What is the Future of Learning?:
Visions of Education in Our Changing
Learning World!
Curtis J. Bonk, Professor, Indiana University
cjbonk@indiana.edu
http://curtbonk.com/

**Talk Overview**

1. The Evolution of Learning Technology
2. Education 20/20 and the Role of the Instructor
3. First and Last Principles of Instruction
4. Megatrends of Learning: Engagement, Access, and Customization (30 ways that learning is changing…)
5. Future Trends and Ideas

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**The Evolution of E-Learning (All 7 year cycles)**

- **Phase I, 1994:** The Age of Portals and Pages (Netscape goes public)
- **Phase II, 2001:** The Age of Openness (MIT OCW & Wikipedia born)
- **Phase III, 2008:** The Age of MOOCs (First MOOC offered)
- **Phase IV, 2015:** The Age of Personalization

Other prior significant e-learning dates:
- 1985: First online course, Linda Harasim, Univ. of Toronto
- 1987: HyperCard first shipped

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(Circa Confucius 551–479 BCE)

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April 30, 2017

**Education 1.0**

‘Those Jobs Are Gone’

Steve Kolowich, The Chronicle of Higher Education
The Innovators:
Walter Isaacson (2014)
http://books.simonandschuster.com/The-Innovators/Walter-Isaacson/9781476708690

Machines of Loving Grace:
John Markoff (2015)
http://www.amazon.com/Machines-Loving-Grace-Common/dp/0062266683

Poll: Remember Education 1.0
1728: 1st correspondence course advertised Boston
Learn shorthand from Caleb Phillips thru weekly mailed lessons
The First University Correspondence Course
(University of London, External Program, 1858)
1728-1990s – Generally postal system based
Fall 2014, On Wisconsin
MOOC, Meet MORC (Massive Open Radio Course)
WHA, UW Madison, College of the Air, 1933, Vocational Training dedicated to Agriculture, and later Home Economics and Typing.

Artificial Intelligence
John McCarthy, Stanford AI Lab

March 14, 2016
Artificial Intelligence and Robots
Paul Basken, The Chronicle of Higher Education

June 3, 2017
How PLATO changed the World...in 1960
Cait Etherington, ElearningInside News

The World of Open Education

Intelligence Augmentation and Amplification
Douglas Engelbart's "The Mother of All Inventions" (1968)
Augmentation Research Center (ARC)
May 22, 2019

**Story #1: VisiCalc (a boring accountant)**
How computing’s first ‘killer app’ changed everything
Tom Harford, BBC News

Dan Bricklin, inventor of the first computer spreadsheet

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Poll: Anyone remember these technologies?

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Story #2: The Zip disk dissertation...
10 ed-tech tools of the 70s, 80s, and 90s
eSchool News, Maris Stansbury
http://www.eschoolnews.com/2013/05/10/10-ed-tech-tools-of-the-70s-80s-and-90s/

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Story #3: To a product of distance learning...
Bob Clasen, University of Wisconsin
February 27, 1934-March 17, 2018

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Knowledge Navigator (1987)
Apple Computer
http://www.youtube.com/watch?v=hb4AzF6wEoc

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September 26, 2018

**Story #4: Remember Education 2.0?**
The rise and fall of the company behind ‘Reader Rabbit’ and all your favorite educational games
Abigail Cain, The Outline

Rocky’s Boots:
https://www.youtube.com/watch?v=a-NLh58bIIk
Project YES (Lori Bank):
https://youtu.be/bZD5mQH4Ups
1995

Story #5: A nice day on Nicenet
http://etec.ctith.ubc.ca/510wiki/A_Nicenet_Approach

April 22, 2019

Story #6: CU-SeeMe Innovations
http://www.umich.edu/~comm464/virtcomm/mingchen/

Fast Forward 30+ Years...
“Anyone can now learn anything from anyone at any time.”

March 6, 2019

Sharing Courses Far and Wide
Mark Lieberman, Inside Higher Ed
https://www.insidehighered.com/digital-learning/article/2019/03/06/online-course-sharing-grows-more-complex-support-college

The World is Open:
How Web Technology Is Revolutionizing Education
In Education 3.0, classrooms would move away from lectures, such as this one, to having class time be spent on discussions and projects, using digital technology. (Per Wikipedia: https://en.wikipedia.org/wiki/Education_3.0)

Every industrial robot takes up to 6 jobs, study finds
Steve Goldstein, MarketWatch

The Fourth Industrial Revolution: What it means, how to respond
Klaus Schwab, Founder and Executive Chairman, World Economic Forum
https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

The Rise of the Phigital Learner
Going ‘phigital’? 4 things schools need to know about Generation Z, Todd Kominiak, TrustEd

ST Future Economy Roundtable: Is Asia ready for the Fourth Industrial Revolution?
The Straits Times
http://www.straitstimes.com/asia/is-asia-ready-for-the-fourth-industrial-revolution

“it’s quite clear that the established models of education have to change and adapt to the new environment.”

March 29, 2017

April 13, 2016

July 11, 2017
Clearly... Learning is Changing!

Education 20/20

20 New Roles of the Instructor
- Captain
- Counselor
- Conductor
- Consultant
- Community Organizer
- Cultivator
- Course Ambassador
- Curator
- Concierge
- Camping Trip Guide
- Course Expedition Leader
- Chemist
- Collaborator
- Care Giver
- Change Catalyst
- Consumer Advocate
- Coach

Merrill’s First Principles of Teaching/Instruction
[Link](https://travelinedman.blogspot.com/2011/05/bonks-last-principles-of-instruction.html)

Bonk’s Last Principles of Teaching/Instruction (Education 4.0?)
[Link](https://travelinedman.blogspot.com/2011/05/bonks-last-principles-of-instruction.html)
https://www.applicadthai.com/articles/education-4-0/
Bonk’s 20 “Last” Principles of Instruction (LAST = Learning Activation System Template)

- Convenience
- Cheerfulness and Optimism
- Support and Feedback
- Spontaneity
- Nontraditional Learning
- Relevance and Meaningfulness
- Trial and Error (i.e., it is ok to fail)
- Expanded Resources
- Human Connectedness
- Empowerment and Autonomy
- Choice and Options
- Flexibility
- Collegiality
- Organization
- Purpose and Vision
- Cognitive Apprenticeship

20. ??? (what is missing)

Part II. Technology Today

ARKit lets you create immersive augmented reality experiences on iOS devices. (Photo: Wareable)

December 13, 2018
In China’s Silicon Valley, Edtech Starts at the ‘MOOC Times Building’
Jeffrey R. Young, EdSurge

30+ Ways Learning is Changing: The Mega Trends
Thirty Ways Learning is Changing...
(i.e., it’s more informal, video-based, ubiquitous, collaborative, self-directed, global, mobile, open, massive, etc.)

How Learning is Changing: Mega Trend #1. Learner Engagement

July 17, 2017
Learning is More Collaborative
Buildings That Foster Collaboration,
Lawrence Biemiller, The Chronicle of Higher Education

Social spaces, like this one in an interdisciplinary-science building at Arizona State U., don’t qualify for federal reimbursement of research-overhead costs. So now "we don’t build any single-purpose space," says the university architect.

January 3, 2018
Learning is More Mobile
CES 2018: Your guide to the biggest consumer electronics show
USA Today

The Octopus watch from Joy, an icon-based watch for kids to have good habits is on display during CES.

August 4, 2017
Learning is More Mobile
When our smartphones leave us out of touch
Brett Molina, USA Today

October 8, 2018
Learning is More Social
First look: Facebook unveils Portal video calling devices for the home with Alexa
Edward C. Baig, The USA Today

Video (1 minute): http://curtbonk.com/facebook-portal.html
July 24, 2018
Learning is More Digital and Resource Rich
This Physicist Wants Female Scientists To Get Noticed.
So She Wrote 270 Wikipedia Profiles.
Jenna Amatulli, Huffington Post
https://www.huffingtonpost.com/entry/scientist-pens-270-wikipedia-pages-in-a-year-so-female-scientists-get-noticed_us_5b55eed4e4b0b15aba92c0d5

August 8, 2017
Learning is More Game-like
ShortSims
http://www.shortsims.com/
Clark Aldrich clark@clarkaldrichdesigns.com

July 19, 2017
Learning is More Immersive
HoloLens Assists in Live Surgery
Tommy Palladino, Next Reality
Video #1: 1:09: http://curtbonk.com/hololens.html
Video #2: 1:37: http://curtbonk.com/hololens2.html

July 17, 2017
Learning is More Immersive
Learning Chemistry in Virtual Reality,
Sarah Hardman, New Learning Times
1:38 video: https://vialogues.com/vialogues/play/38337/
All: http://curtbonk.com/chemistry-vr.html

May 1, 2018
Learning is More Immersive
3 ways districts can use AR and AI
Justin Anglio, eSchool News
When a teacher glances around her classroom, Lumio allows her to see real-time analytics (in the form of icons) floating directly above each student’s head. The teacher can glance directly at a student or “click” on a student’s icon to see more detailed information about where and how that student might be struggling.
May 28, 2019
Learning is More Immersive
Virtual Reality Comes to the Classroom
Beth McMurtrie, The Chronicle of Higher Education
https://www.chronicle.com/interactives/20190528-ImmersiveTech

A virtual reality experience for students in a conducting class:
http://curtbonk.com/virtual-o.htm

A group of students could gather around a virtual heart:
http://curtbonk.com/vrheart.htm

How Learning is Changing:
Mega Trend #2. Pervasive Access

August 1, 2016 (Access)
Learning is More Ubiquitous
363 by Idea Group; Study Café Meeting Place; Idea Space (Seoul, Korea)
http://363.co.kr/wp/?page_id=244
http://363.co.kr/wp/?bw_gallery=study-cafe_11

April 16, 2018
Learning is More Informal
World of active learning in higher ed
Formal and informal learning spaces transforming campuses internationally
Sherrie Negrea, University Business, May 2018
https://www.universitybusiness.com/article/world-active-learning-higher-ed

April 22, 2018
Learning is More Visual
Microsoft AI Commercial ft. Common
Video 1:00: Microsoft AI Commercial ft:
https://www.youtube.com/watch?v=9tucY7Jhhs4 / (Feb 11, 2018)

Video 1:48: Microsoft AI: Amplifying Human Ingenuity:
https://www.youtube.com/watch?v=NDmu7Z5NPXo

Video 1:00: Microsoft AI: Empowering Innovators ft. Common:
https://www.youtube.com/watch?v=Z5OWdqfAYfw / (April 22, 2018)

Video: 1:00 Microsoft AI + Iconem: Preserving History ft. Common:
https://www.youtube.com/watch?v=ZDZjaIhzMSM / (April 22, 2018)

Video: 0:44: Microsoft AI + The Yield: Taking the guesswork out of farming ft. Common:
https://www.youtube.com/watch?v=7rzufxlGH4o / (April 22, 2018)

November 20, 2018
Learning is More Video-based...
The Mantis Cam Gives Us a Peek into a Whole New Ocean World
Melanie Hering, New Learning Times
March 21, 2018 (Engagement)
Learning is More Global
Chatterbox
The overall winner in the competition was Chatterbox, an online language school powered by refugees
https://www.youtube.com/watch?v=4-thwPFk

November 19, 2015 (Access)
Learning is More Immediate...
New daddy longlegs named after 'Lord of the Rings' character Smeagol, Mary Bowerman, USA Today
https://www.youtube.com/watch?v=S-5EfwpFOk

November 28, 2018
Learning is More Immediate...
'Siberian unicorn' once walked among early humans
Tara John, CNN

October 4, 2018 (Engagement)
Learning is More Synchronous
Shindig, Future Trends Forum, Bryan Alexander
Anant Agarwal, CEO and founder of edX
http://www.shindig.com/
http://events.shindig.com/event/ftf-agarwal

July 29, 2018
Learning is More Synchronous
Why Silicon Valley is teaming up with San Quentin to train young people to code
Jessica Guynn and Megan Diskin, USA TODAY
https://www.youtube.com/watch?v=dA5LJU-16uw

February 4, 2019
Learning is More Online (Access)
Indiana University, Office of Online Education
http://www.shindig.com/
http://events.shindig.com/event/ftf-agarwal
February 18, 2019
The Rise of the Mega-University
Lee Garner, The Chronicle of Higher Education

July 29, 2018
Learning is More Online
Can a Huge Online College Solve California’s Work-Force Problems?
Karin Fischer, The Chronicle of Higher Education
http://curtbonk.com/link

The new college is being created to help California’s adults improve their job prospects in growing fields like IT support.

March 19, 2018
Learning is More Free and Open
Open Textbook Network
Center for Open Education, University of Minnesota
http://research.cehd.umn.edu/otn/

March 6, 2019
Learning is More Free and Open
The high cost of college textbooks, explained
Gabby Del Valle, The Chronicle of Higher Education
eTexts 101: A Practical Guide
https://iu.pb.unizin.org/iuetexts101/front-matter/introduction/
https://iu.pb.unizin.org/iuetexts101/

May 19, 2016 (Access)
Learning is More Free and Open
From MOOC to bootcamp to MIT
MIT News, Office of Digital Learning
(2015—From MITx to MIT Global Entrepreneurship Bootcamp to master’s student)

August 9, 2017
Learning is More Free and Open
Modern State Education Alliance
https://modernstates.org/
March 21, 2018
Learning is More Direct from Experts
TeachMeNow and VIPKid
TeachMeNow is a gig-economy platform for teachers. This marketplace connects teachers, experts, and mentors to students. The technology combines scheduling, payments, and live virtual sessions that can connect on any device allows tens of thousands of teachers to create their own online businesses, with some earning over $100,000 last year. In addition, schools and companies including Microsoft use TeachMeNow software to create their own-branded online learning communities.

September 25, 2017
Learning is More Direct from Experts
Professors Have Taken Over the MOOCs: How open online learning is changing
Joshua Kim, Inside Higher Ed

May 12, 2017 (Customization)
Learning is More Modifiable
The Future of Collaboration Spaces Encompasses Video Interactive, Mobile

January 9, 2017
Learning is More On Demand
What I Learned When My Students Used Google Translate
Diane Loyet, The Chronicle of Higher Education

April 8, 2018
Learning is More On Demand
What I Learned When My Students Used Google Translate

I was very surprised by the results. They sent me examples of translations into English from Albanian, Chinese, Kazakh, Russian, and Spanish. The translations from Albanian, Kazakh, Russian, and Spanish were good. They were not perfect, but the mistakes were such that, had I encountered the sentences in a student paper, I would have attributed them to grammatical errors on the part of the non-native speaker of English. Here is one of the Spanish examples:

Original Spanish: Si yo fuera tú, le cobraría hasta por respirar.

Google Translate's English translation: If I were you, I'll even charge you for breathing.

Accurate translation: If I were you, I would even charge him for breathing.
April 8, 2018
Learning is More On Demand
What I Learned When My Students Used Google Translate
Diane Loyet, The Chronicle of Higher Education
• In contrast, Google Translate’s English version of a Chinese passage was unintelligible:
  • But the second language acquisition is a steady process, if you take a cure to do, that is, chronic diseases and even health care, unlike acute disease, once the recipe to treatment, the consequences will soon be reflected.

May 9, 2017 (Customization)
Learning is More On Demand (PDAs)
Amazon Echo Show brings chatty Alexa to a two-way, video touchscreen
Edward C. Baig and Elizabeth Weise, USA Today
https://www.usatoday.com/story/tech/reviews/2017/05/09/amazon-echo-show-touchscreen-video-alexa/101448844/
44 Seconds: http://curtbonk.com/jetsons44.html

August 2, 2018
Learning is More On Demand (PDAs)
Hey, Alexa, Should We Bring Virtual Assistants to Campus?
Lindsey Ellis, The Chronicle of Higher Education
https://www.chronicle.com/article/Hey-Alexa-Should-We-B/244129

September 17, 2018
Learning is More On Demand
Talk to Books
https://books.google.com/talktobooks/

May 9, 2018
Learning is More On Demand
Google Duplex Demo from Google IO 2018
Video (4:11): https://www.youtube.com/watch?v=b0d1mEm2Fy08
Video (2:05): http://curtbonk.com/google40245.html
Donald Clark Plan B
http://donaldclarkplanb.blogspot.ca/2018/05/google-just-announced-ai-bot.html?m=1

November 15, 2018
Learning is More Personalized
TutorIT SAT Prep
Joseph M. Scandura; yscandura@gmail.com
Students can now practice on actual SATs at www.TutorT.org. They also will get individualized help on items they miss, as long as they wish or until they get them all right. SATs generally cover very similar material from one year to the next. Students can continue with additional SATs until they reach their goal.
A new grading tool called Gradescope—powered by AI and now being used for more than 175,000 students at 550 colleges—offers one window on the possibilities. The tool automates the grading process without requiring instructors to do any grade-book tallying. Several professors who use it say the automation has actually made it easier for them to personalize their teaching. At the University of Michigan at Ann Arbor, students in a statistics class last fall had their writing assignments evaluated by an automated text analysis tool.

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**November 8, 2018**

**Learning is More Personalized**

**AI Question Asking**

(Paul Kim keynote in Taiwan; Education 4.0 Conference)

https://www.facebook.com/digitalschema

https://www.facebook.com/digitalschema/videos/10217854957270186/

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**October 14, 2017**

**Learning is More Personalized**

China wants to bring artificial intelligence to its classrooms to boost its education system

How the take-off of AI-enabled education will affect the interaction between China’s 14 million teachers and 188 million pupils

Meng Jing, South China Morning Post


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**Weirdness #1...We’re Teaching the World**

October, 2018

Learning is More Massive

Sarah Fister Gale, CLO


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**Weirdness #2: Your Friends are doing MOOCs**

June 15, 2017

Massive List of MOOC Providers Around The World, Class Central

https://www.class-central.com/report/mooc-providers-list/
June 14, 2016 (Customization)
Chapter 15: Learning About MOOCs by Talking to Students
Charles Severance, Univ. of Michigan
Anuar Lequerica, Class Central

October 30, 2017
Learning is More Massive
Report: 59% of employed data scientists learned skills on their own or via a MOOC
Alison DeNisco Rayome

October 12, 2018 (Customization)
Learning is More on Modular
edX Expands MicroMasters Programs With Data Science (“nanodegrees”) Digital Leadership and More, Sri Ravipati

Weirdness #2: Summer Discounts on MOOCs
May 30, 2019
From: edX <news@edx.org>
Sent: Thursday, May 30, 2019 10:12 AM
To: Bonk, Curtis Jay <cjbonk@indiana.edu>
Subject: We have some big news.

March 4, 2019
Weirdness #4...MOOC-based Pricing Charts
35+ Legid Master’s Degree Via MOOCs
MOOC-Based Degrees, Pricing Chart (IBL News)
Weirdness #5...MOOCs in Wedding Announcements
September 26, 2018
The Future of Professional Credentialing in an Engagement Announcement
Joshua Kim, Inside Higher Ed

MOOCs Trends
Year of MOOC-based Degrees: A Review of MOOC Stats and Trends in 2018,
Dhawal Shah, Class Central--January 6, 2019

January 6, 2019
Learning is More Massive
Year of MOOC-based Degrees: A Review of MOOC Stats and Trends in 2018,
Dhawal Shah, Class Central

MOOCs and Open Education Around the World
http://routledge-ny.com/books/details/9781315807419/

30+ Ways Learning is Changing: Recapping the Three Mega Trends: Engagement, Access, and Customization

WHAT'S NEXT
Part III. Technology Tomorrow

July 24, 2018
The 100-Year Life: Living and Working in an Age of Longevity
Lynda Gratton and Andrew Scott

August 1, 2018
1. Independent Studies Via MOOCs
MOOC: AI A-Z: Learning How to Build an AI Online Course and Machine Learning
Mengyuan Zhao
https://www.udemy.com/artificial-intelligence-az/
https://www.coursera.org/learn/machine-learning

October 12, 2018
2. OER-Based Courses and Programs
The Chronicle of Higher Education
Launching OER Degree Pathways: An Early Snapshot of Achieving the Dream's OER Degree Initiative and Emerging Lessons

September 22, 2017
3. Binge Learning Experiences
What Online Education Can Learn from Netflix
Henry Kronk, E-learning Inside News
https://theumlaut.com/binge-learning-is-online-educations-s-killer-app-84da18f8ae76
4. Rise of Super E-Mentors and AI Coaches
(Paul Kim, 2018)

February 27, 2017
5. Web Conferencing Walls
Global Learning Partner or PBL Team Selection Walls

September 26, 2018
6. Interactive Agents and Tutors
Pushing the Boundaries of Learning With AI
Lindsay McKenzie, Inside Higher Ed
[http://www.thelivingmoon.com/43ancients/02files/Library_Alexandria.html]

March 24, 2017
Artificial Intelligence Market in the US Education Sector 2017-2021
AI Market to Grow 47.5% Over Next Four Years
Richard Chang, Campus Technology

January 30, 2017
7. Professor Einstein PDA's
[https://www.airmynetwork.com/Blog/2016/08/11/Professor-Einstein-PDA]

February 27, 2017
8. Robot Collaborators/Partners
[https://www.mandarin-language.ai/]

Professor Einstein, an educational Wi-Fi connected robot is on display at the Hanson Robot display during the opening day of Consumer Electronics Show 2017. (Photo: Robert Hanashiro, USA TODAY)
[http://www.usatoday.com/story/tech/2017/01/30/robotic-barista-now-serving-really-fast/95888780/]

[https://www.youtube.com/watch?time_continue=4&v=7EuSTu1iR2A]
[http://curtbonk.com/mandarin.html]
9. Café Classroom and Café Connectedness
Starbucks Your Classroom!
Oskar Cymerman, Teaching Channel

Sterile, industrial-era rows aren’t very attractive or motivating...I believe the “Starbucks” environment will promote that freedom and movement...Freedom is the key ingredient to social-emotional well-being and deeper learning. Rows and columns constrict. They hold and stifle.

10. Instructional Designer Morphs into Learning Environment Engineer

February 27, 2017
11. World Knowledge Refreshment Stations

June 3, 2016
12. Explosion of AR and VR
VR Lets Med Students Experience What It’s Like To Be 74
Elyse Wansel, Huffington Post
http://ht.ly/69pe300XEP3

13. The Age of Personalization

Poll: Evolution or Revolution?
Poll: Excited or does all this give you a headache?

We are entering a jumping off point...
(South University of Science and Technology of China, Wednesday June 10, 2015)

Things are heating up!

The Learning Revolution is coming within reach!

Remember...
“I cannot do this alone.”
“I cannot do this alone.”
“I cannot do this alone.”

Any Questions or Comments?

Slides at: TrainingShare.com
Papers: PublicationShare.com
Free book: http://tec-variety.com/
Email: cjbonk@indiana.edu