

## FROM EDUCATIONAL INSTITUTIONS

# to learning flows

**A combination of drivers is breaking learning—and education overall—out of traditional institutional environments and embedding it in everyday settings and interactions, distributed across a wide set of platforms and tools.**

As connective and mobile technologies spread, content proliferates and becomes increasingly available through open sources, and new modes of value creation emerge, we are moving away from the model where learning is organized around stable, usually hierarchical institutions (schools, colleges, universities) that for better and for worse have served as main gateways to education and social mobility. Replacing that model is a new environment in which learning is best conceived of as a flow, where

learning resources are not scarce but widely available, opportunities for learning are abundant, and learners increasingly have the ability to autonomously dip into and out of continuous learning flows.

The transformation from educational institutions to learning flows is profound and disruptive, and no existing institution will have the luxury of remaining unchanged. Such transformation requires us to rethink all of the assumptions, structures, and principles that have worked thus far. It also raises a new set of questions and challenges that educational institutions, learners, and our society as a whole will have to grapple with.

This map is a synthesis of key components of the emerging learning ecology. Using IFTF's forecasting methodologies such as expert workshops, interviews, data and signals analysis, we have created this map to highlight important future stories that will be shaping the world of learning over the next ten years.

**“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn”**

*—Alvin Toffler*



INSTITUTE FOR THE FUTURE

# Key Shifts to Watch

The emergence of new environments is leading to a number of shifts that learners, educational institutions, accreditation agencies, and policymakers will need to navigate.

## **From episodic to continuous learning**

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In an era of learning flows, opportunities for learning are potentially embedded into every activity and encounter. You can learn about plants, history, or architecture while walking down the street, or by taking an online course while at a coffee shop. The myth that learning only takes place in a particular setting (classroom) at a particular time (during a school day) and is delivered by a few specialized people (teachers), will increasingly come undone as mobile devices, content commons, and collaborative platforms make learning possible anywhere at any time.

## **From assigning to enticing with content**

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With information and knowledge resources becoming ubiquitous, the challenge for educators shifts from conveying resources to attracting learners to partake in all the resources at their disposal. What incentives and techniques will we employ to entice people to want to use resources, to navigate the new learning ecology, or to complete that online course? In the world of learning flows, the prospects of a growing cognitive divide looms large: those who are self-directed and driven to learn can find many more ways to satisfy their desire to learn, while those who lack the necessary social and other incentives may fall increasingly behind.

## **From content conveyors to content curators**

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As the amount of available information continues to increase, the signal-to-noise ratio will often become too small to be useful. In this environment, curation—the ability to find, consolidate, and deliver needed information and learning resources at the right time and in the right context—gains paramount importance. When a great lecture can reach

millions of people, and many such lectures and other learning modules and resources are widely available, the need for tools and platforms to guide the learner to the right learning opportunities grows in importance.

## **From working at one scale to working up and down the scale**

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Many institutions are built to work at one particular scale. Large lecture halls can accommodate hundreds of students; small discussion groups serve few students in intimate settings. Large universities are geared to serve tens of thousands of students; small liberal arts colleges cater to much smaller numbers. The new generation of connective technologies, however, will provide opportunities for us to rethink scale. From a relatively small university and a classroom geared to a small number of students, Sebastian Thrun and his colleagues at Stanford University offered a course in artificial intelligence to 150,000 online students. This is the age in which many organizations will need to learn to work at such extreme scales—making it possible to offer highly personalized courses, yet having the capability to reach hundreds of thousands and more when needed.

## **From degrees to reputation metrics**

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The number of platforms built for people to express their opinions, share views, and review products, services, and other people, is rapidly growing. These platforms are becoming new avenues for providing feedback and assessment of an individual's skills. In a recent survey asking people who hire contractors through oDesk to rank the criteria for making their hiring decisions, the last listed requirement was possession of a college degree. The #1 criterion for hiring was the assessment of a person's previous

performance on a similar or related task. These reputation and performance scores are increasingly replacing indicators such as college degrees, attendance at Ivy League schools, or other proxies for assessing knowledge and competency levels.

## **From grades to continuous feedback mechanisms**

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In the world of big data, advanced analytics, and growing reputation markets, assessment is likely to shift from episodic, tour-de-force quantitative and qualitative encounters, to a continuous feedback mechanism. This mechanism will take into consideration a complex set of factors to enable flexible adaptation and improvements in learning outcomes. It will increasingly provide a way to guide continuous improvement in learning rather than rendering zero-sum judgments. Platforms such as Khan Academy are paving the way in providing feedback on performance and measuring a learner's level of mastery rather than assigning grades.

## **From lecture halls to collaborative spaces**

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As lecture halls lose their appeal and dominance as the premier spaces for learning, the need for spaces for collaborative project work, and one-on-one mentoring and coaching will grow. Already the concept of a flipped classroom, in which students view lectures as homework and come to school to receive help with areas of confusion or trouble, or to do collaborative work, is paving the way for rethinking the design and usage of physical spaces in the new learning ecology. Alternative learning spaces are also beginning to grow—including hacker and maker spaces—that are open to member communities or the public.

# Signals

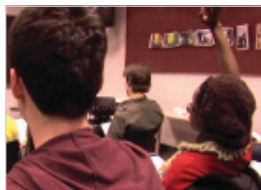
Signals are the early indicators—tools, technologies, and processes—that together point to the larger stories on the map.

## CONTENT COMMONS



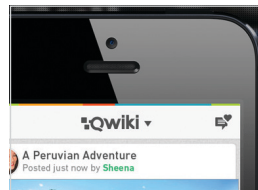
mendeley.com

**Mendeley:** Platform for discovery and sharing research data and collaborating online.



oli.cmu.edu

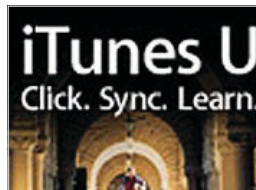
**Open Learning Initiative:** Data-driven open courseware that offers feedback to individual learners.



qwiki.com

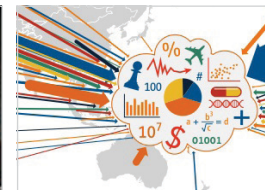
**Qwiki:** Software to translate video, audio, and photo inputs into short movies on an iPhone.

## NEW FOUNDATIONS



heartofwisdom.com

**iTunes U:** Super-modular learning through synchronized audio, video, note-taking, and presentation materials.



jennywp.jennycarpenter.com

**Kaggle:** Platform for predictive modeling and analytics competitions.



play.google.com

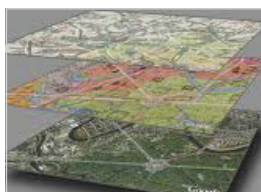
**Wolfram Alpha:** Online service that uses computation to answer questions.

## EMBEDDED AND EMBODIED LEARNING



news.cnet.com

**Fluther:** Online Q&A collective specializing in getting answers quickly from the right people.



hypercities.com

**HyperCities:** Educational platform for interactively exploring historical layers of city spaces.



blog.microtask.com

**VizWiz:** App that connects the blind with sighted workers to aid in solving visual problems.

## SOCIALSTRUCTURED WORK



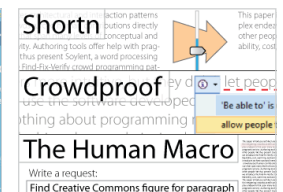
mobineer.com

**Elance:** Staffing platform for skilled freelancers around the world.



mobileworks.com

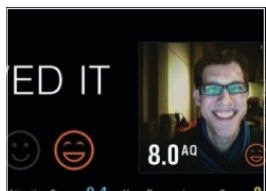
**MobileWorks:** Next-generation crowdsourcing platform that uses a virtual workforce.



projects.csail.mit.edu

**Soylent:** Crowd-powered interface that coordinates Mechanical Turk workers to perform writing tasks.

## HUMAN-SOFTWARE SYMBIOSIS



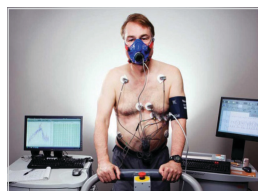
techjournal.org

**Affectiva:** Affective computing used to measure human emotions with scoring and dashboards.



edsurge.com

**NoRedInk:** Learning platform using feedback loops for grammar and writing skill development.



technologyreview.com

**Quantified Self:** Community of self-tracking individuals interested in tools and methods for self-knowledge.

## GLOBAL LEARNING ARBITRAGE



mepedia.com

**Mepedia:** Personal branding and networking platform for young talent.



livemocha.com

**Livemocha:** Online language learning community that uses instruction materials and native speakers.



lccdigilit.our.dmu.ac.uk

**Mozilla Open Badges:** Digital badges that recognize achievements and skills of an earner described by an issuer.

FROM EDUCATIONAL INSTITUTIONS

to learning flows

Social Intelligence

**Leafsnap:** Smithsonian Institution app to identify tree and plant species from photos of their leaves.



**Yelp Monocle:** App providing location-specific information on iPhone or iPad.

Sense-making

**teaching resources in the cloud**  
diversity of on-demand skills, resources, and knowledge opening new access pathways

**systems bricolage**  
the ability to pick and optimize learning routes, as well as their components (teachers, platforms, courses, accreditation)

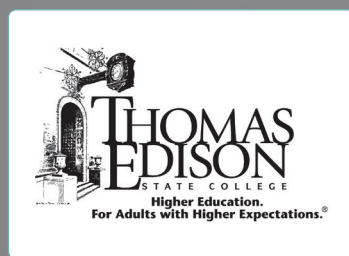
**online reputation markets**  
reviews, rankings, and vouching systems as new evaluation methods for teachers and learning programs

**leapfrogging institutional models**  
emerging markets and new content systems to circumvent old structures and create new models for learning

Cross-cultural Competency



csmonitor.com



dcmillitaryed.com

**University of the People:** Free university-level education to students around the world

**Thomas Edison State College:** Virtual college that banks credits for correspondence courses from accredited U.S. universities.

Design Mindset

## EMBEDDED AND EMBODIED LEARNING

The movement of information into the real world from restricted physical settings—classrooms and desktops—embeds learning into the flow of everyday experiences, making it something we do continuously while walking, riding a bus, or sitting at home or in a park.

New Media Literacy

PROCESSING VS BEING PROCESSED

**media rich**  
content represented in an immersive and engaging way

**personalizable and customizable**  
highly specific and targeted content

**open source**  
information, code, and packages free for use and reformatting or "forking"

Transdisciplinarity

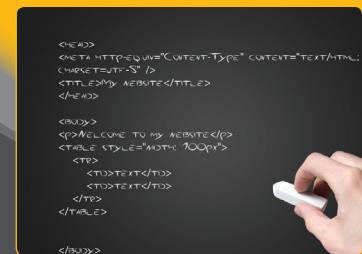
## GLOBAL LEARNING ARBITRAGE

A new generation of players enters the field of learning services provision. These players include global tutors and mentors, but also institutions—unencumbered by legacy systems—that can create new pathways for obtaining a college degree (or its equivalent), certification, and accreditation.

ACCREDITATION VS REPUTATION

**tools as content**  
systems and complex packages that guide learning

**CONTENT COMMONS**  
A tidal wave of open digital materials—text, simulations, video and audio recordings, photographs, and learning tools—is becoming available to people around the world via the Internet.



ntriggan.com/com

**Codecademy:** Platform for teaching and learning how to code.



boundless.com

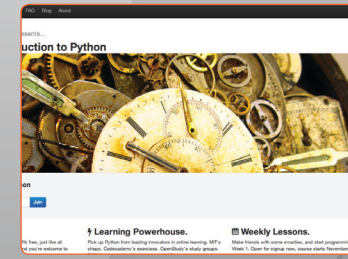
**Boundless:** Open education resource for building textbooks.

**blended reality world**  
every object or interaction provides opportunities for learning

**expertise on demand**  
experts from around the world helping via real time queries

**reality filters**  
apps and tools for morphing your reality

**Mechanical MOOC:** Online programming courses that combine the powers of open courseware, study communities, and platforms for learning.



tinywork.wordpress.com

**Amazon Cloud Drive:** Web storage application for photos, videos, documents, and other digital files.



readwrite.com

Computational Thinking

**resource assembly in the cloud**  
groups form to quickly tackle a task, allowing workers to distribute previously individual jobs

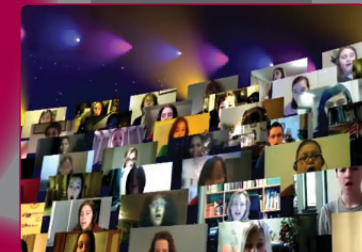
EXPERTISE VS CONTRIBUTION

## SOCIALSTRUCTURED WORK

In place of stable 9-to-5 jobs in large companies, new forms of socialstructured value creation emerge, based on microcontributions from large networks of people utilizing social tools and technologies to create a new kind of wealth. This work necessitates a careful rethinking of the kinds of skills people will need in order to live productive and fulfilling lives.



wired.com



3.bp.blogspot.com

**TaskRabbit:** Platform for outsourcing small jobs and tasks to local individuals.

**Virtual Choir:** Musical compositions integrating submissions by a global crowd.

Virtual Collaboration

**micro-contributions**  
lightweight contributions by hundreds and thousands to create a greater whole

ALGORITHMIC VS INTUITIVE LEARNING

## HUMAN-SOFTWARE SYMBIOSIS

Smart machines and software enter almost every domain of our lives, assisting doctors during surgery and teachers in the classroom. They extend human capabilities, enabling us to do things in new ways and accomplish previously unimaginable tasks.



interaxon.ca/muse

**Interaxon Muse:** Bluetooth-enabled headset for direct monitoring of brain activity and a neural interface platform to connect with other devices.



surgesim2013.com

**Surgeon Simulator 2013:** Virtual reality game helping surgeons improve their craft.

**evidence-based learning**  
analysis of successful learning paths across a crowd offered back to individual learners

**extended humans**  
human capabilities (memory, sight, analytical capacity, etc) extend with the help of machines

**quantified learning**  
measurement and instant feedback on individual learning progress

Cognitive Load Management

Novel & Adaptive Thinking

**virtual data storage**  
platforms and tools for aggregating information

**search and analytics engines**  
tools for finding and analyzing relevant content

**content aggregators and curators**  
guides for learning

**massively open online courses (MOOCs)**  
online collection of lectures, texts, and learning modules

## NEW FOUNDATIONS

The ecology of learning flows is built on a new set of foundational players—organizations and platforms functioning as modern-day utilities—through which information, learning, connection, and reputations flow.

CONVENIENCE VS FILTER POWER

BURDEN VS EMPOWERMENT

# How to Use this Map

The Future of Learning research intends to prepare you for disruptive changes at the intersections of learning, technology, and human behavior emerging over the next decade. Use this map as a big picture “first look” at the research. Look for connections across

the forecasts. Highlight the stories and signals of most interest to your organization, processes, and challenges. The foresight presented on this map is designed to inspire insights that will help you identify action steps to prepare you and your organization for the future.



## FUTURE STORIES

This map is organized around six emerging themes. These are big stories that will define the landscape of learning in the coming decade. Each theme is comprised of three or four forecast clusters—important shifts, currently in their early stages, that will grow in the coming years.

BURDEN VS EMPOWERMENT

## DILEMMAS

With new tools, structures, and skills come new dilemmas—tensions within the learning ecology that won't be easily resolved. Dilemmas require strategies and leadership that go beyond “either-or” thinking.



## SIGNALS

Around each cluster are smaller signals: the details that add up to the big stories and forecasts. These are the early indicators, tools, technologies, and processes that together point to major shifts for the future of learning.



## WORK SKILLS

The future stories and forecasts are situated within a new work environment that calls for new skills and competencies. More information on these skills can be found in IFTF's Future Work Skills 2020 report.

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## About the Institute for the Future

The Institute for the Future is an independent, nonprofit strategic research group celebrating 45 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research generates the foresight needed to create insights that lead to action and spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is based in Palo Alto, California.



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