International Journal of Online Pedagogy and Course Design
Volume 12 • Issue 1

Active Learning Online:
Necessity, Faculty Role, and a Concept Model for Course Design

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ABSTRACT

Preparing graduates for the present and future workforce is an important strategic learning and teaching goal of higher education. Towards realizing this goal, institutions are expending significant effort promoting active learning as an institution-wide teaching approach. Active learning is defined as learners deeply participating in the learning process which are being increasingly used in face-to-face contexts, but can it be used just as effectively in the online environments now common in higher education? In their 2017 paper, the authors established that active learning online is certainly possible. In this current article, the authors assert that not only is active learning online possible, but that it is a necessity to bolster workforce and higher order thinking skills needed in this current century. Importantly, the faculties have a crucial role to play in implementing active learning online, and active learning online permeates the whole of the online learning experience within courses.

KEYWORDS

Active Learning, Experiential Learning, Future of Work, Online Learning, Social-Cultural Principles, Technology, Workforce Development

INTRODUCTION: FROM POSSIBILITY TO NECESSITY

In 2017, we queried whether active learning via internet technologies was possible (Wang & Hitch, 2017), concluding that it was. Revisiting that question today, we propose that active learning online is absolutely necessary to foster in learners' higher order thinking and preparation for work. We uphold the view that active learning through technology is not merely an enhancement to effective online learning but is indispensable to preparing students (and some might say faculty as well) for their future.

Why the concern about active learning online? Part of the answer relates to volume of students undertaking online learning. The number of students undertaking online study is staggering and continuing to grow. As of January 2018, there were an estimated 6.3 million students in the U.S. alone taking at least one online course (Friedman, 2018). The number of students engaged in at least one online course has grown over 15% from 2016 to 2018 (Lederman, 2018); Colleges and universities, integrate online learning into their strategy (Kak, 2018) mostly for reasons of competitiveness, expanding market reach and efficiencies; Globally, the age-spectrum of students worldwide who have grown up with technology is lengthening and there is the expectation that technology will be used for learning, just as it is for many other aspects of daily living; And lastly, the current and future workplace

DOI: 10.4018/IJOPCD.2022010105

is incorporating technology at a dizzying pace: "Because of technological advances, technology's role within the organization is itself shifting," reports Satish Alapati, CIO of Media & Entertainment Customer Experience at AT&T. "The role of technology has evolved from automating the business to actually *being* the business" (Kark, Briggs, Terioglu, & Puranik, 2019).

The second part of the answer to the question of why we are concerned about active learning online, relates to the necessity of active learning to successful citizenship of the present and future world and to the continual evolution of human society. Active learning is inextricably linked to development of the higher order thinking capabilities such as analysis, and critical thinking – which are essential to effective functioning in the present and future society and importantly completely necessary to the innovation and creativity required to solve complex problems and keep human society moving forward, positively.

Active learning is a necessity to develop the capabilities required for successful citizenship and driving positive change for human society, in the 21st century and beyond. Increasingly, education is being conducted online and hence, central to the present paper is the argument that active learning in online learning environments is a necessity. Furthermore, the faculty role in active online learning is crucial. The role of faculty in facilitating active learning online is discussed and a conceptualization to guide the design of online courses based on the active learning paradigm is proposed.

THE CURRENT AND FUTURE WORKFORCE

In 1994, the venerable Peter Drucker offered to the world the article: The Age of Social Transformation (https://www.theatlantic.com/past/docs/issues/95dec/chilearn/drucker.htm). First published in the Atlantic Magazine in November of that year, Drucker envisioned a world where the blue-collar worker (the 'class' (*his word*) that had displaced the farm worker) was now rapidly disappearing itself. Some in the United States at that time (and to a lesser degree now) blamed the loss of manufacturing positions in the US on movement of manufacturing offshore. Drucker, disagreeing with this premise, envisioned a world where now the 'knowledge worker' was ascendant. Over 20 years ago, Drucker said this:

But--and this is a big but--the great majority of the new jobs require qualifications the industrial worker does not possess and is poorly equipped to acquire. They require a good deal of formal education and the ability to acquire and to apply theoretical and analytical knowledge. They require a different approach to work and a different mind-set. Above all, they require a habit of continuous learning. Displaced industrial workers thus cannot simply move into knowledge work or services the way displaced farmers and domestic workers moved into industrial work. At the very least they have to change their basic attitudes, values, and beliefs. (1994)

Human society is now fully established and entangled in the Age of Social Transformation. The worldwide accounting firm PwC prepared in 2017 a report describing the workforce of 2030, a year that is now only a decade away (www.pwc.com/people). In their report they state: "We are living through a fundamental transformation in the way we work. Automation and 'thinking machines' are replacing human tasks and jobs and changing the skills that organisations [sic] are looking for in their people. These momentous changes raise huge organizational [sic], talent and HR challenges – at a time when business leaders are already wrestling with unprecedented risks, disruption and political and societal upheaval" (p. 3). The Lumina Foundation supports the Institute for Higher Education Policy (IHEP) a nonpartisan, nonprofit organization. IHEP states its mission as promoting access to and success in higher education for all students. In their 2014 White Paper, IHEP wrote "instruction for all students should enhance problem solving, critical thinking, communication, and other transferrable skills that will enable them to become valuable members of their communities". Drucker's prophecy is reality. And that prophecy, we contend, requires the inclusion of active learning strategies whenever and wherever possible, including in online learning environments.

What is Active Learning?

The following is a brief review of the concepts in active learning that is built from the theory of constructivism and often attributed Jean Piaget (1896-1980). We condense key concepts here (Wang & Hitch, 2017, pp. 53-55).

- Repetition
  - The use of repetition may seem incongruous to active learning. However, Bruner (1966) posited that growth depends upon internalizing events into a "storage system" (through repetition) that corresponds to the environment.
- Reinforcement
  - Reinforcement follows from repetition. For active learning to take place, memorization, and/or storage of information, must applied through proactive application of the material.
- Social Principles and Situated Cognition
  - Key to active learning is social-cultural understanding, which contends that there are individual variables on student learning that also include cultural expectations. Social principles dovetail with situated cognition, which is learning that happens in 'real' situations (Brown, Collins, & Duguid, 1989).[1]Activities within the construct of active learning are designed to establish, as close as possible, authentic contexts.
- Active Learning
  - Lastly, as the name implies, advocates that learning occurs from activity. Intellectual development, higher order thinking, requires a person to address several alternatives simultaneously, and "to allocate time and attention in a manner appropriate to these multiple demands" (Bruner, 1966, pp. 4-6).

Fink (2005, updated 2013)) states active learning involves doing and it requires observing. He focuses, too, on reflection. Students should consider why they are learning something and whether they are actually learning it the most effective way. The result of Fink's (2013) approach is that learning should lead the student to the next step – what else does he or she need to learn?

This methodology is actually not at all new. It harkens back to [John] Dewey's Practical Inquiry Model shown here and retrieved from https://canvas.ucdavis.edu/courses/34528/pages/types-of-presence-cognitive-and-social-presence (Figure 1).

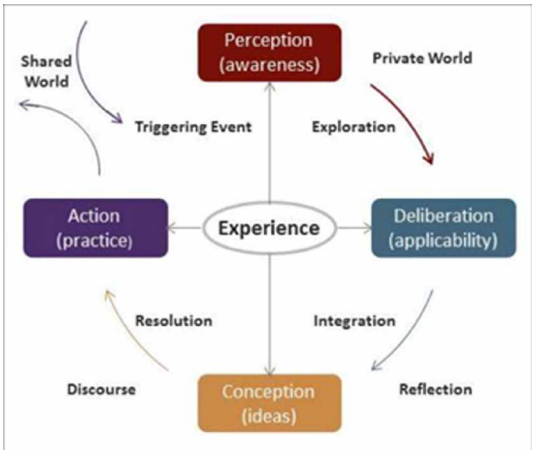
Active learning thus about 'cognitive presence'. Active learning is a process and refers to when learners are engaged with, and participating in exploration such that they form deep understanding of concepts and their inter-relationships with other concepts, and this deep engagement can lead to new insights. Reflection and discourse are crucial to the process of active learning. The importance of active learning to the present and future society is most evident from the frame of a knowledge society.

What is the Role of Active Learning in a Knowledge Society?

John Dewey, American educator (1859-1952), reasoned that informal education was not only the foundation for formal education but also to instill lifelong learning (Dewey, 2010). Dewey was very far ahead of his time. He did not agree with one-way transfer style of authoritarian schooling (e.g., lecture) because it did not fit the model found within democratic societies (Wang & Hitch, 2017) where multiple voices and ideas are paramount. His philosophy, simplified here, is that for students to thrive, they need to learn *from* the curriculum *and* interact with it (Dewey, 2010b). Understanding through 'reflective' interaction is at the root of active learning (Ambrose et al., 2010) and today active learning through experience is critical for employability (Kelly et al., 2019; IHEP, 2014).

There are, and have been, multiple ways to design Deweyesque hands-on learning activities in the traditional classroom. These include, but are not limited to writing exercises, group discussion, case study analysis, role playing, etc. using several principles of active learning such as learning by

Figure 1. Dewey' practical inquiry model. Retrieved from https://canvas.ucdavis.edu/courses/34528/pages/types-of-presence-cognitive-and-social-presence



doing, repetition, reinforcement, social-cultural application, situated cognition and meaning making (Weimer, 2012). The digital environment gives individuals the ability to pursue information on their own resulting in the learner developing his or her own meaning and is a fertile ground for Deweyesque hands-on learning.

"For example, a college student now has the freedom to uncover information from technical blogs presented by professionals in the sciences, engineering and computer fields (Taylor, 2010) and that are much more current than a traditional textbook… students find online blogs and other material more mentally digestible and often can take away far more knowledge that further advances the learning experience" (Wang & Hitch, 2017, p. 51). Beyond those already in use such as social media tools, TedTalks, etc., there is experimentation in the online environment with emerging technologies such as 3-D (Top, 2011) especially in the sciences (Mohammadi, 2019).

Over time and very slowly, others have agreed with Dewey. Coomb and Ahmed, (1973); Knowles, Holton and Swanson (1998, 2005, 2011), further define education as a change agent. Boyd et al. (1980) and Gagne (1985) include behavior change in their definition. Braume (2016) relying on Bonwell and Eison, (1991), the more recent Handelsman, Miller and Pfund (2007), and Freeman (2014), identified active learning as the method for students to construct knowledge and understanding. The result of active learning is higher order thinking. What these authors share in common is that learning must be associated with development and growth (Merriam, 2004). Maslow (1970) was more concise stating that self-actualization was "the full use of talents, capacities, potentialities, in other words, active learning" (Wang & Hitch, 2017). The development and growth of individuals cumulatively reflects as the growth and change of knowledge in the wider society and is thus essential to a knowledge society.

Rapidly generated, and therefore extremely large volumes of knowledge characterize a knowledge society. Knowledge creation is the 'currency' of a knowledge society, but a knowledge society is driven by creativity and innovation. Importantly, knowledge created is not static, it is in a constant state of change and the momentum of change needs to be maintained in a way that benefits the human condition, if the society is to move forward and thrive. Providing the momentum for knowledge creation are problem solving, creativity and innovation. – Impossible without the cognitive engagement, reflection and life-long learning capabilities embodied in active learning (Ciolan, Petrescu, Radulescu, & Bucur, 2014).

The Role of Faculty and a Conceptualization of Online Active Learning Course Design

Today's students, born into the digital environment, interact perpetually in the online world [2] (Seilhamer et al., 2018). To punctuate this fact, iTunes was introduced in 2003 when today's 18-year-old was but two years old. These students expect some form of digital knowledge discovery and delivery: "Informal learning is often a spontaneous response to their digitally wired social environments as learners navigate the personal, social and work journeys of their daily lives" (Wang & Hitch, 2017, p. 51).

"Whether students are learning informally or formally one thing is certain, as the use of more advanced technology comes to the forefront of our daily lives, students, workers, managers, and administrators need the skills to navigate within these transitions in order to be successful in the workplace" (Wang & Hitch, 2017, p. 51).

Literature indicates that more and more active learning is taking place online (Brame, 2016; Dixson, 2010). Both the University of California at Davis (https://canvas.ucdavis.edu/courses/34528/pages/learning-activities-and-active-learning-online) and the Ohio State University have web sites devoted to active learning in the online classroom (https://resourcecenter.odee.osu.edu/course-design-and-pedagogy/active-learning-online-course). In the STEM fields in particular (Top, 2011), active learning through technology is often a requirement, as students need to interact with the tools and concepts they will be using in the field. However, the use of active online learning is not limited to STEM. Pilkington, (2018) describes how blogging in an online composition course was an effective method to improve both writing and student attitudes toward writing.

In *Is Active Learning via Internet Technologies Possible* (2017) we touched upon the role of the faculty in the delivery of active learning online. We primarily referred to the underpinnings of active learning through oft-cited theoretical work such as Prior, Solberg, Berry, Bellwoar, Chewning, Lunsford, and Walker (2005), CHAT theory (Foot, 2014), (Knowles, Holton, & Swanson, 1998, 2005, 2011) and Skinner's (1968) definitive treatment of learning.

We do acknowledge that active learning may be seen to upend the traditional faculty-centered view of teaching and learning, a paradigm that has been most prevalent in higher education for over a century. And we acknowledge that in an age of 'fake news', the ability for students to make their own meaning can be disconcerting to traditionally trained faculty. For some faculty, active learning may be perceived as a loss of control. In the online environment where there is limited, if any, face-to-face interaction, faculty concerns about activity learning are likely to increase.

There are some important points to be made in response to the above-identified faculty 'concerns' and in relation to the role of the faculty in active learning online. Firstly, implementing the active learning paradigm requires the shift from 'faculty as director', to the constructivist view of 'faculty as facilitator' and even more so, to a more democratic, participatory approach to knowledge generation and formulation of understanding. In implementing active learning requires a change in faculty philosophy about learning and teaching.

Secondly, the digital environment gives individuals the ability to pursue information on their own resulting in the learner developing his or her own meaning. The capability to develop meaning rests firmly on the individual's ability to navigate, connect and make meaning among many pieces of information and concepts, and ultimately derive understanding. The task is complex involving selection, organization and integration as described in Mayer's (1999) model. There is a good deal of reflection, particularly critical reflection involved, as well as self-direction, evaluation and a host of other metacognitive skills required in connecting concepts, sense-making and understanding and in 'seeing things in a new way'. To successfully participate in active learning, which often involves open-ended learning environments, students need metacognitive capabilities (Zhao, Wardeska, McGuire, & Cook, 2014). Event at university there is much room for improvement in metacognition and the associated capabilities (Zhao, Wardeska, McGuire, & Cook, 2014). In literature the need to grow metacognitive capabilities in students is quite well documented (Zhao, Wardeska, McGuire, & Cook, 2014). In open-ended online environments or in more autonomous learning environments

such as flipped classrooms and other active learning contexts, students' metacognition is important to their success. A lack of metacognitive capabilities can be detrimental to student success in active learning, open-ended learning environments (Li, 2018). Hence, one key role of faculty, in facilitating active learning, is the scaffolding and development of academic metacognition. The faculty here can be considered as type of metacognitive coach.

One method of achieving maturing metacognition and active learning participation in students is to move from simpler to more encompassing active learning strategies in the online environment. The chart below shows possibilities for implementing active learning in any educational environment, including online (Dixson, 2010) (Figure 2).

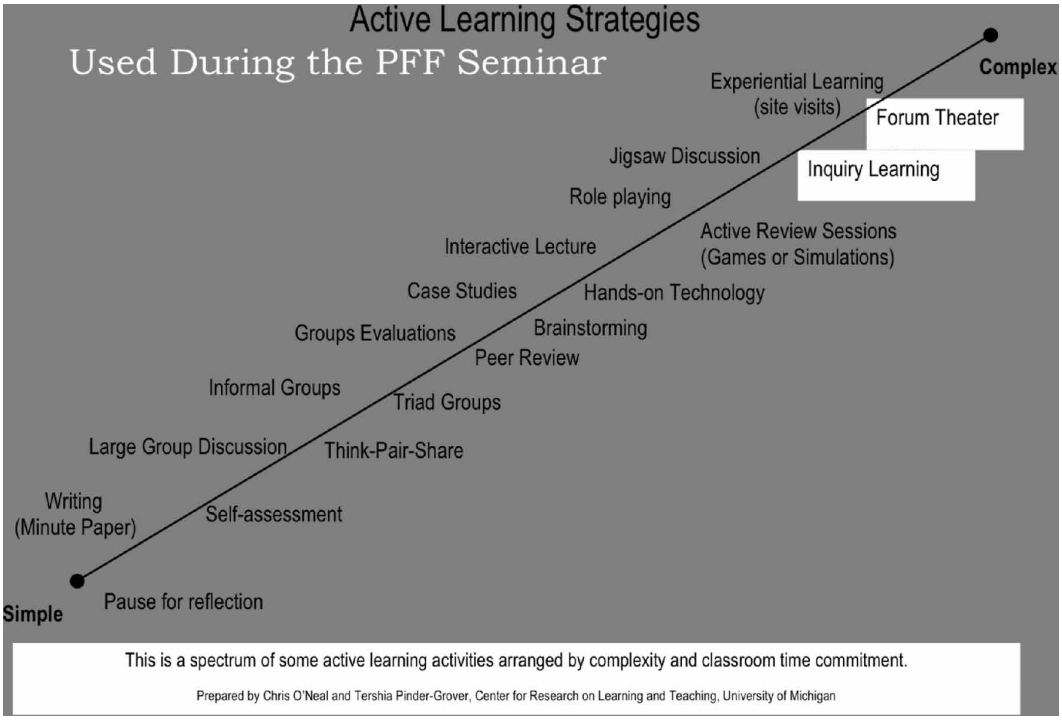
The 'simpler' active learning strategies are easily available in most, if not all, of the current learning management systems (i.e., Blackboard, Canvas, etc.). These products can be formatted for small groups either informally or as part of a formal assignment and to require peer review. And, at its most basic, the online environment has been used for writing submissions, self-assessment quizzes and reflection, and journaling. As previously noted, students can take full charge of their learning by searching credible sources, in print or video or audio, for information that will help them learn or reinforce concepts.

Moving up the diagram toward complex active learning Harvard Business School Publishing (www.hbsp.edu) and others offer 'real-world-based' online simulations adaptable in traditional as well as fully online environments. With careful planning, the online environment can 'host' debates in real as well as asynchronous time. Additional ideas, concepts and strategies can be found from resources such as the University of Florida (https://citt.ufl.edu/online-teaching-resources/activelearning/); the University of Minnesota (https://cei.umn.edu); the University of Illinois (https://www.uis.edu/ion/resources/instructional-activities-index/) and others. Instructive also are journal articles. Doris U. Bolliger and David Des Armier Jr. (2013) required integration of audio files in an online course and then evaluated student satisfaction with this active learning method. Bell et al. (2019) discuss the use of active learning across disciplines. This requirement compels faculty to be facile with as many forms of active learning as possible.

A third important faculty role in online active learning arises from a common strategy for active learning online in the form of synchronous and asynchronous communication. Discussion boards, forums, live chat, webinars etc. all provide opportunity for interaction among learning participants and engage in active, social learning. In such instances, the faculty, as moderator, must take the lead to establish safe spaces for interaction. In participating in active learning, students often take the risk of exposing their ideas to others. If students are to engage genuinely in interaction with others then they must feel safe, with low or no threat of being embarrassed. Additionally, the faculty as moderator, and facilitator must develop techniques such as question prompts and other techniques to continue to inspire participation.

And finally, if active learning is be truly integrated into online learning environments, then it must be woven into the 'fabric' of the course. Active learning must become the paradigm for learning and be characteristic of the online learning environment. Active learning should not be reserved for only online communications. Whenever interaction occurs, be it with other humans or with digital content, the opportunity to develop or engage in active learning is present. The online medium is not only for transmission of content. Media rich interactive, when well-designed provide significant opportunity for active learning. At the most sophisticated level, interactive simulations can provide a level of experiential learning either as preparation for field work or as an opportunity for fieldwork that might otherwise be too costly, dangerous or impractical. 'Choose your own story' style of case studies is another example of allowing student experimentation online. With the emerging media rich interactive technologies (including VR and AR) the faculty, we propose here that the faculty assumes the role of interaction architect.

Figure 2. Active learning strategies from simpler to more complex



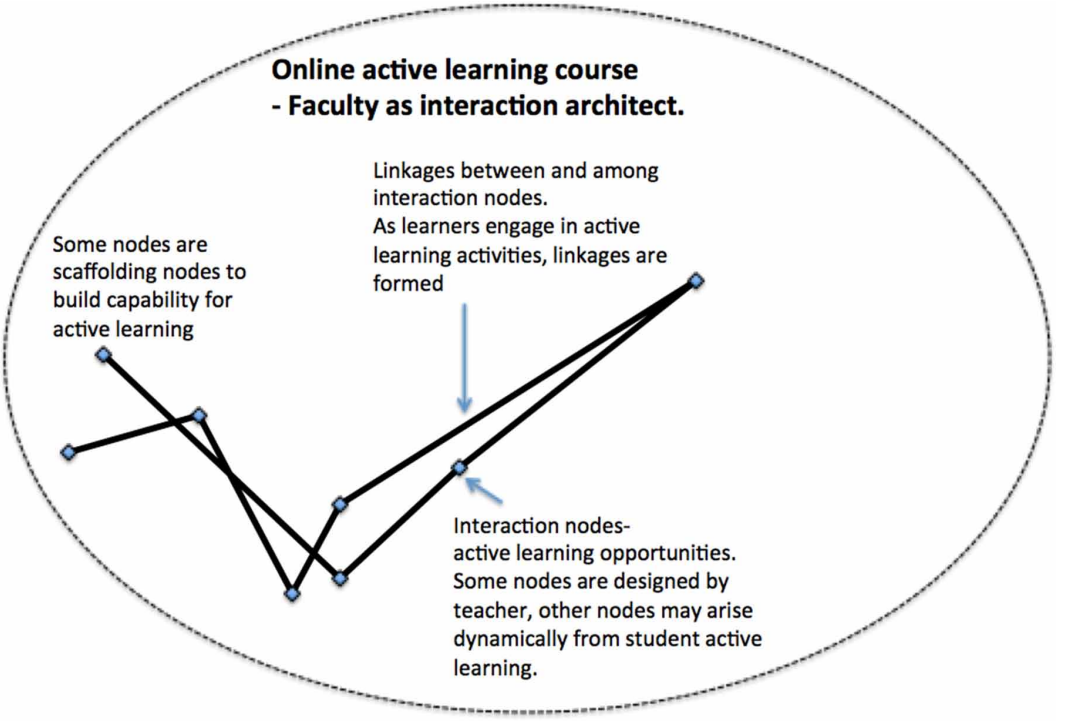
Faculty as Interaction Architects and a Model of Designing Active Learning Online

As the interaction architect, the faculty is responsible for an integrated network of interactive nodes, which when taken together form a cohesive active learning experience across the whole of the online learning experience. Active learning takes place at both the level of each interactive node and at the level of the architecture resulting from the integration of nodes. Interaction nodes are related to other nodes and may feed into other nodes enabling learners to progressively explore more deeply their 'internal world' and to reflect on a widening network of experiences and ideas. At both node and greater level, interactions are facilitating cognitive presence. Faculty themselves, as interaction points with learners also facilitate and guide behaviors necessary for cognitive presence. Figure 3 illustrates the idea of online course design using the interaction nodes for active learning.

Each node presents an opportunity for active learning, whether through learner-learner/faculty interaction, learner-digital content interaction, learner-technology-physical environment interaction (e.g., Augmented reality). The form of the node network is determined by design.

As noted earlier, active learning interactions are often open-ended, and students require metacognitive and self-regulation capabilities to successfully engage. These capabilities need to be nurtured by faculty. With the proposed model of the design of online active learning courses, faculty must consider how development of these capabilities is scaffolded and how students can move through the network of interaction modes to successfully engage in more sophisticated forms of active-learning. Furthermore, given the open-ended nature of sophisticated active-learning, faculty must consider the possibility of new nodes of interaction being dynamically generated through student activity.

Figure 3. Active learning in online courses can be conceptualized as a series of inter-connected interaction nodes



THE FUTURE OF EDUCATION AND FUTURE RESEARCH

Does active learning online actually work? To this question we offer two answers, one empirical and the other practical. Empirically the answer is yes (Dixson, 2010; Pilkington, 2018; Top, 2011). It is, however, the practical answer that is more imperative than empirical studies. The faculty of today is teaching the workforce of today *and* also tomorrow. A PBS MoneySense news hour report on December 6, 2018 began with this salient fact from the Institute of the Future: 85% of the work that students will do in 2030 does not exist today. The new work, as Drucker presciently outlined, is that of knowledge worker. The knowledge worker requires higher order thinking skills. The more traditional transmission of knowledge model is no longer effectual (Seilhamer et al., 2018)

We concluded our 2017 article by looking at the future of education and including concepts for future research. We projected that technology's use in education would increase (Seilhamer et al., 2018). This projection is corroborated in the 2018 article in Educause Review that states the results of a multiyear study (2012-2016) on the changes in mobile learning practices. Technology enhanced learning, work and of our own lives is or will be ubiquitous. With, according the Educause (2018) report, three-quarters of current students owning and using either a smartphone, tablet or both (p. 10), banning these devices from the classroom is futile, and above all, a lost opportunity.

The application of active online learning online, wrote Educators Technology (2016), has become an ultimate goal for educators and practitioners in the 21st century. The results of these applications require further research. Matching Dewey's original philosophy with the needs of the 21st century workforce could show not only the progression of educational methodologies but also changes in

the nature of work. With some trepidation, knowing the controversy this will engender, we suggest that there needs to be serious study of the continuation of the traditional process toward a doctorate.

CONCLUSION: FROM NECESSITY TO MANDATORY

Drucker (1994) foresaw that: "We will have to think through *education*--its purpose, its values, its content. We will have to learn to define the quality of education and the productivity of education, to measure both and to manage both." This is why active learning, in any educational delivery system – online, on-ground, formal or informal, needs to be at the proverbial forefront of pedagogy – not an afterthought, also-ran, or nice to do.

For colleges and universities to remain relevant in this knowledge-centric world, an active learning methodology is now mandatory. In our previous article we asserted that the global workforce needs these skills. "Self-directed learning that aligns with students' needs, styles, and personal learning goals is necessary in current society. This flexible learning attitude will become more important in learning environments of all kinds. The sought-after result is increased productivity and active engagement in learning" (Wang & Hitch, 2017, p. 52).

Technologies enable simulated work environments, enhance cooperative and collaborative learning outside the confines of place and time, and can motivate, or even necessitate, student involvement (Wang & Hitch, 2017). Pursuing active learning opportunities through technology revitalizes curricula to meet the requirements of the relentless changes in work, society and educational delivery (Wang & Hitch, 2017).

Active learning online is not only highly desirable, but essential to the learning for the 21st century. Although learners will learn informally online, the role of the faculty is not trivial. Active learning should permeate online learning environments. We have proposed that faculty take on the role of interaction designers and seek to facilitate and provide optimal conditions for active learning by designing courses using the notion of interaction nodes. The aim is to craft an integrated network of active learning opportunities for learners in a way that will build capabilities for active learning and will support cognitive presence. The proposed model is abstract and generic, there is a need for further research into the proposed approach and into understanding the nature of online learning and how active learning can be best enacted through the exploitation of the potential of interactive and connected technologies.

The presence of the COVID 2019 pandemic has been strongly felt throughout the lifecycle of the present article. Discussing the transition of active learning online as moving from necessity to mandatory cannot be complete with at least acknowledgement of an event that created urgency for the adoption of active learning online and is also a catalyst of innovation and experimentation for active learning online. Pre-pandemic, online learning was not usually associated with active learning (Khan, Egbue, Palkie, & Madden, 2017). Overcoming the inertia of centuries of passive learning approaches in Universities is apparently difficult. Contemporary active learning approaches such as 'flipped classrooms' frequently work by relegating content transmission and some lower order thinking to the online mode and designing face-to-face interactions for exercising higher order thinking (Karanicolas & Snelling, 2010). Prior to the pandemic, the approach makes sense and is practical – making the most of face-to-face interaction with active learning and leaving the lower order, transmission activities to a computer platform. After all, it is challenging in the online environment to replicate the richness and responsiveness of face to face when body language and a host of other visual cues provide the platform for engaging in conversation and discussion. However, with the advent of the pandemic many educators had to operate (Harris, et al., 2020) in 'panic mode' and engagement through active learning truly is no longer a matter of choice – it is imperative.

The well-known proverb "Necessity, is the mother of invention" comes to mind. The pandemic has precipitated much reflection and thought on how to engage students online and stimulated thought on best practices for active learning online. One theme emerging is the necessity of designing online

classes for activity (Harris, et al., 2020) (Khan, Egbue, Palkie, & Madden, 2017). Earlier works on active learning are again rising to the surface. For example, Fink (2015) (cited in (Khan, Egbue, Palkie, & Madden, 2017) discusses course design as various components which includes the situation, alongside teaching goals, learning activities and assessment. Poll and Weller (2014) provide six strategies of best practice for active learning online including establishing a sense of community, setting course expectations, using online tools to facilitate engagement, facilitating discussion and exchange of ideas and providing feedback. Overall creating a student-centred environment. Koehler's and Mishra (2008) Technological, pedagogical, content knowledge framework for effectively teaching in the presence of technology comes to the fore. Active learning online will require creative and innovative use of a variety of technological tools beyond those employed in traditional physical classrooms. For example, polling tools, online collaborative concept mapping, collaborative cartooning and other collaborative workspaces all contribute to providing opportunity for students to work together and negotiate understandings using visual, textual and audio media. Undeniably, active learning online places demands on the educators' time and effort, especially as educators grapple with the challenge of changing mindsets, explore new possibilities and take up a steep learning curve. There is no question, active learning can take place online, but the challenge now is how the affordances of various tools can be exploited to create rich nodes of cognitive activity.

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ENDNOTES

[1] Authors' note: John Seely Brown is one of the foremost thinkers on the implications of technology in the workplace.

[2] To punctuate this point, observe not only children with digital devices but also adolescents and young adults who, even in a group, seem to prefer more interaction with their phone than with their peers.