Immersive Learning in the Digital World
Manufacturing in America | 03/22-23/2017

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usa.siemens.com/mia
Users’ top challenges include the **retiring workforce** and their replacement with appropriate talent. The **lack of automation experts** and training the **millennial workforce** add to the challenges.

-- Frost & Sullivan, 2015 Outlook for Global Automation Industry

…the **skills gap** is an issue that has reached the boiling point. The same old approaches aren’t enough to close the gap.

-- Deloitte / Manufacturing Institute, Boiling point? The skills gap in U.S. manufacturing.2015

Change is the law of life. And those who look only to the past or present are certain to miss the future.

-- John F. Kennedy
Underlying issues of the Skills Gap

10,000

Baby Boomers will reach age 65 every day for the next 20 years.

SOURCE: PEW RESEARCH

The essence of the U.S. skills gap can be summarized as this: There are too many jobs for which the unemployed are ill-prepared or inadequately trained. This means that the solution to this problem lies in the onset – and it starts with education and training.

By 2020, there will be a SHORTAGE OF

1.5 MILLION COLLEGE GRADUATES

Source: McKinsey & Company

69 MILLION People work in middle-skill jobs.

- 48% of the labor force
- 47% (25 million) of all new job openings through 2020

Middle Skills jobs: Those requiring post-secondary technical education and training and, in some cases, college math courses or degrees. This includes high-skill manufacturing jobs.

SOURCE: JP MORGAN CENTER FOR COMMODITIES

2/3 of hiring managers say they struggle to find talented people to fill job openings.

- 61% agree there is a skills shortage
- 56% say their business is negatively impacted by the skills shortage
- 48% say their company is currently below its target headcount

SOURCE: RANDSTAD SALARY SURVEY CONDUCTED BY AN IPSOS' U.S. ONLINE PANEL

In a survey for the National Association of Colleges and Employers, companies planning to hire were most interested in graduates who majored in:

- Economics
- Engineering
- Business
- Accounting
- Computer Science

SOURCE: U.S. NEWS & WORLD REPORT, SEPTEMBER 2012
# Transforming Skill Sets Over Time

<table>
<thead>
<tr>
<th>Top 10 Skills</th>
<th>...in 1970</th>
<th>...in 2015</th>
<th>...in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td></td>
<td>Complex Problem Solving</td>
<td></td>
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<tr>
<td>Computational Skills</td>
<td></td>
<td>Coordinating with Others</td>
<td></td>
</tr>
<tr>
<td>Reading Skills</td>
<td></td>
<td>People Management</td>
<td></td>
</tr>
<tr>
<td>Oral Communications</td>
<td></td>
<td>Critical Thinking</td>
<td></td>
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<tr>
<td>Listening Skills</td>
<td></td>
<td>Negotiation</td>
<td></td>
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<tr>
<td>Personal Career Development</td>
<td></td>
<td>Quality Control</td>
<td>Emotional Intelligence</td>
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<tr>
<td>Creative Thinking</td>
<td></td>
<td>Service Orientation</td>
<td>Cognitive Flexibility</td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
<td>Judgment and Decision Making</td>
<td></td>
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<tr>
<td>Goal Setting/Motivation</td>
<td></td>
<td>Active Listening</td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td>Creativity</td>
<td></td>
</tr>
</tbody>
</table>

Technological Impact

• Barriers to entry are diminishing

• Technology enables rapid prototyping and new product introduction

• ‘Just-for-Me Products’

• Dawn of autonomous manufacturing

• Connected machines = data availability

• Rise of Data Analytics skills
Technology’s Progressive Impact on Global Industry

Timeframe to impact industries, business models

**Impact felt already**
- Rising geopolitical volatility
- Mobile internet and cloud technology
- Advances in computing power at Big Data
- Crowdsourcing, the sharing economy and peer-to-peer platforms
- Rise of the middle class in emerging markets
- Young demographics in emerging markets
- Rapid urbanization
- Changing work environments and flexible working arrangements
- Climate change, natural resource constraints and the transition to a greener economy

**2015 - 2017**
- New energy supplies and technologies
- The Internet of Things
- Advanced manufacturing and 3D printing
- Longevity and ageing societies
- New consumer concerns about ethical and privacy issues
- Women’s rising aspirations and economic power

**2018 - 2020**
- Advanced robotics and autonomous transport
- Artificial intelligence and machine learning
- Advanced materials, biotechnology and genomics

Demographic Impacts / Adult Learning
|------------|------------|----------------|----------------|----------------|----------------|-------------------|
| Descriptions | • ‘Greatest Generation’  
• War heroes  
• Endured Depression  
• Presidents & Generals | • Caught in the middle  
• Led Civil Rights  
• Created much national wealth  
• Prophets & Professionals | • Fought in & protested Vietnam War  
• Redefined culture  
• Revolutionaries & gurus | • Latchkey kids  
• Savvy & entrepreneurial  
• Slackers, thought leaders & free agents | • Wanted & protected  
• Beginning to define their own destiny  
• Determined to create a better world  
• Entitled and app ‘enabled’ | • Security focus  
• Global paradigm shifting  
• Strive for higher levels / goals  
• Even more entitled and ‘App ‘dependent’  
• Immediate gratification need |
| Key Figures | • John Kennedy  
• Walt Disney  
• Walter Cronkite  
| • MLK  
• Gloria Steinem  
• John McCain | • Bill Clinton  
• Steven Spielberg  
• Oprah Winfrey  
• Al Gore | • P Daddy  
• Tiger Woods  
• Cast of Friends  
• Barack Obama | • Miley Cyrus  
• LeBron James  
• Michael Phelps  
• Justin Bieber |

Source: A. Hershatter, Emory Univ
## Differences in Generations

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Formative experiences</strong></td>
<td>Second World War</td>
<td>Cold War</td>
<td>End of Cold War</td>
<td>9/11 terrorist attacks</td>
<td>Economic downturn</td>
</tr>
<tr>
<td></td>
<td>Nativism</td>
<td>Post-War boom</td>
<td>Clinton / Bush</td>
<td>Global warming</td>
<td>Global focus</td>
</tr>
<tr>
<td></td>
<td>Fixed-gender roles</td>
<td>“Swinging Sixties”</td>
<td>Reagan / Bush</td>
<td>Mobile devices</td>
<td>Mobile devices, 5G</td>
</tr>
<tr>
<td></td>
<td>“Black ‘n’ Roll”</td>
<td>Apollo Moon landings</td>
<td>Bush / Clinton</td>
<td>Energy crisis</td>
<td>Energy crisis, smart devices</td>
</tr>
<tr>
<td></td>
<td>Versatility</td>
<td>Woodstock</td>
<td>Live Aid</td>
<td>Arab Spring</td>
<td>Cloud computing, AI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family-oriented</td>
<td>1st PC</td>
<td>Prosumerism</td>
<td>Vehicle autonomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rise of the teenager</td>
<td></td>
<td></td>
<td>WiFi</td>
</tr>
<tr>
<td><strong>Percentage in U.K. workforce</strong></td>
<td>3%</td>
<td>33%</td>
<td>35%</td>
<td>29%</td>
<td>Currently employed in either part-time jobs or new apprenticeships</td>
</tr>
<tr>
<td><strong>Aspiration</strong></td>
<td>Home ownership</td>
<td>Job security</td>
<td>Work-life balance</td>
<td>Freedom and flexibility</td>
<td>Security and stability</td>
</tr>
<tr>
<td><strong>Attitude toward technology</strong></td>
<td>Largely disengaged</td>
<td>Early information</td>
<td>Digital Immigrants</td>
<td>Digital Natives</td>
<td>“Technolo”ics — entirely dependent on IT. Limited list of alternatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>technology (IT) adaptors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attitude toward career</strong></td>
<td>Jobs are for life</td>
<td>Organisational — careers</td>
<td>Early “portfolio” careers</td>
<td>Digital entrepreneurs — work “with” organisations not “for”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>are defined by employers</td>
<td>— loyal to profession, not</td>
<td></td>
<td>Career multi-taskers — will move seamlessly between organisations and “pop-up” businesses</td>
</tr>
<tr>
<td><strong>Signature product</strong></td>
<td>Automobile</td>
<td>Television</td>
<td>Personal Computer</td>
<td>Tablet/Smart Phone</td>
<td>Google glass, graphene,</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>nano-computing, 3-D printing,</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>driverless cars</td>
</tr>
<tr>
<td><strong>Communication media</strong></td>
<td>Formal letter</td>
<td>Telephone</td>
<td>E-mail and text message</td>
<td>Text or social media</td>
<td>Hand-held (or integrated into</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>clothing) communication</td>
</tr>
<tr>
<td><strong>Communication preference</strong></td>
<td>Face-to-face</td>
<td>Face-to-face ideally, but</td>
<td>Text messaging or e-mail</td>
<td>Online and mobile</td>
<td>Facetime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>telephone or e-mail if required</td>
<td></td>
<td>(text messaging)</td>
<td></td>
</tr>
<tr>
<td><strong>Preference when making financial decisions</strong></td>
<td>Face-to-face meetings</td>
<td>Face-to-face ideally, but</td>
<td>Online — would prefer</td>
<td>Solutions will be digitally crowdsourced</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>increasingly will go online</td>
<td>face-to-face if time permitting</td>
<td></td>
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</tr>
</tbody>
</table>

*Percentages are approximate at the time of publication.*

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Source: TrainingPros, Vol 9, 2014

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## Differences in Generational Learning Styles

<table>
<thead>
<tr>
<th>Generation</th>
<th>Attributes and Values</th>
<th>Learning Styles / Preferences</th>
<th>Instructional Design</th>
<th>Delivery</th>
<th>What to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby Boomers</td>
<td>• Workaholic optimism • Involvement</td>
<td>• Recognition and relationship driven • Training aligned with career goals</td>
<td>• Facilitated • Team learning • Group discussions • Lunch ‘n learns • Informational sharing • “Balanced” technology • Visually guided • Fulfilling</td>
<td>• Classroom • Workshops • Balance of traditional face to face vs. online • Visual • Gamification • eLearning</td>
<td>• Laziness and age bias</td>
</tr>
<tr>
<td>(1946-1960)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation X</td>
<td>• Independence • Skepticism • Informality</td>
<td>• Versatile • Training aligned with personal goals</td>
<td>• Informal • Self-motivated and self-driven • Internet driven • Clear and consistent instruction</td>
<td>• Self-paced • Independence and control over learning environment • Interactive and engaging • eLearning • mLearning • Gamification</td>
<td>• Telling them what to do • Micromanagement</td>
</tr>
<tr>
<td>(1961-1981)</td>
<td>• Self-reliance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation Y</td>
<td>• Determination • Realism • Tech savviness</td>
<td>• Activism • Training aligned with fast track to success</td>
<td>• Incorporates networking opportunities • Short, structured bursts of learning • Entertaining and fun</td>
<td>• Collaborative and continuous • eLearning • mLearning • Gamification • Latest technology</td>
<td>• Slow processes, slow instruction • Negativity</td>
</tr>
<tr>
<td>(1982-1995)</td>
<td>• Fun • Social networks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: TrainingPros, Vol 9, 2014
Training vs. Learning Paradigms

TRAINING
- Teacher focused
  - Goal is training
  - Teacher’s role is expert
  - Learner’s role is passive
- Individual
- Program driven
- Standardized
- Linear, sequential
- Periodic, as needed
- Long term – semester
- Classroom located
- Memorize information
- Feedback – test retention

LEARNING
- Learner focused
  - Goal is to produce learning
  - Teacher is coach, facilitator
  - Learner’s role is active
- Team/Community/Collaborative
- Process driven
- Customized
- Experiential, relationship based
- Continuous, life long
- Short term – retreat, seminar
- Learning environment
- Critical thinking, problem solving
- Feedback – test application

Source: Leadership Network, 1996
Continuous Learning and the Future
Source: McKenzie Magazine 2017
Learning Model Transition: A View for the Future

Today

Historical SITRAIN Classroom
Mobile Learning Roadmap

Tomorrow?

LCMS Modularized Content Mgmt
Customized Content Mobile Delivery On Request

Source: Bersin Deloitte 2013
Knowledge Continuity Consulting

Explicit Knowledge:
External, Internal

Tacit Knowledge:
Knowledge Capture

Workforce Performance Improvement Consulting

Skills Assessment  Learning Paths  Learning Tools  Custom Aftercare

Collaborative Learning Tools and Services

Performance-based Learning:
Instructor-led and Virtual Instructor-led learning
Learning Simulation Systems
Self-paced Learning
How-to Video Library
Structured On-the-Job Learning
Virtual Mentoring

New Hire:
Job Role Profiles
Assessment Center
Onboarding/Orientation

Job Shadowing:
Mentoring
Continuous Skills Assessment
How to bring Digital Enterprise Learning together forward

Siemens Digital Enterprise Learning

PL Learning for Digital Enterprise

SITRAIN Learning for Digital Enterprise Products

Learning on Digital Enterprise Use Cases and Solutions
Immersive Learning
Immersive Learning Technologies

• **Virtual Reality (VR)** – a multimedia or computer-simulated reality that creates a full 360° immersive experience for the user including audio & video.

• **Augmented Reality (AR)** – combines VR with the user’s view of the real world to provide a composite view. A computer or mobile device superimposes VR images over the user’s real-world environment.

• **Mixed Reality** – Mixed Reality is when digital and physical worlds interact with each other in real time. This experience is mostly seen when a video game player’s physical form is actually part of the game play.

• **Merged Reality** – Not to be confused with Mixed Reality, Merged Reality is different in the sense that users have the ability to use their actual hands in the experience. For example, users can turn doorknobs and push buttons and other objects using their hands instead of a controller.
Immersive Learning Delivery Technology

- Microsoft Holo Lens
- 360º Video
- Standard Video
- Tethered Headset VR
- Non-Tethered Headset VR/AR
- Mobile Device Inserted into a Headgear
- Mobile VR
- Desktop VR
- New VR (Leap Motion)
Bicycle frame builder

Viewing 360 degree image
Tethered and Non-Tethered VR/AR Headsets

Tethered Headset

HTC VIVE

Non-Tethered Headset

HEADSET

LASER-TRACKING BASE STATIONS

HAND CONTROLLERS
Google Daydream

HEADSET

GOOGLE PIXEL PHONE

BLUETOOTH MOTION CONTROLLER
Various VR Technologies

Mobile VR

VR on Desktop

New VR - Leap
Organizations Using Immersive Learning

General Mills, Deutsche Bahn, and Jet use VR as a recruitment tool by going to college campuses and showing potential applicants what it’s like to work for them.
Organizations Using Immersive Learning

Bosch trains 8,000 - 10,000 service technicians on direct-injection and braking technology using the Oculus Rift headset to take three-dimensional tours of the inner workings of a car engine to enhance technicians’ understanding.

The mobile tour consists of a classroom experience, which is supplemented by wearing the Oculus Rift DK1 to watch the automotive parts in action.

The sessions consist of a 10-minute virtual lesson followed by a 15-minute discussion centering on the participants’ thoughts, including how to implement the ideas into their work environments.
Organizations Using Immersive Learning

Jiff, Inc uses Pokémon Go as an engagement tool for its wellness program with an 83% success rate in participation.

Volkswagen is using VR and AR for service training on new cars and repairs.

L’Oréal uses VR to train new stylists on products and work culture, but also as a tool for continued education on new products and trending makeup and hair styles.
Organizations Using Immersive Learning

ThyssenKrupp uses AR headsets with all of its elevator technicians for repair work. Since moving to this technology, elevator repair times have been cut from 1-2 hours to just 20 minutes.

Lowes created the HoloRoom so customers can create a virtual mock-up of their homes and then work with designers for renovations.

Boeing trains engineers and pilots with VR.
Thank you for your attention!
Questions / Contacts

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