

Innovation, Technology and The Future of Education

REIMANN Andrew

Introduction

The world is changing, probably faster now than at any time in recorded history. Although this revolution may be largely invisible and incremental, the impact is significant and far reaching. Most of the greatest changes are in how we create, transfer and process information and the technology that facilitates this. Tech and media companies such as Google, Apple and Amazon have done very well by anticipating the trends and shifts. The major impact of this revolution is not however in the economic gains, even though these add up to billions and billions. The ability to influence others, share ideas and shift perspectives on an unprecedented scale is the most significant change. The information age, by unleashing the power of ideas and truly democratising information, has for better or worse, opened a Pandora's Box of possibility and chaos. The internet is the ultimate tool in this regard as it amplifies all that is good and bad about the human nature. No one can doubt the effect on every aspect of society and civilization, however the true impact will probably not be known until the next century.

When Johannes Gutenberg made the first viable printing press in Europe 600 years ago, the volume of books in Europe grew from 20 million to 200 million in 50 years. For the first time in history books and information were accessible to the masses and not controlled by the elite. At the time, no one understood the impact of this change. Looking back however, we can see it as one of the most influential events of modern history. Freedom of information through printable books stimulated the Renaissance, facilitated Luther's Reformation and Columbus's voyage to America, sparked the 30 Years' War, created momentum for the Age of Enlightenment and the

Industrial Revolution, helped English to become a global language and allowed Europe to dominate the world for over 500 years.

"What the world is today, good and bad, it owes to Gutenberg. Everything can be traced to this source, but we are bound to bring him homage ... for the bad that his colossal invention has brought about is overshadowed a thousand times by the good with which mankind has been favored." Mark Twain, June 27, 1900, p. 7.

Today information technology is expanding faster than ever and we have no idea of the impact this will have, on the future. There is no doubt that the democratization of education and freedom of information are hugely beneficial to the entire human race, however these same freedoms facilitate criminals and allow terrorist groups to organize and plan their attacks. There are many questions that the present and future generations will have to come to terms with. For better or for worse information and knowledge are power and these, more than ever, are accessible to everyone, stimulating innovation and growth at an unprecedented rate in human history. What impact will this have on our future?

As global economies and age old business models merge, collide and are irreversibly disrupted, progress, innovation and opportunity seem abundant and inevitable. In the short term, however widespread, an unchecked revolution in communication, business and media does not automatically benefit everyone. In most cases, including the top three world economies, USA,

China, Japan, the gap between rich and poor has gotten worse (McCurry, 2017). Despite its many advantages, the information age has left many casualties in its wake, the most significant of these is the end of the honeymoon with globalization. Like dominos, the nations of the world are beginning to move away from, globalization. This is ominously similar to the post colonial world in the catastrophic years between 1914-1945. Brexit, the election of Trump and other shifts to the conservative right in Europe and elsewhere, have demonstrated clearly that the world is rejecting globalization.

The inability to control flows of information has been positive in keeping people informed easily, but it has had the side affect that people have become easier to manipulate. The majority of tweeting, data consumers, no longer have patience for contradictory information and have developed a tendency to justify their beliefs with fake news, and un-vetted, unsourced and biased information. Several have argued that this is how shocking events like the Arab Spring, Brexit or the election of Trump were possible. Truth, reality and information no longer reflect each other and the unchecked flow of information, has ironically produced a great disinformation.

Economically the revolution has been equally disruptive. In the late 90's the music industry was all but destroyed by networks of peer to peer file sharing. Although such downloading activities are now internationally deemed criminal and have slowed, the industry was gutted and will likely never recover. Foresight and flexibility would have probably saved music and media companies had they been able to adapt and harness the new technologies. We now have the benefit of hindsight, yet new technologies and innovations are threatening to do the same thing on an even greater scale. The exponential increase in the connecting and sharing of ideas has the potential to unleash a tidal wave of change on almost every human endeavor. The emerging Sharing Economy, which is the backbone of billion dollar enterprises like Uber and AirBnB, have the power and potential to take over the world. A real power to the people, if the smartphone is

the middle man, the impact of sharing ideas, resources and information increases exponentially, transforming Adam Smith's invisible hand into a tentacle. In politics the flow of information is equally transforming, from Snowden to WikiLeaks, exit polls and Russian election hacking, the threat to democracy has never been greater. The alternative of tightly controlling information is however equally frightening. What is required to benefit from this revolution and avoid the many pitfalls and ensuing chaos, is not controlled internet or limited information, but a rethinking of education and the skills needed to manage, navigate and process these new resources.

The telephone, cars, airplanes, medicine have changed completely in the past 100 years yet the classroom remains relatively the same. This is a tragedy in the making and constitutes nothing short of malpractice on the part of teachers and educators. Clinging to old world skills and pedagogies such as testing, memorization or disseminating stale information through lectures in a static classroom, are no longer acceptable nor productive. Those in education need to embrace new technologies and changing paradigms to prepare students for the world that they will enter.

I. Education Revolution

Not so long ago coming to class without paper or a notebook and something to write with would have seemed unthinkable. These days however it is becoming increasingly likely that students will have neither and will be less and less adept, comfortable or able to take notes, write short sentences or even spell. Why is this happening? What affect is this having on learning styles, teaching strategies and the traditional classroom? What can the teacher do to reach students and ensure that they are still learning at an acceptable level? The simple answer is a massive paradigm shift in perspectives on technologies typically associated with learning, leisure and communication, Traditional communicative and education tools and materials are continuously and rapidly blending into an indistinguishable, almighty hybrid of media and

technology. Whether it's the iPhone, game device, or some SNS, today's students are more comfortable and creative with digital mediums than they are with a pen and paper. Are handwriting, spelling and memorization skills still viable and essential? How about texting, snapchatting, tweeting and blogging? Education in Japan has much to gain from adapting quickly to the changing times. Although students spend most of their education memorizing information, cramming for exams and preparing for a future bequeathed to them by their peers and seniors, the final hurdle for graduating from university requires researching and writing an original thesis. This is a highly personal and individualistic task, for which, up until their senior year, they receive virtually no preparation or training. Conducting research requires many multilevel skills, the least of which involves memorizing and retaining facts. Being able to analyze, evaluate and organize, information efficiently, effectively and creatively are essential skills for students today. Knowing how to use the right tool for a job, knowing where to find the right information, knowing how to apply that information appropriately, effectively, critically and creatively are key skills for the information age.

“Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.” The question I have for you at this point of our journey together is, “What is your genius?” Albert Einstein
Kelly, M. (2004)

In many ways, Japan is stuck in an early Showa paradigm, which in terms of education and employment, focused on weeding out the ‘wheat from the chaff’ rather than cultivating specialized skills and abilities. In times of huge economic boom and population growth, where labour shortages and limited university entrance were the norm, arbitrary tests which separated those that merely studied hard and jumped through hoops, from those that did not, were adequate. These days however they fall well short of

meeting the expanding needs and requirements of a society in decline. University education in Japan, as it exists today, is largely irrelevant as there is little or no connection with what students study, the skills they develop and the type of work they will do in the future. This is a well known fact, which was acceptable in times when jobs were plentiful and companies had ample resources for training, retraining and guaranteeing lifetime employment. However those days are long gone and it is critical that higher education start to consider the reality of students futures and prepare them appropriately. A recent forum on the state of English education in Japan stressed the need for curriculum changes reporting that 85% of company managers surveyed, stated that presentation and negotiation skills are most important to succeed in business, however most university graduates are in still greatly lacking in this area. According to M. Hirai of Waseda University;

“There is a huge gap in what corporations want and what the current education system provides. Current English education in Japan focuses too much on passive skills: reading and listening. But the demand in the real world is active skills: speaking and writing. I’m afraid this gap largely stems from overdependence on the TOEIC test as the sole indicator of English skills both in industry and academia.’
(Hirai, 2009, p. 8).

Similarly, traditional job hunting methods designed in the 1950's to efficiently fill the many vacancies in the burgeoning, post war companies with young, fresh, obedient workers, have proven ineffective in today's economic climate and a waste of time, effort and education. McNeill, D. and Matsumoto, C. (2009). It is high time that these conventions are reevaluated in favour of more flexible systems, able to balance tradition with innovation. As job offers reach their lowest levels since the recruiting system began, many

students are questioning the validity of a process that is neglecting them. Comments from several students participating in a recent demonstration at Waseda University include:

"It's ridiculous. We don't have time to mature as people or as students,"

"University is supposed to be a place to learn, but more than half our lives are spent out job hunting,"

It's about 60-40. It makes studying very difficult, especially if you have an interview. You can't think about essays."

"I'm as afraid as anyone of not being able to get work, but university just becomes a waste of time."

"Companies want to mold their employees, which is why they start recruiting so soon, instead of giving us time to become mature, thinking people."

"Why does the system have to work like this?"

(McNeill, D. and Matsumoto, C. 2009, p. 11)

In traditionally vertical societies, with strict hierarchical conventions characteristic of Japan's *keigo* communication protocols or strict *sempai-kohai* relationships, the internet and cheap and abundant information level the playing field, democratize communication and serve as a cold culture shock and rude awakening to those who wish to maintain the status quo at the expense of embracing the unknown. In many ways Japan has been left behind by the information revolution and as present trends indicate it is doubtful whether any kind of complete recovery will be possible. Traditional leaders in innovation and technology such as Sony, Panasonic, Toshiba or even DoCoMo and Nintendo, names synonymous in the past for successful design and marketing, have misjudged changing climates and clung stubbornly to outdated business models rather than allow a younger, savvy

generation take its turn at the helm. Sony has grown too large to be competitive and has failed to maintain its historical presence in the market share because most required innovations end up creating a conflict of interest with one or more of its many divisions. For example, Sony Music's many copyright holdings limit any serious developments of its MP3 technology. Today 30 years after the walkman became a household word, most young people, growing up under the shadow of the iPod and iTunes, do not even know what a walkman is. Even domestically, within Japan, the Walkman has an insignificant market share compared to Apple devices (Kashiwagi 2007). In 1997 Sanyo was offered the idea of creating an iPod like player but the senior board members rejected any form of alliance with Apple (Carryl 2007). Similarly DoCoMo, which in 2001 was one of the world's leading telecom companies, failed to gain an international foothold, despite heavy financing, research and marketing abroad and vastly superior technology, because the company leaders failed to consider global need and perspectives. According to Fasol (Time Magazine December, 2007) "Not one of DoCoMo's senior management leaders was non-Japanese and they were hopelessly mired in old mindsets. They could have been Google but they blew it." More recently, Nintendo missed its big chance at becoming relevant again with Pokémon Go, the most successful mobile game of all time. The company's CEO rejected the idea of mobile gaming and as a result, the hit game was produced, developed and distributed by a subsidiary of Google instead.

Part of the problem is that there is no opportunity for the required form of innovation and research which requires taking risks and challenging the status quo. Japanese are still averse to going against the grain even at the expense of their company's future. Group consensus and harmony are still strong values and the nail which stands up is hammered down. Unfortunately this mind set, though socially very desirable for community building, is having a disastrous effect on the competitiveness of Japanese companies and is crippling as a business model. Innovation requires risk taking mavericks, however the

necessary individualistic values are not condoned and strongly discouraged in most Japanese group oriented institutions.

In the present system revolutionaries like Einstein, Edison, Ford, Bill Gates or the founders of Google, Twitter, Yahoo and YouTube would have all been ostracized, high school dropouts who would have been lucky to get jobs as “freeters” at a convenience store. As a result Japan is currently experiencing a debilitating “braindrain” in which over 41 percent of all post doctorate students choose to emigrate in order to engage in meaningful research or employment. (Fukue, 2010). Of the Japanese Nobel Prize winners since 2008, none have their research based in Japan. The most recent winner, Yoshinori Ohsumi, highly criticized education and research in Japan, stating that universities are very poor and without adequate funding and investment in a more diverse range of studies, research in Japan will “hollow out” within a decade (Yoshida, 2016). The story of Shuji Nakamura, another Nobel Laureate, who developed the revolutionary blue iode led light found in most electronics today, is a case in point. Nakamura received no credit for his discovery while the company went on to make billions. After several legal battles, Nakamura was finally given a settlement and credit for his invention but nevertheless, left Japan for the more tolerant and supportive climate of California where he is now a professor. In a 2001 interview Nakamura stated that;

“The egalitarianism embedded in Japanese society deprives researchers and scholars of the economic incentives to pursue creative and innovative studies. "At Japanese universities, there is absolutely no culture to nurture venture businesses. Even if the government were to try to promote such businesses through universities, it would be very difficult.”

(Hirao, S. 2001, p. 13)

This is indicative of the difficulties facing Japan’s economic recovery, the old generation, a majority in an aging population, clings to traditional, tried and true models while young and imaginative newcomers have no room, support or opportunity to develop their ideas (Mok, 2007). It is important to keep in mind that Japan only flourished economically when the unburdened and hungry youth were free to pursue their dreams; Akio Morita founded Sony at age 25, Soichiro Honda established Honda Motor Corp. at age 40, Eiji Toyota started Toyota Motor Works at age 43, and Hiroshi Yamauchi at age 22 changed the course of The Nintendo Playing Card Company helping it become one of Japans’ most enduring and popular brands.

The reality is that young Japanese are no longer bound to the sensei or sempai centered models, information is no longer trickled down from superiors or the gate keepers of promotion and progress. The Heisei generation, more so than any other, has options, choices, and the opportunity to think ‘outside of the box’. What they are missing however, is the motivation to do so, the permission of their peers, the consensus of society and the flexibility and insight required in determining when to hold on to tradition and when to try something new. The sempai system, left over from bushido code, is only effective if the top takes care of the bottom. In post bubble Japan this has failed miserably as the top has precariously and without foresight, maintained its opulence at the expense of workers, juniors and freshmen.

According to 2014 figures from the Japan Institute for Labor Policy, Japan has the highest percentage of workers working over 49 hours per week among the G-7 nations. However data from the Japan Productivity Center indicates that the country also has the lowest productivity among the group. According to Kazunari Tamaki, a lawyer who specializes in karoshi, “Japan is still a country where working long hours is considered a virtue.” “But we need

to focus on improving efficiency within fixed hours to boost productivity.”

(Hincks, J. 2016, p. 16)

This obsolete and dangerous system of mismanagement and abuse is about to come crumbling down, hastened by 20 years of deflation and the recent recession (Masters and Beech 2009). As symbolized by the landslide election and subsequent failure of the Hatoyama cabinet, the return of Abe and his Abenomics, which are still out of synch with the real-world economy, the message is clear, a revolution is underway and it is time for leaders, policy makers and educators to take responsibility for leading a generation astray, by empowering them to take initiative for this change. This will be a difficult task with much social upheaval, already evident in recent student demonstrations opposing the archaic job hunting system, declining birthrate, increasing suicide rates, high unemployment and temporary worker percentages. However with the ever aging population, dwindling workforce, the increasing tax burdens and declining economy these last hurdles will eventually fall and the next generation will likely embrace and master these 21st century skills and perspectives as if they had always been a traditional part of Japanese culture. Japan is poised on the edge of a great paradigm shift, similar in many ways to that of the Meiji Era. The lessons of Meiji Japan, arguably one of the greatest examples of reform and innovation in human history, need to be revisited and looked upon for inspiration by today’s leaders, teachers and visionaries. Meiji leaders like Hirobumi Ito, who established Japan’s tax system at age 30 and became the first Prime Minister at 44, were all young men with vision. They had seen the future and knew what had to be done. Now, a century later, as the sunsets on the Heisei Era, these ideals must be reevaluated and modified, the pendulum swings and the next generation will take over, younger and free from the chains of the past and open to the flexibility, innovation and changes required to preserve Japan’s significance on the global stage of the future.

Perhaps Guttenberg had a similar revelation when he envisioned the impact his printing press and more accessible information would have on the people of Europe. With the advent of the mass production of books, learning became democratic and could take place in more varied locations, knowledge was no longer confined to the elite, teachers became more than scholars who remembered and recited scripture and erudite manuscripts. Although limited, with the dawn of efficient printing systems, wide spread libraries and accessible books, people became the masters of their own knowledge and the seed of the information age was planted. Since the printing of the first Guttenberg Bible in the 1450’s, the base of human knowledge and information has mushroomed exponentially to the point that it is doubling every few years. Between 2006 and 2010 alone the amount of information freely circulating and available grew six fold. The last decade, which many have referred to as the Golden Age of Information, has also signaled a passing of several fundamental innovations upon which many of mankind’s greatest achievements have been built. The Digital Era is here and analog technology and vestiges of the age including books, pencils, CDs, DVDs, department stores, magazines, memorization skills and traditional studying strategies are either obsolete or on their way into obscurity.

The once ubiquitous five pound, “Genius” dictionary has become a relic of the past. Students now use “smartphones” for everything including taking notes making presentations or communicating in class. Music and movies are downloaded and stored on massive hard drives or streamed from the cloud, not bought from a shop and kept on a shelf. Online shopping is eclipsing retail sales while media titans like Amazon and Google are racing to replace the traditional book, library and basic concept of reading. In a recent study, 50% of Americans reported that they read less than four books per year with 25% admitting that they read no books. (Fram, 2007). Yet they spend hours blogging, texting or reading messages in online communities like, Facebook, Instagram, or Twitter. A similar study reported that Americans sent over 110

billion text messages in 2008, double the amount sent in 2007 and eclipsing the number of calls made to become the preferred type of communication among younger people. According to Amanda Lenhart (2009), "If teens are trend leaders, then we are moving to a text-based communication system. For them, there is less interest in talking." In Japan, this trend is probably similar, if not more extreme, as smartphones, portable video games, and other devices have long been the diversions of choice. Books are now available and are being read on a variety of electronic devices. eReaders being marketed by Sony and Amazon are fast becoming an acceptable alternative to paper and students are already able to carry whole libraries with them wherever they go. What are the implications of this in terms of learning, studying, teaching or even knowing?

"The dead tree book will never die – but our generation will be the last to use 'books' as our primary reading systems. Expect ebooks to hit colleges in perhaps five years and high schools and elementary schools in about seven."
(Biggs, J. 2009)

In a classic parody of the changing classroom, The Simpsons satire what are being referred to as 21st Century skills as follows:

Teacher: "Who can tell me what the Monroe Doctrine was?"

Student: "The policy of President Monroe that America has the right as a nation to"

Teacher (interrupting): "Are you telling me you memorized that fact, when anyone with a cell phone can find it out in thirty seconds?"

Student: "I've crammed my head full of garbage!"

Teacher: Yes... yes you have.
(M. Groening, 2009).

This change is questioning the very core of education philosophy. Are we best serving our students needs and preparing them for the world they will soon enter? If tests are supposed to reinforce desired skills and competencies, do traditional tests accomplish this? Educators on all levels must take responsibility for the well being of our students. We can no longer continue to commit such gross malpractice by reinforcing outdated and obsolete skills because we are too lazy or afraid to try a new approach. Our duty as educators is to instil in students lifelong learning tools, skills and motivation reflective of and relevant to the real world.

"The best teachers don't give you the answers; they just point the way and let you make your own choices, your own mistakes..."

(Murphy, R. 2009)

Throughout history, information has been power. Understanding how or whether to use, apply, adapt, adopt, reject or embrace new ideas and innovations has consistently been the critical factor in determining the rise and fall of civilizations.

Innovation necessitates the blending of the old with the new, finding different ways of seeing, being and doing. Japan cannot and should not abandon its past and traditions for the sake of economic growth, stability and competition. However an environment conducive to risk taking, creativity and individuality must be developed, supported and allowed to flourish. Japan lacks flexibility in its approach to problem solving and ideas required in creating a nurturing climate for innovation and risk taking.

References

- Alabaster, J. (2008). *Japan's online social scene isn't so social*. Associated Press. Saturday, September 27, 2008.
- Biggs, J. (2009). *10 reasons to buy a Kindle 2... and 10 reasons not to*. <http://www.crunchgear>.

- com/2009/02/25/10-reasons-to-buy-a-kindle-2-and-10-reasons-not-to/ February 25, 2009.
- Fletcher, D. (2009). *Time's Person of the Year 2009: The Twitter Guys*. Time Magazine, December 16, 2009.
- Foroohar, R. (2009). *Japan Is Fading; One thing the nation's next leaders don't talk about is growth*. Newsweek, August 15, 2009.
- Fram, A. (2007). *One in four read no books last year*. Washington Post, AP. Tuesday, August 21, 2007.
- Fukue, N. (2010). *Universities must look abroad to reverse Japan's brain drain*. Japan Times Monday, Jan. 4, 2010
- Groening, M. (2009). *Bart Gets a Z*, The Simpsons, Season 21, Episode 2. Fox. October 4, 2009.
- Grossman, L. (2006). *Time's Person of the Year 2006: You (YouTube)*. Time Magazine, December 13, 2006.
- Hincks, J. (2016). *Japan's Latest Scheme to Reduce Working Hours Is Essentially Meaningless*. Fortune, December 31, 2016.
- Hirai, M. (2009). *Engineers must have English skills to succeed*. Japan Times Forum on English Education, Japan Times. Monday, October 5th, 2009.
- Hirao, S. (2001). *Egalitarian values stifle creativity: researcher*. Japan Times Sunday, Jan. 28, 2001.
- Johnson S. (2009). *How Twitter Will Change the Way We Live*. Time Magazine, Friday, Jun. 05, 2009.
- Kashiwagi, A. and Caryl, C. (2007). *Why Apple isn't Japanese*. Newsweek December 10, 2007.
- Kelly, M. (2004). *The rhythm of life: living every day with passion and purpose*. p.80, Fireside, New York.
- Kyodo, AP. (2005). *Blue LED inventor to get 843 million yen: Settlement lets Nichia off hook for 20 billion yen*. Japan Times, Wednesday, Jan. 12, 2005.
- Kyodo, AP. (2009). *Students and Cell Phones*. Japan Times, Thursday, Feb. 26, 2009.
- Masters, C. and Beech, H. (2009). *Young Japan, The New Activism of Japan's Youth*. Time Magazine, Thursday, Aug. 20, 2009.
- McCurry, J. (2017). *Japan's rising child poverty exposes true cost of two decades of economic decline*. The Guardian, Tuesday, Jan. 1, 2017.
- McNeill, D. and Matsumoto, C. (2009). *Students give job-hunting system a big F*. Japan Times, Friday, December. 18, 2009.
- Mok, J. (2007). *How the Japanese IT Industry Destroys Talent*. Japan Inc. Magazine, No. 74, November 8, 2007.
- Murphy, R. (2009). *Mattress, Glee*, Season 1, Episode 12, Fox. December 2, 2009.
- Nagata, K. (2008). *Market for mobile 'manga' taking off*. Japan Times. Friday, July 11, 2008.
- Naughton J. (2009). *The digital world may not offer a true 'free'*. The Observer, London, Sunday, July 5, 2009.
- Ogoura, K. (2009). *Why is Japan introverted?* Japan Times. Tuesday, July 14, 2009.
- Sutter, J. (2009). *The future of libraries, with or without books*. CNN, Associated Press. September 4, 2009.
- Twain, M. (1900) *The Work of Gutenberg*, *Hartford Daily Courant*, June 27, 1900, p. 7.
- Yen, H. (2009). *Popularity of Texting Edging Out Cell Phone Calls*. Time Magazine, AP. December 15, 2009.
- Yoshida, R. (2016). *Nobel winner Yoshinori Ohsumi urges investment in science*. Japan Times, Oct 4, 2016.

教育のイノベーション、技術、将来性

ライマン アンドリュウ

今日、これまでの歴史上まれにみるスピードで、世界は変化している。そして最大の変化は、情報を作り出し、移動し、処理する手段の変化にもたらされている。このような変化は、個々人が、これまでにないスケールで、影響し合い、アイデアを共有し、価値観を変容させる手段を手に入れたことに見出される。情報化時代は、個々のアイデアの影響力を最大化し、情報を大衆社会へ広く拡大することで、良くも悪くも可能性と混とんが相反するパンドラの箱を開けたといえる。このような時代に、人間性の良い面も悪い面を強調することで、インターネットは唯一無二のツールとなっている。今日、情報技術はこれまでにないスピードで拡大し、この変化が人類の未来にもたらす影響の大きさは計り知れない。教育の民主化と情報の自由化は人類の発展にとって大きな利益となることは間違いないが、同じ自由と民主性が犯罪者やテロリストの温床となることも同時に注意しなければならないだろう。このような変化がもたらす影響は、必ず将来の世代にとって大きな問題を残すはずだ。良くも悪くも、情報と知識は権力性を有しているのである。そしてこれらの権力性へのアクセスは、近年の技術革新が個々人に保証している。このような変化は、将来にどのような影響をもたらすのだろうか？ 通話、交通、医療分野の技術は、100年の間で目覚ましい変化を遂げたにも関わらず、教育の形はこれまで大きな変化がなかった。このような変化の不在は、現場で教育に携わる者に教授行為の不都合を生み出しているといっても過言ではないだろう。従来通りのテストや、学生に記憶を強いる一方的な教育手法は、今日すでに正当性を失いつつあり、非生産的だと言わざるを得ない。教育に携わる者たちは、新しい技術を活用し、学生たちがこれから直面しようとしている新しい時代へ、できる限り備えることができるようにサポートしていくことが、これまで以上に求められているのだ。