Technology in Learning

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Abstract: Why does technology in higher education and training matter? Learning matters because without it individuals, organizations, and society stagnate and stand still. Good learning experiences matter because they engender a love of progress and development that leads to a lifelong desire to progress and continue learning. Distance learning and blended learning programs offer an opportunity beyond that of a delivery method for transmitting module content to learners.

This article positions high-quality learning, teaching, and learners' experience as a cultivation and blend of social interactivity alongside the sharing of knowledge, feedback, and experience.

Keywords: Blended Learning, Connectivism, Distance Learning, Learning, Learner-Centered

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INTRODUCTION

Technology in learning is far from a new invention. The days of blackboard and chalk in our school classrooms, front-of-the-class lectures, and whiteboard-and-workbook classrooms are numbered. The advent of computing, computer labs, and access to online and e-learning has progressed in line with the adoption of digital platforms in the workplace.

Learning has always adapted to environmental opportunities beginning with correspondence courses becoming available following the development of the universal postal services. It could be argued that in many respects the use of digital platforms for delivery of learning is little more than an extension of the correspondence course; technology is simply a more efficient delivery mechanism for the transmission of knowledge and content. In education, technology has transitioned from chalkboards to smart boards, overhead transparencies to overhead projectors, and the television and video trolley to embedded MP4 files. This has been facilitated by the use of PowerPoint, video, and more recently animation, as the demand for more professional, learner friendly, and entertaining methods of content has become de rigeur in the teacher's toolkit.

For some, making learning fun, entertaining, and easy-to-digest has led to accusation of dumbing down as learners opt for easy-to-access bite-sized options, slick four-point PowerPoint, or 5-minute short animations, instead of years spent searching through the hallowed halls of research and reference libraries digesting obscure books written in an academic language that excludes rather than includes.

For learning providers, YouTube videos longer than 5 minutes are considered too long for the short attention spans of learners, children's learning is focused on games, and adult learning appears to be delivered to students who don't have time to read widely or think critically, resulting in a situation where tutors and trainers are pressed to provide the answers to pass the course rather than developing deep learning and a curiosity for the subject they are studying.

In society at large, the use of smartphones is driving a new way of interacting with content and changing the way in which individuals communicate with each other and with institutions. The development of the World Wide Web has transformed society in ways that could not have been imagined when the web became publicly available in 1991. Technology has heralded the digital era impacting upon economic activity, working practices, and work itself, as well as shifting norms of social interaction, self-concept, and the process of meaning-making.

Moravec (2013) introduced the term Knowmads to describe the changes in the workforce that is transforming how and where learning takes place. The rise of the nomadic knowledge worker in the economy has resulted in a workforce who demonstrate a flexibility in regard to who they work with, where they work, and when they work. This shift has consequences for traditional learning delivery methods, as classroom-based learning no longer meets the requirements for the independence, self-determination, and demand for interactivity. Technology in Learning is not simply the introduction of fancy gadgets in a classroom setting, it provides the freedom demanded by Knowmads to learn what they want, when they choose, how they wish, and where they desire.

Social networks such as Facebook and Twitter have been a game changer in the way in which people communicate and live their lives. Individuals have become both broadcasters and receivers of information, evolving both consumers of content and contributors of knowledge. However, in a world rich with information, perhaps suffering from an abundance of information, the issue has become one of overload and post truth debates. One of the biggest challenges facing the learning and development profession is how to ensure that learners are learning from valid sources of information and that the knowledge content they are assimilating is relevant and reliable.

What Is Learning?

Learning is a multifaceted concept, which depends on both context and outcome. Gray (2007: 496) argues that, "action and experience. . . do not inevitably lead to learning"; rather individuals develop mental models of the world, and where experience conforms to existing cognitive structure, learning is prevented. Since new experiences are assimilated using existing neural networks, new learning is more difficult where existing neural networks are absent, whereas learning based on prior experience or learning is more readily processed (Knowles et al, 2015). A precondition to learning could be the adoption of tools and processes for individuals to assimilate experience. An interpretation of this research is that learning agility and learning from experience are essential skills in the modern world. Learning can be something as simple as acquiring a new piece of information, such as learning someone's name, or transformational in regard to affecting an individual's foundational beliefs and values, causing them to change direction, shift thinking, and understanding or deeply affect an individual's life meaning. Meizrow (1990) explored the latter, describing it as transformative learning. Transformative

learning follows a transforming experience that results in the learner acquiring knowledge and skills and developing attuned attitudes, values, and beliefs as a result of the learning process. Learning in this respect therefore is more important than the transmission of information or facts, rather it inspires critical thinking, prompts reflection, and leads to the learner changing as a result of having gone through the process of learning.

Transformative learning implies that a certificate or qualification by memorizing knowledge is not the sole purpose of learning, rather that the ultimate goal of learning endeavor is change. New experiences, which require the individual to confront their frames of reference, provide the arena for new learning to take place. This view is supported by Boud and Walker (1991) who highlight that the continuous, dynamic, and complex interaction between the learner, learning milieu, the learning environment, and reflective processes is required to assimilate experience and lead to action.

Traditional educational systems have focused upon content-based learning, demanding that students memorize declarative knowledge, learning facts and principles, which are subject to a summative assessment to prove that the learner has succeeded in learning, or rather memorizing that knowledge. This reinforces the notion that tutors are there to provide students with wisdom and the assessment of learning is based on how much wisdom students are able to absorb in time for the exam (Willis, 1993). However, this encourages surface learning rather than deep learning. This is highlighted by problems students have with connecting what they have learnt at university with what is happening in their workplace. Declarative knowledge is often supplanted by new knowledge, what it was to know about a subject becomes outdated and outmoded. In this respect learning focused on memorizing facts has the potential to quickly become obsolete and lacks the agility and flexibility demanded of the digital age.

The speed of change prompted by globalization and technology, which has heralded the digital age, has meant that educational norms are under pressure. It is often said that the children being taught is school today will be working in jobs that don't yet exist. Even for those already in the workforce there is a requirement for lifelong learning and pressure to ensure that knowledge and skills remain current and marketable. The realities of the complex, turbulent, and fast-changing organizational environment demands that individuals take every opportunity to learn, and that includes learning from every experience encountered (Terrell and Rosenbusch, 2012). As a result, learning is beginning a process of moving away from the transmission of content from teacher to student, to a learner-centered approach focused on discovery, interactivity, and creativity. Focusing on developing declarative knowledge risks the learner's capability becoming redundant, not so much low skilled as old skilled.

Learner-Centered Learning

Another notable change is the growing acknowledgment of the need for learning to be learner-centered. In the last century, education was dominated by experts giving seminars and lectures to the worshipful masses, who turned up to hear the sage wisdom in the hope that it might make them cleverer. The outcome of the teacher-led interventions was that learners discovered they didn't remember most of what was said, and the little that they could remember added to their knowing, but not necessarily to their ability to operationalize their learning in order to make use of it. Knowing that is all very well, but being book-smart isn't enough in the world of work, which is task-focused and requires immediate action. Elton (2010) argues that allowing learners to find solutions to relevant problems aids learning. This ability to be self-directed should be encouraged by allowing learners "to have choice and control whenever possible" (Mazmanian and Feldman, 2011: 325).

There are two parts of the equation to learner-centered learning. First, there is the input focus, whereby individual learners are demanding a personalized approach to their learning requirements. What they don't want is to be told stuff or have to learn stuff that is not relevant. This personalization of the curriculum is partly responsible not only for the increased popularity of Massive Open Online Courses (MOOCs), but also for the rise of specialisms in regard to formal educational programs offering a number of different pathways to suit the diversity of learner interests. The input focus is also concerned with how the learner learns. Readiness to learn operates on the basis of an individual paying attention to intense and diverse experiences if they highlight an immediate developmental requirement (Luo and Peng, 1999**;** Knowles et al, 2015). Also, the choice of delivery vehicle for learning transmission will vary based upon the learning style of the learner, and what content should be delivered must be focused upon what the learner needs to learn rather than what the tutor thinks they should be taught. The second part of learner-centered learning is on outcomes, how the individual learner makes sense of what they are learning. Vocal pace, tone, language, and communication method—all have a part to play in shaping how the learner reflects on the knowledge content or on an experience and how the learner is able to make sense of their learning. This is personal rather than personalized, but means that the learner will seek out a unique pathway to assimilate their own understanding of what they have been learning.

Why Learning Matters

Learning matters because without it individuals, organizations, and society stagnate and stand still. Good learning experiences matter because they engender a love of progress and development that leads to a lifelong desire to progress and continue learning. The desire to learn begins with the individual being situated in an environment that causes the learner to become curious, which in turn has the potential to develop into a climate where creativity, problem solving, innovation, and growth expand exponentially. The emphasis is on helping learners develop "a deep approach to learning that seeks deeper meanings and understandings of what they are studying" (Cheng et al, 2009: 320). However, good learning does not happen in a vacuum; it requires a deliberate and systematic interaction among learner, opportunities to learn, and meaning-making.

This article positions high-quality learning, teaching, and learner's experience as a cultivation and blend of social interactivity alongside the sharing of knowledge, feedback, and experience.

Summary

- It could be argued that technology is simply a more efficient delivery mechanism for the transmission of knowledge and content.
- The demand for more professional, learner-friendly, and entertaining methods of content has become de rigeur in the teacher's toolkit.
- Technology in Learning provides the freedom demanded by Knowmads to learn what they want, when they choose, how they wish, and where they desire.
- Learning agility and learning from experience are essential skills in the modern world.
- Transformative learning inspires critical thinking, prompts reflection and leads to the learner changing as a result of having gone through the process of learning.
- Learner-centered learning is both personal and personalized.

WHY TECHNOLOGY IN LEARNING MATTERS

There should be no false distinctions between the real world and the digital world, there are certainly none in the minds of learners; what is important to note is that technology is enabling an enhanced learning paradigm to emerge. "As education strives to

Figure 1: Open Iterative System of Learning
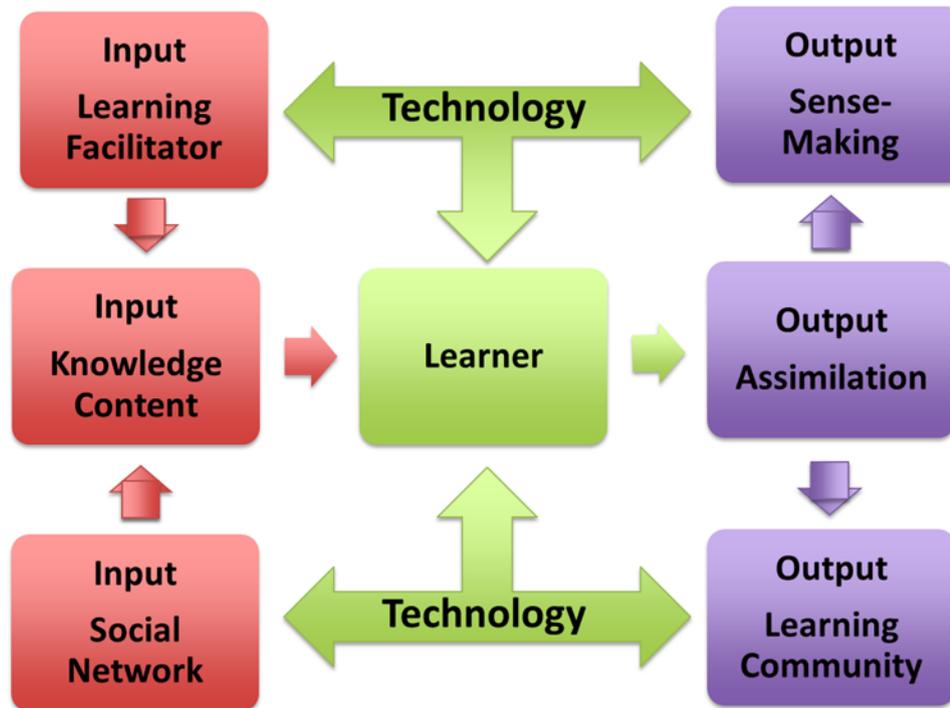
preserve its old traditions, an entirely new generation of learners, immersed in the digital world from birth, is entering our gates. They are demanding—and expecting—new approaches to learning, approaches that incorporate technology" (Wheeler, 2015).

Technology in learning is important, not only because it provides an efficient vehicle to support the delivery of material to the learner but because it fundamentally changes how learning happens, transforming the culture and environment of learning. Technology has the ability to activate and interconnect content, learner, learning community, and learning facilitator. It has the capacity to create juxtaposition between the learner accessing knowledge content and the process of sense-making. It is more than a simple transmission system; it creates an open iterative system of learning (see Figure 1).

Within this system, technology becomes more than a transmitter, broadcasting knowledge content from the teacher to the learner. The teacher becomes a learning facilitator who engages in a process of coconstruction with the learner. Technology offers a range of digital tools that facilitate an enabling conduit, which frames the process of learning. At the center of this process is the learner feeds from, feeds back, and feeds forward into the system of learning.

Traditionally, learning has been centered on some form of instruction or experience that results in new or improved knowledge or skill (Foster and Stines, 2011). Technology as an open iterative system of learning operates on the basis of a continuous process of inputs and outputs made possible because of technology and digital platforms. The learner feeds from the input elements and contribution from both the learning facilitator and social network advancing the internalization of the knowledge content. Technology extends the learning process by allowing the learner to feed forward their initial conceptualization of their newly acquired knowledge into their social network. This allows the learner to assimilate and

contextualize the information to create new knowledge contributing to their existing cognitive structure. The learner then uses technology to feed back into the system of learning both to develop a socio-cognitive mindfulness through their contribution and interaction with the learning community and a shift in their phenomenal world as they engage in sense-making (Knowles et al, 2015; Yeganenh and Kolb, 2009). This system repeats itself as the learner then feeds from the response of the learning facilitator and social network. Technology therefore offers an iterative system of learning, which results in and contributes to a continuous process of new understanding and meaning-making for the learner, the learning community, and the learning facilitator. In this respect the iterative system of learning is aligned to Govarets and van der Vleuten's (2013: 1167) proposition that "learning for future practice thus implies that learning is an on going process without a clear endpoint; learning is never complete."

Double-Loop Learning—Argyris

The iterative system of learning described earlier is based on the Argyris (1976) double-loop learning theory, which describes the learning process that leads to change in the learner's underlying values and assumptions. The double-loop learning theory distinguishes between a learner's opinion or point of view (espoused theory) and their action (theory in use). Double-loop learning requires the learner to question the assumptions that are underlying their current perspective, developing alternative methods, putting their new ideas into action, and then responding to feedback from the system as to how the implemented changes have improved the learner's efficiency. The purpose of double-loop learning is to develop deep learning, challenging familiar ways of approaching problems, or thinking about a situation and testing out new skills or ideas. Double-loop learning is reliant on dialogue and communication. Technology, specifically socio-digital platforms, provide the feedback loop necessary

to identify and challenge existing perspectives whilst providing feedback through interaction on developing viewpoints.

What Technology Offers Learners

Technology, specifically digital platforms involving virtual learning environments (VLEs) and social media, provides a number of advantages to both learners and learning facilitators. For educational establishments, technology breaks down the reliance on a physical campus, and instead provides a boundary less campus that offers an opportunity to recruit students beyond traditional geographical boundaries. Furthermore, it increases the diversity of the types of learners who may become involved in a program, because barriers to entry are reduced. For those individuals who are already in the workplace and wish to acquire professional qualifications, the introduction of asynchronous learning opportunities means that they can access learning anywhere, anytime. This has the added benefit of situating learning, meaning that the learner can apply what they have learned to their own individual situation. The demand for flexibility is increasing, and will continue to do so as the expectation of learners to be able to study distance learning and blended learning programs becomes the norm. Access to knowledge resources such as libraries is increasingly becoming available online, with the advent of e-books and online versions of journals. This means that getting hold of necessary information is no longer an impediment to learners, opening up declarative knowledge beyond the sacred halls of educational establishments. With more information available, the challenge then becomes about organizing the information, and managing the volume of information that is literally at the learners fingertips; if used well, technology can help the learner to organize and manage the information flow, but if used badly it can be overwhelming. The flip side to the information flowing into the learner

is the tools that technology provides the learner to create content themselves. This is a growing tenet of learning in the digital age. Consuming, capturing, and then sharing in an iterative cycle of discourse and distribution is an area of significant growth in the process of the learning in the digital age. The creation of content from the learner leads to the facilitating discussions and discourse, which aids sense-making.

Summary

- Technology is enabling an enhanced learning paradigm to emerge.
- Technology has the ability to activate and interconnect content, learner, learning community, and learning facilitator.
- The open iterative system of learning operates on the basis of a continuous process of inputs and outputs made possible because of technology and digital platforms.
- The learner is from, feeds back, and feeds forward into the system of learning.
- Double-loop learning requires the learner to question the assumptions that are underlying their current perspective.
- Consuming, capturing, and then sharing in an iterative cycle of discourse and distribution is an area of significant growth in the process of the learning in the digital age.

DISTANCE AND BLENDED LEARNING

The rise of the distance and blended learning formats has reinvented the delivery of learning and learner access to learning opportunities. It has moved learning away from a reliance on physical spaces to the development of boundary less campuses, where learners are connected to learning resources by technology. The border between on-campus and the off-campus activity has become blurred where many learners never meet their tutors in person, and the mode of learning itself dictates a separation between learner and instructor.

The learning environment can be anywhere at anytime, and space and time no longer matter in terms of tutor–learner interaction. Asynchronous methods of delivery, such as forums, recorded lectures and online, interactive subject guides have freed both learner and tutor from the tethers of timetabling. However, synchronous methods such as webcasts, live streaming, and virtual café's enable learners and tutor to meet in real time.

Educational media has made possible enhanced learning environments, which are attractive and compelling in crafting a virtual campus where learners can explore within the learning space, remaining connected to the community and have access to collaborate with other learners, both on their own program and elsewhere. The technological platform becomes a town hall, where interested parties can meet, share, and debate the merits of knowledge content. Learners have the means by which they can create and make their own contributions and leave the learning environment having encountered other unique learner perspectives, thus enhancing their learning experience of the subject in similar ways to a lecture, workshop, or tutorial.

Early adoption of distance learning platforms were focused on swopping instructional methods in the classroom, with instructional transmission using low-tech online platforms. The profusion of material on VLEs such as Blackboard in the 1990s were little more than file sharing of classroom PowerPoint decks and handouts. In simple terms, early distance learning was a digital correspondence course with little opportunity for interactivity and the development of a more sophisticated pedagogy. It was simply a vehicle through which the learner was required to read material, digest content, and regurgitate for assessment. The VLE became little more than an archive of materials similar to the much-maligned pedagogy of chalk and talk.

Today a revolution is taking place, as learners demand more from their learning providers. It's not acceptable to simply provide documents to be accessed, instead the virtual learning platforms and the tools

provided by technology are allowing learners and teaching providers to develop a new pedagogy. Wheeler (2015) identifies four modes of interaction made possible by e-learning:

1. **Intrapersonal:** Boosting the capacity of learners to think, and share that thinking across their network.
2. **Interpersonal:** Creating a catalyst for dialogue with network members.
3. **Peripersonal:** Individual members interacting with their digital devices.
4. **Extrapersonal:** Individual members interacting with their environments (online and physical).

These mode of interaction capture the responsiveness of distance-learning platforms to the changing nature of the way in which we learn in the modern world. In many ways, even full-time students who are learning on campus are experiencing a transition away from traditional classroom interaction to one that relies, in part, on blended learning approaches. The VLE is becoming an extension of physical campuses, students are being asked to access reading prior to a tutorial or classroom workshop, forums are used to answer student questions in between face-to-face sessions and assessments are handed in and marked online.

Learners are building relationships beyond the classroom, making connections with experts, professors, and other learners from around the world. These connections develop into the learner's personal learning network (PLN), always on hand, or online, to support, share knowledge or content, answer questions, debate, and encourage the learner. PLNs are not restricted to distance learners; they can be used in the development of informal study groups and Facebook support groups set up by class cohorts.

Makerspaces

Piaget's theory of constructivism is concerned with the learner developing meaning by constructing and sharing new knowledge and understanding based upon their existing knowledge constructs and the new learning experience. In the digital age, technology provides a platform where individuals can assimilate their experience through the creation of online artifacts, whether that's a blog, prezi presentation, YouTube video, narrative animation, or meme. The guiding pedagogy and theory of learning is embodied in the creation of makerspaces, which provide the online content creation tools as part of the individual learner's PLN or the educational establishment's VLE. The result is the learner engaging in active learning, exploring a subject to innovate, and develop a creative output to make sense of their new understanding.

The key identifier of both distance and blended learning is not so much the fact that technology is used as a delivery vehicle but rather that the pedagogy is focused on the learner being able to create and own their personal learning environment, connected to their PLN and providing the learner with tools to create and contribute their own unique take on what they have been learning.

Summary

- The border between on-campus and the off-campus activity has become blurred.
- Early distance learning was a digital correspondence course with little opportunity for interactivity and the development of more sophisticated pedagogy.
- The VLE is becoming an extension of physical campuses.
- Learners are building relationships beyond the classroom, making connections to develop a PLN.
- PLNs are not restricted to distance learners; they can be used in the development of informal study groups and Facebook support groups set up by class cohorts.
- Makerspaces provides online content creation tools as part of the individual learner's PLN.

BEYOND CONTENT TRANSMISSION

Technology in learning is very often spoken of as something different from learning in the classroom or workshop—introducing a digital platform separates learning in the real world from learning using technology. However, when it comes to learning, there is no separation between online and offline worlds, learning is learning regardless of where it happens or what method is chosen as a vehicle for learning delivery.

Perhaps more important is the realization that the new generation coming into the world of work, and those in the compulsory education system are a digital generation, for whom technology has been a familiar companion throughout their lifetime. For many learners they are connected at all times, and they are more comfortable using their mobile phone, tablet, or laptop to connect, gather information, watch videos, and learn than they are with a book from the library, a hardcopy journal, or sitting in a lecture theater. Therefore, there is an expectation that technology will be used in the learning process. However, introducing technology is not simply replacing a blackboard with an Interactive White Board. Facilitating learning through the use of technology requires new thinking and an examination of how technology can improve pedagogy. There needs to be a recognition that technology imbues the learning facilitator and the learner with an obligation to develop new learning practices.

Mezirow—Transformative Learning

Transformative learning is a constructivist model that results in the learner revising their previous understanding to create new meaning through a process of critical reflection. Merriam (2004) argues that cognitive development requires that the learner take part in an objective critique of their existing assumptions and that engaging in critical reflection on and critical–dialectical discourse about an experience are the key elements of transformative learning. Mezirow (1990) defined three types of learning: instrumental, communicative, and dialogic.

Instrumental learning focuses on processes and content of task-orientated problem solving that relates to how something is done and enables the learner to consider how to improve performance. Social sharing and engagement with their PLN allow the learner to engage in instrumental learning on an individual basis, working through problems to find solutions, and find better ways to do things. The wealth of information that is available to an individual through their digital device means that it is simply a matter of typing how to, into Google to find advice, tips, and techniques to improve performance. Learning facilitators are able to integrate new processes of content sharing within the classroom environment. For a long time the use of devices such as mobile phones and laptops was forbidden in classrooms considered to be a distraction from the teaching being delivered. As web tools such as live streaming, Twitter stream channels to follow a class hashtag, and content sharing platforms have developed in sophistication and reliability, the connected classroom can combine the contribution of the learning facilitator, learner, and the wider learning network of the whole class to engage in instrumental learning.

Communicative learning is the process of learning and understanding meaning by how others communicate ideas based on values, feelings, principles, and morality. It is a process of "learning to control and manipulate the environment or other people" (Meizrow, 1990). From a technological perspective, reflective practice, such as writing and sharing a blog, tweeting, engaging in forums, or simply exploring websites and online libraries to discover alternate perspectives, is focused upon communicative learning. The comments and interaction with others in social networks help to

create new meaning. However, there are some risks that the savvy learner must consider. Reliability and credibility of the information being read has, in recent years, become more difficult to discern. Many parody websites now publish fake news, and individuals need to take time to filter and check the reliability of what they are reading, rather than responding based on a single source. The emergence into popular parlance of post truth following the 2016 presidential election highlights the postmodern rejection of reliable sources and the growth of narrative in how people assimilate their understanding of the world. Fragmentation and the unreliable narrator are all characteristics of knowledge sharing and communication in the social space.

Dialogic learning involves the construction of understanding and the interpretation of the learners' world including the subject framework through dialogue. Ongoing narrative and dialogue will challenge the individual learner to self-organize the emerging themes, ideas, and suggestions, which are developed in interactions with other individuals within their social network. Mezirow (1991) describes perspective transformation as a situation where the individual learner is liberated of their assumptions through becoming critically aware of any distorted meanings that may be impacting their problem-solving and decision-making. Discourse and critical reflection are pivotal in the process of perspective. As individuals engage in a process of critical reflection, they transform their frames of reference and develop new perspectives. There is, however, an inherent danger that the learner's PLN will become little more than an echo chamber, rather than challenging the learners' existing assumptions, prejudices, and perspectives. The chaotic nature of modern life leads to the creation of safe spaces where the individual feels safe and understood. The downside of chaos is uncertainty leading to the learner rejecting new understanding and challenging perspectives in favor of the known.

Connectivism

Siemens' (2002) learning theory, connectivism, seeks to provide clarity to the complexity created as a result of the use of technology and connection via social platforms in the digital age. The acquisition of knowledge has become chaotic due to the contingent-learning environment engendered by technology. Connectivism as a theory explores how the unpredictability of the current learning environment requires the learner to self-organize to create meaning and engage in lifelong informal learning through the development of PLNs. Most importantly, connectivism offers an alternative to the memorization of declarative knowledge, which dominates pedagogy in traditional teaching institutions. The new paradigm offered by connectivism places an emphasis on the learner's knowing where knowledge can be found. Given the vastness and global nature of online communities and the World Wide Web as an information- and knowledge-sharing platform, searches for knowledge can often lead to random discoveries and requires a nomadic approach whereby the learner is willing to explore areas that may be virtual rabbit holes. The theory of Rhizomatic learning (Deleuze and Guattari, 1987) links to connectivism whereby the learner engages in a multidirectional knowledge exploration process, which results in an interconnected knowledge root system made up of multiple links and layers. This means that where knowledge resides no longer matters, as long as the learner knows where to find it.

Learners are no longer simply receivers at the end of the learning transmission from the expert teacher. They have become producers of knowledge capable of taking what they have learned and "creating, repurposing, organizing and sharing" that knowledge (Wheeler, 2015: 97). Like the bards of old, who would share stories, learners are now online bards of knowledge, purloining from multiple sources the components of our learning story to innovate, create, and

contribute. This develops the traditional transmission model to a cocreation multiplex. The role of education and learning interventions in this environment is to move away from content delivery and instead provide the platform for connecting learners to sources of knowledge from which they can create their own understanding, picking and choosing the subject matter that fits with their own frame of curiosity.

Summary

- When it comes to learning, there is no separation between online and offline worlds; learning is learning.
- Transformative learning results in the learner revising their previous understanding to create new meaning through a process of critical reflection.
- The connected classroom combines the contribution of the learning facilitator, learner, and the wider learning network to engage in instrumental learning.
- Fragmentation and the unreliable narrator are all characteristics of knowledge sharing and communication in the social space.
- Dialogic learning will challenge the individual learner to self-organize the emerging themes, ideas, and suggestions that are developed in interactions with other individuals within their social network.
- The unpredictability of the current learning environment requires the learner to self-organize to create meaning and engage in lifelong informal learning.
- Where knowledge resides no longer matters, as long as the learner knows where to find it.

HIGH-QUALITY LEARNING AND TEACHING

A number of models of learning exist, which attempt to explain how high-quality learning and teaching process results in a learning experience that changes the learner and provides a forum for meaning-making. The emphasis of a good-quality learning process is on the progress of the learner from input of knowledge content, to assimilation through a process of critical reflection and meaning-making. Distinctions are made between reflective and non-reflective learning outcomes.

Argyris and Schön—Single-Loop and Double-Loop Learning

Argyris and Schön (1996) offer a framework of single-loop and double-loop learning. Single-loop learning is used to explain a surface level of learning, whereby a learner may find solutions to a problem, which needs fixing, but does not challenge current assumptions or models of thinking. Single-loop learning may involve intuition and can be useful in making decisions that are based on requirements with relatively fixed outcomes and can be useful in enabling the development of a strategy for action.

On the other hand, double-loop learning is related to critical reflection because it explicitly explores and evaluates the learning experience using existing conceptualizations, underlying assumptions, and consideration of the consequences of the actions taken (Fook et al, 2006; Van Woerkom et al, 2002). This will include a confrontation of existing assumptions, values, beliefs, and biases as a result of social and political context, which is considered necessary for improved professional performance.

Kolb—Cycle of Experiential Learning

Kolb (1984) provides a process of reflective learning based upon the Lewinian Experiential Learning Model. The model is based on the concept of creating meaning from experience and aims to help the learner learn about and from the experience.

The process begins with concrete experience, which relates to ill-structured and complex experiences with which the learner is involved. The process continues with the individual entering a phase of observation and critical reflection. This leads to the learner developing an abstract conceptualization where new concepts are created and finally active experimentation, which requires individuals to take what they have learnt from the process

Figure 2: A New Model of Learning: Technology in Learning

and "make decisions and solve problems" (Kolb, 1984: 30).

The experiential learning model is a systematic learning process that is a continuous loop based on experience and reflection in order to facilitate learning. A linear progression through each stage of the model will result in instrumental learning of skills and knowledge, whereas experience and action without learning is considered to lack meaning (Roessger, 2014).

Wheeler (2015) argues that Kolb is outdated and relies upon a pedagogy associated with instructional design describing a basic teacher-led process that disregards social learning, which is a central facet of learning in the digital age. The model is further weakened by the detachment of the learner from other learners, which ignores the connectedness of learners today.

A New Model of Learning—Technology in Learning

To explain the involvement of technology in the learning process the development of a new model of technology in learning is proposed. The technology in Learning Participation model (Figure 2) seeks to encompass the changing landscape of how quality and learning and teaching happens as a result of the learner having access to, and the use of, digital platforms to support their learning. There are four stages to the model: Discovery, Participation, Engagement and Creation.

1) Discovery—Exploring Content and Identifying with Others

Discovery involves the learner investing time to explore the real and virtual world for accessible learning content, objects, tools, and development opportunities available. It involves a process of the learner finding and searching for new knowledge, the random exploration of new lines of inquiry using different modes of learning to immerse themselves in new discoveries. Discovery enables communicative learning to take place. It requires key skills relating to curiosity, inquisitiveness, a questioning mindset, reflection, networking, and exploration to navigate multiple layers to find relevant knowledge. Technology supports the learner both as a vehicle for exploration to develop a PLN, and as a means of organizing learning content for sense-making.

2) Participation—Building Relationships with Content and with Others

The learner participates through their PLN in a dialogic process, which includes online discussion and face-to-face conversations. The result is participatory meaning-making in which the learner is empowered to share, participate, build, and exchange knowledge and understanding with others. Participation requires the individual to build relationships with content and with others, making connections between content and ideas and taking opportunities to express their voice. Participation enables instrumental learning to take place. For participation to be effective, the learner needs to engage with a diverse network and content streams overcoming any aversion to conflict and avoiding the echo chamber. Participation requires key skills in exchanging ideas, engaging in synchronous and asynchronous dialogue, self-expression, critical thinking, and sociability. Technology provides a platform in which social participation without boundaries becomes possible. It also provides the tools for online discussion, dialogue, and exchange of ideas to happen in real time.

3) Engagement—Commitment to Community and Disseminating Information

Participation only goes so far, and can be superficial unless the learner engages with and commits to being part of a learning community that works together to solve problems and develop solutions. This requires the learner to cojourney with others to go deeper into the knowledge content to find out more and develop connecting knowledge streams. Social interactivity is at the heart of technology in learning, which provides online tools and the opportunity for learners from all walks of life to become involved in learning opportunities, outside of the traditional educational boundaries. Engagement requires the learner to respect the input of others and suspend assumptions and judgment within community discussions. Dialogic learning becomes possible as the learner joins others to build and coconstruct new knowledge and understanding, which they then share more widely and circulate among other communities to which they belong. Engagement requires key skills in debate, revising understanding and assumptions, balancing advocacy and inquiry, redirection to focus on desired outcomes, organizing, and dissemination. Technology provides the learner with the opportunity to engage in a number of different learning communities and embody a number of different roles and increase their footprint of circulating knowledge content.

4) Creation—Coconstructing Content and Sustaining a System of Connection

An output of engagement is the coconstruction of content by the learning community. Learning by doing and learning by making are made possible through the content creation tools such as wiki's, blogs, multimedia digital tools, website development, and file sharing. It can be as simple as writing a blog on LinkedIn or broadcasting multimedia files. The important components of

the creation are that it is based on a coconstruction of content with others within the learning community and that it contributes to the network's developing body of knowledge. As new knowledge is created, the cycle begins again as the input into the knowledge system creates opportunities for the learner to discover more knowledge and content, and increase their PLN. Creation requires key skills in digital platform use for creation of content, collaboration, negotiation, creativity, production, writing, and making connection between new content creation and existing knowledge.

As the learner engages with technology in learning, they become part of the knowledge system, and the result is a self-sustaining system of connection between the learner, knowledge content, and the wider learning community. The result is that the learner is both a consumer and a facilitator in the learning system, a system made possible by technology.

However, this system can become corrupted if the knowledge being created is based on bad input knowledge, and faulty processes of learning. Learners operating within an echo chamber and/or the unreliability of knowledge upon which meaning-making is being made will result in an accumulation of untrustworthy and invalid sources of knowledge within the system. The speed at which information travels within the system can have a similar effect to that of a corrupted file on a computer; it spreads the contagion fast. There are no answers as to how to manage the dissemination of corrupt knowledge within the system; however, it is the responsibility of every learner to check their facts and ensure that they consume with criticality. Is this true? This is perhaps the most important question a learner can ask during the discovery phase.

Summary

■ The emphasis of a good-quality learning process is on the progress of the learner from input of knowledge content to assimilation through a process of critical reflection and meaning-making.

■ Kolb's model of experiential learning disregards social learning, which is a central facet of learning in the digital age.

■ A new model of Technology in learning is proposed to explain the involvement of technology in the learning process.

■ Discovery involves the learner investing time to explore the real and virtual world for accessible learning content, objects, tools, and development opportunities available.

■ Participation empowers the learner to share, participate, build, and exchange knowledge and understanding with others.

■ Engagement requires the learner to co-journey with others to go deeper into the knowledge content to find out more and develop connecting knowledge streams.

■ The important components of the creation are that it is based on a coconstruction of content with others within the learning community and that it contributes to the network's developing body of knowledge.

Enhancing Learner Experience

With all the research available regarding what components make a good learning environment, it might seem curious that even today many educational establishments and educators ignore learner experience, with the focus still being on teacher-led interventions. In many ways this can be attributed to the Victorian paradigm upon which education in the Western world was founded. In a time of industrialization, mechanization, and a focus on efficient production, instructional education design was perhaps inevitable. What the ruling class needed were individuals who were taught skills and could apply those skills by doing what they were told to do, when they were told to do it. The national school system was introduced, not for the educated classes but for the poor and uneducated. Those with money and influence continued to be educated privately or at elite institutions. During the industrial revolution the uneducated weren't being paid to be creative, instead they were paid to do a task as dictated by their masters. This

isn't meant as a damnation of the earlier pioneers of education. Educating people was necessary for the development of the Western world, driving forward economic powerhouses and improving the chances of the poor to progress.

The principles of learner-centered learning are based on Heutagogy, which is the study of self-determined learning. Heutagogy challenges the prevailing educational paradigm and argues that people inherently know how to learn. The challenges to traditional education is therefore to support learners to engage in self-directed learning where the learner controls the choice of what to learn, who to learn from, the mode of learning, and the direction of their study. The outcome of Technology in Learning is that knowledge becomes negotiated as tutors and learners become equal partners in the learning process. Both the tutor and the learner are equal partners and are both learners and teachers of each other, which shifts the power balance within the learning process. Self-governing learning is by its very nature antiestablishment and that is uncomfortable to learning providers.

The other transition is the move from formal learning to informal learning. Lifelong learning requires individuals to keep their skills and knowledge up to date to remain flexible and agile in a fast-changing complex environment. However, lifelong learning is not about taking a new qualification every couple of years. It is about keeping up to date, and that does not necessarily mean taking a new course. Technology offers the opportunity to learn what is needed to stay relevant without ever enrolling on a course.

However, despite the trends toward informal learning, in the twenty-first century, the institution you are educated at and the qualifications you hold provide weightage when it comes to getting a job. Those who go to elite private schools are more likely to succeed in securing employment as a professional, than those who were educated at local comprehensive school. It begs the question whether all learning is equal? But technology is beginning to level the playing field. Individuals who would never gain access to institutions such as the Russell Group Universities in the UK are now able to access MOOCs by establishments such as Oxford University. The increase in the development of online learning resources and environments, especially by established education providers, indicates that the paradigm is shifting.

Massive Open Online Courses

There is a growing recognition that the way in which learners access learning content has changed. MOOC is shaking up the infrastructure of traditional learning portfolios, heralding an era of informal learning platforms that allow individuals to pick and mix courses that interest them, without committing to a full-time three-year degree course. The impact of the universality of MOOCs being offered by universities is that the learner is no longer choosing what university campus that will become their home for the next three years, instead it is what courses are available for the learner to access from the comfort of their home that is of interest to them. There are, as with all modes of delivery, advantages and disadvantages of the introduction of MOOCs (see Table 1).

Table 1: Advantages and Disadvantages of MOOCs

Advantages	Disadvantages
Increases opportunity for lifelong learning Expands the range of subject areas Increases access to institutions Uses a wide range of interactive tools to support learning Leaners can work at their own pace Convenience of accessing course around own schedule	Proportion of students not completing course Lack of interaction between learner, facilitator, and other learners on the course Lack of qualification outcome Large audiences reduces time that tutors can dedicate to provide feedback

Components Required to Enhance Learner Experience

Barriers to learning opportunities are breaking down, but this doesn't mean that all learning opportunities on offer provide an enhanced learner experience. It would be nonsense to say that the learning experiences that students have at a red brick university is universally better than that at an ex-polytechnic. Instead, most people would identify individual teachers or tutors as opposed to an establishment when it comes to a particularly good learning experience. Good learning experiences, it seems, are not about place, it's about people. There are, however, several components from research that appear regularly in good learning practice, including:

■ **Socratic discourse:** A deceptively simple pedagogy that is thousands of years old, Socratic questioning works on the philosophical basis of helping learners to learn, rather than trying to teach them anything. The role of the facilitator is to create a space where individuals feel empowered to debate and explore a subject, where there is no right or wrong, just good questions and empowered dialogue. Technology removes the physical barriers of the classroom and allows spirited discourse to take place across geography and time, allowing students more time to consider the questions, and make meaningful contributions. Something limited that is limited by a scheduled time-based curriculum.

■ **Storytelling:** Storytelling is part of most human cultures; it existed before printed books and by examining specific stories from our experiences and reflecting on that experience, it is possible to create a positively focused dialogue. The collective imagination of the human race is powerful, and enquiry into the best of what is now and was in the past can help provide a rich process analytical engagement and knowledge assimilation. This people-led pedagogy is expanded by digital platforms, which allows stories to be shared with a wider audience. From a learners' perspective, there is no longer a requirement for the story to be your own experience. Instead accessing the same story from other people becomes the shared experience of the learning community. The culture of storytelling on digital platform releases the story from the original owner, meaning that other people's stories become our stories to tell.

■ **Experimentation:** Pedagogically, experimentation is based on creating new experiences for the learner. By doing things for themselves rather than being told what to do, or watching someone else do it, the learner becomes the focus of the learning activity. Technology provides the learner with their own tools to learn both within formal and informal contexts. The key to experimentation is developing a confidence for the learner to try things out and use the tools at their disposal. The proliferation of students on courses producing blogs, podcasts, YouTube videos, and file sharing online is testament to the positive learner experience that experimentation delivers.

■ **Adaptation:** Provides a multifaceted exploration of a subject area, taking in different perspectives, ideas, beliefs, values, and content before creating something new from that, which already exists. Existing knowledge and skills are transformed through the combination of constructing a tangible output or by assimilating abstract ideas and concepts, which can be applied in real-life contexts.

The Technology in Learning model integrates Socratic discourse, storytelling, experimentation, and adaptation at each stage of the process. Whether using technology or not, however, good pedagogy is good pedagogy, both online and offline. Creating an enhanced learner experience using technology therefore requires the same inputs that an enhanced learner experience requires offline. It's about good pedagogical choices.

Summary

- Most education systems in the Western world are founded on a Victorian paradigm.
- Barriers to learning opportunities are breaking down, but this doesn't mean that all learning opportunities on offer provide an enhanced learner experience.
- Good learning experiences are not about place, it's about people.
- Socratic discourse creates a space where individuals feel empowered to debate and explore a subject, where there is no right or wrong, just good questions and empowered dialogue.
- The collective imagination of the human race is powerful, and enquiry into the best of what is now and was in the past can help provide a rich process analytical engagement and knowledge assimilation.
- By doing things for themselves, the learner becomes the focus of the learning activity.
- Creating an enhanced learner experience using technology therefore requires the same inputs that an enhanced learner experience requires offline. It's about pedagogical choices.

CONCLUSION

Perhaps the biggest contribution to learning that technology makes is that it is no longer the teacher who is the expert and has all the knowledge, which they will regale to the students. Instead, technology equalizes knowledge acquisition and knowledge sharing. Knowledge is literally at every learner's fingertips, anything that someone would desire to learn, whatever a learner wants to know about, can be found somewhere. What technology offers to learning is a return to the Socratic roots of learning, where learning to think, reflect, debate, and come to your own conclusions is more important than being given the right answer by an expert. It could be argued that leaving the learning environment with more questions than answers is essential to enhancing learner experience. The pedagogy of technology in learning is still developing, but what is clear is that the PLN is supplanting the role of teacher and the individual's own learning communities. Whether face to face or on virtual platforms, the learning facilitator role is developing into content input using signposting, facilitative questions rather than about the impartation of declarative knowledge and perhaps, most important of all, becoming a colearner in the learning process.

Furthermore, technology enhances the learner's ability to make something of the knowledge they have learned. They can create, expand, and contribute to the content that exists in ways that could never have been imagined even a decade ago. Whether it is the creation of a blog, video, audio file, animation, or their very own online course, the learner can become a destination for knowledge. The creation of material means that they are learning in order to share. From this perspective learners don't even require learning facilitators, simply an innate curiosity is enough to want to find out more in order to learn. Perhaps this is the most startling revelation that technology in learning can offer us. Learning is not the preserve of the elite and technology in learning is directly responsible for reducing or removing gateways and barriers to learning.

In a world where experts are being rejected and post-truth appears to be the new reality, technology in learning provides hope that we are at the cusp of a new Enlightenment.

References

1. Argyris, C. (2002) *Double-loop learning, teaching and research*. Academy of Management Learning and Education, 1(2), 206–218.
2. Argyris, C. and Schön, D. A. (1996). *Organizational learning II: Theory, Method and Practice*. Boston, MA: Addison-Wesley.
3. Boud, D. and Walker, D. (1991). *Experience and Learning: Reflection at Work—Adults Learning in the Workplace Part A*. Burwood, Australia: Deakin University.
4. Cheng, M. M. H., Change, K. W., Tang, S. Y. F. and Cheng, A. Y. N. (2009). *Pre-Service teacher education students' epistemological beliefs and their conceptions of teaching*. Teaching and Teacher Education; 25, 319–327.

5. Deleuze, G. and Guattari, F. (1987). *A Thousand Plateaus. Capitalism and Schizophrenia (trans. Brian Massumi).* Minneapolis, MN: University of Minnesota Press.

6. Elton, L. and Johnston, B. (2002). *Assessment in Universities: A critical review of research.* Learning and Teaching Support Network Generic Centre. 3–97.

7. Fook, J., White, S., and Gardner, F. (2006). *Critical Reflection: Review of Contemporary Literature.* In White, S., Fook, J., and Gardner, F. Critical reflection in health and social care. New York: McGraw-Hill International. 3–20

8. Foster, R. D. and Stines, A. (2011). *Experience, Thinking and Learning: An Integrated Definition and Framework of Reflection.* Organization Development Journal, 29(2), 9–19.

9. Garrison, D. R. and Kanuka, H. (2004). *Blended learning: Uncovering its transformative potential in higher education.* Internet and Higher Education, 7, 95–105.

10. Govarets, M. and van der Vleuten, C. P. M. (2013). *Validity in work-based assessment: expanding our horizons.* Medical Education, 47, 1164–1174.

11. Gray, D. E. (2007). *Facilitating Management Learning: Developing Critical Reflection through Reflective Tools.* Management Learning, 38, 5, 495–517.

12. Hase, S. and Kenyon, C. (2007). *Heutoagogy: A Child of Complexity Theory.* Complicity, 4, 1.

13. Knowles, M. S., Holton III, E. F. and Swanson, R. A. (2015). *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development* (8th Ed). London, UK: Routledge.

14. Kolb, D. A. (1976) *Management and the Learning Process.* California Management Review. 18(3), 21–31.

15. Kolb, D. A. (1984). *Experiential learning as sources of learning and development.* Englewood Cliffs, NJ: Prentice Hall.

16. Luo, Y. and Peng, M. W. (1999). *Learning to Compete in a Transition Economy: Experience, Environment,* and Performance. Journal of International Business Studies. 30(2), 269–294.

17. Mazmanian, P. and Feldman, M. (2011). *Theory is needed to improve education, assessment and policy in self-directed learning.* Medical Education, 45, 324–325.

18. Merriam, S. B. (2004). *The role of cognitive development in Mezirow's transformational learning theory.* Adult education quarterly, 55(1), 60–68.

19. Mezirow, J. (1990). *How critical reflection triggers transformative learning.* Fostering critical reflection in adulthood. Hoboken, NJ: Jossey Bass, 1–20.

20. Merizow, J. (1991) *Transformative dimensions of adult learning.* San Francisco, CA: Jossey-Bass Publishers.

21. Moravec, J. W. (2013). *Knowmad Society*. Minneapolis, MN: Minneapolis Education Futures.

22. Roessger, K. M. (2014). *The effect of reflective activities on instrumental learning in adult work-related education: A critical review of the empirical research.* Education Research Review. 64(4), 17–34.

23. Siemens, G. (2004). *Connectivism. A Learning Theory for the Digital Age.* http://www . elearnspace. org/Articles/connectivism.htm.

24. Van Woerkom, M., Nijhof, W. J. and Nieuwenhuis, L. F. M. (2002). *Critical reflective working behaviour: a survey research.* Journal of Industrial Training. 26(8), 375–383.

25. Wheeler, S. (2015). *Learning with 'e's: Educational Theory and Practice in the Digital Age.* Carmarthen, UK: Crown House Publishing.

26. Willis, D. (1993). *Learning and assessment: Exposing the inconsistencies of theory and practice.* Oxford, UK: Oxford Review of Education, 19(3), p. 03054985.

27. Yeganeh, B. and Kolb, D. (2009). *Mindfulness and Experiential Learning.* OD Practitioner, 41(3), 13–18.