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Mandated media innovation impacts on knowledge dissemination in workplace training

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ABSTRACT

This conceptual paper examines voluntary versus mandatory cloud-based training, generating recommendations to harmonise the complementarity of face-to-face and online media in future careers. Technological change was already accelerating when the COVID-19 pandemic response turbocharged transformations of knowledge dissemination in training, thus impacting learning and competency development for the future. The methodology applies comprehensive, structured literature review following PRISMA guidelines with development of a novel conceptual framework illuminating facets of knowledge dissemination. Exploring the context of workplace training and the future of careers with aid of NVivo it was found that altered social cues in cloud training are generating changes in learner attention span, engagement, and peer-to-peer interaction, potentially increasing contract cheating. It is hence recommended that stakeholders demarcate theoretical and practical learning outcomes to develop hybrid cloud media and face-to-face knowledge dissemination to accentuate professional accreditation requirements, engagement and etiquette in virtual spaces, and improve understanding of work-home balance.

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Knowledge dissemination; communication media innovation; learners at workplaces; future of work; mandatory versus voluntary training; hybrid workplace

1. Introduction: cloud over the future of work

Change is ubiquitous in technology, global economics, the natural environment, and demographics, thereby leading to innovative management methods and the development of systems for improved knowledge and learning (Hirschi, 2018; Lent, 2018). In this interdisciplinary paper, we ask the question: “Do mandatory innovations in the cloud media environment alter knowledge dissemination and affect workers?” The objectives of the paper are to examine the factors of voluntary versus mandatory cloud-based training and to provide recommendations to harmonise the complementary roles of face-to-face (hereafter F2F) and online media in preparing for future careers. Largely the literature has focused on the supplementary roles of online learning in either adding or subtracting the value in F2F contexts (see Hines et al., 2020; Racat & Lichy, 2022). There are unexplored short- and long-term intersectional knowledge tensions for organisations and individual workers operating in a dynamic technological environment; especially when supercharged by events such as the COVID-19 pandemic and other disruptions, including worker shortages, supply chain disruptions, internet outages due to energy shortages, geo-political tensions, and restricted internet access.

Innovations may be either incremental or radical changes in how workplace training is conducted or

experienced (Sharma & Lenka, 2022). For instance, trainers and learners being mandated for health reasons to communicate temporarily by existing video technology is an incremental innovation, and is a change of process but one with precedent to be managed at the margins. By contrast, a total curriculum redesign that brings in technologies and procedures that have not been experienced before by trainers and learners would be a radical or major innovation. Context and experience levels of the people involved affect whether workplace training innovations are viewed as incremental or radical. Communication in this paper is defined as having both a transmission perspective (Bergman et al., 2020) and a constructivist aspect (Kesler et al., 2022), the latter referring to how learners and trainers interact to generate new knowledge together. Some knowledge is transmitted through media from trainers to learners, but other knowledge develops (is simultaneously constructed) out of the full context of the environment and interactivity between learners and trainers. In this paper, we define knowledge dissemination as combining knowledge transfer and dialogic interpretation in context with trainers and learners.

The timeless adage that the medium is the message (Makienko & Rixom, 2022; McLuhan, 1964) reminds us to examine emerging media to understand better how

communication is transmitted or disseminated and how it is simultaneously constructed and interpreted. Electronics have enabled the amplification of voices and images and altered how we encode, store, transfer, interpret, and disseminate all types of information. Today, cloud-based knowledge is created, categorised, and transmitted at the speed of light, and vast quantities of information are stored and backed-up for global accessibility, all contributing to intellectual capital, value, and job creation revolutions (Roos, 2018). Some events and conditions have accelerated the adoption of cloud-based digital technology. The Internet bubble starting from the late twentieth century, the innovation and rapid uptake of touch screens and mobile hand-held devices, the economies of scale of cloud server farms, and the global COVID-19 pandemic are exemplars of notable events impacting upon the ways we manage knowledge (Salmador and Florin, 2013; Tovstiga & Tovstiga, 2020). The workplaces of today and the future are transforming to make it mandatory in many cases for knowledge dissemination to be mediated through technology. It is probable such mandates mixed with barriers of accessibility to available media in training are causing a range of effects for facilitators and learners.

Learning, storing knowledge, and generating new ideas are important for every existing and potential employee. In most industries and sectors, knowledge sharing, for example, via F2F workshops and other training, may be undertaken during either ad-hoc or planned, periodic learning events (Wilson & Spoehr, 2010). The COVID-19 pandemic, however forced institutions to redistribute knowledge and learners to absorb information and access work-relevant knowledge almost entirely digitally (Tortorella et al., 2021). Accordingly, how we learn and disseminate knowledge effectively experienced a perturbation and acceleration that indelibly changed the emphasis of workplace training. We are now in a crucible for studying the consequences of voluntary versus mandatory technology innovations and applications in workplace training, with potential impact on knowledge dissemination and transfer (de Zubielqui et al., 2015; Linzalone et al., 2020). Accordingly, this paper will first review knowledge management through the dichotomy of mandatory versus voluntary adoption of communication media in workplace training. The methodology will be outlined and then conceptual mapping applied to knowledge dissemination factors predicting future career themes. The conclusion section will provide recommendations for stakeholders, including trainers, learners and managers involved in decision making for the future of workplace training.

2. Literature review: KM dichotomy, integration, and context of workplace training

Quintessential knowledge management (hereafter KM) occurs as part of workplace training. The knowledge-

intensive work of training has undergone change through technological advances combined with the social fault lines generated by COVID-19 (Schiuma et al., 2021) and other disruptions, such as, the changing geopolitical landscape (Chukwuma, 2022; Iwashita et al., 2023), workforce shortages (Ambrogio et al., 2022; Khor & Tan, 2022) and ongoing supply chain disruptions (Hosseini and Ivanov, 2022; Moosavi et al., 2022). The traditional human communication cues of tone, inflection, expression, temporal expectations, facial recognition, body language, and visual cultural signifiers are transmuted when moved from F2F into online environments (Barner & Ideus, 2017; Campbell et al., 2020). Simultaneously, the future work and careers of learners are pivoting (Jimenez et al., 2017; Lent, 2018), creating implications for all varieties of ongoing workplace training.

Forced into online delivery, even in disciplines not previously matched to an electronic medium of communication (meaning physical, hands-on, or F2F careers, such as, health, processing and engineering-related), trainers and facilitators have had to reframe how knowledge is managed, encoded, and relayed (Parihar et al., 2022). Learner engagement is directly affected when the learning objects are mediated entirely through the cloud (Zizka & Probst, 2022). At every stage, from preparation to delivery and assessment to feedback, the training function of conveying or disseminating information and knowledge has been undergoing transformation (Finnie-Ansley et al., 2023; Pavlik, 2023). Preparation lead-times alter, delivery modes become diverse and recordable, (practical) assessment must be reformulated, and feedback can be instantaneous in various forms. The situation encourages trainers or facilitators to use situational attribution (Fiske, 2018; Friestad & Wright 1994) to take stock of the seesawing work and social restrictions and generate changes to how learners gather, analyse, and implement the information, thus impacting upon the present and future of learning and work.

2.1. Integration of knowledge management in training roles

The mandatory acceleration of training as a type of KM in virtual spaces orients attention to media selection and knowledge dissemination. The same workplace knowledge previously expressed by voice or on paper, now converted to electrons and conveyed at light speed, delivers a different message by virtue of altered perceptions caused by the different media (McLuhan, 1964; Postman, 1985). This view is supported by ongoing and emerging research into virtual communities of practice (Haas et al., 2021), knowledge sharing (Zeiringer & Thalmann, 2022), organisational agility (Franco et al., 2022) and other critical management fields (Reyt et al., 2022). There are growing calls

for a new KM philosophy and set of standards in light of evolving technologies (Schmitt, 2022). Table 1 is an original synthesis indicating emerging KM implications in various teaching and training contexts from F2F to online to hybrid settings.

Aligning with choice theory and embracing dichotomous contexts (Hassan & Mohsin, 2015), Figure 1 provides a juxtaposition of the taxonomy of teaching and learning objectives by Bloom et al., (1956), later revised by Anderson and Krathwohl (2001), with Dale’s Cone of Experience (Dale, 1969). These seminal pedagogical models are theoretically grounded (Creed & Zutshi, 2019) and consistently applied and supported in the general management and vocational

education literature (Calma & Cotronei-Baird, 2021; Grant & Baden-Fuller, 2018; Nellemann et al., 2022; Wu & Chen, 2021). In the context of training being compelled into the cloud media, the right side of Figure 1 invites reflection on relevant training methods in accordance with the objectives indicated on the left side.

Whether training online or F2F, Figure 1 shows that the facilitation methods of Dale’s Cone (right) match broadly with objectives from Bloom’s Taxonomy (left) with the prominence of dimensions contingent on the media of knowledge dissemination. A hybrid situation, with facilitation methods simultaneously F2F and online, requires rapid transitions in

Table 1. Pros and cons of different training media.

Training mode	Pros	Cons	KM implications
Physical (Face-to-face)	<ul style="list-style-type: none"> Easier to see and pick up on body language and nonverbal cues (Dávila et al., 2022). Spontaneous engagement with participants (Young & Williams, 2008). 	<ul style="list-style-type: none"> Space constraints to have a limited number of people in a room (Brennan, 2020). Time constraints due to room availability and travel times (Saiz-Manzanas et al., 2022). 	<ul style="list-style-type: none"> Knowledge hiding may be less prevalent. Knowledge sharing may be bounded. Knowledge transfer is richer. Knowledge dissemination is more visual or auditory with strong social cues.
Fully virtual (Online)	<ul style="list-style-type: none"> No space constraints concerning the attendance of participant numbers (Hernandez-Pozas & Carreon-Flores, 2019). No geographical boundary constraints (Mitchell, 2021). 	<ul style="list-style-type: none"> Challenging to pick up nonverbal cues and other nuances (Sa et al., 2021). Internet and bandwidth issues may require participants to keep their videos switched off (leading to reduced presence and engagement) (Walwyn & Combrinck, 2021). Limited to no opportunity to be spontaneous in activities (more pre-planning required) (Young & Williams, 2008). Training is required for both facilitator and learner to ensure full use of the gamut of online learning system features (Andrukhiv et al., 2022). 	<ul style="list-style-type: none"> Knowledge hiding may be more prevalent. Knowledge sharing may be less bounded or controllable. Knowledge transfer may be shallow and accelerated. Knowledge dissemination may be either hindered by coding/language problems and noise or facilitated by novelty and speed.
Hybrid (Physical & virtual)	<ul style="list-style-type: none"> It can draw upon the pros of both types of training media – (F2F) and electronic [online] (Adipat, 2021). Facilitators and learners can pivot to suit circumstances (Ruostela et al., 2015; Uraiby et al. (2021). 	<ul style="list-style-type: none"> It cannot be utilized if mandatory rules require one or other media to be applied (as was evident in COVID-19) (Schiuma et al., 2021). Special training and technology are to run this model. (Cheng & Agyeiwaah, 2022;) Flexibility for quick switches between media (Tholen, 2022). 	<ul style="list-style-type: none"> Opportunity to balance sharing and hiding knowledge throughout the knowledge transfer process, including the last step of dissemination through different media.

Source: Compiled by the authors from multiple sources.

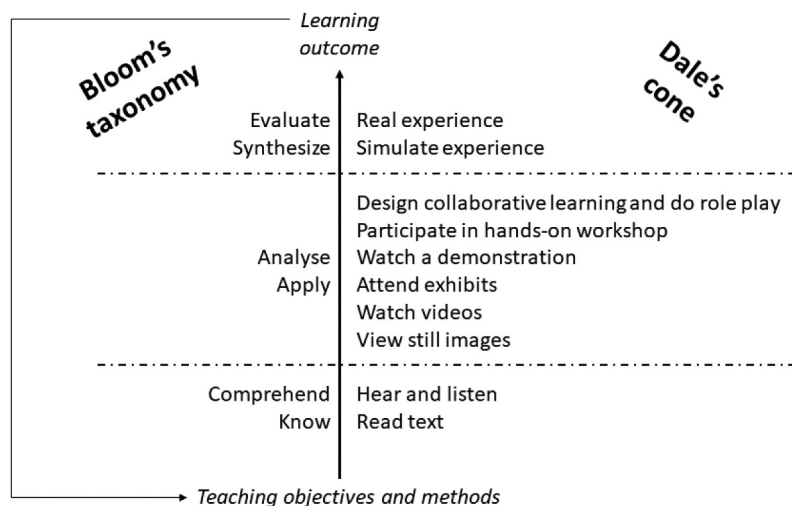


Figure 1. Bloom and Dale juxtaposed. Source: Authors

media. For example, learning designs must be adjusted andra- and pedagogically with each new mode of conveying knowledge (Adipat, 2021; Ruostela et al., 2015). The core function of knowledge transfer continues, and yet the balance of knowledge sharing with knowledge hiding is altered, in turn changing the flows and interpretations of knowledge as it is ultimately disseminated (see Figure 2).

The phenomena of mandatory and prescriptive media selections impose knowledge dissemination pathways that periodically conflict or crossover with the voluntary choices of trainers and learners, depending on situations, cognitive preferences, and designed content. The pinnacle of real experience on Dale's Cone is a human-centred training context and this aligns with Bloom's highest order cognitive function of evaluation. Technology is still relevant because simulation, which is more likely to be technological in its structure, can assist with the other higher order learning function of conceptual synthesis. While F2F learning appears most aligned with the highest objectives of both seminal taxonomies as they are juxtaposed in Figure 1, in fact a hybrid approach to using technology to assist human interaction is predicted to have intersectional impacts, as outlined in Figure 2.

While there are two distinct pathways of knowledge, one being voluntary (intrinsic motivation) and the other mandatory (extrinsic motivation), the two coalesce and exchange between each other in a spiral cross-transfer (see Figure 2). The broad field of industry knowledge exchange among trainers and learners occurs in shared and hidden contexts. For instance, the explicit knowledge of experienced industrial managers has often been described in textbooks and case studies. However, a manager's more tacit, artful insights are not readily accessible until face-to-face dialogue in appropriate learning spaces allows them to reveal deeper insights.

One outcome of mandatory online training has been increased access to otherwise restricted (or hidden) experts across borders and time zones who can more easily adapt their availability to exchange knowledge straight from their desks through web conference apps. Online technologies can facilitate knowledge transfer, especially data less dependent on body language, intonation, visual cues, and other physical human interactivities. The observable advantages of cost efficiency, economies of scale, and increased accessibility are relied upon by policymakers when mandating technological solutions in workplace training (Kang & Park, 2022).

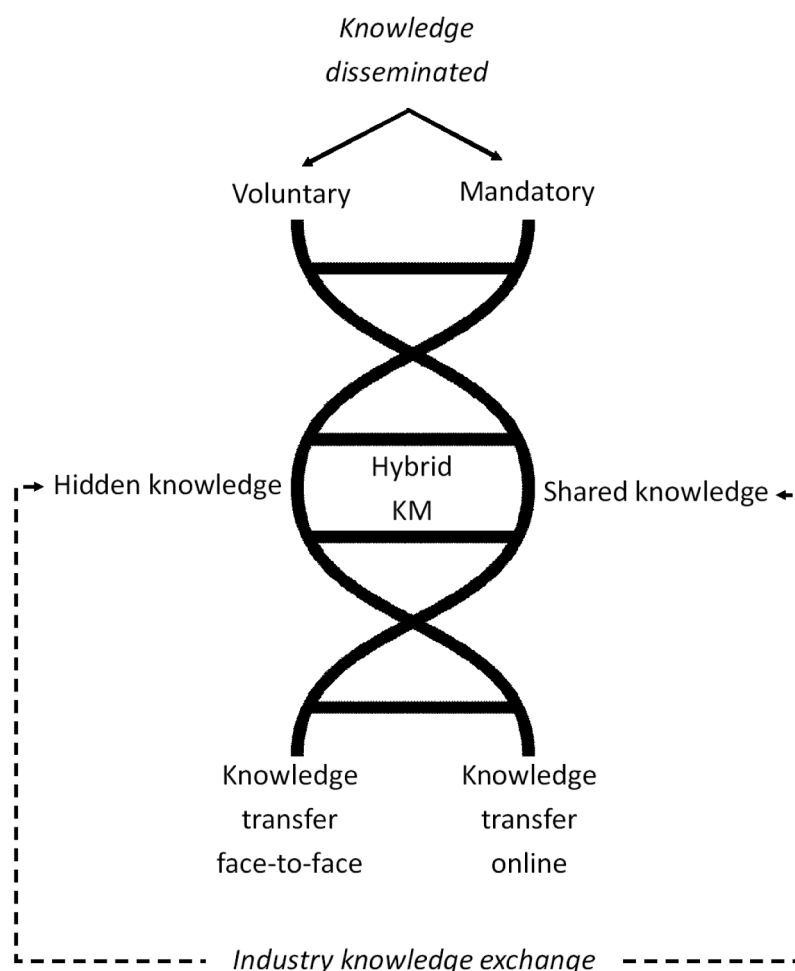


Figure 2. Pathways of mandatory and voluntary knowledge dissemination. Source: Authors

The design epistemology of mandates in training involves patterned, structured, systematised pedagogies that are more disposed to collectivist, commons-based dissemination methods (Freire, 2021; Karabeg, 2012; Ruivenkamp & Hilton, 2017). The opposite (individualised, less structured, play and discovery) applies to giving voluntary options to learners and trainers (Pillay, 2022). This dichotomy revives, in part, the critique and counterpoint of early scientific management, especially Taylorism, by the human relations theorists of the twentieth century. As a technological system that mandated key machines and tools and imposed surveillance of work practices, scientific management knowledge systems (J. Chen & Nonaka, 2022) imbued a sense of dehumanisation by removing the freedom of movement and innovation that would otherwise lead to worker motivation. Reminiscent of the past, with today’s workplace training re-engaging in a cycle of information technology with associated mandates imposed on workers and trainers, the intersections of choice theory (Allingham, 2002; Alonso et al., 2018; Glasser, 1965), locus of control (Martinez-Martinez et al., 2021), and the persuasion knowledge model (Coleman et al., 2022; Friestad & Wright, 1994) warrant further investigation. In asking the question, “Do mandatory innovations in the cloud environment alter knowledge dissemination and affect workers?”,

a conceptual mapping of the literature was undertaken to address the postulates raised by the question to arrive at a comprehensive response, as outlined in the following sections.

3. Method

This research was designed as a structured literature review working with NVivo and leading to the development of a novel conceptual framework. To ensure comprehensive inclusion of the literature and minimise researcher bias, the literature search followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement guidelines with its four steps (planning, selection, extraction, and execution), as guided by Okoli and Schabram (2010); and Okoli (2015) (see Figure 3).

In the first step, the search was conducted using Web of Science (WoS) on January 14 2022, to review five years (1/1/2017–31/12/2021). The COVID-19 pandemic as an example of disruption and forced transition to the online platform partly prompted the selection of this time period. While technology had been used pre-pandemic by organisations to facilitate some knowledge dissemination and training, the accelerated mandates to move entirely online disruptively altered communication strategies for companies

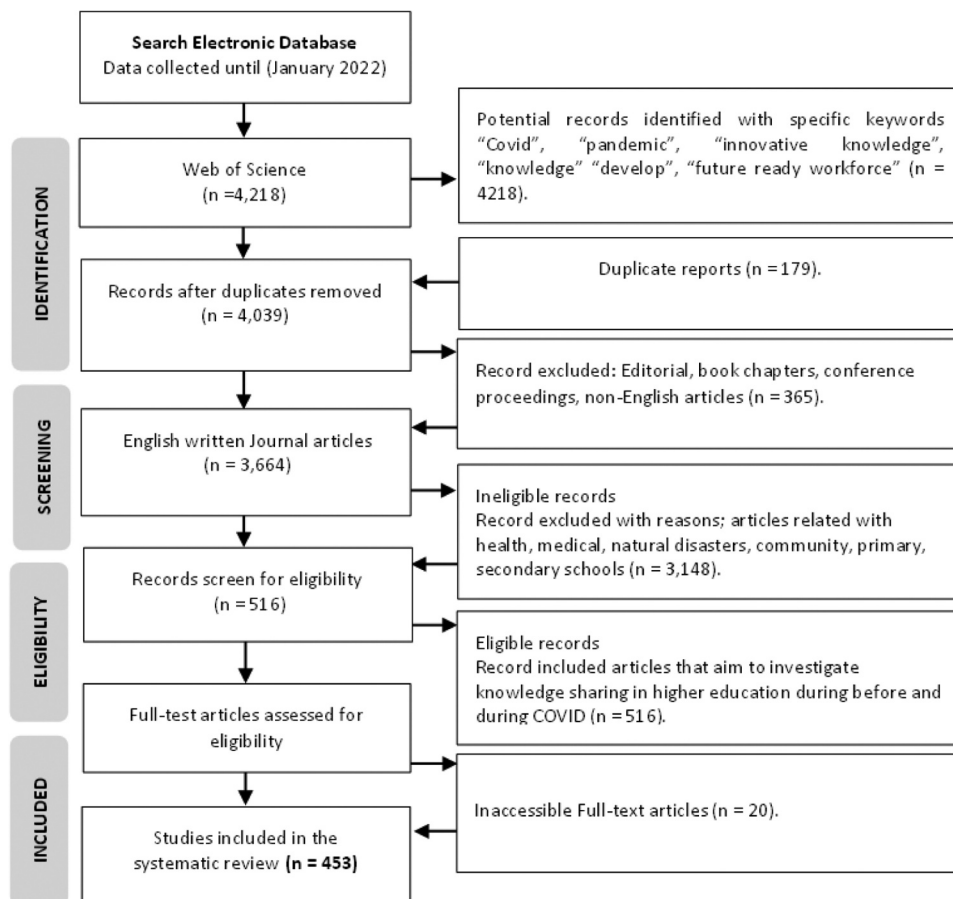


Figure 3. Method flowchart.

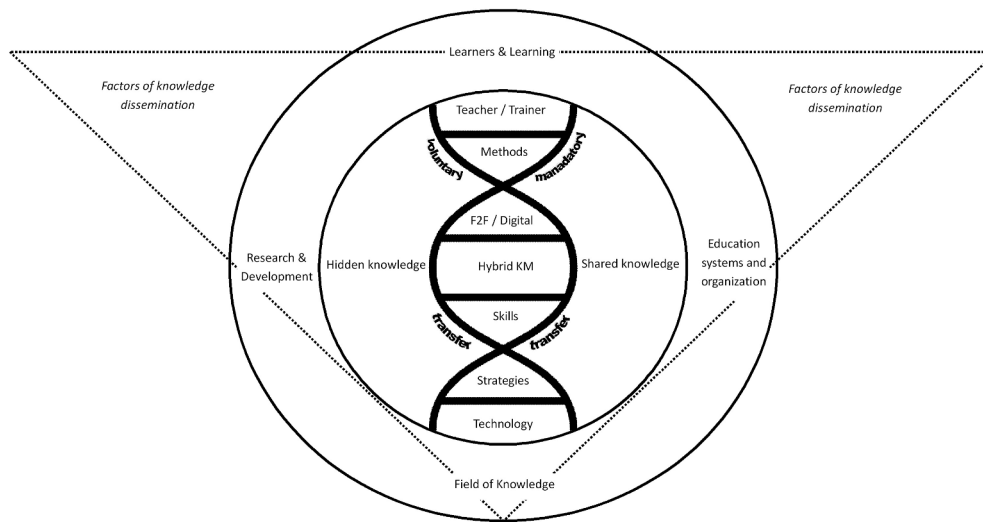


Figure 5. Knowledge dissemination factors as future career themes in training. Source: Authors

choices across industries. Note that the WoS search did not target keywords, such as, “higher education sector”, “education”, or “student”. However, these terms became evident during the auto-coding, showing intersectional relevance throughout the iterative thematic analysis.

4.1. Theme 1: the experience of learners (being a student) and the learning process

The words and synonyms of, “student” and “learning”, in the middle of Figure 4 (ovals) dominated this theme. Technology was applied in the delivery of content. Nonetheless, learners sometimes lacked satisfaction with the quality of learning on online platforms. The reasons for dissatisfaction ranged from technological challenges (such as limited equipment or poor internet connection) to a lack of social interaction involving no human connection, misunderstanding of the institutional culture, or diminished motivation to continue learning (Raja & Kallarakal, 2021). This is supported by the findings of Walwyn and Combrinck (2021, p. 22), where more than half of surveyed students, “felt that the [COVID] lockdown was alienating and made learning more difficult”.

Some disciplines and professions requiring practical labs or hands-on experience (such as plumbing, cooking, or meat and other food processing) suffered the most. Although theoretical classes and simulations were performed as substitutes, learners did not feel the same tactility and human engagement as they would have in F2F settings (Sa et al., 2021). Uraiby et al. (2021), on the contrary, found that online learning could encourage higher participation and improve learners’ interest and confidence in the subject matter if the digitised learning environments supported autonomy, relatedness with other learners, and generated competence. During the pandemic and forced

lockdown scenarios, learners expected more opportunities for electronic connection with trainers and other learners. Hence, the higher the opportunity for human-related learning, the greater the chances for active engagement from learners (Hines et al., 2020). For trainers, their future work must cater to rising engagement expectations regardless of the media involved in knowledge dissemination.

4.2. Theme 2: education online (resources, skills and experiences of trainers)

Soft skills are considered important for facilitators to create an engaging learning environment, and this emerged as the second theme denoted by words such as “online” and “education” shown in Figure 4 (rectangles). During the pandemic, when online and hybrid teaching modes were used in place of conventional F2F modes, the importance of soft skills needed to be further emphasised. Strong communication skills, emotional mastery, effective thinking, and mentoring skills emerged as necessary for trainers to create motivation within the learning spaces (Zhukova et al., 2021). Trainers should be approachable, responsive, and organised within the virtual space to create a positive experience for learners who are not sharing the same physical space with the trainers and other learners (Walwyn & Combrinck, 2021).

4.3. Theme 3: knowledge transfer methods – digital and F2F

Online learning has been around for some time; for example, De Jong et al. (2008) shared different mobile social software technologies that can facilitate learning with ensuing benefits and challenges. More recently, big data helped analyse consumers’ perception of online education before, during, and

after the main COVID-19 wave (Sohn et al., 2021). Different disciplines evolved, sometimes expanding rapidly through online knowledge dissemination methods, evidenced as part of this theme by words such as “methods” and “digital” in Figure 4 (triangles). Health disciplines were notable, where web-based programs emerged to teach about dementia management (Moehead et al., 2020). Web 2.0 technologies were adopted by health professionals to encourage learning from evidence-based practice (David et al., 2012). Online knowledge sharing and learning were increasing before COVID-19. For example, the use of Coursera or LinkedIn Learning was common among practitioners and some learners due to platform flexibility, yet the pandemic accelerated online adoption rates. Further opportunities are identified for the different training providers to collaborate with emergent open learning platforms to augment industry training offerings (Raja & Kallarakal, 2021).

4.4. Theme 4: future of work strategies, resources, and skills for trainers, institutions/providers

The participatory theory of knowledge (De Fillippi & Milter, 2009; Huber & Knights, 2022) suggests physical interactions have always affected learning. Dewey’s (1916, 1997) experiential learning as a foundational theory for Dale’s cone of experience and the top level of Bloom’s taxonomy (see Figure 1) are founded on physical engagement as an element of action learning (see Chang & Huang, 2022; Kolb, 1984; Marsick and O’Neil, 1999). Sensory learning (including sights, sounds, smells, tastes, and touch) comprises complex levels feeding into experiences along with intonations and indicators of how learners and trainers perceive and comprehend the subject matter. Words such as “skills”, “strategies”, and “teachers” in Figure 4 (hexagons) resulted in this theme. Virtual spaces are non-physical and can only be a simulation of physical experiences. Obviously, sights and sounds happen in a Zoom, Google Classroom, or MS Teams session, for example, but the physical subtleties and complexities of the trainer’s space are sensorily detached from the various spaces of the learners (Brennan, 2020; Sáiz-Manzanares et al., 2022). Context can be lost or changed when transitioning from physical to online knowledge sharing and dissemination. The emerging literature around unlearning (Sharma & Lenka, 2022) is expected to build upon some aspects of this theme.

4.5. Theme 5: knowledge, research, and technology (managing libraries of information)

The diamonds in Figure 4 show “knowledge”, “research” and “technology” leading to this theme which encapsulated how learning is a human process

that learning resources must support. Resources can be digital learning objects, traditional books and journals, or a whole suite of new and interactive technologies connected in thematic and categoric relevance webs. The management of learning resources is the function of a library, and the mandatory move to online spaces expedited the transition of library functions (Andrukhiv et al., 2022). Any learning organisation in any industry in the future that adopts hybrid KM will need to subsume the library functions and is increasingly enabled to do so with emerging knowledge technologies.

COVID-19 accelerated the use of technological tools for training in workplaces globally. The strategies, dominance, and competitive positions of certain geographical regions and branded top-tier universities and training providers altered when restrictions and lockdowns extended over months (Cheng & Agyeiwaah, 2022; Tholen, 2022). Dissemination of information and knowledge using online virtual platforms has become a norm amongst different providers, some of whom may have previously adhered to more traditional teaching and knowledge dissemination modes. The door opened for geographical borders to be overridden and learners to be connected electronically with previously unreachable institutions, facilitators and trainers. In this discussion, the role libraries play as a conduit of social and knowledge interaction via the application of digital technologies is acknowledged (see Ameen, 2021, for an example in Pakistan; and Tsekea & Chigwada, 2021, for an example in Zimbabwe) and should be further explored in future research.

5. Conceptualizing where to next

The persuasion knowledge model of attribution theory (Coleman et al., 2022; Friestad & Wright, 1994) suggests that the pandemic and subsequent mandatory directives were variations of persuasive agency, with workplace trainers and learners being the targets. The theory highlights the necessity of being able to cope under both voluntary and involuntary pressures. Choice theory (Allingham, 2002; Alonso et al., 2018; Glasser, 1965) intersects through self-efficacy insights and is challenged by mandates of training methods. From a knowledge dissemination perspective, Table 2 summarises the stages of content delivery and the different ways F2F and online media impact future careers. It coalesces interdisciplinary themes from the extant literature and establishes a foundation for an ensuing conceptual framework in Figure 5. For instance, through iterative literature analysis, we redistributed elements of the knowledge dissemination process of preparation, delivery, assessment, and feedback from Table 2 into the helix at the core of Figure 5. Trainers and learners engage in the process through

Table 2. Summary of knowledge functions and implications for future workplace training.

Knowledge dissemination function	Face-to-face imperatives	Online imperatives	Hybrid opportunities	Future training career implications
Preparation	Plan for physical interactivity.	Numerous apps, platforms, and audio-visual resources may be accessed.	Harness the power of physical interactivity and supercharge with supplementary online resources.	Plan to access electronic resources more frequently while not losing the capacity to access and collate physical resources in preparation for interactive sessions.
Delivery	More paper-based resources might be handed out	Competency with online streaming and seminars	Combine the use of traditional tactile resources with the immediacy of electronic delivery.	Blend facilitator training to maximize physical interactivity with online accessibility and functionality.
Assessment	Controlled invigilation is possible.	Problem-based approaches to circumvent learning integrity issues.	Various assessment designs leverage electronic knowledge accessibility (for formative assessments) with integrity designed into the summative assessment.	Build experience in authentic assessment design for online spaces without losing the integrity benefits of physical invigilation in key disciplines.
Feedback	It could involve meetings in addition to traditional written forms.	More immediate and responsive options to build-measure-learn excellent training in real-time.	Build-in diverse ways of feeding back to learners to match different learning styles.	Dialogue training in context with diverse media to ensure feedback is dextrous in hybrid settings.

the hybrid application of technology, strategies, skills, and methods using F2F and digital media.

Virtual spaces can significantly alter the expectations of learners and trainers. The expectation of being active or passive is different online, where the ability to observe or lurk is more prominent, especially where control over visibility is given to the learners who can turn off cameras and microphones. For example, learners lurking in a virtual room can more readily mute the microphone or switch off the video for fear of answering a question incorrectly, compared with attendance in a physical room being asked the same question. The relative ease of being present but being inactive online affects the usual patterns of engagement and interaction that physical spaces can afford (Zhang et al., 2021). Online breakout rooms provide challenges when engagement is altered, and people cannot always be seen or heard. Larger virtual gatherings can further inhibit the opportunity for learners to breakout and socialise. This engagement deficit compromises group tasks in virtual spaces. Good virtual teams are truly streamlined and empowered by technology when the communication dynamics and motivational foundations of team members are positive. Conversely, when online engagement is low, the productivity spiral can be very negative for teams.

Virtual spaces have an expediency connection to knowledge bases and can facilitate the rapid conveyance of information between people. Experts as guest presenters can connect from all corners of the globe far easier and less expensively when online. Regardless, practical knowledge is distinguished from theoretical, and a valid challenge emerges about how best to teach practical disciplines reliant on physical interaction in purely virtual settings. Virtual reality is an established and growing field (Hernandez-Pozas & Carreon-Flores, 2019; Sholihin et al., 2020). However, not all physical realities are successfully transitioning

to virtual ones, particularly for the disciplines that require utility or experience of knowledge by undertaking hands-on activities. The visceral arts of surgery, nursing, cooking, plumbing, farming, meat processing, and the like are examples. Hybrid spaces remain important in such disciplines where F2F experiential learning must occur while augmented knowledge can be made accessible and even speed up some training objectives through online classes (potentially including a mix of live and pre-recorded sessions) and resources. This context from the literature enables a conceptual view of the horizon of workplace training (see Figure 5), including the factors and intersections that are meaningful for trainers, learners, and employers with continuing involvement in education, training, and development.

The dichotomy and integration of knowledge dissemination and exchange from Figure 2 are at the centre of Figure 5, which expanded through our iterative analysis of the emergent literature themes (Figure 4). The inverted dotted triangle represents intersecting factors that articulate within a field of knowledge at the lower apex. Research and development, education systems and organisations, and the learners and learning processes in the field comprise the crucial factors. At the heart of the system is the dichotomy of content delivery media and knowledge transfer methods. Consistent with the persuasion knowledge model and choice theory, the future will involve a hybrid of digital and F2F media, each requiring training skill sets predicated strongly on self-efficacy. Facilitators will need to distinguish between mandatory and voluntary modes of training, subsequently developing strategies and deploying methods that are tailored to the situation, commensurate with organisational resources and systems, and attuned to preferred learning styles and the nature of knowledge in the field. The art of training will emerge from the

exchanges between shared and hidden knowledge and the identification of bespoke ways to convey or transfer knowledge through the dichotomies.

Other trends and workplace responses are developing. Higher levels of online learning are noted to restrict some physical and experiential learning (Chang & Huang, 2022). Hybrid learning opportunities such as on-the-job learning or planned shadowing at work will continue to be useful (Makovec, 2022). Increased reliance on online learning pushes responsibility for managing learning experiences back towards the learner. A stronger emphasis on instructing for self-managed learning will be relevant (Mujalli et al., 2022), along with continued research into how learners self-manage knowledge. The phenomena of learners online being reticent or shielding their identities or minimising their engagement in traditional educative dialogue need further recognition and strategies developed to mitigate possible learning deficits in such instances (Goenechea et al., 2022). Ongoing issues of learners sometimes losing connectivity and accessibility will also need research attention (Salas-Pilco et al., 2022). Some team members will have fluency with technology whilst others will be laggards in responsiveness and general digital literacy. This will affect overall knowledge sharing consistency amongst the team members. Future research should investigate the reasons for these technical barriers, extending the discussion further within intergenerational, gender orientation, ethnic, Indigenous, and underprivileged inclusivity perspectives.

Physical versus virtual presence in work as well as training will be an ongoing issue. While some organisations prefer employees to attend the office a few days per week, other companies opt for a different strategy. For example, the Chennai-based company Kissflow took a learning approach to their first mandated three-month government work-from-home order and developed a proprietary Remote+ work model for when the mandate ended. Remote+ allows for hybrid work but requires employees to work at least one week in the office each month, while the rest of the month can be from an off-site location, including from home (Kissflow, 2020). The company has proactively designed and explained the benefits, challenges and strategies for hybrid work to employees (Kissflow, 2021a, b). In another example, Zoom expects employees to be back a few days a week at the office since most employees support a flexible hybrid work structure (Montgomery, 2021). While hybrid work can provide workers with a balance between autonomous and structured work, switching between mode and structure at work can negatively impact workplaces and the social balance among workers. De Smet et al. (2021) found that 39% of employees lose their social connection with colleagues and attachment to their workplace if they do

not meet in a physical workplace. Further, hybrid work structures require management to maintain office space and bear the fixed costs without fully utilising the capacity. The Chicago-based Barlow Law Firm (Ro, 2020) maintains office space for practical use, such as bulk printing, for use by others who need the office space when starting a new project during orientation and team building exercises. To manage the fixed costs, downsizing office space can be a preferred solution by companies. For example, NOVOS developed a membership with WeWork, an office space rental company, to let employees work on the booked workspace (Ro, 2020).

In the current and future work environment, employers value virtual collaboration and the related technological skills (Mitchell, 2021). There is debate about whether the pandemic has shifted the focus away from proponents of more traditional F2F requirements of job security and loyalty (Serenko, 2022). Irrespective of that, the employer's responsibility is to maintain group dynamics among dispersed members through synchronous and asynchronous communication (Adamovic et al., 2022; Vaitilingam, 2022). Further training and guiding instructions will be required to support employees' adjustments to new work structures.

A significant challenge is employees having to adjust when they are expected to work in a hybrid structure. Those who prefer a fixed routine struggle to switch between attending the office and attaining work continuity at home. There is no research suggesting a universal policy for how many days in the office are optimal (Costa-Font, 2021; Davies et al., 2022). A majority of employees prefer to work from home for more than three days per week, however, employers prefer higher office frequencies for maintaining organisational culture and belongingness (De Smet et al., 2021). The preference differential could affect the maintenance of hybrid teams and create a two-tier payment system based on where employees work. For example, Google experimented with changing the payment structure based on home-to-office balances. Likewise, Facebook, Twitter and Reddit cut employees' pay if living in a less expensive location and working from there (Kaye, 2021). Such developments could add further to gender disparities in the workplace since women are expected to take on most of the caring responsibilities (Ro, 2020) and the balance of work-home ratios may have disproportionate impact.

5.1. Higher education as a context exemplar

In higher education, knowledge sharing and dissemination were traditionally undertaken in a timetabled classroom setting, and knowledge dissemination using

a digital platform was generally provided voluntarily. Learners could elect to have lecturers, tutorials or workshops F2F or in a hybrid configuration. With time and events, there was a shift in the responsibility of higher education representatives to contribute beyond core KM activities of teaching and research to engaging with businesses and the community actively. A case in point is the experience of a regionally based university in Brazil working and collaborating with local SMEs (Brauner et al., 2020). Such functional transitions directly impact the future of academic work, now requiring a stronger blend of technological and disciplinary (content and pedagogy) expertise (Adipat, 2021). Hines et al. (2020) highlight the need to shift the educator's role from lecturing to facilitating and refocus pedagogy from content-orientation to learning outcomes. This is especially relevant since the ease of information duplication in digital media is leading to increased contract cheating in higher education (Lord Ferguson et al., 2022). The disruptive influence of a global pandemic supercharged a mandatory move into full virtual spaces. Refocused management is needed for this radical shift leading to wider evolutionary development in the sector.

In previous centuries, education, training, and most other industries relied on paper for coding, conveying, and decoding knowledge (de Bem Machado et al., 2022; Tynan et al., 2013; Zutshi et al., 2011). The KM aspects of knowledge transfer, sharing, and hiding are well-understood, yet the context is transformational and unique to education (see Jiang et al., 2019; Zutshi et al., 2021) and for knowledge facilitators generally. Cloud technologies continue to transform industries everywhere, and knowledge-intensive industrial stakeholders are among the intermediaries and beneficiaries of digital KM, in general, and knowledge dissemination, in particular (Meyer & Schroeder, 2009). Trainers and learners no longer opt to be online; rather, the virtual space has effectively become mandatory in many fields. Questions remain about the effectiveness of F2F versus cloud-based media, and future research should explore whether (and how) online knowledge dissemination in any context may affect knowledge sharing. Trends include the evolving hybrid, dichotomous core of education indicated in Figure 5, oscillations between mandatory and voluntary pathways, and shifting balances between F2F and online. These trends have fundamentally changed how information is disseminated and what work design may look like in the foreseeable future.

Overall, to ensure training and facilitation flows well, high-quality knowledge transfer is paramount. Naturally, all training platforms are integral to the environment or the construct of learning. Several factors vary, such as the level of technology (connection

speed), device variety (old vs. new), and human skills (computer competencies). Educational providers must identify and respond to unexpected events or situations. Therefore, to develop the Figure 5 framework for an uncertain future, consistent with the Bao (2020) proposal for contingency planning as one of the important principles of online teaching, we suggest institutions foster dual mode teaching contingency plans. The focus should be on internal and external factors such as person-related (trainer/learner) problems, physical or virtual space factors (such as, safety, temperature, and noise or distractions), technological issues (including malfunctions of devices), and the wider socioeconomic and natural external environment. A dual-mode contingency plan addressing such issues can mitigate potential problems, normalise enhanced knowledge-sharing, and improve the current training process.

Mandating changes to how trainers disseminate knowledge creates a dilemma. In general, experienced facilitators who know how successfully traditional methods have worked may find it challenging to change practices in accordance with the persuasion knowledge model (Coleman et al., 2022; Friestad & Wright, 1994). The ease of acceptance or resistance to imposed changes depends on the individual locus of control (Martinez-Martinez et al., 2021). If there is a mismatch between the institution's reasons for implementing change and the facilitator's interpretation, the transition will be difficult, leading to increased stress which, if not effectively managed, can lead to higher staff turnover. Furthermore, choice theory (Allingham, 2002; Glasser, 1965), with its connection to self-efficacy (Alonso et al., 2018) explains some of the challenges confronting voluntary versus mandatory actions and how dichotomous situations are handled in workplaces. The great resignation debate (Dean, 2022; Ellerbeck, 2022; Morgan, 2022) coupled with labour shortages (Causa et al., 2022; Gittins, 2022), and work-life balance expectations of workers (Brace, 2022; Turner and Baker, 2022) is confounding the psychological contract between a worker and their institution. The quandary in future careers and contexts is whether the freedom of choosing dissemination media remains with the facilitator or if workplace restrictions mean certain technologies will be imposed involuntarily.

This conundrum of where a job is located, proximities of worker (or learner), and from where they receive communication and training is being redefined, with many locations offering workers havens (as digital nomads, Digital Nomad World, 2022; Karsten, 2022) in exotic locations with taxation benefits (Mierdhani et al., 2022; Yu et al., 2022). Technological developments expedited by the COVID-19 pandemic are transforming career progression discussions with new variations of work-

from-home options, leading to associated impacts on work-life preferences, overall career progression (Alliance Virtual Offices, 2022; Hendy, 2022) and economic wellbeing. Equally pertinent, though not the focus of this paper, are the privacy laws and other online security measures required to protect the identities of both the facilitator and learner, especially when sensitive personal information is stored and transmitted by online platforms of the institution and contracted third-parties. Identity theft and hacking are real challenges (Eghe-Ikhrhe & Bonsu-Assibey, 2022; Kryvinska & Michal, 2022) which will require ongoing research questions about the security level and time period of organisational access to personal information.

6. Conclusion: cloud on the horizon

This interdisciplinary paper responded to the research question, “Do mandatory innovations in the cloud environment alter knowledge dissemination and affect workers?” The objectives were to examine the factors of voluntary versus mandatory online training and to provide recommendations to harmonise the complementary roles of F2F and online media in preparing for future careers. The limitations involved application of a systematic approach to literature review and conceptual mapping with no extension to field data collection. The strengths were a timely focus on knowledge gaps with an iterative conceptual scaffolding to establish future research directions relevant to extant literature.

The intersections of choice theory (Allingham, 2002; Alonso et al., 2018; Glasser, 1965), locus of control (Martinez-Martinez et al., 2021), and the persuasion knowledge model (Coleman et al., 2022; Friestad & Wright, 1994) became consistently relevant in the mapping of the literature. Support for dual-mode contingency planning in knowledge dissemination emerged from research of virtual communities of practice (Haas et al., 2021), knowledge sharing (Zeiringer & Thalmann, 2022), organisational agility (Franco et al., 2022) and other critical management fields (Reyt et al., 2022). Similar support was found from a training perspective in the general management and vocational education literature (Calma & Cotronei-Baird, 2021; Grant & Baden-Fuller, 2018; Nellesmann et al., 2022; Wu & Chen, 2021) which had strong foundations in the earlier seminal work of Dewey (1916, 1997), Bloom and Krathwohl (1956), Dale (1969), Kolb (1984), and Anderson and Krathwohl (2001).

Essentially, there is a large strategic picture to be understood by learning organisations and institutions involved in contracting and delivering training. The structure of work, the strategy for enhanced and sustainable delivery, and the systems for upskilling and

supporting the trainers involved in delivery are symbiotic elements to consider. Raja and Kallarakal (2021) highlighted how private businesses encourage employees to benefit from online courses to update their skills at their own pace. The deliberate design of delivery strategies in hybrid modes can maximise flexibility, relevance, and targeting desired outcomes.

With a strong shift into virtual spaces comes greater opportunity for learners to either shield their identity or harness the communicative power of digital social media to enhance their identity and education. Also, the knowledge sharing capabilities of trainers keep shifting as new technologies are adopted. The redesign and redefinition of learning spaces have already been predicated on these changing contexts. Perhaps a campus or physical room is more of a social hub than a place for knowledge sharing and transfer. Assessment and work structure are also changing. However, with the speed and convenience of online spaces, some genuine concerns about the real level of competent knowledge transfer, sharing and dissemination remain. Trainers have noticed a lack of social cues in online environments, leading to changes in attention span among learners. Increases in contract cheating enabled by the duplicating capacities of digital technology lead to implications for accredited professions such as accounting, law, and medicine that deal with prescient fiduciary responsibilities. Such concerns open opportunities for constructive conversations between students, education providers, accreditation and other regulatory bodies, leading to policy changes in these areas.

Based on the literature conceptual mapping, the recommendations proposed are for the stakeholders (trainers, learners and managers involved in decision making) in training, knowledge sharing, and dissemination to carefully consider the distinctions between theoretical courses (such as most social sciences) and practical courses (such as applied streams of STEM and the arts of medicine, technology, and most experiential fields). Likewise, hybrid courses (e.g., humanities and creative arts) should include theory and practical aspects harnessing online and F2F media in appropriate situations. The regulatory and accreditation bodies should consider options of evaluating learner knowledge in a hybrid manner before they can be registered for certain fiduciary professions beyond traditionally invigilated assessment tasks (Vogel & Hamann, 2023). This will have a flow-on effect on policy and funding decisions and may lead to streamlining processes. Further recommendations and areas for future research include to investigate and understand work-life balance implications for workplace trainers operating in hyperconnected virtual spaces trying to be responsive to learners in a timely (and at times instant) manner. Second, how can both facilitators and learners adapt to changing language (for example, use of emojis,

emoticons and acronyms in written communication) and professional etiquette protocols in digital media spaces? Third, employers and policy decision-makers (in view of potential taxation implications) also need to factor in the costs (financial and psychological) for staff of home set-up for disseminating training sessions, and employers contribution towards the financial costs. Last, but not the least, future research needs to orient towards understanding how reduced physical presence may impact on organisational culture and advancement opportunities and whether this has any detrimental impact on employees from varied demographic backgrounds, and any differentials between casual, part-time and full time working patterns.

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