity, demographics, social causes, sustainability initiatives).

**Code Halos Interplay**

1. Interaction leads to a college match offering – a solution concept for suggesting potential college options based on student persona.
2. Interaction leads to a career match offering, which helps employers find the right candidate for their organization.
3. Interaction leads to an industry connect offering, a solution for improving research collaboration based on industry needs.
4. Interaction leads to a career match offering, which helps educators find the right institution for themselves based on their aspirations.
For example, if a student is 70% likely to pursue a career in applied mathematics, this insight can be matched with colleges that offer a strong math program, leading math professors, personalized course plans and connection to outside resources, such as academic groups of interest and industry experts. Or, assume that a student earns a degree in anthropology from a prestigious university. Based on her Code Halo, she presents strong traits indicating a fit with a particular company’s organizational theory and culture. This type of “code-meets-code” matching is potentially more powerful than traditional hiring and recruiting models.

A few institutions have begun leveraging the power of Code Halos, especially in their admissions function. Information including social media messages, campus-visit logs and student records are all input into the admissions software to predict the likelihood of students accepting an offer of admission.

Samford University, through its Facebook/mobile app, uses an “enrollment intelligence” algorithm to predict students who are more likely to enroll by analyzing their social and behavioral data patterns. Denver University predicts interest in enrollment by analyzing the student’s online and social media behaviors, such as number of friends or conversations the student participates in.

Code Halos can also help institutions focus their communication and create deeper, more engaging relationships with prospective students. This process begins before the learner ever attends a university, as well as after graduation, from admissions to employment.

Looking Ahead
As new technologies raise expectations across nearly every aspect of our lives, the learning ecosystem needs a radical overhaul, powered by SMAC Stack technologies. But what will success look like? Increased four-year graduation rates and higher pay for graduates? What about lifelong learning? How best to prepare young minds for the future workplace they will enter? What behaviors, creativity and emotional intelligence skills will be required for success? What will work look like in the next few years? All these questions need to be addressed in the way we confront, challenge and change our current learning ecosystems. If these issues are addressed thoughtfully, that change can occur without causing chaos to the education system as we know it.

Code Halos provide the lens through which to imagine aligning students, educators, institutions of higher learning and potential employers. Improving the student experience and increasing their value in the future is essential to ensuring that these efforts are a success.

To take the first steps, institutions should:

• Revisit their student lifecycle to identify specific touchpoints where they can leverage Code Halos to transform the student experience.
• Identify programs and courses that can be redesigned for adaptive learning.
• Identify one or more hypotheses that can be put to the test with analytics tools; obtain insights that can drive student recruitment, retention and persistence.

At a time when many are questioning the value of “business as usual” for higher education, there has never been a better moment to rethink the art of the possible. It’s time to go back to school and re-think, reset and unlock the immense potential of the learning paradigm for the success and prosperity of our society, nation and the world.
Footnotes


6 A massive open online course (MOOC) is a model for delivering learning content online to any person who wants to take a course, with no limit on attendance. For more information, see http://www.educause.edu/library/massive-open-online-course-mooc.


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