21ST-CENTURY SKILLS AND THE FOURTH INDUSTRIAL REVOLUTION: A CRITICAL FUTURE ROLE FOR ONLINE EDUCATION

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Online education is often represented as the future of education. But what is the future of society in which that education will be delivered? Many economists and futurists predict growing disruption in multiple industries caused by the accelerating evolution of 21st-century technologies, including artificial intelligence, robotics and automation, nanomaterials, and additive manufacturing. This tsunami of change comes on top of recent transformations in business processes enabled by digital platforms and networks. The future of work will be a landscape in constant flux, with no job or career guaranteed. Structuring education as a menu of predefined disciplines and degrees may no longer be optimal. To help the learner survive and thrive in a VUCA environment (volatility, uncertainty, complexity, ambiguity), we may need to teach so-called 21st-century skills – flexibility, adaptability, observation, empathy, creativity, innovation, learning how to learn. Many of the skills are inherently metacognitive and fractal, demonstrating the same basic principles at various levels of detail and knowledge. In this context, we should explore new ways to structure online education as well. How do we teach 21st-century skills in an online environment? What is the least amount we really need to teach, given that most subject-specific content is already available on the internet? How do we use online platforms to support learners through real-world practice and coaching? The answers may be critically important to our future, not just as individuals but as communities and a global society.

KEY WORDS: future, education, online, innovation

1. INTRODUCTION

Online education has made tremendous strides in the last few decades. There is no longer a debate about its potential impact. It is often seen as the future of learning, the major

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disruptor of traditional educational models in all sectors, from traditional schools and universities to on-the-job training.

But if the future of education is online, what is the future of everything else? Education and training as disciplines are shaped by their function within organizations, industries, and society. How will the next few decades affect those communities, and how will it affect the role of online education?

2. THE FUTURE? SERIOUSLY DIFFERENT.

It is tempting to think that the future will be more of the same, even if it is more of the same level of change and innovation. But experts are sounding the alarm, louder than ever before. They are outdoing each other in predicting an unprecedented increase in the rate of disruptive transformation.

Their logic is compelling. Breakthroughs are imminent in a vast range of fundamental technologies, including robotics, artificial intelligence (AI), quantum computing, the Internet of Things, electric and autonomous vehicles, 3D printing and additive manufacturing, nanotechnology and nanomaterials, gene therapy, and drug discovery.

By themselves, each development promises to radically transform whole industries, sectors, and economies. But that's just the beginning.

The impact of each breakthrough will be compounded by their intersection. New capabilities in different fields will reinforce and accelerate each other, resulting in a sustained and exponential rate of change. AI + quantum computing + gene therapy, for example, or 3D printing + nanomaterials + robotics. This compounding equation is seen as leading to an exponential rate of transformation across most areas of human endeavor.

The new era is being called the fourth industrial revolution (4IR) (Schwab, 2016). Figure 1 illustrates the industrial revolution framework, which includes the first revolution (steam engine and industrialization), the second (electricity and mass production), and the third (computers, networks, and information technology).

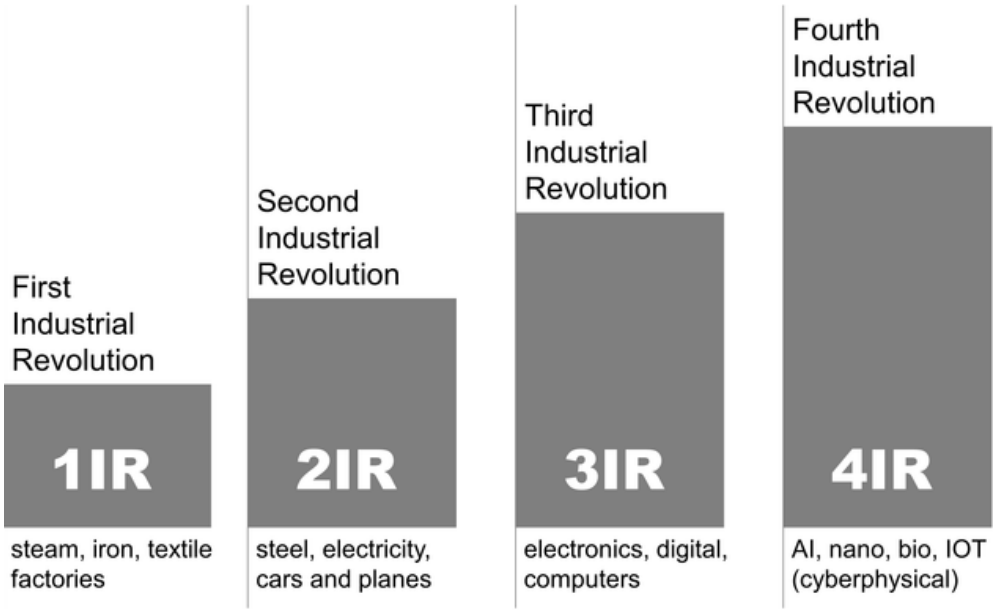

FIG. 1: The history of industrial revolutions

The fourth industrial revolution is acknowledged to be growing out of the third but is considered new (rather than a continuation) because of the expected breadth, depth, scale, and speed of the disruption.

Of course, the 4IR disruptors may follow the classical curve of technology impact, from hype to disillusionment to a more gradual long-term transformation. Change may arrive later than predicted and impact markets and society in unpredicted ways. Economists and futurists are fiercely debating which industries will be most affected and whether any sector, company, or job will remain unaffected.

But it should be noted that the predicted flood of radical developments attributed to 4IR is coming on top of major innovations in information technology, media, and communications over the last few decades. These have already enabled transformative business models like Amazon, Uber, and online education itself. The disruptions started slowly but are continuing and accelerating. They are following the classical model of technological change: slower at first than we predicted, but with the eventual impact proving larger, more diverse, and more pervasive than we could imagine.

This may be one reason why there's not much debate about the eventual scale of 4IR's impact – we are still seeing a rising tide of change from 3IR.

3. 4IR AND ONLINE EDUCATION

How will this impact online education?

As practitioners, we may think that online education is ahead of the curve, and all we need to do is rev up our learning management platforms to train more people in more new fields.

Or it may seem like the future of online is about new delivery technologies, about mobile and augmented reality (AR) and virtual reality (VR) and 5G. Or that we'll simply succeed in converting more of the traditional education holdouts and extend the benefits of online to everyone around the world.

All these predictions are likely to be true. But there is a much more fundamental way in which education (online and off) may be affected, and that is about *what* we teach, not just how we teach it. This debate is already raging among the administrators and strategists concerned with traditional educational institutions.

4. THE FUTURE OF WORK

There are many potential benefits to individuals and society from K-12 and university education. We want to prepare individuals to be part of an enlightened society, appreciate history and culture, be good citizens, and learn to live fulfilling lives. But one important objective has always been to prepare students for work and careers. Education in other sectors and scenarios, including onboarding and on-the-job training, are even more focused on work-related goals.

The future of work and the future of education are closely connected. Here is where the potential disconnect with traditional education is most critical. If the fourth industrial revolution evolves as expected, the very nature of work and careers will change.

Future-of-work thinkers lay out a compelling logic:

1. If all industries are in flux, then no job will stay the same.
2. Existing jobs and definitions of work will change fundamentally or disappear; new jobs may be radically different or may not be defined as work at all.
3. Today's educational curricula, career and training programs, assessments, degrees, and certifications could become largely irrelevant to the challenge of creating value and earning income in a constantly evolving market.
4. Individuals, communities, and organizations will need to prepare for a world where the economic ground is continually shifting, where nobody has one career for life, let alone one employer.

Online education and training may be equally affected. As fast as we translate subject matter onto digital platforms (complete with interactive experiences, metrics, testing, and certification), it is likely to become obsolete. A carefully structured curriculum from last year may include the wrong elements in the wrong order. Unlearning outdated material could become almost as important as learning.

In corporate training programs, we may see the impact in terms of decreasing shelf life of any specific learning package or curriculum (Fig. 2).

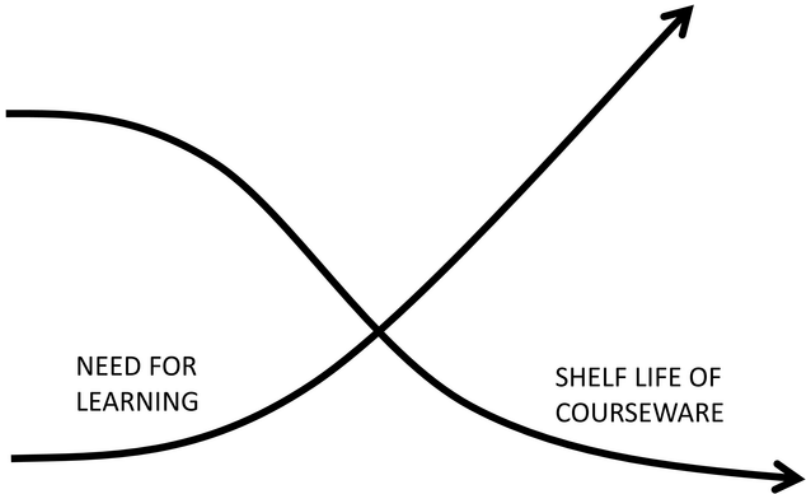

FIG. 2: Future trends of specific learning courseware

In this vision of the future, the more detailed the learning program, the more likely it is to be disrupted by change. Operations and procedures will be fluid on a scale of months rather than years. Any process which is easy to codify and teach in a linear format is easy to automate.

There is, of course, a deliberate element of provocation in futurist thinking. These trends may not be as dramatic and wholesale as envisioned. Some subjects and disciplines could be exempt. But there is another factor in the equation which is giving additional momentum to the transformation.

5. CONTENT IN THE CLOUD AND THE FLIPPED CLASSROOM

The storage and transfer of knowledge is one of those areas where new and transformative delivery models are already enabled by technology.

Generation Z, the cohort born between 1995 and 2012, has been growing up with the reality of a global multimedia library in the cloud. Some GenZ observers are calling them the DIY generation. They assume that they can do anything themselves, with the help of YouTube.

In a YouTube world, dozens of video modules are accessible online covering almost any topic. Video is supplemented by podcasts, recordings, texts, and graphic material representing nearly the entire library of human culture, translated into digital formats and available virtually anywhere, anytime.

Like 4IR, this epochal transformation was predicted decades ago and has gradually become a reality. But the implications of having such a resource have not yet finished transforming the educational sector.

An example of the new models which this development facilitates is the "flipped classroom" (Fig. 3). Rather than lectures in class and homework at home, we can simply refer to content already online and then actually work together in the classroom, where the teacher-as-coach is available to mentor and facilitate.

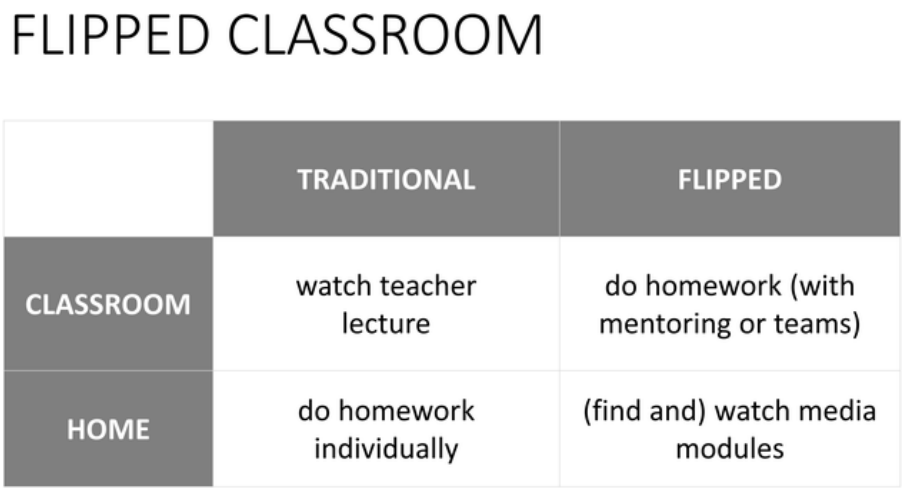

FIG. 3: Differences between the traditional and “flipped” classroom models

The fact that the content is of various qualities, comes from different sources, and may offer varying perspectives and solutions does not invalidate its utility. We can include search literacy in our core skills, plus links to online materials on deeper learning strategies. Learning how to learn is now empowered by the full resources of a global knowledge base.

6. FLIPPING THE ONLINE CLASSROOM

Although there is not a physical classroom in online education, the flipped concept is relevant to the virtual classroom or asynchronous course as well.

At the level of instructional design, the bulk of the content which the student is expected to access does not have to reside within the explicit structure of the course. In designing a new learning initiative, we might first ascertain whether appropriate content is already available somewhere in the cloud.

Even if some of the content needs to be developed, we could create easily searchable and digestible media bites, add metadata, and make them available on a cloud platform (public or private), rather than build a sequential series of content modules. The course designer can then focus on facilitating relevant activities.

If we structure the program as a basket of activities rather than a topic-based hierarchy, then each activity can have tags attached which point to relevant skills and methods.

When students come to the “flipped virtual classroom,” they will expect to do real work. Finding the content in the cloud which they need to solve their problem is simply one of their tasks and often a critical skill that we want them to practice.

7. FLIPPING THE EDUCATIONAL PROCESS

In fact, as a result of these profound shifts, many future-of-work and future-of-learning thinkers are proposing that the entire educational process be flipped.

In the traditional education + career model, students spend years on discipline-specific coursework *before* being certified by an advanced degree and then rewarded with a high-paying career-for-life. But this formula is becoming increasingly problematical. Today, only one in four college graduates gets a job in the field they studied in school. Even if they do enter the field, staying with that one career will become increasingly rare. Switching careers and industries multiple times will be the norm.

Maintaining the relevance of academic curricula to real-world jobs is a growing challenge. The rate of change in real-world jobs and industries is overwhelming the ability of educational institutions to codify new knowledge into departments and coursework. Instead, students may need to explore an industry by actually working in it as soon as possible, acquiring domain-specific knowledge from the cloud, and adjusting to changes in the field as they go.

For example, Heather McGowan and Chris Shipley have formed a consultancy called Work to Learn: “Students learn a profession, workers strive for experience, all to be applied to the next known step in the career ladder. But what happens when those steps aren’t known? When everything is a first? When degrees and experience barely matter?" (McGowan and Shipley, 2015).

Their theoretical framework emphasizes the importance of acquiring the skills to continually acquire new skills, across and beyond traditional disciplines. Work to Learn describes the evolution from siloed "stocks of knowledge" to "flows of knowledge," a systems thinking perspective, and emphasizes “transdisciplinary” skills which are useful across multiple fields and domains of knowledge.

Teaching skills becomes more important than transferring knowledge, because the global library is already in the cloud, constantly updated with the latest research and developments and instantly available to the individual. It is less important to transfer that library to memory than to practice navigating the cloud, finding the right resources and applying knowledge to the problem at hand. The emphasis is on doing-to-learn rather than learning-to-do.

8. 21ST-CENTURY SKILLS

The shift in focus from knowledge to skills is expressed in discussion and advocacy around a concept often called 21st-century skills. These are the skills considered necessary to survive and thrive in a 21st-century economy of constant change and disruption.

The list varies, of course, but there is a remarkable degree of overlap. For example, here is one developed by the World Economic Forum (Gray, 2016):

- complex problem solving
- critical thinking
- creativity
- people management
- coordinating with others
- judgement and decision making
- service orientation
- negotiation
- cognitive flexibility

Here's a list from the Education Design Lab (2018):

- initiative
- collaboration
- creative problem solving
- critical thinking
- intercultural fluency
- empathy
- oral communication
- resilience

And finally, one from the Institute for the Future (2011):

- sense-making

- social intelligence
- novel and adaptive thinking
- cross-cultural competence
- computational thinking
- new-media literacy
- transdisciplinarity
- design mindset
- cognitive load management
- virtual collaboration

A number of future-oriented educators have been working on K-12 and college programs and curricula with a "21st-century skills" theme. These include Partnership for 21st Century Learning, Wildfire Education, Dida Academy, Design Thinking for Educators, Design Your Life, MissionU, the 21C Skills Lab, and 4IR.org.

9. SOFT SKILLS AND INNOVATION METHODOLOGIES

Although the 21st-century label is not as common in the corporate training and human resources world, the list is very similar to what top companies and executives say they want in their employees, based on numerous surveys. Often, these are the so-called “soft skills” like creativity, problem solving, empathy, critical thinking, teamwork, and leadership, rather than specific technical knowledge or experience.

The “skills” label is frequently stretched to include specific techniques or methodologies which are nevertheless considered to be useful in a fundamental and cross-disciplinary way, particularly in relationship to change and innovation. These include core business functions such as project management and time management, as well as approaches borrowed from product innovation, systems thinking, design thinking, and entrepreneurship.

Although the methodologies included in this basket were often developed in specific domains (design thinking comes from product design, systems thinking from ecology, etc.), they have proven useful in multiple fields and scenarios. Versions are being taught in many communities and at all levels from K-12 to management to retired. They can be applied to an individual’s career challenges as easily as a corporate goal.

The assumption is that in a future of accelerating change, everyone will need the capacity to analyze problems, generate new ideas, navigate sources of knowledge and support,

kick off an innovation project, design a new solution, pivot and develop a new strategy, and so on.

10. TAKING THE SKILLS BASKET ONLINE

If the future of education is soft skills and innovation methodologies, what is the role of online learning? Can we be as effective in teaching and practicing 21st-century skills as we have been with more subject-oriented, content-focused programs?

In the corporate world, teaching innovation and soft skills is a booming industry of its own, with a diverse community of practitioners, each with their own learning theories and delivery strategies.

A big part of this body of practice is experiential in nature. Every week, somewhere in a hotel or corporate meeting room, employees are attending workshops related to this basket of skills. Participants range from sales people and customer service representative to accountants, engineers, and executives.

The workshops often include experiential elements like:

- role playing and theater
- escape rooms and competitive games
- drawing, painting, sculpture, and dance
- building bicycles and prosthetic devices for needy children
- elaborate simulations of real-world scenarios and challenge-solution projects

Despite the variety in depth and explicit relevance of these approaches, there are solid theoretical foundations for this work, including the research of David Kolb on experiential learning (Kolb et al., 2000).

As illustrated in Fig. 4, his model describes a four-stop iterative cycle: (1) concrete experience; (2) observation of and reflection on that experience; (3) formation of abstract concepts based upon the reflection; and (4) testing the new concepts.

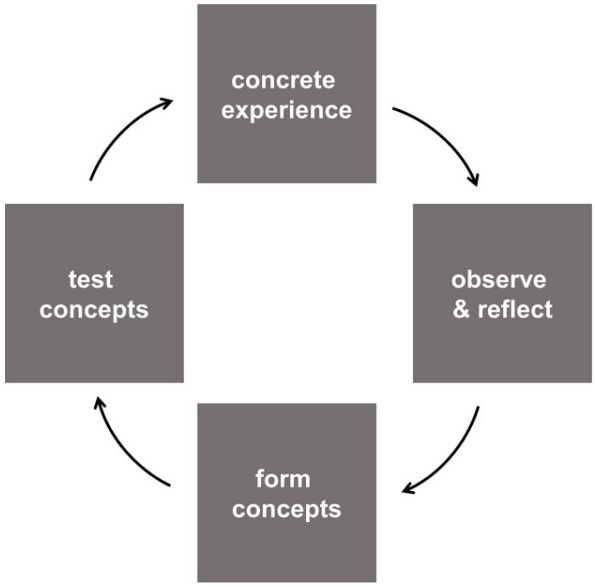

FIG. 4: Visual example of Kolb's workshop model

11. A WORKSHOP EXAMPLE

Below is the outline of a workshop that leverages elements of design-thinking and arts-based exercises to practice iterative development and "lean innovation" concepts.

1. The group is divided into teams of 4 to 7. At each table are copies of a challenge statement, napkins, and pens. Each team is asked to read the challenge. Working individually (without discussing the challenge), each person comes up with an idea for a solution to the challenge and sketches it on the back of their napkin.
2. Each table is provided with a bag of assorted objects and materials. While learners explore the materials, they share their ideas and brainstorm, using the materials to build a construction/sculpture that explains and models their ideas. The goal is to select or combine solution ideas, or pivot to a new idea, which will then become the team's concept going forward. Together, the team assembles one model embodying the concept.
3. Each team shows and explains its model briefly to the other teams, soliciting feedback focused on improving the concept.
4. Two actors lead the group through a series of theater warmup exercises.
5. The group breaks into teams again and begin to develop a user scenario for their concept. They cast themselves as characters in the scenario and improvise a scene illustrating a real-world implementation challenge related to the concept.

6. The teams perform their scenarios for each other and solicit feedback as before.
7. The teams revise their concept based on the feedback and decide which decision-makers might be critical to getting approval for moving forward toward implementation. They develop a pitch poster (image, brand name, and tag line) and present the poster to the other teams.
8. The group is debriefed about what they learned in the workshop and discuss how to carry the methods practiced back to their home teams.

The workshop takes about 2.5 hours and has been given with some adjustments to a wide range of groups, from executives and engineers to teachers, STEM workers, accountants, teenagers, and retired people. It has been used as the basis for further practical work (developing real-world innovations) as well as more in-depth learning on the methodologies being introduced.

12. ONLINE EXPERIENTIAL LEARNING

Translating this kind of experience to an online learning format, either live or asynchronous, is challenging but exciting. As the example illustrates, the interactions associated with soft skills and innovation learning are often visceral, tactile, multimodal, open-ended, and collaborative.

Here is where the latest innovations in digital displays, mobile devices, and networked applications can really shine by addressing the potential for online platforms to provide functional or metaphorical equivalents for face-to-face workshops. A brief list of possibilities might include:

- movement, exploration, or collaborative construction in 3D space using shared VR spaces
- shared real-world navigation and discovery through AR on mobile devices
- learner-generated content and research created with mobile device cameras, sensors, and apps and integrated in the flow of doing-and-learning
- group collaboration/competition using a wide variety of mobile-friendly interfaces and interaction models inspired by sharing apps and game communities

This is a tremendously exciting area of development for online education, and we should expect new models to surface and evolve.

The evolution will be helped by the newer generations of learners, Gen Z and beyond, who grew up assuming that everything physical has a digital equivalent; the term “phigital” has

been coined to describe this culture. The practical barriers to richer and more immersive integrations of physical and digital learning are gradually dissolving.

13. CROSS-DISCIPLINARY LEARNING

Although there are educational groups and institutions developing 21st-century (21C) skills and methodologies as an integrated program, it is still rare. For example, it is more common for design thinking to be taught in a design department; for systems thinking to be taught in biology; for entrepreneurship to reside in the business course list, etc. And typically, the various courses and curricula are attached to a discipline-specific certificate or degree program.

At the corporate level, soft skills and innovation workshops are usually more flexible and cross-disciplinary in focus but are often limited to one-off sessions for specific audiences or an ongoing program just for designated innovation teams.

Yet, as we've discussed, skills like these will be essential for nearly everyone in a society profoundly affected by change, including people employed in any field, as well as those who are un-, under-, or pre-employed (i.e., students). Even retirement may become a partial or periodical condition, and so retirees will need to adapt to and navigate a future-of-work landscape.

If we are right in thinking that the core focus of education must be transformed from knowledge to skills, from narrow disciplines to learning-how-to-learn and doing-to-learn, then we are faced with a considerable challenge as a society.

Traditional education and training institutions at all levels are structured and staffed to teach existing disciplines through a highly siloed pedagogy. Radically shifting their teaching model and organizational structure to address a 4IR future based on cross-disciplinary learning could be a long and expensive process.

As a consequence, there is a real opportunity for online education to contribute by radically expanding the potential learning community and providing scalable skill-building frameworks (Fig. 5). Time and geography become less of a factor; diverse cross-disciplinary and cross-organizational teams become more practical. Useful designs for facilitating work and practice activities become more replicable.

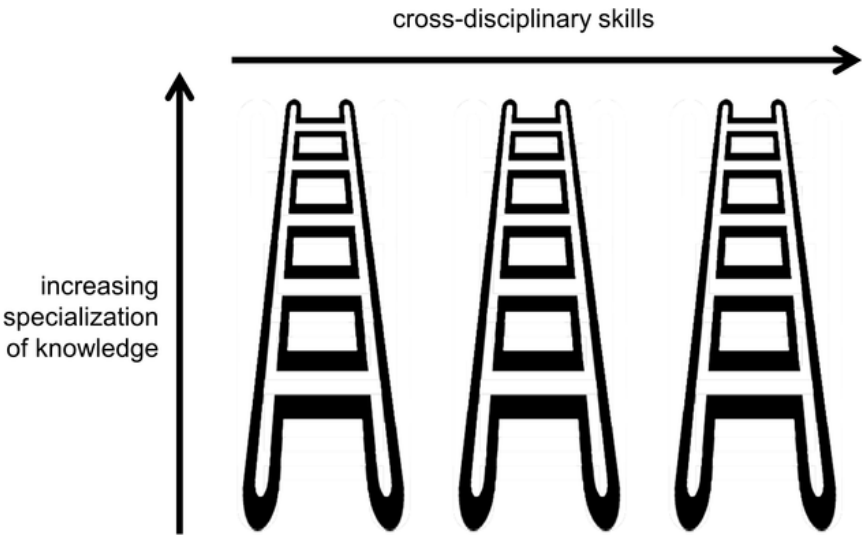

FIG. 5: Transformation of education from knowledge to skills

14. A CORE PACKAGE

One approach to this radical challenge is to develop radically efficient and streamlined learning packages. For many communities and organizations, it might make sense to think of a core portfolio of online workshops which can be delivered in a flexible *ad hoc* format rather than a fixed curriculum with requirements, prerequisites, certifications, and degrees.

A compact, flexible learning program can travel farther and faster. It can be more easily and quickly adapted to a variety of audiences and delivery scenarios. Typical soft skills and innovation workshops in the corporate world are 90–180 min. The essential elements of the 21st-century skills concept might be introduced in a half-dozen workshops or online equivalents.

Any of the methods may, of course, be covered in more depth. Experts in a particular methodology, e.g., design thinking, will insist that “real design thinking” takes years of study and practice embodied in a highly detailed, rigorous, degree-certified curriculum. But there are compelling reasons to think that, for the skills and methodologies we think are critical, less can be more useful and strategic.

15. FRACTAL SKILLS AND METHODOLOGIES

One reason to hope that a radically streamlined learning design could be successful is the nature of the skills and methodologies themselves.

Unlike most subject-based disciplines, 21C skills tend to be useful if you learn and practice them a little, and they work even better if you learn more and practice a lot. We might call this characteristic “fractal,” after the equations discovered by Mandelbrot, which generate the same shapes at any scale (Fig. 6).

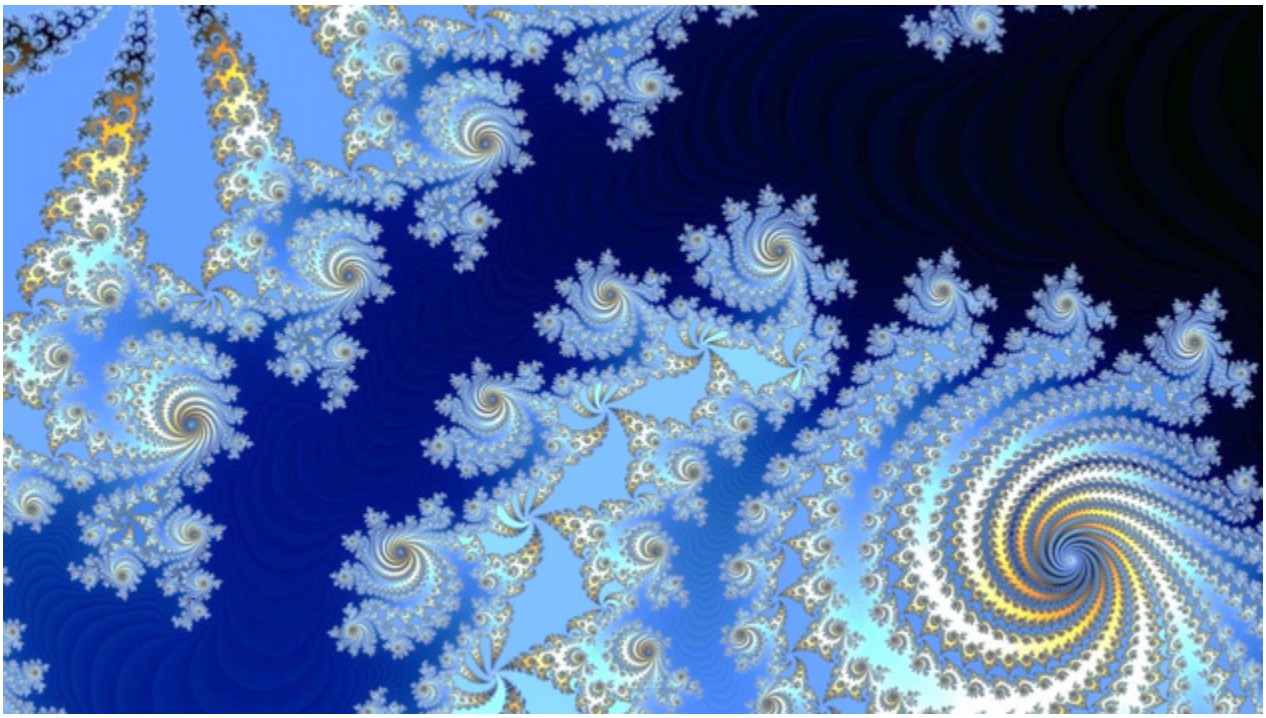

FIG. 6: Visual representation of fractal equations

Design thinking is an example of such methodology. Although there are many practitioners who insist that true design thinking requires a design degree and a deep basket of specialized techniques, one of the reasons the approach has become popular is that the basic framework can be applied widely across various fields with enough effectiveness to make learning it at an introductory level worthwhile.

Many of these skills and methods are already being taught in corporate settings through short, intense workshops including both instruction and practice. This may be considered evidence that brief exposure can have measurable results.

More in-depth material is, of course, available in the cloud. If the learner finds a technique or exercise particularly interesting in a brief introduction, there is always additional relevant content available, online and on demand. Students are learning to learn, so just getting started with these techniques can kick off a virtuous cycle of learn/do/learn.

16. METACOGNITION

We might argue that 21C skills are fractal because they have a strong metacognitive component. They are about stepping away from the usual perspective on a problem, stepping "up" and seeing the big picture, flipping ideas and realizing new possibilities, reflecting on process, and developing a consciousness of how and why we do what we do, apart from the specific context and content.

Even leadership and team skills involve metacognitive processes. We try to become aware of our own behavior and the social patterns around us, understand the difference between our values and motivations and those of others, and then use that awareness to shape our personal strategies and improve effectiveness.

What is sometimes called metalearning is an integral piece of the package. We don't have to structure our programs as a "me teach, you learn" exercise. If we assume that the core skill we're practicing is "learning how to learn in the 21st century," then ideally everyone, including the educators themselves, observes their own mental processes and uses those insights to guide and improve their learning strategies.

Of course, metacognition itself has a meta component. Ideally, we continue stepping up and out of each new framework, observing how we are developing and applying our insights, and discovering new insights and methods.

17. REFLECTION AND METACOGNITION ONLINE

How can an online program support metacognition?

A common method to encourage metacognition in face-to-face workshops is to include specific time slots for reflection and journaling. Participants are asked to write down their thoughts and observations about what they are learning and often to share those with the group verbally if they are comfortable.

This is certainly an approach that could be translated into online or virtual formats. Here the experience of the cognitive process is less important than the actual output. The journals shouldn't be graded, though they may become useful for further activities and feedback.

It is also possible to imagine visual or interactive exercises that stimulate metacognitive thinking. Mind mapping and graphic facilitation often help visual thinkers to step back and see the big picture. Visual thinkers can draw or collect images and make collages and visual structures. A variety of online tools can be used to share the results.

18. FRACTAL PATHWAYS

Despite the seemingly abstract character of metacognition, the goal is always to push learning closer and closer to real-world goals and scenarios and empower learners with more agency and self-direction.

Translating 21st-century skills into action can be done at multiple levels and lead the learner in any direction, inside the classroom/training program or (more productively) outside of it. The ultimate objective is for individuals to use the skills and methodologies in mapping their own path from introduction to practice to real-world application, from learning to doing (Fig. 7). Increasing the specificity of the learning, down to the level of the

individual's concrete actionable goals, helps increase motivation and impact. This is a strategy closely aligned with heutagogy, defined by Hase and Kenyon in 2000 as the study of self-determined learning (Blaschke, 2012).

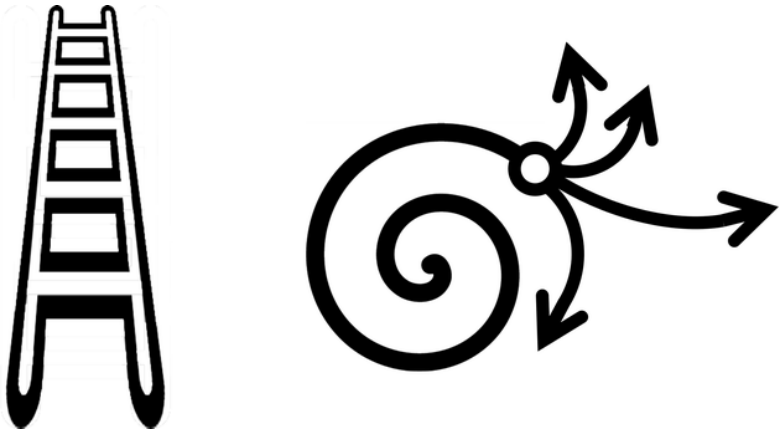

FIG. 7: Traditional learning pathways versus fractal learning pathways

Because such a learning process is iterative and needs to respond to real-world scenarios and feedback, it cannot be linear, with predetermined levels and gates, like a ladder which the learner is required to climb. It should be able to branch and pivot at any level of detail, from project to job to career, like the graphic of a fractal algorithm.

19. COACHING

Such a fractal learning/doing/learning pathway might seem hard to support within a traditional educational program, whether brick-and-mortar or online. The traditional curriculum-oriented model tends to slot students into an existing structure of subjects and disciplines, internal to the institution and organized hierarchically. Each course element tends to be organized in a certain order and schedule.

But there is no reason why learning organizations cannot support a more open-ended learner-centered approach. Coaching is one potentially powerful model. Rather than focus on large group interactions, we might structure interactions as brief one-hour one-on-one sessions, once a week, in which the agenda is adapted to the goals and needs of the learner and applied in practice to their real-world projects. Coaching is potentially adaptive and dynamic and can leverage the full resources of the cloud.

Such an approach is not completely alien to traditional institutions. In fact, tutoring systems are an integral part of programs at Oxford and Cambridge, among others.

Online platforms are certainly capable of supporting individual coaching models, arguably with greater convenience and flexibility than face-to-face coaching.

20. INCUBATING

Coaching/mentoring/consulting are also critical components of many business incubator programs, which support entrepreneurs with new ideas. Incubators could be models for a more entrepreneurial approach to career development.

In the incubator model (Fig. 8), the content and direction of support is primarily driven by the nature and potential of the startup's vision, not by a predetermined curriculum. Activities include connecting startups to mentors, external talent, advisors, and resources; encouraging learning and collaboration between startups; or helping startups to test ideas in the marketplace.

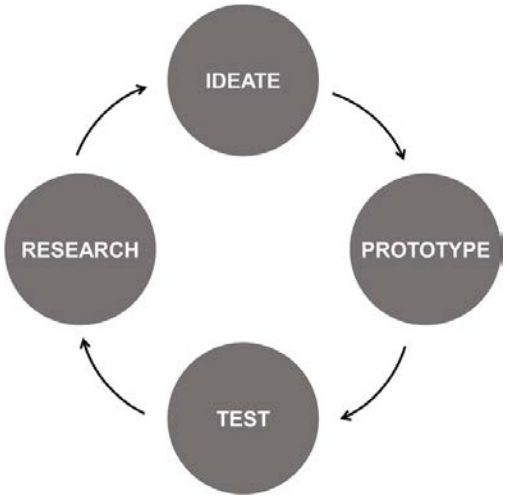

FIG. 8: Incubator model

The process is often iterative, as in design-thinking methodology. The target outcome is not a final exam or certificate but rather success in the real world as defined by the person with the original vision.

We can imagine online education programs being redesigned as "virtual incubators" which nurture and support the real-world goals of "entrepreneurs in training," providing tools and resources to support them in developing their individual agendas. The virtual platform makes it easier to connect to a wide range of content, advisors, and collaborators.

21. A DESIGN-THINKING MODEL

A related model might leverage a design-thinking approach, with the learner's own curriculum as the product being designed. Design thinking is an iterative approach to developing products or services, essentially a way to systematically experiment to find the best solution in a real-world scenario. (Note the similarities to Kolb's experiential learning model.)

If we are looking for the best agenda for a particular learner to achieve their own career goals, for example, we can help them use an iterative cycle to develop and test the curriculum themselves.

Initial research helps the learner generate ideas, which they develop into prototype modules. They can test the resulting curriculum elements in a variety of ways: by interviewing knowledgeable people in the field, comparing it to existing courses, developing portfolio material, taking practice exams, etc.

22. MINIMUM VIABLE INSTRUCTION

What if we set ourselves a learning design objective of minimizing the amount of actual instruction, supported by a virtual coaching function? This would allow us to design highly flexible and viral online learning programs which naturally adapt to the needs and objectives of the learner.

We might call this a minimum viable instruction (MVI) strategy, inspired by the minimum viable product (MVP) strategy used in many product development and business models based on lean startup methodologies. Figure 9 is a diagram of one possible example.

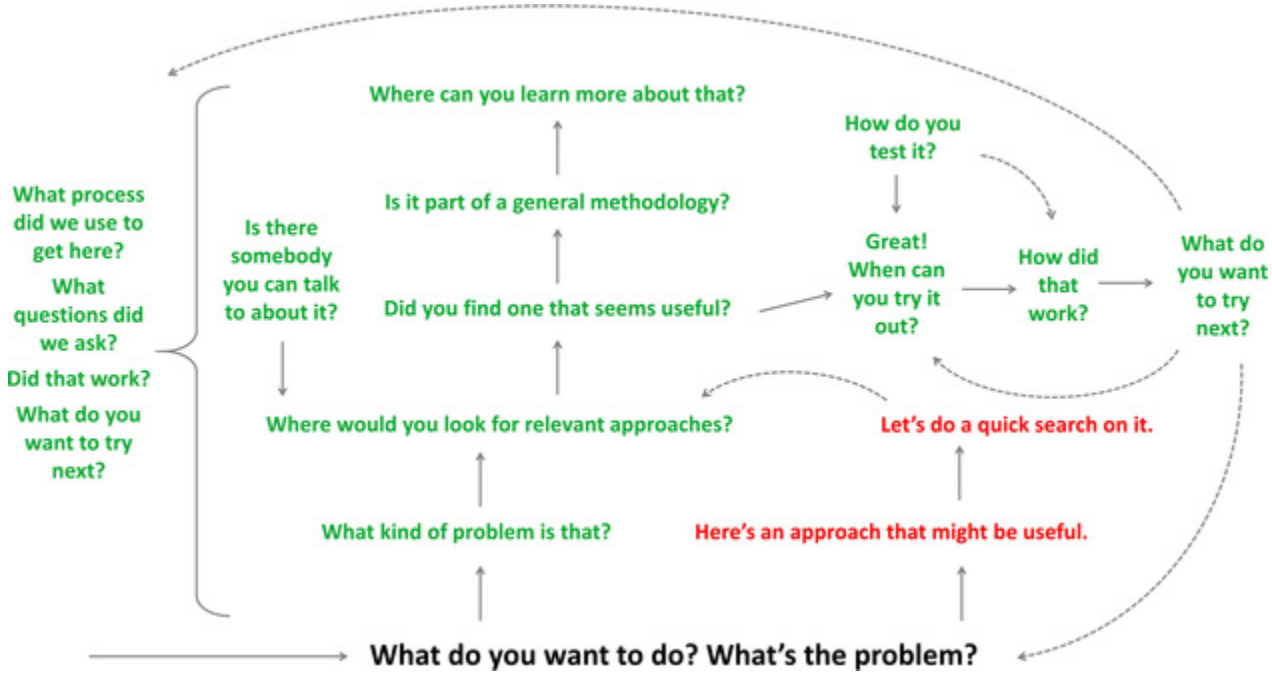

FIG. 9: Example of the minimum viable instruction (MVI) strategy

The emphasis is on asking questions (in green on the diagram) and on "step forward, up, or back" cognitive movements. The only instructional moments, i.e., "here's information I know that you don't," are in red; if the learner seems stuck, the coach suggests possibilities.

A program like this seems imminently suitable to online delivery using collaborative tools like shared web browsing. The coach and learner can be provided with specific supplementary materials in a cloud format or go out on the “wild web” and navigate through publicly available resources to find useful content and media.

23. AN ITERATIVE AND INCREMENTAL TRANSFORMATION

The educational transformation we need will certainly be an iterative and incremental process, following multiple lines of innovation. Online learning designers will be facing a huge variety of scenarios and requirements, some traditional and some future-oriented. It is extremely unlikely that any one program will include all of the approaches we’ve discussed. But it might be useful to have a quick checklist of potential creative strategies from which to choose.

For example:

- Think of the curriculum as potentially open, nonlinear, a series of starting points rather than a sequence.
- Find or push as much of the subject matter/content/media as possible to the cloud.
- Flip the classroom, the course, the program—ask learners to do first, then learn, then do.
- Send learners to look for answers and useful content sources rather than incorporating them into the course structure or giving them lists.
- Look for ways to build in “soft skill” and metacognitive exercises, serving the same learning function as facilitated experiences in face-to-face workshops.
- See if a coaching-based approach could work better than group interaction.
- Integrate real-world projects, relationships, and goals, serving the same function as support services in a startup incubator.

24. SUMMARY

The 4th industrial revolution will accelerate the rate of disruption in jobs and careers which we are already experiencing. The result will be a profound shift in the character of what we need to teach and learn at every level, from K-12 to corporate training.

The emphasis will be on doing/learning/doing, empowering individuals to take charge of their own education and career strategies, with maximum flexibility and minimum lag time between the learner and real-world opportunities.

Online education and learning designers will have a major role to play in this transformation, particularly if we can embrace new approaches leveraging cloud content, 21st-century skills, metacognitive learning, coaching, and incubator models.

The stakes are high. Unless we find new modes and models of education which can quickly and equitably disseminate these skills, successive waves of disruption may overwhelm the ability of organizations and communities to adapt.

More than ever before, the future depends on learning.

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