# Introduction

The current COVID-19 epidemic is having a global impact on all areas of society — the extent of which is not yet fully known. Education is one key area where international health advice on social distancing is prompting renewed focus on fully online delivery to support K-12 learners in schools throughout Australia. As a research field, distance learning stretches back several decades and encompasses approaches that range from earlier mail-based correspondence courses to more recent real-time online lessons aided by media live streaming and instantaneous online feedback. As of the time of writing, almost Australian universities have quickly adjusted to full online course delivery, with some universities being better prepared than others by virtue of having a history in external course offerings. However, most Australian K-12 schools have been places where face-to-face learning has been the dominant delivery mode, meaning that many K-12 educators and school leaders now find themselves in relatively uncharted territory. There is, therefore, a case for a timely review of meta-analyses with a view to assisting K-12 schools in making the shift towards fully online delivery while enabling them to learn from the wealth of literature to date.

## Aim and Method

This review provides an evidence-based summary of synthesised research findings on the efficacy of online distance education initiatives. By reviewing the findings of peer-reviewed meta-analyses, we identify major themes, success factors, and contextual constraints.

We conducted database searches using Educational Resources Information Centre (ERIC) and Education Research Complete. Selection criteria included: (1) meta-analyses of empirical studies on distance learning; (2) only peer-reviewed studies; (3) papers published in the last ten years; and (4) papers reporting findings relating to distance learning themes, success factors, and/or contextual constraints. Based on the searches conducted and inclusion criteria, we identified seven papers, which are synthesised below in reference to overarching themes. These seven meta-analyses collectively encompass over five hundred empirical studies.

## Findings

Research concludes that across large samples, there are no significant differences between students’ academic achievement when at a distance compared with learning face-to-face. Perhaps most notably, meta-analysis by Simonson, Schlosser, and Orellana (2011) reports that based on “218 independent findings from 103 studies representing 25,320 students… on average, students achieved similarly, whether they learned in distance education courses or in the traditional classrooms’’ (p. 127). These findings suggest that it is important not to view distance learning automatically through a deficit lens and acknowledge, as the authors do, that “what is known about effectiveness in education is most often also applicable to distance education” (p. 124).

However, research also reveals a set of conditions around what a distance learner needs to be in order to learn successfully. These conditions include having intrinsic motivation, being capable of learning independently, being a good time manager, having a high degree of self-efficacy, practising a growth mindset, being comfortable with online connections, and having a strong locus of control (Hart, 2012; Simonson et al., 2011). Conversely, students who struggle to meet some or all of these conditions are less likely to succeed, being more likely to succumb to feelings of isolation, fall behind academically, and in some cases disengage altogether (Chen et al., 2015; Hung et al., 2015). Such at-risk students need stronger support and guidance to develop the skills and temperament to succeed.

In addition to how an individual learner’s profile affects their success when learning at a distance, research documents a wide range of contextual constraints that can either support or hinder the learning experience. These include:

* Increased time commitment
* Financial resources to implement distance learning programs
* Organisational support or resistance to change
* Having a shared vision for distance education in the organization
* Provision of support staff to help course development
* Strategic planning for distance education
* Timely implementation
* Having incentives for teachers and learners to succeed
* Teachers keeping up with technological changes
* Having adequate technology infrastructure (Hung et al., 2015; Simonson et al., 2011; Valai et al., 2019)

Watts (2016) points to significant advances in synchronous technologies being used in many online learning settings, citing findings that show, on the whole, that students “report feeling more connected to the online experience, report higher levels of satisfaction, continue to be motivated to engage, and are more successful in group and individual work” (p. 31). Despite the challenges and constraints distance learning educators face, technology continues to enable more ways of connecting, sharing, and enhancing the learning experience.

## Key themes

Several meta-analyses have focused on different themes evident in the distance learning literature. Each of these themes reveals important considerations with regards to provisions and practices that can be implemented to improve learning outcomes and the learner experience.

### Theme 1: social presence

Chen, Fang, and Lockee (2015) review the role of social presence as a key factor in the success of distance learning. This meta-analysis included 189 empirical studies in distance learning from 1976-2013, noting that social presence has consistently been examined in research over several decades. The authors identify three main attributes of social presence: (1) intimacy —the feeling of connection with others; (2) immediacy — psychological closeness in communication; and (3) interactivity — the dependency between the actions of individuals. As the authors explain:

Social presence is dynamic. It measures the moment-by-moment judgment about the interaction with another sentient that might be limited or facilitated by a medium. At its lowest degree, social presence simply means being there, and at it0s highest degree, social presence represents mutual dependent behavioural interaction (p. 1802).

In reference to how the research has evolved from earlier notions of “telepresence”—or simply being together—the authors point to the importance of the following forms of involvement:

* psychological involvement: “the need to be emotionally motivated to respond to the other participants” (p. 1798)
* intelligence involvement: “the degree to which a user feels access to the intelligence, intentions, and sensory impressions of another” (p 1799)
* performable conceptualisations: utilising multiple channels for communicating — for example, expressing emotion, posting/replying, using certain language, and group breakout activities; presence as building “a relationship through an interdependent, multichannel exchange of behaviours” and participants’ ability to “identify with the community, conduct communication, and develop interpersonal relationships via projection of their personal characteristics” (p. 1799).

In their systematic review of 106 empirical studies, Hung, Flom, Manu, and Mahmoud (2015) also draw attention to social presence and define a number of best practices that encompass both social presence and, more specifically, teacher presence. The authors argue that low social presence “creates an invisible obstacle that undermines quality social interactions, and thus may hinder online learners’ development of a sense of a learning community” (p. 230). Social presence practices that are recommended include having multiple real time communication channels, embedding relationship-building activities, allowing for social interaction outside of class time, and ensuring clear and explicit activities. Teacher presence practices include having presence in several forms (for example, through announcements, emails, discussion comments, and video), actively and regularly engaging with students, and providing clear structure while allowing for independent and creative thought.

The review by Watts (2016) cites Moore’s theory of transactional distance, which posits that quality interaction between learners, instructors, and content reduces the experience of the psychological and communications gap evident in most online learning settings. Similarly, Chen, Fang, and Lockee (2015) stress the need for students to feel involved in communication while encouraging teachers to practise immediacy behaviours such as using first names, asking divergent questions, making jokes, and using emoticons. Finally, Valai, Schmidt-Crawford, and Moore (2019) stress that a “large body of empirical research suggests [social presence] is important to students’ motivation, engagement, and academic performance in the course” (p. 22).

###  Theme 2: student persistence

In her review of the literature on student persistence in online learning, Hart (2012) synthesises findings from 131 studies in the period 1999-2012. While noting that little is known about how to identify at-risk students in online settings, the review nonetheless finds that there are a number of key factors known to affect levels of student persistence online, including a sense of belonging to the learning community, motivation, peer and family support, time management skills, and increased communication with the instructor. Students with high degrees of self-efficacy, a locus of control, a growth mindset, and who feel comfortable with online social connections are considerably more likely to engage well and succeed in online learning. Similarly, grade point average (GPA) also represents a key factor with higher-GPA students much more likely to persist. Conversely, the author identifies several factors that work against persistence, including auditory learning difficulties, having only basic computer skills, difficulties accessing resources, isolation (from the school and peers), slow feedback, and poor communication. Hart recommends that online teachers practise flexibility, set realistic expectations about workload, establish goals, integrate asynchronous activities to support learners outside of formal class time, provide feedback that is constructive and adds meaningful input into learning, and engage in clear and unambiguous communication. In their review of best practices in online education, Hung, et. al. (2015) also highlight the need for well-established goals for “explicitly contextualizing and linking learning content to real life practice” and “creating an environment where some degrees of collaboration is required for effective learning” (p. 246).
Theme 3: the role of gender

Perkowski’s (2013) meta-analysis of 18 empirical studies suggests that gender is an often-overlooked factor in distance learning success. Paired with historical research that shows, on average, lower levels of female participation in the classroom, the author finds that female students tend to outperform male students in online learning settings, observing that:

Instructors have found that the relative anonymity of online discussions, the additional time available to formulate responses, and the ability to consult other resources to make informed, intelligent responses led to more students participating overall (p. 268)

Specific quantitative findings show that gender has a significant effect on both online learner self-efficacy and academic performance. This somewhat contrasts findings from Hung et. al. (2015) suggesting that communication barriers usually hinder interaction among students and contribute to lower levels of social presence. That female students can use anonymity and additional time to succeed suggests that some communication barriers can be positively harnessed to ensure greater voice from all students in the online classroom. Best practices relating to interdependency in the review by Hung, et. al. (2015) involve creating safe and welcoming environments for students to share personal thoughts and emotions, incorporating activities for students to develop psychological connections with others, encouraging students to take active roles in various learning tasks, and explicit and clear structure and guidance. When examined in light of Perkowski’s work, these findings draw attention to the need to ensure gender-based inclusivity and gender relevance in online learning designs.

### Theme 4: the learner’s perspective

Valai, Schmidt-Crawford, and Moore (2019) synthesise findings on the distance learner experience from 124 studies over a five-year period (2009-14). Observing that much of the research to date has not explored the learner’s perspective, the meta-analysis highlights inconsistencies in quality indicators, which often vary considerably from one institution to the next. The authors also argue that the profile of the distance learner has changed, alluding to the growth of the K-12 sector:

Globalisation has stretched the scope of the online learner population from a homogeneous profile of mostly adult, mostly employed, place-bound, goal oriented, and intrinsically motivated to one that is heterogeneous, younger, dynamic, and responsive to rapid technological innovations (p. 16)

According to the findings of the meta-analysis, learners perceive four main areas of the distance learning experience to be most important: (1) course design; (2) interaction; (3) support; and (4) technology use. In terms of course design, learners are concerned about, first, how the course content connects with prior knowledge; and, second, the need to have strong teacher presence and involvement in the delivery of the course content. Having a well-structured course eases anxiety, including having “procedural scaffolding to help guide learners in navigating course content” (p. 21). Interaction is typically seen by learners as necessary for creating strong interpersonal connections, and learners in the meta-analysis most often rate interactions with the teacher as the best predictor of a quality online learning experience. Learners perceive the importance of both physical support (for example, access to library resources) and non-physical support (for example, high quality feedback) in many forms, helping to “both remove barriers (situational, institutional, dispositional, and informational) and promote academic success” (p. 25). Finally, in relation to technology use, learners recognise the need for technology tools to be pedagogically integrated and purposefully employed.

### Theme 5: the balance between synchronous and asynchronous interaction

The review by Watts (2016) explores the distance learning research comparing synchronous and asynchronous interaction. The authors find support for both forms of interaction in the research and argue against either-or dichotomies. However, the review notes that asynchronous interaction—although traditionally the dominant form—has been increasingly replaced by synchronous forms, as technologies for live streaming and instantaneous feedback have been developed. Both forms of interaction are viewed as essential for reducing the transactional distance between teachers and learners. On the one hand, the authors find that research indicates asynchronous interactions “allow students to take time to consider their thoughts, engage with the content more deeply, feel a part of the learning community, and post more reflective comments in discussion boards” (p. 27). This finding supports Perkowski’s (2013) assessment of female learners benefiting from additional time and space in many online learning settings. On the other hand, Watt’s (2016) review shows that students tend to view synchronous interaction positively “because of instantaneous feedback, being able to see their classmates, and because they report feeling more engaged in the online experience” (p. 27) and because it fosters motivation among learners.

## Best practices moving forward

The themes explored thus far highlight the importance of empathising with learners of differing abilities as they make the transition from face-to-face learning to distance learning. They also reflect to the value of understanding learners’ needs, characteristics, abilities, and interests — all of which can be challenging for distance learning educators at any stage of implementation. Nonetheless, the meta-analyses included in this review reveal several best practices moving forward.

In their review, Simonson, Schlosser, and Orellana (2011) found that distance learning educators need training, adequate time, technical support, and emotional support when adjusting to new distance learning initiatives. Arguing that distance learning needs to be participatory, interactive, and experiential, the authors recommend a team-based approach to course design and delivery, with team members including, as a starting point, subject matter experts, instructional designers, and media specialists. Several best practices recommendations cited include:

* instructors providing clear guidelines for interaction with students
* having well-designed discussion assignments facilitate meaningful cooperation among students.
* students presenting course projects
* instructors providing two types of feedback: information feedback and acknowledgment feedback
* having online courses deadlines
* incorporating challenging tasks, sample cases, and praise for quality work communicate high expectations
* allowing students to choose project topics incorporates diverse views into online courses.

In a review of distance learning practices, Hung, et. al. (2015) identify several areas with best practice recommendations, including goal setting, interdependency, social presence, teaching presence, and cognitive presence. Key recommendations include:

* Explicitly contextualizing and linking learning content to real life practice and communities
* Creating an environment where collaboration and interdependency are required for effective learning
* Incorporating activities for students to develop psychological connections to other members
* Encouraging students taking active roles in various learning tasks
* Explicit and clear structure and guidance for the activities
* Providing multiple real time communication channels to promote level of intimacy
* Providing space and opportunities for social interaction outside of class time.
* Explicit and clear structure and guidance for the activities
* Appropriate frequency presence through various formats (announcements, emails, comments during discussions, etc.)
* Avoid being inactive for long period of time
* Allow flexibility for independent and creative thinking
* Encouraging exploring the content domain
* Providing guidance for developing scientific inquiry skills

## Conclusion

This review has explored large-scale findings on distance learning with a view to understanding the key themes, factors, and contextual constraints that continue to face educators and their students. Although earlier thinking may have viewed distance education as an inferior learning experience, the findings encompassed in this review suggest that it is simply another form of learning that is not inherently better or worse than face-to-face learning. However, as educational institutions implement distance learning initiatives, issues related to the learner characteristics, institutional constraints, and organisational change continue to rise to the surface. Central to addressing these issues is an understanding of the key themes on which empirical distance education research has focused, including social presence, student persistence, gender, the learner’s perspective, and the balance between synchronous and asynchronous interaction. These issues can and do impact on students’ success in online learning environments, thereby highlighting key recommendations for best practice in instructional design and course delivery. With several decades of research and a wealth of empirical research, the present time therefore affords an opportunity to learn from the successes and mistakes of the past while embracing the brave future of online learning with open arms.

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