BIG DATA, BUSINESS ANALYTICS AND IMMERSIVE LEARNING
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GENERAL OUTLINE

INTRODUCTION (15 minutes)
“Counting stars …”
A text, a promise and a purpose
Limits on human predictions

BIG DATA IN EDUCATION AND TRAINING (15 minutes)
Descriptions and definitions
Examples: Google local marketing, National retail, NSA spyware
Quick Start, Phase One (Strategy, Audit)

BIG DATA AND BUSINESS ANALYTICS FOR AN ONLINE CAMPUS (15 minutes)
Descriptions and definitions
Examples: For both new students and new donors with “Engagement Index” via College
Boards and IBM SPSS
Quick Start, Phase Two (Data, Platform)

BIG DATA AND IMMERSIVE LEARNING FOR AN ONLINE CAMPUS (15 minutes)
Descriptions and definitions
Examples: Key Technologies, Course Smart, online “sims” for immersive learning
Quick Start, Phase Three (Adaptive Instruction, Adaptive Assessment)

CONCLUSIONS AND RECOMMENDATIONS (15 minutes)
Trajectories of data, analytics and immersive learning plus disclaimers
Quick Start Phases and Steps
Discussions Questions

Q & A (15 minutes)
I. INTRODUCTION (15 minutes)
“Counting stars …”
A text, a promise and a purpose
Limits on human predictions

ATTENTION-GRABBER
Let’s do a little bit of mental stretching before we begin our workout with your personal Big Data trainer today …

Reference back to the mode of an ancient promise by God to the Patriarch Abraham …

Genesis 15:4 And behold, the word of the LORD came to him: “This man shall not be your heir; your very own son shall be your heir.” And he brought him outside and said, “Look toward heaven, and number the stars, if you are able to number them.” Then he said to him, “So shall your offspring be.” And he believed the LORD, and he counted it to him as righteousness.

Question: What is the number of stars in the sky?
There are an estimated 100 to 200 billion galaxies. Scientists estimate that our Galaxy (The Milky Way) contains 200 to 400 billion stars. So taking a conservative number of 100 billion stars per galaxy, gives an approximate total of 10,000,000,000,000,000,000,000 stars, which is 10 sextillion. Another way of looking at it is there are 100 stars for every grain of sand on the Earth. To be honest we will never know. Just as we start counting a star dies or is born. (Yahoo Answers)

TEXT FOR “DISRUPTIVE” BIG DATA IN EDUCATION AND TRAINING
Big Data and “Predictive analytics” appear to be another disruptive innovation for education and training … making predictions for learner success “But we have tried to give the term a very specific meaning: “disruption is an innovation that makes things simpler and more affordable, and “technology” is a way of combining inputs of materials, components, information, labor, and energy into outputs of greater value.” (Clayton Christensen, The Innovators Prescription: A disruptive solution for health care, Chapter 1, Loc 858)

PROMISE FOR THIS TALK TODAY
Regardless of your level of familiarity with “Big Data,” you will see its relevance to your immersive learning projects and begin to implement its principles by the end of this presentation today … without doing any mathematical equations!

PURPOSE OF THE PAPER AND PRESENTATION
To assist your next steps for solving business and instructional problems with big data in online immersive learning for predicting greater learner achievement, student enrollment and donor support

AUDIENCE FOR THE ILU CONFERENCE
Let’s see … how many are … Business Leaders, Instructional Trainers, School Administrators, Online Educators?

INTRO FOR THE KEYNOTE
Here is the foundational work for “big data” for an effective “virtual campus” with online immersive learning for predictable learner success.

In each section, we will give definitions, examples and next steps to take in your use of big data and immersive learning.

THE PRESENTATION IN THREE PARTS

I. BIG DATA … for a team process with better immersive learning in online education

II. BUSINESS ANALYTICS … for more user-friendly, less complex criteria for reliable and valid predictions

III. IMMERSIVE LEARNING … for more meaningful use of big data to predict best conditions for training … and creative and surprising learning

X. BIG DATA QUICK START … Plus six “Quick Start” steps will be provided for audience engagement and participation in each of three phases of the presentation …

“What if?” you used a big data approach, you tied it to your business analytics and you added it to your immersive learning methods? What if?

Note of Disclaimer: Prediction for immersive learning and its context is limited by …

1. Incompleteness theorem of logic and math, cf. Kurt Godel said any algorithm cannot be both complete and consistent

2. “Counter predictive effect” of humans for liberty, cf. Michael Scriven said that once any theory is published there will be those who will get around its predictive power

3. Creativity and innovation as the hallmark of good learning of expertise, cf. Omar Moore and John Couch said that we want our learners to exceed our behavioral objectives

II. BIG DATA IN EDUCATION AND TRAINING
BIG DATA … for better online education and training with immersive learning

A. Understandable description of “Big Data”

1. Applications: Google local marketing, National retail, NSA spyware … “Big Data” is everywhere on every topic and affecting every industry

2. Nature of Big Data Revolution
   a. Discovery from present data: Novel events (unknown unknowns), New classes of things, new associations of correlations and connections (Kirk Borne, TED Talks, George Mason University)
   b. Implementation of new data capture: New “structured” (categorical, numerical) and unstructured (text) information to analyze … and predict.

3. Quantity of Big Data Revolution acceleration
   a. University of California, Berkeley study, Year 0-2002, total information made, 5 billion gigabytes (exabytes) on 1 billion DVDs, which would fill a large football stadium
   b. Year 2003, same total as 0-2002 … in one year
   c. Year 2011, same total as 0-2002 … in every two days
   d. Year 2013, same total as 0-2002 … in every ten minutes
   e. … acceleration to same total in every few seconds in 2015!

4. Big Data is best job opportunity today … skyrocketing to 100 applicants for every one job, now 100 jobs per applicant are unfilled and by 2015, over a million unfilled jobs for big data science.

5. The Five V’s plus Two
   a. Volume: Here, “big” is often taken to mean multiple terabyte- or petabyte- class data, motivating the use of such highly parallel next-generation data management technologies as MapReduce, Hadoop, and NoSQL.8 that can be used on much, much cheaper hardware
   b. Variety: Big data goes beyond numbers in relational databases, a.k.a. “structured data.” Such “unstructured” data sources as Internet search log files, tweets, call center transcripts, telecom messages, email, and data from sensor networks, video, and photographs can equally well be considered data. The multi-structured nature of big data in part accounts for its large volume and often high degree of “messiness” and “noisiness.”
   c. Velocity: Because much of it emanates from sensors, web search logs, real- time feeds, or mobile devices, big data is often generated continuously and at a rapid clip, e.g., Macy’s national retail statistics from two days to two hours
   d. Value: Delivery on strategic goals for the firm or school regarding the impact and revenue of a “going concern”
   e. Very Interdisciplinary Team: Business consultant, Subject Matter Expert, Educational technologist, Statistician, Database programmer et al
6. The Math of it all … for Prediction
   a. Looking for legacy Big Data in … *Typical Statistics*
   b. Parametric statistics
   c. Measures of Central Tendency

7. Looking for contemporary Big Data in … *Specific Patterns, including Outliers*
   a. Factor Analysis
   b. Patterns as Exemplars
   c. Sample = Population with Big Data
   d. Info fine-tuning

B. BIG DATA QUICK START, PHASE ONE

Step 1. Review organizational strategy
Evaluate your legacy business questions (sustaining operations)
Evaluate your new questions for the current business (sustaining innovation)
Evaluate your new business opportunities (disruptive innovation)

Step 2. Audit your organizational data
List the database silos with customer data
List the database silos with product data
List the database silos and interaction in your ecosystem

II. BUSINESS ANALYTICS FOR A VIRTUAL CAMPUS
A. Business Matters for Immersive Learning (student enrollment, donor advancement, product development)

B. Recent Deloitte Advisement on Business Analytics and Big Data (Charlotte Business Journal meeting, 2013)

1. Use Facts for evidence-based decisions vs. Habits for organizational politics and inertia in decision-making

2. Customize Big Data reports by organizational role of the reader

3. Apply Big Data at every point in the end to end business value cycle: strategy, business analytics, implementation, technology integration, organization change management, performance evaluation management

4. Review of all databases and their data structures

C. Use Big Data to answer these business questions …

1. Existing questions in current business (operational effectiveness)

2. New questions in current business (sustaining innovation)

3. New questions in new businesses (disruptive innovation)

D. Remember that a Big Data analysis is more than numbers

1. Role of art in BD, Robert Nisbet, Page 41, text on data mining

2. Refer to Hubert Dreyfus about what is needed, role of judgment, creative writing, multiple comparisons problem, cf. What Computers Still Can’t Do.

3. Modeling choices, common sense, expert judgment in business, education and government … all involve intuition as well as numbers

4. Page 45, Data science is not an automated process

5. Articulate right questions with good judgment

6. Articulate right data with good relevance

E. Page 51, But it is too big to ignore, John Lucker, Deloitte (2013)
Properly harnessed, the right data can indeed be an organization’s new oil. But it is important not to lose sight of two fundamental points. First, analytics initiatives ultimately do not begin with data; they begin with clearly articulated problems to be addressed and opportunities to be pursued. Second, more data does not guarantee better decisions. But the right data—properly analyzed and acted upon—often does. Organizations that lose sight of these principles risk experiencing big data not as the new oil, but as the new turmoil.” John Lucker

F. Current examples … Note Personal “engagement’ of the actors in all these examples seems to be a key variable across the board … for education and training and business

1. Example 1 of Big Data for business analytics: Big Data for College Admissions (W. Kent Barnds, the executive vice president of Augustana College in IL)
   a. “Applicant engagement” index
   b. Buying lists (The College Board, ACT)
   c. Source codes (early and unsolicited is the strongest)
   d. Demonstrated interest (visiting, conversation, return of materials)
   e. FAFSA position choice
   f. Date of application
   g. Next … Web marketing and the “Funnel”
   h. Next … Mobile platforms (real-time, interactive)

2. Example 2 of Big Data for business analytics: IBM SPSS for Fundraising at Michigan State University
   http://www-01.ibm.com/software/analytics/spss/12/non-profit/
   a. “Donor engagement” index
   b. Determined by response on direct mail, phone, travel, event attendance, volunteer
   c. Results in Levels: Owner, Participant, Interactive, Curious, Aware
   d. Still use wealth screening, plus affinity index
   e. Tracks, displays, schedules, monitors for solicitors and leadership

G. BIG DATA QUICK START, PHASE TWO

Step 3. Add your variables to predict and be predicted
Rank current expected predicted variables by importance
Add new predicted variables by importance
List predictor variables (categorical, numerical)

Select analytic methods (statistics, algorithms)
Prepare the data (linear and non-linear)
Capture customer responses
Analyze input data
Design dashboard and training

III. IMMERSIVE LEARNING ON A VIRTUAL CAMPUS
A. Big Data for applying Immersive Learning to global distance learning enterprises

1. Immersive Learning occurs in online interactive video social simulations

2. Role play instruction increases learner engagement … and now more so with Big Data personalization

B. Examples of instructional problems with online immersive learning to be solved (with leadership training e-textbooks and online simulations)

1. (PROFILE) Example 1 of Big Data for Immersive Learning: Ken Blanchard leadership training, Key Technologies, Del Mar, California, mid-90s, cf. Guilford’s Structure of Intellect model.
   a. Semantic learners profile
   b. Figural learners profile

2. (REAL-TIME) Example 2 of Big Data for Immersive Learning: CourseSmart for E-Textbooks in a Learning Management System (LMS)
   a. “Learner engagement” index
   b. 100,000 e-books for 1M students across publishers (McGraw Hill, Pearson, Houghton Mifflin)

3. (PROFILE AND REAL-TIME) New example of Big Data for Immersive Learning: Online interactive video social simulations, cf. similar to the CourseSmart e-textbook example above
   a. Next Step: For Immersive Learning with online interactive video social simulations, too?
   b. Types of variables for prediction: Ability, Achievement, Aptitude, Personality?
   c. Types of scoring for opinions about the process and other matters: Magnitude scaling on component media preference?
   d. Investigate role of a “Self-regulation” index

   e. *Predictor features* could include Completeness, Notetaking, bookmarking, printing, sharing, collaboration, speed, participation, episode scores, Quiz scores, Story Character choices, Personal Avatar choices, etc.

   f. *Predicted outcomes* could include Quizzes (responses correct plus branched practice), Exam (cumulative responses correct, course grade), Survey (activity liking, sphere liking, confidence), Magnitude scaling on application preference, Future vocational choices and behavior, etc.

   g. Note: “Sense of immersion” enhanced by real-time feedback based on user responses in the context of their (1) profile and (2) cumulative response patterns throughout the role play

C. Big Data has the potential to improve immersive learning with …
1. Better Content from massive databases
2. More Application situations
3. Unlimited Practice with varied and apt feedback
4. Results for student retention going forward
5. Additional Visualization for feedback and results

F. Big Data is evidence-based approach to learner achievement, school success and training utility for business.
   1. Perhaps use a “Learner Engagement” index for immersive learning
   2. Better stories for immersive learning
   3. Social Ethics in role play immersive learning for theological education, cf. Social Ethics course
   4. In conjunction with real-life mentoring for community application and assessment

G. Big Data is a resource for adaptive education and training
   1. Ongoing and dynamic assessment within sessions and students
   2. Summative assessment among various designs and approaches
   3. Long-term student assessment for the individual
   4. Long-term program evaluation for the school or workplace

I. BIG DATA QUICK START, PHASE THREE
Step 5. Build Adaptive Instruction
Profile learners
Exploration of an immersive story
Discovery of Productive insights for heuristic learning

Step 6. Build Adaptive Assessment
Inter-related content
Self-pacing
Immediate Feedback
… all within and after the immersive stories

IV. CONCLUSIONS

A. Big Data and Predictive Analytics are here to stay

B. Applied Big Data is based on attempted prediction of human behavior

C. Repeated Note: Prediction in immersive learning is limited by …
1. Incompleteness theorem of logic and math, cf. Kurt Godel (1930) said any algorithm cannot be both complete and consistent
2. Counter predictive effect of humans for liberty, cf. Michael Scriven (1977) said that once any theory is published there will be those who will get around its predictive power
3. Creativity and innovation as the hallmark of good learning of expertise, cf. Hubert Dreyfus, Omar Moore, and John Couch said that we want our learners to exceed our behavioral objectives

D. Big Data can help in many ways in the design, development and evaluation of immersive learning programs … but automation and application will always need the human touch and insight

Nisbet quote (personal communication, 2013) …

How you work it out in a specific educational context will be a much greater challenge. Schools must build systems to handle it. But, they have to build the system with the right architecture, or it won't work right. Data must be prepared properly; as much as 90% of the project time will be spent in data access, data integration, data cleansing, and other data preparation jobs, before the modeling can even begin. Some of that preparation is the subject of my Effective Data Preparation course at UC-Irvine. The big challenge for schools will be that last "mile" in the data pathway (analogous to the last "mile" in a telecommunications network). Those last "mile" problems in deployment can kill a project in any organization, particularly a school.

V. QUICK START SUMMARY OF THREE PHASES WITH SIX STEPS
A. QUICK START PHASE ONE: BIG DATA

Step 1. Review strategy
Evaluate your legacy business questions (sustaining operations)
Evaluate your new questions for the current business (sustaining innovation)
Evaluate your new business opportunities (disruptive innovation)

Step 2. Audit your data
List the database silos with customer data
List the database silos with product data
List the database silos and interaction in your ecosystem

B. QUICK START PHASE TWO: BUSINESS ANALYTICS

Step 3. Add up your predicted and predictor variables
Rank predicted variables
Add new predicted variables
List predictor variables (categorical, numerical)

Step 4. Build Platform
Select analytic methods (statistics, algorithms)
Arrange the hardware for a Datamart
Capture customer responses
Analyze input data
Design dashboard and training

C. QUICK START PHASE THREE: IMMERSIVE LEARNING

Step 5. Build Adaptive Instruction
Profile learners
Exploration of an immersive story
Discovery of Productive Insights

Step 6. Build Adaptive Assessment
Inter-related content
Self-pacing
Immediate Feedback
… all within and after an immersive story

DISCUSSION QUESTIONS FOR THE AUDIENCE TODAY
Questions about these six Quick Start steps?

Various understandings and applications of Big Data in your organizations?

Possible Wins (more revenue, more profit, more impact)?

Possible Losses (higher expenses, slow ROI, negative distraction)?

New ways to apply Big Data to Immersive Learning?

Sorts of data that you need to better know your customers?

Cross-cultural benefits and limitations of big data in education and training?


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Numbers 1:1-3, King James Version (KJV)

1 And the LORD spake unto Moses in the wilderness of Sinai, in the tabernacle of the
congregation, on the first day of the second month, in the second year after they were
come out of the land of Egypt, saying,

2 Take ye the sum of all the congregation of the children of Israel, after their families, by
the house of their fathers, with the number of their names, every male by their polls;

3 From twenty years old and upward, all that are able to go forth to war in Israel: thou
and Aaron shall number them by their armies.

4 And with you there shall be a man of every tribe; every one head of the house of his
father