



The Art of the Possible for Cognitive Solutions and Apps in Higher Education

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Jeff has over 15 years of education technology experience. Prior to joining the Eduventures team, Jeff was Lead Architect at Houghton Mifflin Harcourt and spent 10 years in a variety of senior management roles including at the Boston-based startup ConnectEDU. He advises several non-profits in the education technology sector, most notably the P20 Education Standards Council (PESC) and the Access 4 Learning (A4L) Community. Jeff is a U.S. Air Force veteran and is a graduate of Worcester Polytechnic Institute.

Agenda

- Cognitive Computing Defined
- Cognitive in the Context Of Higher Education
- Applications for Cognitive across the Learner Lifecycle
- Resources on Cognitive Architecture
- Recent Cognitive Projects and Capabilities from IBM

Cognitive Computing Defined

Three Essential Components of Cognitive Computing

- **Signal:** A way of interpreting an input signal (search terms, natural language processing, chat)
- **Knowledge:** A body of information that supports the decision (structured content, taxonomies, ontologies, metadata)
- **Process:** A way of processing the signal against the body of information (machine learning, analytics)

Cognitive Analytics: Definition

“Cognitive analytics can refer to a range of different analytical strategies that are used to learn about certain types of business related functions, such as customer outreach. Certain types of cognitive analytics also may be known as predictive analytics, where data mining and other cognitive uses of data can lead to predictions for business intelligence (BI).”

Cognitive in the Context of Higher Education

Educational Intelligence Defined

*“... Leveraging data at **MULTIPLE POINTS ACROSS THE ENTIRE STUDENT LIFECYCLE** from pre-inquiry through matriculation to post-graduation from various technologies and data repositories to make **INTELLIGENT, DATA-DRIVEN DECISIONS** based on relationships and patterns within large volumes of data.”*

- Eduventures

Three Essential Components within Higher Education

- **Signal:** Emails, chat-bot questions, student portal queries, Tweets, comments, forums, posts, tickets
- **Knowledge:** student records, learning outcomes, CRM engagement plans, course content, intervention strategies, curriculum plans, FAQs, portfolios
- **Process:** Learning analytics, predictive analytics, open source models (SOLR, OpenCog), proprietary models (IBM Watson, Civitas Learning, HelioCampus, NewSci)

Organizational Readiness

- Assess areas of opportunity in **client-facing processes** (*customer support, customer service, marketing automation and ecommerce*).
- Continue to manage and **curate knowledge and data** (foundational governance and data onboarding will be key capabilities moving forward).
- Understand and **build on your organization's maturity in data science and analytics** (this does not necessarily mean hiring a team of data scientists, but means being intentional about enabling critical functions with analytic capabilities).
- **Investigate and experiment with technologies** in key competitive areas that will differentiate your products and services in the evolving marketplace (use envisioning sessions to get a shared understanding of the future state of the industry and organizational capabilities).
- **Invest in educating the organization in foundational technologies and processes** (knowledge management is not going away or being superseded in the immediate future – these technologies will build on core knowledge capabilities and processes).

Applications for Cognitive across the Learner Lifecycle

- ✓ Admissions and Financial Aid
- ✓ Adaptive Learning
- ✓ Student Success and Services
- ✓ Advancement

Cognitive Use Cases: Admissions and Financial Aid

- **Chat-bots.** Students and parents receive responses to common questions, and the virtual assistant recommends content, links, forms and other resources that have helped other families.
- **Application Review.** Prioritize admissions applications and essays for human review based on quality of responses and likelihood of student success as compared to a history of similar admitted students.
- **Financial Aid Packaging.** Dynamic financial aid packages based on the likelihood of a student to qualify and be awarded scholarships and grants. See **Vocado** (<http://www.vocado.com/>)

Cognitive Use Cases: Adaptive Learning

- **Virtual tutoring sessions.** Natural language processing reads assignments and provides constructive feedback on how to improve quality of writing. Can be used on any open ended type of writing assignment. See **Cognii** (<http://cognii.com/>)
- **Content Recommendations.** Adaptive learning engines and dynamic curriculum platforms that recommend content to learners. Content and supporting resources are provided to students who need it the most, based on the outcomes of other students after receiving the same resources.
- **Virtual TAs.** Virtual agents keep 24/7 office hours and respond to student questions about course content and assignments. Students provide feedback on quality of responses. See **Jill Watson** (<http://b.gatech.edu/1TalmCG>)

Cognitive Use Cases: Student Success and Services

- **Early alert and intervention platforms.** Action plans and intervention strategies are selected and executed automatically based on multiple academic and non-academic factors in the student's profile.
- **Career Services.** Natural language processing reads resumes, cover letters and portfolio content and provides constructive feedback on how to improve quality of presentation, based on the target job, career or employer opportunity.
- **Campus Safety.** Monitoring of social media and other channels to identify threats or students in distress and automatically refer to safety office, medical or other services.

Cognitive Use Cases: Advancement

- **Donor Prospecting.** Analyze social media and other channels to identify donors based on their likelihood to give to the institution, and recommend an engagement plan through the advancement CRM.
- **Message and Channel Segmentation.** Review marketing communications to determine which messages resonate for alumni for various events and activities. Automatically recommend or send messages to alumni using the content most likely to succeed, sent at the time they typically read and respond, and in the most effective channel possible.

Resources on Cognitive Architecture

Resources on Building a Cognitive Architecture

- *A Primer on Cognitive Computing*, Seth Earley
<http://www.earley.com/knowledge/articles/primer-cognitive-computing>
- *Machine Learning and Cognitive Computing Roundtable*, Seth Earley
<https://www.infoq.com/articles/machine-learning-and-cognitive-computing>
- *Your guide to cognitive computing: An interview with solutions architect*, Chris Ackerson, Hayley Yudelman, IBM Watson Digital Strategy
<https://www.ibm.com/blogs/watson/2016/03/guide-cognitive-computing-interview-solution-architect-chris-ackerson/>
- *IBM Research: AI and Cognitive Computing*, IBM
<http://research.ibm.com/cognitive-computing/> <http://www.ibm.com/cognitive/>
- *Cognitive Analytics: Tech Trends 2014*, Deloitte University Press
<https://dupress.deloitte.com/dup-us-en/focus/tech-trends/2014/2014-tech-trends-cognitive-analytics.html>
- *Building Your Cognitive Technology Architecture*, Thomas Davenport, The Wall Street Journal
<http://blogs.wsj.com/cio/2015/07/15/building-your-cognitive-technology-architecture/>

Recent Cognitive Projects and Capabilities from IBM