Teachers as Learning Designers: What Technology has to do with Learning

A view from Singapore

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This article discusses the controversies and value in the use of technology for learning. It proposes that as a teaching tool, technology also opens up new possibilities for the teachers to design meaningful learning experiences for their students. The appropriate use of technology promises to deepen the learning of traditional literacy, numeracy and the mastery of subject knowledge. More importantly, technology provides opportunities for the development of 21st Century Competencies. Jointly, they form the complementary competencies for students to become future-ready.

Technology & (the elusive) Learning Gains

It is now almost a tired cliché to say that the world around us has changed. Technology has permeated every aspect of our lives and has changed the way we live, play, work, and learn. Technology has ushered in unprecedented productivity gains through automating manual, and often mundane tasks, resulting in greater efficiency and time saved.

Technology has indeed disrupted our world. Just think of the remarkable irony of these disruptive innovations in creating the new sharing economy. Airbnb, the world largest accommodation provider owns no real estate. Alibaba, the most valuable retailer has no inventory. Facebook, the world’s most popular media owner creates no content. Uber the world’s largest taxi company owns no vehicles.

The digital age of the 21st Century has brought about a greater ease in both the production and consumption of information through recent technological advancements. We now have an unprecedented exposure to information presented through language, images and videos.
People are also reading and writing more today, albeit in bite-sizes, through Facebook posts, tweets, and blogs.

Today, there are so many education technology products, offering mobile and web access to curriculum content, teaching and learning tools as well as classroom and school management. The recent developments in the Internet of Things and Learning Analytics also bring with it promises of greater personalisation - be it for business, leisure or learning. Nevertheless we await an educational killer-app environment that can disrupt schooling and learning the way Uber disrupted conventional conceptions of taxi-ing.

In the context of education, many of us are familiar with the OECD Report (2015) Students, Computers and Learning – Making the Connection that the presence of more technology in the classroom has little positive effects on the learning gains of the students. It notes that the impact of technology on students’ performance is mixed. That is, “students who use computers moderately at school tend to have somewhat better learning outcomes than students who use computers rarely. But students who use computers very frequently at school do a lot worse in most learning outcomes, even after accounting for social background and student demographics”. The finding was that “the impact of technology on education delivery remains sub-optimal, because we may overestimate the digital skills of both teachers and students or because of the generally poor quality of educational software and courseware” (OECD, 2015: 4).

The OECD report is not alone in this dismal claim. Previously, other large scale studies, such as NESTLE’s Decoding Learning Report has made similar observations. It reports that "in the last five years, UK schools have spent more than £1 billion on digital technology. From interactive whiteboards to tablets, there is more digital technology in schools than ever before. But so far there has been little evidence of substantial success in improving educational outcomes." The OECD report, however, takes it further by suggesting that they may even be negative gains from higher use of technology in the classroom.

How are we, as educators, to respond in the face of such so-called “damning evidence”? We could, of course, rationalise. For one, we can play the co-relational but not causal card. The
observation made in the report on the negative co-relations between intensity of computer use and student learning outcomes must be seen in the following light:

1. There is no causality; only co-relations between the intensity of computer use and student learning outcomes.
2. While social background and student demographics have been accounted for, there are also other factors involved.
3. It is useful also to note the following statements from the report.
   - “The net effect of computer use in classrooms and at home is likely to depend on whether computers displace other learning activities or, instead, increase the overall time that is spent learning or the effectiveness of learning processes.” (OECD, 2015: 148)
   - “The highest quality of navigation is attained by students who reported browsing the Internet at school “once or twice a week”, suggesting that practice with online navigation in a school setting can be particularly important for specific skills related to online reading.” (OECD, 2015: 154)
   - “When interpreting these results, it is important to bear in mind that the group of students who rarely use computers for doing homework outside of school includes those students who rarely do any homework outside of school, irrespective of whether they do so with computers or not.” (OECD, 2015: 158)
   - “As an exception to these findings, Machin, McNally and Silva (2007) report performance gains from increased funding for ICT equipment among primary schools in England.” (OECD, 2015: 162)

Next, we could also argue that the notion of learning gains in the report is defined too narrowly. They have measured the traditional domains of learning – literacy and numeracy, while neglecting the more critical – and harder to measure – domains such as the 21st Century Competencies. Self-directed learning and collaborative learning, which arguably are what technology contributes in developing best in our students, but have not been measured.
We can also point to the trite and tired platitude that technology is now an integral part of our lives. As such, we perform “emotional blackmail” on our poor teachers - that we do our students a grave injustice if we do not prepare them to become future-ready by guiding them in the skilful and responsible use of technology.

Hence, one could argue that regardless of the elusive learning gains from the use of technology, the use of technology in teaching and learning is now decidedly non-negotiable. As Professor Gunther Kress from the Institute of Education puts it more than a decade ago, it is crucial for educators today to make use of these media and modes for knowledge transmission so as to “engage with the young on the grounds of their experience” (Kress, 2003: 175).

However, no matter how we rationalise, as educators, we cannot ignore the importance of learning gains. Teachers have the irrepressible desire to know that a student, having gone through a lesson, has learnt. This is the fuel that keeps us going and improving. So how do we respond to the claim that technology has not improved learning outcomes of our students? Unsurprisingly, both the OECD Report and NESTLE’s Decoding Learning Report conclude that teachers, not technology, made the difference. The focus remains on teachers’ readiness and capacity to use technology appropriately and meaningfully. It is still the quality of teachers that matters most. The OECD report sensibly reminded us that “technology can amplify great teaching, but great technology cannot replace poor teaching” (OECD, 2015: 4).

MOE (2015, November) has responded to the OECD report with an affirmative nod to the findings but highlighted that the report has noted a truism that it has always been aware of. Technology does not improve learning outcomes – Teachers do.

This is why over the years and also has expressed in the Singapore MOE’s 4th ICT in Education Masterplan (mp4), the focus has been on people. As such, MOE’s focus has been on pedagogy rather than on technology only. The focus has been on building the capacity of teachers, as part of their pedagogical repertoire, to use technology appropriately and meaningfully in our schools.
Technology is a tool to help teachers to design different learning experiences for the students. For example, it allows students to collaborate with one another, receive immediate feedback, and make their thinking visible. Technology is an integral part of our lives and technology should be harnessed to help our students to be future-ready, but teachers remain the key to effective teaching and learning.

Since the advent of the ICT Masterplans, one assumption made by our policy makers is that ICT would be an important medium for both content and communication just as textbooks and CD Roms have been. Studies which attempt to draw evidences of learning outcomes would benefit more to compare the use of technology to aspects of learning which cannot be achieved through conventional mediums, for example, immersive worlds, 3D modelling and visualizations, and game based learning.

More generally, a 2015 Infocomm Development Authority Survey reports that 88% of the Singapore household has Internet access. Coupled with cheaper smartphones and tablets, the ways Singaporeans live, eat and play have changed. While it is indubitable that technology has a profound impact on us, whether we are left better off or worst off is a far more complex question to answer.

**Complementary Competencies**

It is tenable to argue that in the new digitally-saturated, media-rich world that we are immersed in, the savvy use of technology is an important life skill. However, media or digital literacy cannot be the be all and end all. Technology cannot fully address issues on student engagement. Real-life, face-to-face interaction with others and opportunities for hands-on learning are also important. Many of the 21st Century Competencies that we talk about can also be fostered through sports, games and simply encourage children to run about in the playground.

We operate in a digital, media and virtual environment world; but the world is also concrete, material and physical. We communicate electronically mediated via technology;
but communication and interaction are also face-to-face and socially experiential. We read and learn though news snippets, tweets and feeds; but reading and learning are accomplished through books and journals as well.

As we continue to explore the use of ICT to develop adaptive expertise in our students, we must be mindful not to lose the other ‘complementary competencies’, or literacies, that the heightened use of ICT may distract from and dilute. These include skills and dispositions, such as deep thought, self-reflection and sustained reading. They could be muted in a digital environment of instant answers provided by Google, short quips in less than 140 characters on Twitter or flashy Facebook status updates. It has now become refreshing to see someone in a public place with his nose stuck in a book, rather than his eyes glazed over the smartphone or tablet. Yes, the person may still be reading, but, in this case, the medium makes the message – and it is not the quite the same.

In preparation of our students to be future-ready and to be equipped with the adaptive expertise to navigate the knowledge landscape, it is important to build complementary competencies in our students for reading both on screen and in print. These complementary competencies include the ability to scan and synthesis key ideas for reading on screen as well as the ability for deep reading and sustained concentration for reading in print.

An analogy for this is the observation that many of us carry and operate 2 notebooks - our notebook device and a paper notebook. In the world we live in today, we need to develop the complementary competencies in classical domains such as literacy, numeracy, scientific understanding, as well as having fluency in multimodal literacy. We use the different affordances in the mediums that are around us, and exploit them as complementary tools for the purposes we hope to accomplish. Similarly, if students find conventional textbooks and worksheets best suited for the purposes of content mastery for the examinations, such mediums would suit best. However, if we are able to expand the learning experiences to “new” requirements where communication, collaboration, teamwork, and other forms of 21st century dispositions, present technologies may well be a better fit for such literacies.
Teachers as Learning Designers

The role of teachers has gradually but discernibly shifted over time. The role of a teacher has evolved from being a transmitter of knowledge, to a facilitator of the learning process, to more recently a designer of learning experiences.

There are many reasons for this shift. Chiefly, the development in technology and the possibilities it ushered in has changed the nature of how knowledge is accessed and acquired. In turn, technology has transformed the nature of teaching and learning in the classroom. With technology, the roles and relationships between teachers and students in terms of power, distance and authority structures have changed. With the shift in tenor, the composition and texture of the learning experience in the classroom must correspondingly evolve as well.

Pockets of such shifts are already occurring in Singapore classrooms where students use technologies to engage in activities such as Knowledge Building, science inquiry learning mitigating classrooms and outside classroom experiences, immersive worlds for the exploration of geographical constructs, and others. Consistent in these learning environments is the need for teachers to be designers or re-designers of learning. Teachers come together with colleagues from other schools, through the cluster system of schools, and engage in the social construction of lessons. They appropriate exemplars of inquiry based lessons from other contexts, seek advice from experienced others, and attain support and resources from school leaders to enact their plans.

So now that role of teachers are to be designers of learning, how do we begin and how can technology serve our purpose? At the heart of design is the centrality of choice. As a learning designer, the teacher, possesses a range of teaching strategies and has the discernment to select the best fit for purpose. The teacher appreciates the unique profile and differentiated needs of their students, and understands which methods best engage and motivate learning. In addition, the teacher, as a learning designer, has strong content mastery and knows which pedagogy is most suitable to convey the requisite learning.
Typical examples of teachers who engage in learning design through ICT in their everyday enactments include Adeline (pseudonym), a Mathematics teacher, from a secondary school in Singapore. For the past 7 years, Adeline had a teacher-centred pedagogy to teach the lesson on the Interior angles of Polygons in Mathematics. She did this through a didactic demonstration of hand-drawn polygons on the board accompanied by a verbal explanation. However, Adeline decided to grow from being a transmitter of knowledge to a designer of learning experience. She used a freely available tool – Geogebra – to design her lesson. The technological tool supported the visualisation of polygons, which were more precise than hand-drawn examples. The tool also allowed for students’ manipulation of the models and encouraged learning via trial and error. Technology enabled collaborative problem solving amongst students and resulted in higher engagement and deep learning.

The lack of teaching experience should not hinder teachers from growing into learning designers. Cheryl (pseudonym) is a young teacher from another secondary school in Singapore. She wanted to design a lesson to foster students’ critical viewing competencies of media texts by harnessing technology. Having learnt the form and functions of an advertisement, students demonstrate understanding by collaboratively annotating on a text via freely available tools such as Marqueed and Crocodocs. Students then find an advertisement of the same product in print and video and then explain its message via Padlet, another technological tool. Cheryl’s lessons showed how the learning experience can be meaningfully mediated with technology. Her students reported increased appreciation of media texts and demonstrated critical viewing competencies through their lesson artefacts.

Likewise, the many years of teaching experience should not hinder teachers from growing into learning designers. Jane (pseudonym), from another secondary school in Singapore, is a very experienced teacher who has taught for more than 25 years. Recently, she decided to explore how technology can be harnessed to design learning for her students. In her Physics lesson on Sound, she used freely available web 2.0 tools such as the Google apps and other useful Physics ICT tools such as ProTuner app and Noise Watch app to record volume in different parts of the school and nearby environment. By doing so, Jane used technology meaningfully to design an authentic learning experience where the connection between the
knowledge of the nature of sound (frequency, waveforms, pitch and loudness) and applications in the real world is made.

These everyday examples of teachers’ work, and seldom reported, attest to the value they find in using ICT with meaningful and authentic learning designs. Teachers in general are very pragmatic individuals, and we have found that if new innovations are introduced to them and they do not find them valuable, the adoption of these would quickly fade. Many of the instantiations of learning designs through technologies have not only sustained but propagated through the professional sharing platforms which the MOE has setup among teachers and school leaders.

**Conclusion**

Designing learning is within all of our reach. The appropriate use of technology promises to deepen the learning of traditional literacy, numeracy and the mastery of subject knowledge. More importantly, technology provides opportunities for the development of 21st Century Competencies. Jointly, they form the complementary competencies for students to become future-ready. As a teaching tool, technology also opens up new possibilities for the teachers to design meaningful learning experiences for their students.

Policy makers would make decisions on education funding and whether spending should continue on technologies need to see this as an opportunity to disrupt instructional practices and not just whether it produces results when compared to students’ learning through textbooks and the like. Considerations must be placed on teachers’ professional learning in tandem with possible changes in classroom practices. Investments in educational technology can be considered in terms of not spending disproportionally on infrastructure and applications, but instead on teacher learning and social-technological infrastructures such as buying out teacher time to experiment on new innovations.

In their book, The Global Fourth Way: The Quest for Educational Excellence, Professor Andy Hargreaves and Professor Dennis Shirley credit the success of Singapore’s education system
to three factors: 1) Innovation in technology, 2) Intensity of professional interaction and 3) an “ability to live and work with paradox”. As an educational system, Singapore has done well. But, as a system, we must be careful not to be shackled by golden handcuffs. We must not only gaze into the mirror, but we must continually look out of the window to do even better in preparing our students to become future-ready.

References