Bridging the Divide: Linking business workforce needs to work-based learning opportunities

April 2019
As the U.S. transitions to a knowledge economy, our education, workforce development, and employment systems have not kept pace.

A high school diploma now offers a 50% fewer opportunities for finding family sustaining careers versus 30 years ago.

Postsecondary graduation rates have remained stagnant over the same period, with over half of attendees dropping out. For those who manage to complete, 40 percent of graduates will be underemployed, working in jobs that do not require their level of training.

Eighty-nine percent of employers report having difficulty finding people with the requisite skills for job openings and are desperately seeking new ways to fill those gaps.

Unprecedented disconnect in labor market with record high 6.1M open postings, 6.8M currently unemployed and 6.7M more underemployed.
Companies are undergoing rapid transformation

There are still a number of challenges to becoming digital

Technologies by proportion of companies likely to adopt them by 2022 (projected)

- User and entity big data analytics: 85%
- App- and web-enabled markets: 75%
- Internet of things: 75%
- Machine learning: 73%
- Cloud computing: 72%
- Digital trade: 59%
- Augmented and virtual reality: 58%
- Encryption: 54%
- New materials: 52%
- Wearable electronics: 48%
- Distributed ledger (blockchain): 45%
- 3D printing: 41%
- Autonomous transport: 40%
- Stationary robots: 37%
- Quantum computing: 36%
- Non-humanoid land robots: 33%
- Biotechnology: 28%
- Humanoid robots: 23%
- Aerial and underwater robots: 19%

Employers need to reskill at scale

Skills shortages are a problem for companies and industry in the U.S.

Employers’ Hardest to Hire Skills

- STEM Skills
  - Cybersecurity: 97%
  - Data science and analytics: 95%
  - Critical thinking and problem solving: 83%
  - Design/systems thinking: 79%
  - Global perspective: 78%
  - Innovation and creativity: 79%
  - Cognitive flexibility: 78%
  - Cross-disciplinary ability: 74%

% of employers who say these skills problematic to find

The rise of the Data-Driven Decision Makers

<table>
<thead>
<tr>
<th>Analytics-enabled jobs</th>
<th>Data science jobs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data-driven decision makers</strong></td>
<td><strong>Functional analysts</strong></td>
<td></td>
</tr>
<tr>
<td>26%</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>32%</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>43%</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>45%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>46%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td><strong>Data engineers</strong></td>
<td><strong>Data analysts</strong></td>
<td><strong>Data scientists and advanced analysts</strong></td>
</tr>
<tr>
<td>13%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>15%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>26%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>23%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>31%</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>13%</td>
<td>4%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Explosive growth in demand for analytics skills

- Finance and Insurance
- Healthcare and Social Assistance
- Information
- Manufacturing
- Professional, Scientific, and Technical Services
- Retail Trade

entangled.solutions
Today’s changing landscape is demanding business people with new skills, not just digital experts or data scientists.

23% Of educators say all graduates will have data science and analytics skills.

69% Of employers say they will prefer job candidates with these skills over ones without.

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69% Of employers say they will prefer job candidates with these skills over ones without.
## Foundational skills for the digital economy

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<tr>
<th>Digital Building Blocks</th>
<th>Business Enablers</th>
<th>Human Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation Skill Area</strong></td>
<td><strong>Total Openings: 2017</strong></td>
<td><strong>Growth: 2012-2017</strong></td>
</tr>
<tr>
<td>Managing data</td>
<td>3,527,740</td>
<td>24%</td>
</tr>
<tr>
<td>Software development</td>
<td>3,326,192</td>
<td>44%</td>
</tr>
<tr>
<td>Computer programming</td>
<td>2,571,728</td>
<td>35%</td>
</tr>
<tr>
<td>Analyzing data</td>
<td>1,320,678</td>
<td>68%</td>
</tr>
<tr>
<td>Digital security &amp; privacy</td>
<td>895,547</td>
<td>75%</td>
</tr>
<tr>
<td>Business process</td>
<td>3,215,648</td>
<td>18%</td>
</tr>
<tr>
<td>Project management</td>
<td>2,354,230</td>
<td>21%</td>
</tr>
<tr>
<td>Digital design</td>
<td>1,427,981</td>
<td>2%</td>
</tr>
<tr>
<td>Communicating data</td>
<td>147,219</td>
<td>323%</td>
</tr>
<tr>
<td>Communication</td>
<td>5 million</td>
<td>27%</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>3,666,249</td>
<td>31%</td>
</tr>
<tr>
<td>Collaboration</td>
<td>3,480,175</td>
<td>46%</td>
</tr>
<tr>
<td>Analytical skills</td>
<td>2,395,145</td>
<td>24%</td>
</tr>
<tr>
<td>Creativity</td>
<td>1,217,062</td>
<td>23%</td>
</tr>
</tbody>
</table>
A new blended digital professional is emerging
Skills best learned at work

**Core Skills:** Definitional skills to each occupation which job seekers need in order to contribute. Best addresses in academic/training settings.

**Building Block Skills:** Required and relevant across many roles and represent foundational, but not unique skills. Typically best developed on-the-job.

**Distinguishing Skills:** Allow a job seeker to highlight his or her technical proficiency in the role. Typically best developed through a hybrid of training and on the job.
Both credentials and internships/co-ops

Employers want graduates with work-ready technical skills, critical thinking, problems solving and additional baseline skills developed through traditional academic coursework.

We identified eight skill sets that Liberal Arts graduates can develop through a modest amount of coursework, such as a minor or online training or internships, that **double their job prospects**:

<table>
<thead>
<tr>
<th>Skill Set</th>
<th>Additional Salary Premium</th>
<th>Postings</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Networking &amp; Support</td>
<td>+ $1,058</td>
<td>66,429 postings</td>
</tr>
<tr>
<td>Sales</td>
<td></td>
<td>567,855 postings</td>
</tr>
<tr>
<td>General Business</td>
<td>+ $11,144</td>
<td>577,787 postings</td>
</tr>
<tr>
<td>Social Media</td>
<td>+ $3,424</td>
<td>399,577 postings</td>
</tr>
<tr>
<td>Data Analysis &amp; Management</td>
<td>+ $12,703</td>
<td>136,757 postings</td>
</tr>
<tr>
<td>Marketing</td>
<td>+ $336</td>
<td>359,916 postings</td>
</tr>
<tr>
<td>Graphic Design</td>
<td>+ $9,188</td>
<td>134,090 postings</td>
</tr>
<tr>
<td>Computer Programming</td>
<td>+ $17,753</td>
<td>52,822 postings</td>
</tr>
</tbody>
</table>
Skilling up has significant returns
Work-Based Learning used to remediate talent gaps

- Internship programs: 96%
- Co-op programs: 63%
- Curriculum development: 54%
- Classroom instruction: 54%
- Student mentorship programs: 50%
- Apprenticeship programs: 50%
- Faculty development: 20%
- Other*: 7%

Responses: n = 56;
*Note: For a complete list of “Other” specifications, refer to Appendix III.
Inequity remains a primary challenge

California low-income adults are underserved by traditional education and training programs

- **58,000** Workers served by workforce development programs
- **62,000** Apprenticeship positions
- **2.1 million** Community College Students

Low-income adults in California: ~7 million

Source: Tyton Partners
Further, just 6% of graduates strongly agree they had an internship or job that allowed them to apply what they were learning, worked on a long-term project, and were actively involved in extracurricular activities.

The odds of being engaged at work are:

- Higher if... (College) prepared me well for life outside of college: 2.6x
- Higher if... I had a mentor who encouraged me to pursue my goals and dreams: 2.2x
- Higher if... My professors at (College) cared about me as a person: 1.9x
- Higher if... I had an internship or job that allowed me to apply what I was learning in the classroom: 2.0x
- Higher if... I worked on a project that took a semester or more to complete: 1.8x
- Higher if... I was extremely active in extracurricular activities and organizations while attending (College): 1.8x
- Higher if... graduates experience all three: 2.4x

The Undergraduate Experience: Support and Experiential and Deep Learning

<table>
<thead>
<tr>
<th>Experiential Statements</th>
<th>% Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I worked on a project that took a semester or more to complete.</td>
<td>32%</td>
</tr>
<tr>
<td>I had an internship or job that allowed me to apply what I was learning in the classroom.</td>
<td>29%</td>
</tr>
<tr>
<td>I was extremely active in extracurricular activities and organizations while attending (College).</td>
<td>20%</td>
</tr>
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Based on Web surveys of nearly 39,000 college graduates with Internet access from Feb. 4-March 7, 2014.

Gallup-Purdue Index

GALLUP
Work-based learning has four key stakeholders:

- **Labor Market**
  - Employers
  - Intermediaries
  - Institutions
- **WBL Marketplace**
- **Students**
- **Institutions**
  - Two-year
  - Four-year

Intermediaries:
- Workforce Development Boards/Chambers
- Apprenticeship Programs
- Career Technical Education Centers
- Community-based Organizations

Stakesholders: Employers, Students, Intermediaries, Institutions.
# Work-based learning benefits both learners and employers

## Benefits of WBL for learners

1. Fosters self and career exploration
2. Develops positive work habits and attitudes
3. Assesses abilities and strengths
4. Expands professional networks
5. Promotes informed decisions when considering job offers
6. Increases income potential

## Benefits of WBL for employers

1. Extends recruiting pipelines
2. Provides access to skilled and motivated talent in accordance with their needs
3. Improves employee retention
4. Reduces training/recruitment costs
Work-based learning is leveraged across industries

Occupational fields with the largest number of internship postings in the United States from September 2015 to October 2016

- Business Operations: 58,949
- Marketing: 35,498
- Engineering: 33,116
- Sales and Business Development: 28,227
- Media, Communications, Public Relations: 28,140
- Data Analytics: 26,257
- Finance: 26,257
- IT Development: 26,227
- Arts and Design: 20,275
- Project and Program Management: 20,186

Work-based learning is most common in fields that require highly technical professional skills that typically are not taught directly in traditional education.

Source: New York Times, Burning Glass Technologies
Work-based learning opportunities vary regionally

Source: Burning Glass Technologies
Comparing the models

Models for WBL
1. Apprenticeships
2. Co-ops
3. Internships
4. Applied Research Projects
5. Practicums & Clinical Placements
6. Online Projects, Consulting, Capstones
The University of Chicago’s Booth School of Business created a practice-based learning program for pre-MBA students called Startup Summer.

Students noted a wish to have done more with their pre-MBA summer—particularly if it meant a chance to explore entrepreneurial opportunities. In response, in 2016 Chicago Booth developed a Startup Summer program, which allows incoming students to work with Booth-led startups for 6-7 weeks before they begin their MBA studies.

Virginia Tech’s Innovation Campus is meant to provide experiential learning to business and technology students.

Virginia Tech’s new Innovation Campus is 2 miles from Amazon’s new HQ in Arlington and aims to produce 25,000-35,000 new graduates in computer science and related fields over the next 20 years. The campus will bring together graduate students, faculty, and numerous industry partners in an experiential learning environment.

Lehigh University’s Enterprise Systems Center (part of its college of engineering) integrates academic with experiential learning.

Students participate in mentored projects with ESC partners from industry and government, allowing students to “interact with all levels of workforce personnel from shop floor to corner office.” Mentors focus on a systems approach, innovative problem solving, integrative thinking, and competitiveness differentiators such as sustainability and analytics. Lehigh alumni are recruited to serve as guest leaders and mentors.
Job skill development

Unbundled learning programs lead to valued workplace credentials

Unique engagement models:

Eastern Washington partners with EdX for a custom Microsoft request

Microsoft needed to hire new employees specialized in data analytics. Microsoft partnered with EdX to offer a “micro-degree” that could be agile in churning out prospective employees. Eastern Washington approved the new major in a year, the fastest approval ever on its campus.

IBM and Northeastern University blur the line between school and work

IBM and Northeastern University announced a partnership in three graduate programs, where IBM badges for employees can count for credit toward a graduate degree.

Apple co-founder’s founding of Woz U to train technology professionals

Apple co-founder Steve Wozniak is helping the for-profit university Southern Careers Institute create Woz U, an online education program to produce tech workers.

Internet of Learning Consortium, founded by Accenture, Boeing, and Microsoft

Companies including Accenture, Boeing, and Microsoft have created the Internet of Learning Consortium to speed up the development of job-ready workers by using the internet to teach them what they need to know.
Three strategies to improve education and work interoperability

- **Empower Opportunity Seekers and Hiring Managers with Outcomes-Based Data**
- **Encourage Disruptive Innovation within Traditional Education Systems**
- **Create Industry-Aligned Talent Ecosystems**
Our collective mission

- Recognize the ecosystem of WBL opportunities zooming in on alignment to employer talent and skill needs tied to talent strategies
- Take the onus off the learner to draw connections of relevancy, particularly working learners
- Leverage intermediaries and institutional partners to facilitate multi-corporation programs with explicit learning outcomes and recognition
- Deepen rigor, recognition, expectations around non-apprenticeship WBL programs, particularly ones already deployed
- Mobilize strategic employer engagement across states and regions
Thank You
...now let’s get to work!

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Our mission is to equitably support the transition from an industrial economy to a knowledge economy. Unlike traditional venture capital, professional services firms, or accelerators, Entangled operates as a company builder, where great ideas become reality with the right support and network.