Factors that influence cognitive presence: A scoping review

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The gradual shift to online modes of learning in higher education institutions over the past 2 decades accelerated drastically on a global scale between 2020 and 2022. Students and educators, who have initially grappled with the shift, have now become accustomed to online teaching; however, there are concerns about the quality of learning that has resulted. To enable a sustainable and effective online pedagogy, educators may need to learn about fostering higher-order thinking skills, which can be challenging even for experienced educators. To conceptualise effective online pedagogy, the community of inquiry (CoI) framework emphasises cognitive presence (CP), which focuses on the higher-order thinking process. The CoI is the most widely researched framework in online pedagogy, yet contemporary CoI literature lacks collective evidence of factors that influence CP. This scoping review of the CoI literature explores the factors that influence the higher-order thinking that is indicative of CP. Inclusion criteria included evidence of CP in online learning contexts and published between January 2000 and March 2022, providing a total of 121 studies. Results suggest that teaching presence, structure of learning activities and student characteristics all influence CP.

Implications for practice or policy:

- Higher education students enrolled in online courses should be taught how to learn effectively in an online mode.
- Online course educators must embed learning tasks that foster self-regulation and higher-order skills in students.
- Online course design should include authentic tasks for students to apply new knowledge to real-life scenarios.
- Educators must be offered ample professional development activities to build their skills in online pedagogy.
- Institutions should encourage translation of online educational research to practice.

Keywords: online learning, cognitive presence, higher-order thinking, community of inquiry, scoping review

Introduction

Since early 2020, higher education institutions were forced to accelerate the delivery of learning content in blended or fully online modes as a contingency plan in response to the pandemic. During this process, the challenge revolved around implementing online learning at a massive scale and scrambling to embed technology-assisted learning. For some universities, especially in nations with developing economies, this required high levels of innovation and adaptation because their pre-pandemic focus was primarily face-to-face (Mataniari et al., 2020). In other universities, infrastructure and practice for online courses existed but needed to be drastically upscaled (Boggs et al., 2021). In the literature, there is a sense in some universities and disciplines of online provision being an emergency temporary measure that should be abandoned once conditions return to normal (Nordmann et al., 2020). However, considering online learning as a short-term setback has not been conducive to maximising potential gains of the technology-mediated development of higher-order thinking skills in students (Nordmann et al., 2020). Implementing online learning tasks to help students to develop higher-order thinking skills should be prioritised. Several studies have investigated and proposed strategies for engaging students in higher-order thinking processes, although not specific to the online mode. For example, Chi and Wylie (2014) proposed the ICAP framework, where they predicted

various levels of student engagement based on the type of learning activities. This research agenda has been expanded to report on challenges in translation to practice (Chi, 2021; Chi et al., 2018). They found that professional development of teachers targeted at enhancing cognitive engagement in students was essential to address some of the gaps in the translation of educational research to practice.

Online teaching and learning, whether part of a systematic development or a contingency, needs to have an evidence-based pedagogy underpinning it. Treating contingent adaptation to online mode as a suboptimal alternative to face-to-face teaching minimises the opportunities to deliver a curriculum which fosters development of higher-order thinking skills (Nordmann et al., 2020). In a similar way, treating systematic shift to online teaching as a cost-reduction strategy can impair the potential benefits of development of students' higher-order thinking skills. However, the demands of facilitating higher-order thinking processes in the online mode poses pedagogical challenges even for experienced educators. The necessity to innovate has created opportunities to champion the development of higher-order thinking in an online mode to allow for a legitimate, constructive and sustainable format for acquiring higher education.

The most widely researched and quoted framework in online learning is the community of inquiry (CoI) proposed by Garrison et al. (2000), deriving its principles from Vygotsky's (1962) social constructivist theory. The CoI continues to influence researchers globally in the current enviroment (Ononiwu, 2021; Padayachee & Campbell, 2022). The CoI framework identified three interdependent dynamic elements required for a successful educational experience in the context of online learning in higher education (Garrison et al., 2000). The three elements are teaching presence (TP), social presence (SP) and cognitive presence (CP), with phases identified for each. TP is defined as "the design, facilitation and direction of cognitive and social processes to realise personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., 2001, p. 5). TP consists of three phases, namely design and organisation, facilitating discourse and direct instruction (Garrison et al., 2000). SP is defined as "the ability of CoI participants to project themselves socially and emotionally as real people within their communication medium" (Garrison et al., 2000, p. 89). CP is defined as "the extent to which participants in any particular configuration of the CoI can construct meaning through sustained communication" (Garrison et al., 2000, p. 89). CP can be considered as the main outcome of higher education (Garrison et al., 2000). CP focuses on higher-order thinking processes and is described to have four phases according to the model of critical thinking (Garrison et al., 2001). The first phase is the triggering event, where a problem is identified, thus initiating the inquiry process. The second phase is exploration, where students explore relevant information and brainstorm ideas, either as individuals or in collaboration with peers. The third phase is integration, where students construct meaning from generated ideas and share these within the community. The fourth phase is resolution, where students apply or defend potential real-world solutions to the problems with new ideas. The integration and resolution phases are considered to require higher-order thinking (Garrison et al., 2001). In our review, CP refers to students' CP, unless otherwise stated. CP is considered the most challenging element to facilitate, develop and measure in online courses (Garrison & Cleveland-Innes, 2005).

To the best of our knowledge, in the context of research conducted on the CoI framework, there is limited literature on collective strategies for understanding factors that influence CP. Although CP has been researched to a significant extent within the CoI literature, most studies investigate specific contexts with varied aims restricting universal applicability. For instance, Beckmann and Weber (2016) found that including discussion starters, such as multimedia videos, enhanced CP. Ononiwu (2021) focused on discussion forums as a learning tool, while Gorsky et al. (2012) researched CP in a blended environment. Further, the existing reviews on CP focused on issues such as building online communities, rather than on factors that influence CP. For example, Fiock (2020) reviewed the CoI and summarised the importance of creating communities in online learning. Rourke and Kanuka (2009) reviewed over 200 reports that cited the CoI framework and found that only five investigated student learning. They suggested future research to make prescriptions for online learning. Darabi et al. (2013), while examining CP and higher-order thinking in students in a meta-analysis, stated that only eight studies from 2000 to 2010 examined higher-order thinking. There is no single CoI study that can provide a generalised resource of the factors that influence higher-order thinking. Therefore, we determined that the purpose of this scoping review was to understand factors that influence students' CP in online contexts within the CoI literature. Strategies that can be generalised to a wider teaching practice in this context will be reported. The findings from this review will serve as a resource for strategies to promote higher-order thinking skills in higher education online learning contexts.

Methods

Scoping reviews are used to summarise literature as they are suited to addressing broader questions beyond those related to the specific effectiveness or intervention. They contribute to evidence-based practice by examining a broader area to clarify key concepts and reporting on the types of evidence that inform practice in the field (Peters et al., 2015). Unlike a systematic review, scoping reviews are designed to provide an overview of the existing evidence regardless of quality. Hence, a formal assessment of methodological quality of the included studies is generally not performed (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2015).

Given the paucity of evidence, the variable quality of the studies conducted prior, and the relevance of the current review to the pre- and post-COVID eras, we conducted a scoping review to map and extract relevant factors contributing to CP. In the light of quality of evidence, we used a five-stage (Arksey & O'Malley, 2005; Levac et al., 2010; Peters et al., 2015) rigorous approach to enable transparency and replication of search strategy and to increase the reliability of search findings. In the first stage, we identified the research question by clarifying the purpose and linking the questions. In the second stage, we conducted a comprehensive literature search. In the third stage, we selected relevant studies by using a team approach, followed by charting the data in the fourth stage. In the final stage, we collated the results and distilled the implications for teaching practice.

To address the limitations of previous research as elaborated above, specifically in relation to the challenges with researching CP, we identified the following research question to guide the search: "What are the factors that influence CP within the CoI literature?" We propose to answer the objectives of the question from the extracted data and provide implications for teaching in the context of enhancing CP, which requires higher-order thinking.

We followed the 3-step search strategy to ensure consistency in search terms across all databases. In the first step, we performed a limited search of key concepts on the ERIC database. We applied the population concept context (PCC) framework (Peters et al., 2015) to determine key concepts (Figure 1): post-secondary education, CP and online learning. We then performed screening of keywords in the abstract and key terms to compile a list of synonyms, or alternate terms. In the second step, we conducted a comprehensive search of all identified search terms in ERIC, ProQuest Central, SCOPUS, PsycInfo and Web of Science databases. Inclusion criteria were studies that (a) present original (primary) research, analysing CP in online learning (b) published in 2000 (after the CoI framework was published), until 13 March 2022 (second search date) and (c) published in English in peer-reviewed journals or conference proceedings. We have registered the search protocol for the ERIC database as an open access data set (Maranna, 2021). In the third step, we identified relevant studies in Google Scholar and the list of CP papers (Athabasca University, 2019). We exported the final list of studies from each database to EndNote and de-duplicated for screening. We conducted the initial search on 11 November 2019, followed by a second search on 13 March 2022 to include recent studies.

Participants	Post-secondary or post-high school or higher education students enrolled in either undergraduate, postgraduate, masters or doctoral studies
Concept	CP in the literature that has studied the CoI as the overarching framework
Context	Studies that involve online learning environments, including online education, distance learning and electronic learning

Figure 1. The PCC framework to determine key concepts

The search terms identified 456 studies. The manual search identified 25 studies. After removing duplicates, five reviewers screened the title and abstracts of 209 studies based on the inclusion criteria. After excluding 66 studies, 143 studies underwent full-text screening. Full-text screening was performed by two reviewers, with an agreement of 84%. Disagreements were resolved by a third reviewer. After excluding 38 studies, we included 105 studies for data extraction. We completed the screening of title and abstracts and the full-text screening using the Covidence review software (https://www.covidence.org/). In the second search, we identified 40 studies after removal of duplicates. After excluding 24 studies, we added 16 studies to the review (total: 121 studies). For the process for article selection (Figure 2), we followed the preferred reporting items for systematic reviews and meta-analyses (extension for scoping reviews) (PRISMA-ScR)

statement (Tricco et al., 2018). We charted the data in Microsoft Excel sheets to include authors, year of publication, title, journal, country of study, sample size, study design and factors supporting CP.

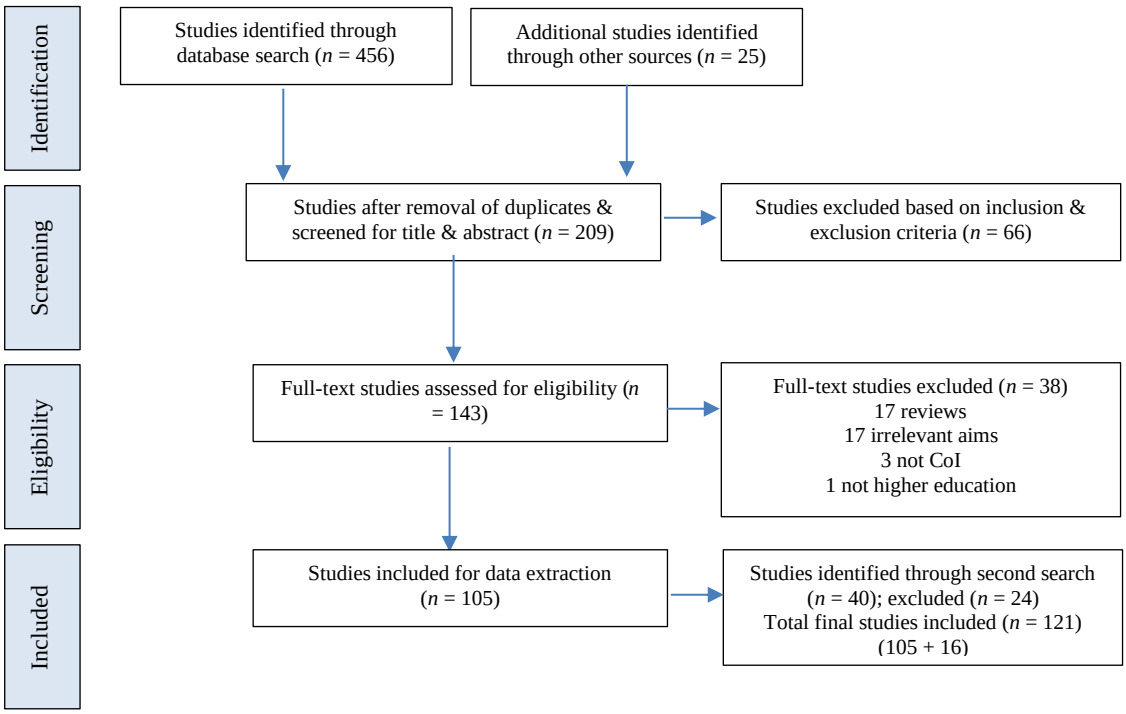

Figure 2. Selection of studies following the PRISMA-ScR statement (Peters et al., 2015; Tricco et al., 2018)

Results and discussion

Results are represented as text and tables. The scoping review yielded 121 studies. For brevity, only those findings relevant to answering the research question "What are the factors that influence CP within the CoI literature?" are presented. Three major themes were derived: (a) role of TP that influences CP, (b) structure of learning activities that influence CP and (c) student characteristics that influence CP. These will be discussed below. Unless stated, there were no disagreements with the following findings.

Role of TP that influences CP

Overall, 41% of studies (n = 50) found that TP played a key role in supporting students to develop CP and suggested that online educators should create an atmosphere of trust, facilitate open communication and be attentive to students' learning needs. In the CoI, the online educator acts firstly as the designer of the educational experience, including planning, evaluating and certifying competence; second, as facilitator and co-creator of a social environment conducive to active and successful learning; and finally, as content expert to scaffold learning experiences by initially providing direct instruction (Anderson et al., 2001, p. 5). However, 8.6% of studies (n = 10) recommended that ample opportunities for professional development (PD) should be available for educators to fulfill the above TP roles. Factors that enhance CP in each of these TP categories are summarised in Table 1.

Table 1
TP factors that influence students' CP

Specific role of TP in enhancing CP	Studies in the review that concur
Instructional design & organisation	
• Consideration of student context, degree programme & level of study	Arbaugh, 2007; Roulston et al., 2018; Sadaf & Olesova, 2017
• Mapping course objectives to learning outcomes Structuring the objectives to enhance conceptual understanding	Cho & Tobias, 2016; Moreira et al., 2013
• Consistent organisation of the course structure	Hosler & Arend, 2012; Ice et al., 2011
• Clear, explicit instructions by the facilitator to students on expectations & online activities & due date reminders	B. Chen et al., 2017; Choy & Quek, 2016; Stodel et al., 2006
• Co-teaching by staff, for a lower student-teacher ratio & for the range of expertise contributed by multiple educators	Abbitt et al., 2018
• Provide an integrated working space, with easy-to-use platforms & minimising workload of mechanical activities, e.g., providing direct links for textbooks	Gunbatar & Guyer, 2017; Kilis & Yildirim, 2018; Kozan, 2016
• Guide students how to learn online & help them develop skills in learning strategies & explain the importance of collaborative learning	B. Chen et al., 2017; Junus et al., 2019; Moreira et al., 2013; Stein et al., 2007
Facilitation	
• Facilitate conditions for active student participation, create a climate in which all students feel included, monitor students' progress & address learning gaps	Choy & Quek, 2016; Clarke & Bartholomew, 2014; Garrison et al., 2010; Saadatmand et al., 2017; Tan et al., 2020
• Allocate more time for students to interact with cognitively complex tasks; create authentic reasons for students to collaborate earlier in the semester for meaningful interaction to occur	Sadaf & Olesova, 2017
• Motivate students to develop their learning trajectory & to engage in additional research	Choy & Quek, 2016; Miller et al., 2019
• Set high expectations for students by progressing from simple to more complex tasks to enhance self-efficacy	Daspit et al., 2015
• Increase opportunities for peer mentoring, study groups & peer facilitation to reduce the perception of being isolated to self-learning & enhanced CP through group cohesion	Daspit et al., 2015; Dona et al., 2014; Garrison et al., 2010; Jimoyiannis et al., 2013; Tan et al., 2020
• Provide collaborative, peer-reviewed activities for students to shift focus from an individual perspective to that of a community	Chen et al., 2017; Johnson, 2017; Kanuka & Garrison, 2004; Kucuk & Sahin, 2013; Nagel & Kotze, 2010; Stodel et al., 2006
• Provide opportunities for brainstorming	Alman et al., 2012; Baytiyeh, 2018; Chen et al., 2017; Jimoyiannis et al., 2013; Johnson, 2017; Stover & Pollock, 2014
• Purposeful group formation to improve learning by gaining new perspectives	Alman et al., 2012; Miller et al., 2019
Direct instruction	
• Scaffold learning experiences	Rolim et al., 2019; Shea & Bidjerano, 2009a
• Provide exemplars & grading rubrics	B. Chen et al., 2017; Stodel et al., 2006
• Share experiences & ask probing questions	Clarke & Bartholomew, 2014
• Provide constructive feedback that would lead to a new understanding of content	Daspit et al., 2015
• Group feedback & further clarification from the facilitator despite learning the theory through videos & other resources	Akyol & Garrison, 2011; le Roux & Nagel, 2018
• Timely response and/or feedback by the online educators to student doubts	Cho & Tobias, 2016; d'Alessio, Lundquist et al., 2019; Gillingham et. al., 2020; Gorsky & Blau, 2009; Kucuk & Sahin, 2013; Zydney et al., 2012

Structure of learning activities that influence CP

Online learning activities, either in the form of assessment tasks or discussion forums, were found to be predominant themes that influence CP. Further, tasks that facilitated application in authentic contexts (19% of studies; $n = 23$), enabled a guided-inquiry approach (7.4% of studies; $n = 9$), aligned with learning goals (6.6% of studies; $n = 8$) and promoted peer-sharing (12% of studies; $n = 15$) were found to be strong influencers for learning in the integration and resolution phases.

A strong relationship to the integration and resolution phases was found with linking tasks that seek authentic application of newly learnt skills to real-world contexts and problem-solving projects. Authentic topics lead to exploring the tasks, appreciating diverse perspectives, creating solutions and applying solutions to their work. Students should be encouraged to share their own experiences of authentic learning experiences, reflect on them and develop new or deeper knowledge (Kilis & Yıldırım, 2019). A guided-inquiry process for learning tasks, which involves working within a framework, is better than open inquiry, which can be perceived as unstructured and vague for students (Gunbatar & Guyer, 2017). Analysing threaded discussions against critical thinking frameworks provided more direction for assessments and encouraged students to integrate their ideas and resolve problems (Meyer, 2003; Schrire, 2006). Examples of some of the frameworks used in various studies are Bloom's taxonomy (Dona et al., 2014), problem-based learning (Gašević et al., 2015; Tirado-Morueta et al., 2016), diagnostic reasoning activities (Posey et al., 2014) and inquiry-based learning (Chanprasitchai & Khlaisang, 2016). Intentional use of higher-order learning approaches, where students were given opportunities to demonstrate autonomy, leadership and decision-making, helped develop CP (Posey et al., 2014; Shea & Bidjerano, 2009b). Alignment of learning tasks to learning goals is a key aspect for enhancing CP (Akyol et al., 2009b; Hosler & Arend, 2012; Kilis & Yildirim, 2019; Krzyszkowska & Mavrommati, 2021; Miller et al., 2019; Saadatmand et al., 2017). CP was represented as dependent on the nature of assessments and their alignment with learning. Embedding activities and assessments that encourage peer collaboration enhanced CP by allowing team-based collective decision-making. Examples include wikis (Jimoyiannis & Roussinos, 2017; Stodel et al., 2006), synchronous online case presentations (Posey et al., 2014) and double peer review, where each student reviews others' work as well as gets their work reviewed (Nagel & Kotze, 2010). The studies cited under assessments were considered as summative unless stated (Table 2).

The role of discussion forums in sustaining online learning is a major focus in the CoI. Asynchronous discussion was investigated in 25% ($n = 30$) of studies and was found to be beneficial for knowledge-construction, allowing time for reflection (Ke, 2010; S. M. Lee, 2014; Mehri & Izadpanah, 2017; Stein et al., 2007; Wang & Chen, 2008). Supporting this, Y. Chen, Gao et al. (2019) found that asynchronicity enabled flexible access to discussions and promoted passive engagement. Ononiwu (2021) suggested that they provide shy learners a chance to participate in the learning process. It also brings out the best in learners as they can respond to questions and discussions more reflectively as opposed to the random approach of face-to-face discussions. However, Stover and Pollock (2014) argued for not restricting to asynchronous discussions alone. Synchronous discussions were investigated in 5.8% of studies ($n = 7$). Collaborative group learning discussions with sharing of solutions (Dona et al., 2014; Posey et al., 2014) and small-group synchronous discussions (Stover & Pollock, 2014) were found to help students to gain different perspectives and to brainstorm ideas. Overall, a combination of synchronous discussions to enable brainstorming and asynchronous discussions to enable reflective thinking is proposed. The findings mapped under discussion strategies (see Table 2) were a combination of learning tasks and assessments, either summative or formative as they were not made explicit in the studies.

Table 2
Strategies for designing learning activities to enhance CP

Learning activities	Studies in the review that concur
Assessment strategies	
• Authentic tasks related to individual practical experiences. Life experience through case study analysis to foster higher phases of knowledge construction through the application of content & personalisation	Akbulut et al., 2022; B. Chen et al., 2017; Choy & Quek, 2016; Feng et al., 2017; Gikandi, 2021; Sadaf & Olesova, 2017; Swart, 2017; Wright, 2014
• Re-design & connect assignments to enable the regular application of knowledge & skills from theory to practice, making the assignment more authentic, relevant & applicable for students	Finch & Jefferson, 2013; Kumar et al., 2011
• Scaffolding of assessments & questioning	Feng et al., 2017
• Extend assessments to analyse knowledge transfer to new situations	Lajoie et al., 2006
• Use questions that have prompts for exploring, explaining, searching or designing an intervention rather than questions that assessed facts or controversies	Olesova et al., 2016
• Case studies, with challenging & reflective tasks, where students are required to demonstrate, creativity & critical reflection, make the learning process cognitively complex	Akyol et al., 2009b; Choo et al., 2020; Gikandi, 2021; Gillingham et al., 2020; Kilis & Yildirim, 2019; Krzyszkowska & Mavrommati, 2021; Stover & Pollock, 2014
Discussion forum strategies	
• Align the theme of discussions to the learning outcomes, to support knowledge construction & to build a discussion culture among students	Makri et al., 2014; Swart, 2017
• Discussion forums with consistent requirements & settings, integrated into several phases of the course as compulsory learning tasks, promotes critical thinking & group reflection	Junus et al., 2019; Ke, 2010; Lajoie et al., 2006
• Schedule discussions in the core teaching period	Makri et al., 2014
• Careful structuring of initiating questions & time of questioning of online discussion forums	Akyol & Garrison, 2011
• Include discussion starters, such as multimedia video statements, images or podcasts	Junus et al., 2019
• Educators to contribute to discussions to keep it focused & unbiased	Hosler & Arend, 2012; Varnhagen et al., 2005
• Group discussions on authentic content	Akbulut et al., 2022
• Integrate discussion topics with work-placement schedule	Arbaugh, 2013
• Graded discussion forums with modelling & guidance on ways to participate	Padayachee & Campbell, 2021
• Design discussion questions using strategies such as scenario-based, scaffolding & role play	Darabi et al., 2011; DuBois et al., 2019; Gašević et al., 2015; C. J. Liu & Yang, 2014

Student characteristics that influence CP

Students with prior experiences with online learning, collaborative learning and an ability to appreciate feedback from others, tended to have an advantage to enhance their CP, whereas those with lesser experience depended more on TP to initiate their learning process (Archibald, 2010). Experienced students perceived a sense of belonging to a learning community (Shea & Bidjerano, 2009a). Student's self-directedness to recognise the ongoing need for additional knowledge was found to enhance CP (Baytiyeh, 2018; Chanprasitchai & Khlaisang, 2016). Students' self-regulation, motivation, skill of identifying, hypothesising, integrating knowledge and proposing solutions to problems, promoted their learning at the integration and resolution phases (Daspit et al., 2015; Shea et al., 2013; Weerasinghe et al., 2012). Study context, age and year level were all identified as important student-related variables which influence their perception of CP (Hilliard & Stewart, 2019; Roulston et al., 2018). Kovanović et al. (2019 investigated the role of learning strategies and concluded that selective users achieved similar learning success as engaged users. Selective users are those who demonstrated highly focused and strategic use of online tools, such as video lectures and graded assessments, and utilised discussions in a passive manner, by viewing other students' postings rather than actively contributing. Engaged users demonstrated active course participation and deep approaches to learning (Kovanović et al., 2019).

Implications for teaching practice

With the global demand for online learning, it is timely to think beyond the mere implementation and emergency adaptation to online mode. Sustained delivery of curriculum that influences higher-order thinking must be prioritised. Our review consisted of 121 studies published from January 2000 to March 2022, with 61% (n = 74) published in or after 2014. Results indicate that teaching presence, structure of learning tasks and student characteristics influence CP. A summary of strategies for assessments, discussion forums and learning tasks to promote CP was collated. Based on the insights derived, the following five recommendations are put forth for educators to consider in their teaching practice in the context of enhancing CP in the online mode.

Higher education students enrolled in online courses should be taught how to learn effectively in the online mode

Firstly, guiding students how to learn online and to model how to participate in online learning activities should be prioritised. This is especially crucial in the foundational courses of a degree programme, enabling students to develop self-regulation and take responsibility of their own learning needs. This will then lead to less handholding as the student progresses to higher levels of learning. As with the challenges that educators encounter in implementing learning tasks to develop higher-order thinking skills, students are also challenged while adapting to active learning strategies. Moreover, students must also learn to quickly adapt to the multitude of online platforms, specific to educational institutions. These challenges are compounded when students transfer between institutions. The nature of learning tasks as designed by individual educators usually is context specific. Therefore, providing worked exemplars and modelling expectations can act as a catalyst for students to explore existing content and set them up with skills for creating new knowledge. Similarly, explaining the significance of peer interaction and reflective thinking to students can enable the development of higher-order thinking skills.

Online educators must embed learning tasks that foster self-regulation and higher-order skills in students

Guiding students with explicit instructions in the early stages of a degree programme or a course can foster self-regulatory skills in the long term. Swan et al. (2009) found that where students were challenged to resolve a problem and explicit facilitation and direction was provided, students demonstrated higher-order thinking. This is evident in instances with the scaffolding of tasks to promote higher-order thinking, where TP can be gradually withdrawn, enabling the students to take responsibility of their own learning goals. It should be noted that although all the studies in our review encompass the CoI framework, results suggest that this framework offers flexibility for adapting other critical thinking frameworks. This can accomplished mainly through learning tasks which are designed based on those frameworks. Similarly, it can be argued that frameworks not included in our review, such as the ICAP (Chi & Wylie, 2014) or the research skill development framework (Mataniari et al., 2020; Willison, 2018), can be adapted with the CoI elements to enhance higher-order learning.

Online course design should include authentic tasks for students to apply new knowledge to real-life scenarios

Online teaching mode was long considered unsupportive for students to demonstrate knowledge application and test real-world application of knowledge (Garrison, 2007). Garrison (2007) further observed that the main reason for students not being able to test their knowledge in real-world situations could be the lack of appropriately designed authentic learning tasks for this to occur. Similarly, online discussions tend to be meaningful only if students perceive the relevance of participation in their learning outcome. Along with the overall course design, individual tasks such as discussion with peers must be designed to be purposeful and intentional to generate the desired learning outcomes. For example, questioning students on how they would apply what they learned from a task to their own profession could initiate an authentic critical thinking process. Similarly, discussions organised around arriving at solutions or the completion of assessments based on real-life application are more likely to enhance CP.

Online educators must be offered ample professional development activities to build their skills in online pedagogy

Student progression through higher-order thinking requires facilitation from educators. However, it can be challenging for educators to manage the multi-faceted responsibilities of TP in an online environment. The challenges for educators who have been predominantly involved in face-to-face teaching and unfamiliar with online pedagogies are that it requires them to shift to a facilitator role and develop the skills to design and implement appropriate tasks that enable students to achieve outcomes. Educators with prior experience in online pedagogy can contribute to a sustainable approach through a collaborative and iterative process. In this review, TP emerged as a significant contributor to developing CP. One of the key implications for teaching practice clearly includes supporting educators in adapting to online pedagogical approaches. Educators must be offered ample opportunities for professional development in online teaching strategies alongside institutional support for adapting and using emerging technology (Capra, 2014; Johnson, 2017; Ling, 2007; Miller et al., 2019). Professional development can help to facilitate cyclical reflective activity by online educators and to provide support and training in online teaching and building skills in course design and facilitation. Professional development is also considered essential to support online inquiry planning and ongoing monitoring.

Institutions should encourage translation of online educational research to practice

Institutional support through funding educational research may help to address the gap in translating research to practice to a certain extent. This funding can provide critical impetus to the educators involved. Additional institutional supports that focus on developing and sustaining an innovative pedagogical mindset to enhance teaching and learning practices in online delivery is also essential. In situations where educators have successfully designed the appropriate strategies to promote development of higher-order thinking skills, it is crucial for such individuals to sustain engagement in evidence-based improvements to course design. It should be noted that in most circumstances, only a single or perhaps a couple of strategies can be piloted. It should also be noted that educators must engage in a reflective iterative process to make enhancements in subsequent iterations of the course. For example, an educator may need a few iterations to strike a balance between synchronous and asynchronous activities to achieve the desired learning outcomes.

Limitations of this scoping study

Because our review focused on the CoI framework and CP, all included studies conform to the CoI literature only. It can be argued that the included studies appear to agree about the aspects they address and therefore can be perceived to have less divergent views. Although we followed a comprehensive search strategy, it was limited to five databases and is likely that all relevant literature may not be identified. To keep within the scope of this article, methodological quality of the included studies has not been evaluated.

Conclusion

In this scoping review, factors that influence CP have been examined. Our findings provide an understanding of the various factors that support students to develop CP in online learning, which, support the development of higher-order thinking processes. Careful consideration of the findings will help enhance the course design and learning tasks. The findings further suggest that a holistic approach for online learning that integrates intentional learning, collaborative problem-solving, deep personal reflection, and real-world application of knowledge is necessary for fostering CP in students.

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*Asterisks indicate studies in the scoping review.

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