Proposed Strategy for Incorporating Critical Thinking in Teacher Education to Support Teacher Professionalism

Teresa Angelico
The University of Melbourne

This paper proposes a change strategy for incorporating critical thinking in teacher education programs globally, that includes, problem diagnosis, identification of desired outcomes and impacts, influential factors, and strategies required to attain desired outcomes and impacts. Central to this change strategy are four key strategic priorities: conceptualisation of critical thinking as professional practice; development of a whole of teacher education program approach to intervention; building capacity for effective implementation of intervention; and development of an evidence base to inform continuous improvement. The change strategy addresses a research gap, and more broadly responds to the demand for improving teacher quality, the effectiveness and impact of teacher education programs and the advancement of the teaching profession.

Keywords: critical thinking, logic model, teacher education, 21st century learning, teacher capability

INTRODUCTION

Given the increasing significance of critical thinking in education, Australian researchers, Hager and Kaye, asked in 1992, why it was not taken seriously in teacher education and made a case for the urgent development of a research agenda to inform a strategic response. But as Cruz, Nascimento and Dominguez (2019) conclude in a Portuguese study, Hager and Kaye's call for a pro-active response in teacher education has not eventuated despite the growing recognition of the importance of critical thinking as an educational goal. A review of the international literature undertaken by Lorencová, Jarošová, Avgitidou and Dimitriadou (2019), concluded that although 'critical thinking is considered an essential component of the pedagogical grounding of teachers, it is not systematically included in teacher education programs' (p. 853). Nor has it been actively addressed by educational researchers, evident in the limited number of studies conducted to date (Lorencova et al. 2019; McBride, Xiang, & Wittenburg, 2002; Mpofu & Maphalala, 2017).

However, the promotion of critical thinking in national policy reports has supported efforts to address critical thinking for teacher education (Williams, 2005). But as Tsui (2002) argued, many of these attempts has not met expectations. Studies of critical thinking in academic and professional courses in higher education indicate similar findings, leading Nicholas and Raider–Roth (2016) to argue for the development of a 'thoughtful response' to the question of how best to address critical thinking to counter the perceived prevalence of a 'hopeful' approach to its development (p.8).

This paper supports the case for the development of such a thoughtful response to the development of critical thinking in teacher education, through the articulation of a change strategy for incorporating it into

programs. The strategy articulates the problem, the desired outcomes and impacts, influential factors, strategies required for success, as well as their underlying assumptions. This paper is significant because it not only addresses a research gap, but it is more broadly responsive to the demand for improving teacher quality, the effectiveness and impact of teacher education programs (Hattie, 2012) and teacher professionalism (Schleicher, 2012).

SIGNIFICANCE OF CRITICAL THINKING

Critical thinking has a long history dating back to the teachings of Socrates in ancient Greece recorded by Plato with conceptual roots in western philosophical thought and democracy (Giuseffi, 2015; Fisher, 2021). Since the 1990s, there has been an intensification of the focus on critical thinking worldwide by educators, policy makers and employers (Haberlin, 2018) making it a universally recognised and valued educational goal (e.g. Cross, 2015; Davies, 2015; Lai, 2011; Wisdom & Leavitt, 2015).

The intensified focus on critical thinking has occurred in the context of an everchanging world and is reflected in its association with various interconnected purposes. Firstly, it supports academic learning and achievement in higher education (Plotnikova & Strukov, 2019; Puig at al., 2019; Wisdom & Leavitt, 2015). Critical thinking is also considered to be essential for the 'survival of a democratic way of life' (Ennis, 1996, xvii, in Moon 2008, p.8) and for cross national interaction in an increasingly interdependent world (Boni and Walker, 2013). It is needed to assist citizens to engage with democratic processes, through the voting process and participation in various forums and activities (Moon 2008, p.8). More broadly, critical thinking is seen 'as a vehicle for personal and social transformation' (Shpeizer, 2018, p.32), assisting citizens to be responsive to personal, career and social challenges (Evens & Verburgh, 2014; Tsui, 2002; Uluçınar & Aypay, 2018) by supporting their personal decision making (Karbalael, 2012) and strengthening their capacity to be functional and successful adults (Thonney & Montgomery, 2019; Miri, David & Uri, 2007).

Moreover, critical thinking is considered to be essential for life and living in an information age, enabling citizens to identify false or misleading information (Haberlin, 2018) and providing protection 'against the less subtle forms of brainwashing' (Lipman, 2003, p.209). According to Erikson (2019), critical thinking has a new relevance in the context of the rise of the predominance of fake news and the downplay of scientific knowledge. With the advancement of technology and rise of social media, the 'ability to judge the credibility of an information source has become an indispensable' (Halpern, 1999, p.71) as citizens need to be able to know the difference between facts and opinions and evaluate and evidence (Soufi & See, 2019). Significantly, critical thinking is associated with successful workplace contribution (Puig at al., 2019; Tang, 2019) as it enables workers to deal with workplace complexity (Huber & Kuncel, 2016; Karbalael, 2012), enabling them to solve problems (Pithers, & Soden, 2000), develop new perspectives (Tang, 2019) and make critical decisions (French & Tracey, 2010).

As critical thinking is relevant to all aspects of professional practice, that is, planning, delivery, assessment and evaluation (Tilbury, Osmond & Scott, 2010), it is also associated with professionalism and the advancement of professions, in particular, in education, health sciences, law and human service professions. It enables success in professional studies and practice (Taghva, Rezaei, Ghaderi, & Taghva, 2014), facilitates the continuous improvement of quality professional practice and outcomes and supports professionals to meet increased professional and public accountability demands (Ahuna et al., 2014; Distler, 2007; Finn, 2011; Morrow 2009).

The unprecedented rate of social, political, economic, and technological change requires professionals to think critically to enable them to effectively respond to new and emerging needs, to adapt to change and to deal with uncertainty (Ahuna et al., 2014; Schleicher, 2012). As Do and Wilson-Rogers (2018) argue 'law graduates will struggle without a strong ability to think critically in this rapidly changing world' (p.247). Likewise, accountants require critical thinking to help them 'behave more strategically' (Latif, Yusuf, Tarmezi, Rosly & Zainuddin, 2019, p.58). Hence, critical thinking supports professional practice in ever changing complex and demanding environments (Tilbury et al., 2010). For instance, it facilitates the provision of patient centred care and quality health outcomes in medicine and nursing (Finn, 2011) and

enables teachers to be responsive to the diverse educational needs of students (Ahuna et al., 2014) and achieve equitable and quality educational outcomes (Huang, 2015). Teachers, like other professionals, need to be critical thinkers to effectively perform their role and gain insight into their own professionalism and their discipline (Morrow 2009; Paul & Elder, 2010). They need critical thinking for all aspects and stages of the professional process (Tilbury et al. 2010), including the facilitation of its development in their students (Lorencova et al., 2019; Mpofu and Maphalala, 2017; Tican, & Taspinar, 2015; Williams, 2005).

CONCEPTUALISATION OF CRITICAL THINKING

Although critical thinking is a widely endorsed and universally espoused (Blair, 2021; Davies, 2015), there is a lack of consensus about its conceptualisation (Ab Kadir, 2017; Evens & Verburgh, 2014; Finn, 2011; Mulnix, 2012; Stassen, Herrington & Henderson, 2011; Thonney, Montgomery, 2019). In the absence of a commonly agreed theoretical and conceptual understanding (Davies, 2015), and guided by Riddell's (2007) suggestion that critical thinking requires 'an explanation rather than a definition' (p.122), an outline of key characteristics of critical thinking is provided.

The critical thinking cognitive process is described as self-regulated (Facione, 2015, p.26), self-disciplined (Mulnix, 2012, p.466), self-controlled (Wilkes & Ashmore, 2014, p.8), self-directed (Mulnix, 2012, p.466), self-monitored (Mulnix, 2012, p.466), and self-corrective (Lipman, 2003, p.218). The critical thinking process facilitates reasoned judgement (Benjamin, Steele, Zahner, Elliot & Patterson, 2016, p.6-7; Lipman, 2003, p. 209; Glaser, 1941, p.6; Moon, 2008, p.126) that are not based on emotions (Halx & Reybold, 2005, p.294) and enable thinkers to recognise possible falsehoods (Mulnix, 2012, p.473). Reasoning is therefore central to the process of making judgements, requiring individuals to think logically and rationally (Ennis, 2013; Facione, 2015; Mulnix, 2012, p.473).

Critical thinking also facilitates an ongoing evaluation of the thinking process (Ennis 2018; Facione, 2015; Halpern, 1999) through 'evaluation of observations and communications, information and argumentation' (Fisher and Scriven, 1997, p. 21). Furthermore, the critical thinking process facilitates an evaluation of the 'merit, quality, worth, or value of something … of the truth, probability or reliability of claims and the reasonableness of arguments and inferences' (Scriven in Fisher, 2019). The critical thinking process enables problems to be solved and overcome (Lai, 2011; Lawrence–Wilkes & Ashmore, 2014) and decisions to be made (Ennis, 1991). Critical thinking theorists highlight the role of evidence in reasoned judgement, evaluation, problem solving and decision making. As Bok's (2006, in Benjamin et al., 2016) argues relevant data needs to be searched for and used to inform or justify conclusions. This requires an understanding of the relationship between evidence and conclusion and the identification of evidence and data to confirm conclusions and generalisations (Benjamin et al., 2016; Glaser, 1941; Mulnix, 2012).

Most significantly, the critical thinking process informs belief and action (Ennis, 2018; Glaser, 1941; Paul and Elder, 2008). By emphasising a thinking process - that is purposeful (Facione, 2015), goal–directed (Karbalael, 2012), active (Fisher, 2021), intentional (Care, Kim, Vista, & Anderson, 2018), reflective (Fisher, 2021) and inquiry-focussed (Miri et al, 2007) - the importance of the application of thought to belief and action is highlighted. Critical thinking therefore seeks to produce something that is said, made or done and involves the production of judgement that is put into action 'to bring about reasonable change' (Lipman, 2003, p.211).

Finally, the critical thinking cognitive process relies on a set of knowledge, skills, and dispositions (Glaser, 1941). The critical thinking knowledge base includes knowledge of methods of logical inquiry and reasoning (Glaser, 1941), knowledge of theories, conceptions of critical thinking and related processes (Ab Kadir, 2017; French and Tracey, 2010; Wang, 2017), the criteria for evaluating its quality; and knowledge of cognition processes associated with critical thinking metacognition (Lai, 2011; Paul and Elder, 2010; Stassen et al., 2011).

Important skills and abilities underpinning critical thinking include: analysis of ideas, arguments, claims and evidence (Ennis, 1985; Facione, 2015); identification of relationships, questions, assumptions, conclusions issues and arguments (Benjamin et al., 2016; Ennis, 1985; Riddell, 2007); interpretation and explanation of data, texts, events, actions etc as a basis for drawing conclusions (Facione, 2015; Glaser,

1941; Fisher, 2021); inference – making through reasoning (Ennis, 1985; Willingham, 2007); and synthesis of information (Lawrence – Wilkes & Ashmore, 2014, p.8). Other identified skills include: questioning (Ennis, 1985); conceptualization and abstraction (Lawrence – Wilkes & Ashmore, 2014); application (Paul, 1985); assessment (Ennis, 1985); observation (Mpofu & Maphalala, 2017); definition (Ennis, 1985); estimation (Care, Kim, Vista, & Anderson, 2018); hypothesis (Care, Kim, Vista, & Anderson, 2018); and prediction (Davies, 2015); and the use language with accuracy, clarity and discrimination (Glaser, 1941).

Dispositions alert individuals to opportunities for using their skills (Facione, 2015) and to inform the selection of relevant skills (Evens & Verburgh, 2014). The most common dispositions identified in the literature include: being guided by reason (Ennis, 1985), open and fair mindedness (Facione, 2015); commitment to overcome ego and socio centrism (Mulnix, 2012); curious or inquisitive, and willingness to consider others' perspective (Facione, 2015).

THE CHANGE STRATEGY

As the purpose of the research was to develop a change strategy to assist teacher education providers to respond to the question of how best to incorporate critical thinking in their programs, a design research perspective informed the overall methodological approach. According to Anderson and Shattuck (2012) design research emerged in early 2000s 'as a practical research methodology that could effectively bridge the chasm between research and practice in formal education' (p.16) that is applicable in complex learning environments. Design research is relevant for complex problems (Plomp, 2007), related to significant educational goals for which there are no guidelines or consensus about the resolution of these problems (Kelly, 2007). The aim of design research is therefore to solve educational problems, through the development of 'usable knowledge' (Plomp, 2007, p.9) not only about the solutions but also about processes for developing these solutions (Plomp, 2007). Most significantly, design research is 'theory oriented' (Plomp, 2007, p.14) as theories not only inform the design of the solution but may also be built as part of the solution. There is recognition that 'there is no simple theoretical model' (Kelly, 2007, p.81) to solve complex problems as solutions occur in complex educational systems. Instead, design research requires multiple interconnected theories to inform modelling of solutions for real contexts (Kelly, 2007).

The design research perspective has supported a holistic approach (Plomp, 2007) to the development of the change strategy, through a two-phased research process. The first phase entailed the preliminary investigation of the problem of the treatment of critical thinking in teacher education and the question of how best to incorporate it within programs, through a qualitative cross-disciplinary literature review. Data was collected and recorded across separate fields of research - teacher education, professional education, higher education, and 21st century learning and teaching – to support the integration of research on teaching with research on higher education and professional education (Grossman and McDonald, 2008). A complexity lens was used to collect and interpret data in recognition of the complexity of not only teacher education but also the broader education system (Cochran-Smith, Ell, Ludlow, Grudhoff & Aitken, 2014) and institutional contexts of higher education, schooling, and government policy (Grossman & McDonald, 2008).

The second phase entailed the adaptation of the Theory of Change Logic Model (W.K. Kellogg Foundation, 2007, p.27) to provide an integrative framework for the development of a proposed strategy to assist teacher education providers to incorporate critical thinking in their programs. The Theory of Change Logic Model enables the incorporation of multiple interrelated elements, the depiction of the big picture and the identification of action needed at the strategic level (Brown, 2016) by articulating an integrated set of planned inputs, strategies linked to outcomes and impacts (Funnell & Rogers, 2011). The proposed change strategy includes the articulation of the following elements: the problem; the desired outcomes and impacts; the factors influencing their attainment; and the strategies required to achieve desired results.

The Problem

This change strategy addresses the problem of the lack of clarity regarding the question of how best to ensure that teacher education programs effectively support preservice teachers to both enhance the

development of their own critical thinking and also develop a capacity to teach it to their students. This lack of clarity raises concern about the inadequate preparation of teachers (Ab Kadir, 2015; Halx & Reybold, 2005) as teacher educators lack clarity about how to support preservice teachers to think (Pithers and Sodden, 2000), often basing their teaching on 'their own definition and understanding of critical thinking' (Halx & Reybold, 2005, p.314) and / or leaving it up to preservice teachers 'to take responsibility for their own learning' (French and Tracey, 2010, p.10). As a consequence of this inadequate preparation for teaching, preservice teachers graduate with gaps in their professional development (Ab Kadir, 2015).

This problem of the lack of clarity about how best to address critical thinking in teacher education is located within a broader context of the recognition that teacher development is considered to be the 'linchpin of education reform' (Cochran – Smith, 2014, p.2) and an awareness of research evidence indicating the limited impact of initial teacher preparation programs on teachers' capacity to influence student achievement (Hattie, 2009, p.126). This problem is also related to the demand for clearly articulating teacher quality and teacher professionalism in an ever-changing economic, social, and political environment (Schleicher, 2012).

The conception of teacher quality as effective professional practice is relevant in this strategy, as it reflects a concurrent shift of emphasis from a focus on teacher knowledge to a focus on professional teaching practice (Grossman & McDonald, 2008,) and puts the spotlight on teacher behaviours and dispositions (Grossman & McDonald, 2008; Krupat, Sprage, Wolpaw, Haidet, Hatem & O'Brien, 2011). Teacher practice requires the transfer of theoretical knowledge to teaching practice (Haberlin, 2018,), the 'use of evidence' (Hattie, 2009, p. 127) to inform 'theoretical and practical judgment' (Dottin, 2009, p.84). Moreover, teaching practice supports teacher responsiveness to the diverse needs of students, enabling 'multitude of simultaneous evaluations, syntheses of observations, and immediate adjustments in the moment to differentiate instruction to meet the needs of as many learners as possible' (Leaman & Flanagan, 2013, p.46). Furthermore, the conception of teacher quality as professional practice, supports a longstanding call to bridge the gap between knowledge of teaching theory and teaching practice (Grossman & McDonald, 2008; Leaman & Flanagan, 2013).

Strategies

Four broad and interrelated strategies are outlined below designed to address the problem of the lack of clarity of how best to incorporate critical thinking in teacher education programs.

Conceptualisation of Critical Thinking as Professional Practice

A clear conception of critical thinking is needed as a starting point (Thonney, Montgomery, 2019, P.174), making it fit for purpose (Erikson, 2019), and providing a workable definition (Paris 2016; Ennis, 2013) or a map (Erikson, 2019) to guide an intentional and consistent application (Bloch and Spataro, 2014). This means that critical thinking needs to be conceived as a professional practice, supporting teachers to make evidence based professional judgements, problem solve and make decision in their everyday practices (Leaman & Flanagan, 2013).

The linking of critical thinking to professional practice addresses the perceived prevalence of superficial thinking in teacher education (Moon, 2008; Watts & Lawson 2009) by supporting deep and complex higher order thinking (Leaman & Flanagan, 2013; Lorencova et al., 2019). Higher order thinking is essential for planning and delivery of education, and continuous improvement of teaching 'based on reflection and adjustment during the act of teaching' (Leaman & Flanagan, 2013), enabling teachers to move 'beyond knowledge and application of quality teaching strategies (lower-order skills) to the moment-by-moment use of critical thinking skills to meet the needs of every learner (higher-order skills)' (Leaman & Flanagan, 2013, p.48).

Critical thinking supports professional practice by enabling teachers to engage in 'reasonable reflective thinking focused on deciding what to believe or do' (Ennis, 1993, p. 180), in order to support their attainment of professional outcomes. It supports professional 'evaluation process of determining merit, worth or significance' (Scriven, 2021, p. 351). The capability underpinning critical thinking includes not only knowledge and skills but most importantly, dispositions, such as, traits, temperaments, or mindsets

(Freeman, 2007, in Dottin, 2009, p.83). Dispositions play a role in supporting the application of knowledge and skills into action (Huang, 2015; Lorencova et al., 2019; Tilbury et al., 2010). Some critical dispositions for teaching include: thinking critically (Williams, 2005; Bloch and Spataro, 2014); being inquiry focussed (Cruz et al., 2019) and being willing to engage in continuous learning and self-reflection (Lorencova et al., 2019).

Development of a Whole of Teacher Education Program Approach to Intervention

A whole of teacher education program approach to intervention is needed, involving the deliberate, intentional, explicit and transparent incorporation of critical thinking into all aspects of programs and domain-specific courses (Verburgh, 2019; Mpofu & Maphalala, 2017; Niu & Behar-Horenstein, 2013; Lorencova et al., 2019). This means that critical thinking needs to be integrated within disciplines or domains, enabling teacher education providers to teach it in context (Lai, 2011) because the learning process requires background or domain-specific content knowledge for effective application and practice (Behar-Horenstein & Niu, 2011; Tiruneh et al., 2018). As Ennis (2013) argues the effective practice of critical thinking depends on familiarity and knowledge of the context.

A whole of program approach will ensure coherence (Flores, Santos, Fernandes, Pereira, 2014) and alignment within and between all elements of programming: goals, aims and objectives (Bezanilla, Fernandez-Nogueira, Poblete, & Galindo-Dominguez, 2019; Puig et al., 2019); academic and professional experience (Haberlin, 2018; Huang, 2015; Watts & Lawson 2009); and curriculum, pedagogy and assessment (Bezanilla et al., 2019; Cruz et al., 2019; Mulinex, 2012; Puig et al., 2019). It provides a vision of program effectiveness (Darling-Hammond, 2006) and supports developmental learning across the entire program (Behar-Horenstein & Niu, 2011; Huang, 2015; Lorencova et al., 2019) and continuous improvement of existing practices (Lipman, 2003). Moreover, a whole of program approach to intervention requires recognition of 'the interdependence of program elements' (Bezanilla, et al., 2019, p.3). This insight provides a basis for the purposeful design of curriculum, pedagogy and assessment (Mpofu & Maphalala, 2017; Pithers, & Soden, 2000; Tilbury et al., 2010) to achieve desired learning outcomes (Haberlin, 2018) and enable consistency and continuity in planning, delivery, and evaluation (Huang, 2015).

The design of curriculum entails an identification of key knowledge, skills and dispositions that underpin critical thinking associated with teacher professional practice and includes the development of the critical thinking pedagogical content knowledge base (e.g. Ab Kadir, 2017), that is informed by research evidence as demonstrating high impact (Verburgh, 2019; Huber & Kuncel, 2016; Puig et al., 2019) and facilitates deep learning (Paris 2016). The concept of pedagogical content knowledge was developed by Shulman (1987) to illustrate the necessity for professional understanding required to teach, consisting of an 'amalgam of content and pedagogy' (p.8). In addition, assessment needs to be designed to achieve critical thinking outcomes (Benjamin et al., 2016; Ten Dam & Volman, 2004). Therefore, assessment needs to: be aligned with the definition of critical thinking (Fountain, 2016) and teaching instruction (Bensley & Murtagh, 2012; Bezanilla et al., 2019; Mulinex, 2012); inclusive of both domain general and domain specific conceptions of critical thinking (Thonney, Montgomery, 2019); valid and reliable (Haynes, Lisic, Goltz, Stein, & Harris, 2016); incorporate both skills and dispositions (Bensley & Murtagh, 2012; Krupat et al., 2011); and include the use of multiple measures, including both quantitative and qualitative methods (Behar-Horenstein & Niu, 2011; Puig et al., 2019; Ten Dam & Volman, 2004; Wang, 2017).

Building Capacity for Effective Implementation of Intervention

As implementation facilitates the enactment of policy and attainment of desired results, a focus on the implementation process is essential, entailing: assessment of readiness and capacity to implement the critical thinking intervention; design of implementation plan from the start to ensure sustainability of effort, recognising that there are different stages of implementation; and monitor and evaluate the implementation process to ensure fidelity and responsiveness to new and emerging needs (Hattie, 2019). This implementation process 'is rarely linear or one-way' highlighting different factors and priorities at different stages (Hattie, 2019, p.13). It requires teacher educators' ownership of the critical thinking intervention and understanding of its capacity to improve teacher learning outcomes (Robinson, 2017, in Hattie, 2019, p.12).

In addition, the implementation process depends on effective leadership, ensuring enactment of policies and goals to achieve desired outcomes and impacts, through articulation of a clear moral purpose (Hattie, 2019) and facilitation of consensus building, collaborative relationships and partnerships regarding the design, implementation and evaluation of the critical thinking interventions (Erikson, 2019; Hattie, 2019; Lorencova et al., 2019). Leadership is also essential to ensure the establishment of enabling organisational policies, structures and processes (Belluigia & Cundill, 2017; Hill et al., 2008), for example, 'staff recruitment, reward and professional development' (Hill et al, 2008, p.158), teaching and learning, and quality assurance (Dumitru, Elen, Railiene, & Penkauskiene, 2018).

Moreover, leaders need to ensure that resources are adequate for implementing interventions (Scheeler, Budin & Markelz, 2016), such as, allocation of time to support teaching and learning (Bloch and Spataro, 2014; Hill et al., 2008; Lawrence–Wilkes & Ashmore, 2014). Funded strategies include redesign of programs and curriculum content; development of assessment instruments and educational resources (Oliver, 2013); staff engagement and professional development initiatives (Pithers & Soden, 2000; Kowalczyk et al., 2012; Tsui, 2002). Furthermore, leaders need to ensure that learning environments are designed to facilitate the attainment of desired results by addressing cultural and organizational factors (Dumitru et al., 2018).

In particular, leaders have an important role in building teacher educators' capacity to support the delivery of critical thinking interventions. As effective implementation of critical thinking interventions depends on instructors' abilities, dispositions, and motivations (c.f. Abrami, Bernard, Borokhovski, Wade, Surkes, Tamin, & Zhang, 2008; Erikson, 2019; Tsui, 2002), investment in critical thinking capability development is essential (Ahuna et al, 2014; Dumitru et al., 2018; Miri et al, 2007; Taghva et al., 2014).

Haynes et al.'s (2016) study confirms the positive impact of critical thinking professional development on teaching and learning. As Erikson (2019) argues 'unless the teacher is able to distinguish critical thinking when it occurs, the students will not receive adequate support, fruitful feedback or a fair assessment' (p.7). Therefore, teacher educators need to be critical thinkers, model it in their teaching and teach preservice teachers to develop their own critical thinking (Halx & Reybold, 2005; Kowalczyk et al., 2012; Urbani, Roshandel, Michaels, & Truesdell, 2017). Moreover, it enables them to be responsive to the various professional demands and supports organisational reform agendas (Low, Hui & Cai, 2017).

The change strategy also supports teacher agency and empowerment to make judgements and decisions that are responsive to specific contexts (Jones & Charteris, 2017) and builds their capacity for self-regulation (McBride & Knight, 1993). The capacity is built through the creation of an empowering learning environment (Belluigia, & Cundill, 2017; Bezanilla et al., 2019; McBride & Knight, 1993) that facilitates continuous professional development (Cruz et al., 2019), through the provision of structured learning opportunities (Cruz et al., 2019), such as, workshops, conferences, and continuing education coursework or by accessing resources provided by college or universities centres for teaching and learning (Ahuna et al, 2014). Also important is rewarding and recognising staff engagement and professional learning (Hill et al., 2008) focussed on: critical thinking content knowledge; pedagogical content knowledge; and knowledge of measures for assessing critical thinking and evaluating or researching the effectiveness of teaching interventions.

Development of an Evidence Base to Inform Continuous Improvement

An evidence-based capability is required to inform the design of effective critical thinking interventions and continuous improvement and thus support evidence based professional practice (Scheeler et al., 2016). This capability needs to be developed by designing, implementing and reviewing evaluation plans to monitor the effectiveness of interventions (Bezanilla et al., 2019), determine the effectiveness of the implementation of interventions, such as, fidelity and quality of implementation (Hattie, 2019), generate evidence of the effectiveness of interventions and inform continuous adaptation and improvement of the design of interventions (Oliver, 2013).

In addition, there is a need to ensure quality research efforts (Fountain, 2016) by improving the design of evaluation and research studies (Tiruneh, De Cock, Spector, Gu & Elen, 2018) to ensure effective positioning of research efforts to achieve desired results. This positioning entails the recognition of

interconnected and complex factors impacting on the effectiveness of critical thinking interventions (Ten Dam, G., & Volman, 2004; Tiruneh, Verburgh & Elen, 2014), and the importance of aligning conceptualisations of critical thinking with assessment measures, and evaluation and research methodologies (Fountain, 2016; Tiruneh et al., 2014).

A balance of both quantitative and qualitative approaches is needed to diversify conceptual and methodological perspectives to deepen insights (Behar-Horenstein & Niu, 2011; Niu, & Behar-Horenstein, 2013). In particular, methodologies are needed to better identify critical thinking gains (Huber & Kuncel, 2016; Tiruneh et al., 2014), and understand contextual variables impacting on effectiveness of interventions (French and Tracey, 2010; Ten Dam & Volman, 2004). Other considerations associated with the improvement of the effectiveness of evaluation and research efforts include measurement of the effect size of interventions (Dumitru et al., 2018); adherence to standards for reliability and validity; and use of factor analysis and multi-level sampling (Fountain, 2016).

Desired Outcomes and Impacts

The change strategy identifies two key desired outcomes to be achieved through strategies outlined above. Firstly, the development of pre-service teachers' critical thinking that are considered to be essential for professional practice, including the capacity to facilitate its development in school students. Secondly, the development of an evidence base capability to inform the design, implementation, and evaluation of critical thinking intervention approaches.

The expectation is that strategy outcomes will have a longer-term impact of the overall curriculum, pedagogy and assessment content and the process of teacher education program entry and admission processes (Hyytinena et al., 2018; Krupat et al., 2011); and more broadly program standards for accreditation and credentialing. It may support systemic reform processes, such as, whole of career teacher development and performance management policies and practices, teacher professional standards and the advancement of the teaching profession. Finally, desired outcomes need to relate to the acquisition of school students' critical thinking potential to support in the longer term social and economic imperatives (Williams, 2005).

Influential Factors

A number of factors enable or hinder the attainment of desired outcomes and impacts (Lorencova et al., 2019). Some enabling examples include:

- conceptualisation of critical thinking as a cultural practice, that is sensitive to the particularities and uniqueness of the context (Lipman, 2003) and is inclusive of cultural difference (Cross, 2015);
- recognition of the graduate skills movement as a driving a broader reform agenda designed to contextualise graduate attributes within disciplinary learning to support deep learning (Oliver & Jorre de St Jorre, 2018) and link programs to professional work (Clarke, 2018);
- inclusion of critical thinking in school curriculum frameworks worldwide (Voogt & Roblin, 2012);
- renewed interest in critical thinking development in schooling globally facilitated by the 21st century learning movement (Tiruneh, De Cock, Spector, Gu, & Elen, 2018);
- debates about the conceptualisation of the essential teacher knowledge, skills, and dispositions to inform professional learning, admission and selection policy and licensing or certification of graduates and accreditation of teacher education programs (Darling-Hammond, 2017); and
- efforts to incorporate critical thinking in teacher professional standards (Leaman & Flanagan, 2013).

A key barrier to the attainment of outcomes and impacts is the lack of consensus about the evidence-based teaching and learning approaches and methods (Abrami, Bernard, Borokhovski, Waddington, Wade, & Persson, 2015; Behar-Horenstein & Niu, 2011; Dumitru et al., 2018; Haberlin, 2018; Puig et al., 2019; Tiruneh et al, 2014; Wang, 2017).

Systematic reviews of research studies undertaken on instructional approaches designed to support the acquisition of critical thinking indicate that the most common instructional approaches in higher education are the immersion approach (Wang, 2017; Dumitru et al., 2018; Behar-Horenstein & Niu. 2011) and the infusion approach requiring critical thinking instruction to be embedded within academic disciplines (Tiruneh et al., 2014). As Tiruneh et al., (2014) argue, the popularity of the immersion and infusion approaches may indicate a general trend towards the integration of critical thinking instruction within subjects, enabling either an implicit or explicit focus on critical thinking.

The limited studies on the effectiveness of the teaching of critical thinking in higher education suggest that combining the teaching of critical thinking with disciplinary and domain knowledge is most effective approach (Abrami et al., 2008; Behar-Horenstein & Niu, 2011; Dumitru et al, 2018; Tiruneh et al., 2014; Wang, 2017). Such an approach recognises that critical thinking is differently realized (Cross, 2015), applied (Wang, 2017) and exercised within and across knowledge domains (Nygren, Haglund, Samuelsson, Geigerslam, & Trytz, 2019; Mulnix, 2012).

Another important barrier to the attainment of desired results is the lack of clarity about how best to assess critical thinking learning outcomes (Fountain, 2016; Lai, 2011; Karbalael, 2012; Pithers & Soden, 2000; Soufi & See, 2019) for not only supporting learning but also for recording learning outcomes for accountability, reporting and accreditation of programs (Ennis, 2018; Liu, Frankel, & Crotts–Roohr, 2014). This lack of clarity is due to the complexity of knowledge, skills and dispositions underpinning critical thinking (Bensley & Murtagh, 2012; Dumitru et al. 2018; Karbalael, 2012; Liu et al., 2014; Lorencova et al., 2019). Moreover, there are issues associated with both the reliability and validity issues associated with qualitative assessment tasks designed to assess critical thinking (Bensley & Murtagh, 2012; Lai, 2011) due to factors, such as, disconnection between teaching goals and assessment focus (Haynes et al., 2016); insufficient attention on assessment tasks and rubrics (Bensley & Murtagh, 2012), lack of clarity about aspects of critical thinking are being measured (Lorencova et al., 2019), lack of quality assessment strategies and difficulty in designing them (Distler, 2007; Haynes et al., 2016; Liu et al., 2014).

There are also concerns about the limited use of standardised tests for assessing critical thinking (Huber & Kuncel, 2016; Karbalael, 2012; Lai, 2011), due to their focus on testing of cognitive skills and abilities (Bensley & Murtagh, 2012; Krupat et al., 2011) and the marginalisation of dispositions. In addition, while standardised tests are considered to be more valid and reliable (Bensley & Murtagh, 2012; Ten Dam & Volman, 2004), they are highly variable in their focus and format (Ku, 2009, in Lai, 2011, p.38) and in their assessment of critical thinking out of the context of student learning (Ten Dam & Volman, 2004). The disconnection between the teaching and the assessment of critical thinking is problematic (Haynes et al., 2016) because it reflects the dominance of the domain-generalist perspective in standardised tests that relies on everyday experience (Lai, 2011; Nygren, et al., 2019). Standardised tests are therefore limited because they fail to support assessment of critical thinking within domains (Huber & Kuncel, 2016; Thonney, Montgomery, 2019). The lack of investment in the development of domain-specific instruments may be explained by the fact that a generic conception of critical thinking is easier to test (Nygren, et al., 2019) as well as the lack of clarity about the relationship between domain-general and domain-specific learning outcomes (Lorencova et al., 2019).

CONCLUSION

This paper presents a proposed change strategy designed to support the incorporation of critical thinking in teacher education, through the identification of key and broad elements to provide guidance to teacher education providers. Central to this change strategy are four key strategic priorities: conceptualisation of critical thinking as professional practice; development of a whole of teacher education program approach to intervention; building capacity for effective implementation of intervention; and development of an evidence base to inform continuous improvement.

The proposed changed strategy provides a wholistic basis for taking a thoughtful response to the complex problem of how best to incorporate critical thinking in teacher education. This paper addresses a gap in the research literature and is responsive to the demand for improving teacher quality, the

effectiveness and impact of teacher education programs and the advancement of the teaching profession. It encourages teacher education providers to test and evaluate this change strategy.

Moreover, further research is recommended extending the predominance of research studies on critical thinking that has focussed on instructional classroom strategies (Ten Dam and Volman, 2004) to include more focus on: the evaluation of critical thinking interventions (Karbalael, 2012; Ten Dam and Volman, 2004; Tiruneh et al., 2018) and professional learning initiatives for teaching staff (Haberlin, 2018; Janssen, 2019); assessment of both critical thinking skills and dispositions (Mpofu & Maphalala, 2017; Puig et al., 2019); the transfer of learning (Janssen, 2019; Lorencova et al., 2019) and the design of effective learning environments (Ten Dam & Volman, 2004).

REFERENCES

Ab Kadir, M.A. (2015). Developing critical thinkers in the 21st century: Gaps in teacher education. In K.M. Baharul Islam, & S.N. Iftehar (Eds.), *International Perspectives on Comparative Education Policy* (vol. 1, pp. 330-342). New Delhi, India: Bloomsbury Academic.

Abrami, P.C., Bernard, R.M., Borokhovski, E., Waddington, D.I., Wade, C.A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*, *85*(2), 275-314. Retrieved from https://www.jstor.org/stable/24434258

Abrami, P.C., Bernard, R.M., Borokhovski, E., Wade, A., Surkes, M.A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research*, *78*, 1102–1134. doi:10.3102/0034654308326084

Anderson, T., & Shattuck, J. (2012). Design-based research: A decade of progress in education research? *Educational Researcher*, *41*, 16-25. Retrieved from http://edr.sagepub.com/content/41/1/7.full.pdf+html

Ahuna, K.H., Tinnesz, C.G., & Kiener, M., (2014). A new era of critical thinking in professional programs. Transformative Dialogues. *Teaching & Learning Journal*, *7*(3), 1-9.

Behar-Horenstein, L.S., & Niu, L. (2011). Teaching critical thinking skills in higher education: Review of the Literature. *Journal of College Teaching and Learning*, *8*(2), 25–41.

Belluigia, D.Z., & Cundill, G. (2017). Establishing enabling conditions to develop critical thinking skills: A case of innovative curriculum design in environmental science. *Environmental Education Research*, *23*(7), 950–971. https://doi.org/10.1080/13504622.2015.1072802

Benjamin, R., Klein, S., Steedle, J., Zahner, D., Elliot, S., & Patterson, J. (2016). The case for critical thinking skills and performance assessment. *Council for Aid to Education*.

Bensley, D.A., & Murtagh, M.P. (2012). Guidelines for a scientific approach to critical thinking assessment. *Teaching of Psychology*, *39*(1), 5-16. DOI:10.1177/0098628311430642

Bezanilla, M.J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. *Thinking Skills and Creativity*, *33*, 10058.

Blair, A. (2021). Studies in critical thinking. In *Windsor Studies in Argumentation* (2nd Ed., Vol. 8). University of Windsor, Ontario, Canada.

Bloch, J., & Spataro, S.E. (2014). Cultivating critical thinking Dispositions throughout the business curriculum. *Business and Professional Communication Quarterly*, *77*(3), 249-265.

Boni, A., & Walker, M. (2013). *Human Development and capabilities; Re-imagining the university of the twenty-first century*. NY: Routledge.

Brown, A.M. (2016). *Differences between the Theory of Change and the Logic Model.* Retrieved from https://www.annmurraybrown.com/single-post/2016/03/20/Theory-of-Change-vsThe-Logic-Model-Never-Be-Confused-Again

Care, E., Kim, H., Vista, A. & Anderson, K. (2018). *Education system alignment for 21st century skills: Focus on assessment*. Brookings Institute.

Clarke, M. (2018). Rethinking graduate employability: The role of capital, individual attributes and context. *Studies in Higher Education Research & Development*, *43*(11), 1923-1937.

Cochran-Smith, M., Ell, F., Ludlow, L., Grudhoff, L., & Aitken, G. (2014). The challenge and promise of complexity theory for teacher education research. *Teachers College Record*, *116*, 050302.

Cross, J. (2015). Book Review: The Palgrave Handbook of Critical Thinking in Higher Education. In M. Davies & R. Barnett (Eds.), USA: Palgrave Macmillan. *Journal of Organizational Knowledge Communication*, *2*(1), 81-87.

Cruz, G., Nascimento, M.M., & Dominguez, C. (2019). With a little help from my peers: Professional development of higher education teachers to teach critical thinking. *Revista Lusófona de Educação*, *44*, 142-157.

Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education*, *40*(3), 291–309. https://Doi.Org/10.1080/02619768.2017.1315399

Darling-Hammond, L. (2006). Powerful Teacher Education: Lessons from exemplary programs. *Journal of Teacher Education*, *57*(3), 300-314.

Davies, M. (2015). A model of critical thinking in higher education. In M.B. Paulsen (Ed.), *Higher Education: Handbook of Theory and Research* (Volume 30, pp. 41-92). New York: Springer International Publishing Switzerland. DOI 10.1007/978-3-319-12835-1_2

Dumitru, D.A., Elen, J., Railienė, A., & Penkauskiene, D. (2018). A European review on critical thinking educational practices in higher education institutions. In C. Dominguez, *Critical Thinking Across the European Higher Education Curricula (CRITHINKEDU)*. ISBN 978-989-704-258-4

Distler, J.W. (2007). Critical thinking and clinical competence: Results of the implementation of student-centered teaching strategies in an advanced practice nurse curriculum. *Nurse Education in Practice*, *7*, 53–59. Retrieved from www.elsevierhealth.com/journals/nepr

Do, C., & Wilson-Rogers, N. (2018). Business, law and regulation: A model for developing 'critical thinking' skills in future law graduates. In F. Kunc (Ed.), *The Future of Australian Legal Education* (pp. 229-254). Sydney: Lawbook Co.

Dottin, E.S. (2009). Professional judgment and dispositions in teacher education. *Teaching and Teacher Education*, *25*, 83–88.

Ennis, R.H. (2018). Critical thinking across the curriculum: A vision. *Topoi*, *37*, 165–184. https://doi.org/10.1007/s11245-016-9401-4

Ennis, R.H. (2013). *How to teach critical thinking: Twenty-one strategies and tactics for teaching critical thinking*. Retrieved from www.criticalthinking.net

Ennis, R.H. (1993). Critical thinking assessment. *Theory Into Practice*, *32*(3), 179–183.

Ennis, R.H. (1991) Critical thinking: A streamlined conception. *Teach Philosophy*, *14*(1), 5–25.

Ennis, R.H. (1985). A logical basis for measuring critical thinking. *Educational Leadership*, *43*(2), 44-48.

Erdogan, F. (2019) Effect of cooperative learning supported by reflective thinking activities on students' critical thinking skills. *Eurasian Journal of Educational Research*, *80*, 89-112.

Erikson, M.G. (2019, February 14-18). *European learning & teaching forum towards successful learning: Controversies and common ground*. Organised by EUA and hosted by the University of Warsaw.

Evens, M., & Verburgh, A. (2014). The development of critical thinking in professional and academic bachelor programmes. *Higher Education Studies*, *4*(2), 42-51. http://dx.doi.org/10.5539/hes.v4n2p42

Facione, P. (2015). Critical thinking: What it is and why it counts. *Insight Assessment*, pp. 1-29.

Finn, P. (2011). Critical thinking: Knowledge and skills for evidence-based practice. *Language, Speech, and Hearing Services in Schools*, *42*, 69–72.

Fisher, A. (2021). What is Critical Thinking. In J.A. Blair (Ed.), *Studies in Critical Thinking. Windsor Studies in Argumentation* (Vol. 8). University of Windsor, Ontario, Canada.

Fisher, A., & Scriven, M. (1997). *Critical thinking: Its definition and assessment*. Edgepress and Centre for Research in Critical Thinking, University of East Anglia.

Flores, K.L., Matkin, G.S., Burbach, M.E., Quinn, C.E., & Harding, H. (2012). Deficient critical thinking skills among college graduates: Implications for Leadership, *Educational Philosophy and Theory*, *44*(2), 212-230. DOI: 10.1111/j.1469-5812.2010.00672.x

Fountain L. (2016). Thinking critically about the quality of critical thinking definitions and measures. In P. Wimmers & M. Mentkowski (Eds.), *Assessing Competence in Professional Performance across Disciplines and Professions. Innovation and Change in Professional Education* (vol 13). Springer.

French, E., & Tracey, N. (2010). Critical thinking and organisation theory: Embedding a process to encourage graduate capabilities. *E-Journal of Business Education & Scholarship of Teaching*, *4*(1), 1-10. Retrieved from http://www.ejbest.org

Funnell, S.C., & Rogers, P.J. (2011). *Purposeful program logic: Effective use of theories of change and logic models*. San Francisco, CA: Jossey- Bass.

Giuseffi, F.G. (2015). Chapter 1: Ancient thinking and modern challenges: Socratic education in the 21st century. In S. Wisdom & L. Leavitt (Eds.), *Handbook of Research on Advancing Critical Thinking in Higher Education*. Information Science Reference. USA: Hershey Publishing.

Glaser, E.M. (1941). *An experiment in the development of critical thinking*. New York: Bureau of Publications, Teachers College, Columbia University. ISBN 978-0-404-55843-7

Grossman, P., & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education. *American Educational Research Journal*, *45*(2), 184-205.

Haberlin, S. (2018). Problematizing notions of critical thinking with preservice teachers: A self-study imparting critical thinking strategies to preservice teachers. *Action in Teacher Education*, *40*(3), 305-318. DOI: 10.1080/01626620.2018.1486751

Hager, P., & Kaye, M. (1992). Critical thinking in teacher education: A process-oriented research agenda. *Australian Journal of Teacher Education*, *17*(2), 26-33. http://dx.doi.org/10.14221/ajte.1992v17n2.4

Halpern, D.F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. *New Directions for Teaching and Learning*, *80*, 69-74.

Halx, M.D., & Reybold, L.E. (2005). A pedagogy of force: Faculty perspectives of critical thinking capacity in undergraduate students. *The Journal of General Education*, *54*(4), 293-315.

Haynes, A., Lisic, E., Goltz, M., Stein, B., & Harris, K. (2016). Moving beyond assessment to improving students' critical thinking skills: A model for implementing change. *Journal of the Scholarship of Teaching and Learning*, *16*(4), 44-61. DOI: 10.14434/josotl.v16i4.19407

Hattie, J. (2019). *Implementing, scaling up, and valuing expertise to develop worthwhile outcomes in schools*. Monograph, No. 58. Strawberry Hills, NSW, Australia: Australian Council for Educational Leaders (ACEL).

Hattie, J. (2012). *Visible Learning for Teachers: Maximising Impact on Learning*. Milton Park, UK: Routledge.

Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 meta-Analyses Relating to Achievement*. Routledge: London.

Hill, J., Walkington, H., & France, D. (2016). Graduate attributes: Implications for higher education practice and policy. *Journal of Geography in Higher Education*, *40*(2), 155-163. http://dx.doi.org/10.1080/03098265.2016.1154932

Huang, J.L. (2015). Cultivating teacher thinking: ideas and practice. *Education Research Policy & Practice*, *14*, 247–257. DOI 10.1007/s10671-015-9184-1

Huber, C.R., & Kuncel, N.R. (2016). Does college teach critical thinking? A meta-analysis. *Review of Educational Research*, *86*(2), 431–468. DOI: 10.3102/0034654315605917

Hyytinena, H., Tooma, A., & Postareffb, L. (2018). Unraveling the complex relationship in critical thinking, approaches to learning and self-efficacy beliefs among first-year educational science students. *Learning and Individual Differences*, *67*, 132–142.

Jones, M., & Charteris, J. (2017). Transformative professional learning: An ecological approach to agency through critical reflection. *Reflective Practice*, *18*(4), 496-513. DOI:10.1080/14623943.2017.1307729

Karbalael, A. (2012). Critical thinking and academic achievement. *Íkala*, *17*(2). Retrieved from http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0123-34322012000200001

Kelly, A.E. (2007, November 23-26). When is Design Research appropriate? In T. Plomp & N. Nieveen (Eds.), *Introduction Educational Design Research*. Proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China). SLO Netherlands: Institute for Curriculum Development.

Kowalczyk, N., Hackworth, R., & Case -Smith, J. (2012). Perceptions of the use of critical thinking teaching methods. *Journal of the American Society of Radiologic Technologists*, *83*(3), 226-236.

Krupat, E., Sprague, J.M., Wolpaw, D., Haidet, P., Hatem, D., & O'Brien, B. (2011). Thinking critically about critical thinking: Ability, disposition or both? *Medical Education*, *45*, 625–635. DOI:10.1111/j.1365-2923.2010.03910

Lai, E.R. (2011). *Critical thinking: A literature review*. Research report. Pearson. Retrieved from http://www.pearsonassessments.com/research

Latif, N.E.A., Yusuf, F.M., Tarmezi, N.M., Rosly, S.Z., & Zainuddin, Z.N. (2019). The application of critical thinking in accounting education: A literature review. *International Journal of Higher Education*, *8*(3), 57-62. Retrieved from http://ijhe.sciedupress.com

Lawrence–Wilkes, L., & Ashmore, L. (2014). *The Reflective Practitioner in Professional Education*. UK: Palgrave Macmillan. DOI: 10.1057/9781137399595.0001

Leaman, L.H., & Flanagan, T.M. (2013). Authentic role-playing as situated learning: Reframing teacher education methodology for higher-order thinking. *Studying Teacher Education*, *9*(1), 45–61. http://dx.doi.org/10.1080/17425964.2013.771573

Lipman, M. (2003). *Thinking in Education* (2nd Ed.). Cambridge, UK: Cambridge University Press.

Liu, O.L., Frankel, L., & Crotts–Roohr, K. (2014). *Assessing critical thinking in higher education: Current state and directions for next-generation assessment*. ETS Research Report Series. ISSN 2330-8516. DOI:10.1002/ets2.12009

Lorencová, H., Jarošová, E., Avgitidou, S., & Dimitriadou, C. (2019). Critical thinking practices in teacher education programmes: A systematic review. *Studies in Higher Education*, *44*(5), 844-859. https://doi.org/10.1080/03075079.2019.1586331

Low, E.L., Hui, C., & Cai, L. (2017). Developing student teachers' critical thinking and professional values: A case study of a teacher educator in Singapore. *Asia Pacific Journal of Education*, *37*(4), 535–551.

McBride, R., & Knight, S. (1993). Identifying teacher behaviours during critical thinking tasks. *The Clearing House*, *66*(6), 374-378. Taylor & Francis, Ltd.

Mcbride, R., Xiang, P., & Wittenburg, D. (2002). Dispositions toward critical thinking: The preservice teacher's perspective. *Teachers and Teaching*, *8*(1), 29-40. DOI:10.1080/13540600120110556

Miri, M.K., & David, B.C., & Uri, Z. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. *Research Science Education, 37,* 353–369. DOI:10.1007/s11165-006-9029-2

Moon, J. (2008). *Critical Thinking: An exploration of theory and practice*. London: Routledge.

Morrow, E. (2009). *Teaching critical reflection in healthcare professional education*. Retrieved from https://pdfs.semanticscholar.org/11e1/e2d2ba2a82c381de56c0f36154e7d59e3955.pdf

Mulnix, J.W. (2012). Thinking critically about critical thinking. *Educational Philosophy and Theory*, *44*(5), 1-16. DOI: 10.1111/j.1469-5812.2010.00673.x

Mpofu, N., & Maphalala, M. (2017). Fostering critical thinking in initial teacher education curriculums: A comprehensive literature review. *Gender & Behaviour*, *1592*, 9256-9266. Retrieved from https://www.researchgate.net/publication/318456229

Nicholas, M.C., & Raider-Roth, M. (2016). A hopeful pedagogy to critical thinking. *International Journal for the Scholarship of Teaching and Learning*, *10*(2), 1-10. Retrieved from http://digitalcommons.georgiasouthern.edu/ij-sotl/vol10/iss2/3

Niu, L., & Behar-Horenstein, L.S. (2013). Do instructional interventions influence college students' critical thinking skills? A meta-analysis. *Educational Research Review*, *9*, 114-128. DOI:10.1016/j.edurev.2012.12.002

Nygren, T., Haglund, J., Samuelsson, C.R., Geijerstam, A.A., & Prytz, J. (2019). Critical thinking in national tests across four subjects in Swedish compulsory school. Education Inquiry, *10*(1), 56–75. DOI.org/10.1080/20004508.2018.1475200

Oliver, B. (2013). Graduate attributes as a focus for institution – wide curriculum renewal: Innovations and challenges. *Higher Education Research & Development*, *32*(3), 450-463.

Oliver, B., & Jorre de St Jorre, T. (2018). Graduate attributes for 2020 and beyond: Recommendations for Australian higher education providers. *Higher Education Research & Development*, *37*(4), 821-836.

Paul, R. (1985). The Critical Thinking Movement in Historical Context. CH. 1. In R. Paul. (Ed.), *Critical Thinking: What Every Person Needs to Survive in a Rapidly Changing World.* Retrieved from https://www.criticalthinking.org/pages/richPual ard-paul-anthology/1139

Paul, R., & Elder, L. (2010). Critical thinking: Competency standards essential for the cultivation of intellectual skills, Part 1. *Journal of Developmental Education*, *34*(2), 38-39.

Paul, R., & Elder, L. (2008) *The miniature guide to critical thinking concepts and tools*. CA: Foundation for Critical Thinking Press.

Paris, B. (2016). Failing to improve critical thinking. *Inside Higher Education*. Retrieved from https://www.insidehighered.com/views/2016/11/29/roadblocks-better-crticlitical-thinking-skills-are-embedded-college-experience-essay

Pithers, R.T., & Soden, R. (2000). Critical thinking in education: A review. *Educational Research*, *42*(3), 237-249. DOI: 10.1080/001318800440579

Plomp, T. (2007, November 23-26). Educational Design Research: An Introduction. In T. Plomp & N. Nieveen (Eds.), *Introduction to Educational Design Research*. Proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China). SLO Netherlands institute for curriculum development.

Plotnikova, N.F., & Strukov, E.N. (2019). Integration of teamwork and critical thinking skills in the process of teaching students. *Cypriot Journal of Educational Sciences*, *14*(1), 1–10.

Puig, B., Blanco-Anaya, P., Bargiela, I.M., & Crujeiras-Pérez, B. (2019). A systematic review on critical thinking intervention studies in higher education across professional fields. *Studies in Higher Education*, *44*(5), 860-869. DOI: 10.1080/03075079.2019.1586333

Riddell, T. (2007). Critical Assumptions: Thinking Critically About Critical Thinking. *Journal of Nursing Education*, *46*(3), 121-126.

Scheeler, M.C., Budin, S., & Markelz. A. (2016). The role of teacher preparation in promoting evidence-based practice in schools. *Learning Disabilities: A Contemporary Journal*, *14*(2),171-187.

Schleicher, A. (Ed.). (2012). *Preparing Teachers and Developing School Leaders for the 21st Century: Lessons from around the World*. Paris: OECD Publishing. DOI.org/10.1787/9789264174559-2-en

Scriven, M. (2021). The unruly logic of evaluation. In A. Blair (Ed.), *Studies in critical thinking*. *Windsor Studies in Argumentation* (2nd Edition, Vol. 8). University of Windsor, Ontario, Canada.

Shpeizer, R. (2018). Teaching critical thinking as a vehicle for personal and social transformation. *Research in Education*, *100*(1), 32-49.

Shulman, L.S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1–22.

Soufi, N.E., & See, B.H. (2019). Does explicit teaching of critical thinking improve critical thinking skills of English language learners in higher education? A critical review of causal evidence. *Studies in Educational Evaluation*, *60*, 140-162.

Stassen, M.L.A., Herrington, A., & Henderson, L. (2011). Defining critical thinking in higher education: Determining assessment fit. *To Improve the Academy*, *30*, 126-141.

Taghva, F., Rezaei, N., Ghaderi, J., Taghva, R. (2014). Studying the relationship between critical thinking skills and students' educational achievement. *International Letters of Social and Humanistic Sciences*, *25*, 18-25. DOI:10.18052/www.scipress.com/ILSHS.25.18 2014

Tang, K.N. (2019). Beyond employability: Embedding soft skills in higher education. *TOJET: The Turkish Online Journal of Educational Technology*, *18*(2), 1-9.

Ten Dam, G., & Volman, M. (2004). Critical thinking as a citizenship competence: Teaching strategies. *Learning and Instruction*, *14*, 359–379.

Thonney, T., & Montgomery, J.C. (2019). Defining critical thinking across disciplines: An analysis of community college faculty perspectives. *College Teaching*, *67*(3), 169-176. DOI:10.1080/87567555.2019.1579700

Tican, C., & Taspinar, M. (2015). The effects of reflective thinking-based teaching activities on preservice teachers' reflective thinking skills, critical thinking skills, democratic attitudes, and academic achievement. *Anthropologist*, *20*(12), 111-120.

Tilbury, C., Osmond, J., & Scott, T. (2010). Teaching critical thinking in social work education: Literature review. *Advances in Social Work and Welfare Education*, pp. 31-50. http://hdl.handle.net/10072/38225

Tiruneh D.T., De Cock M., Spector J.M., Gu X., & Elen, J. (2017). Toward a systematic and model-based approach to design learning environments for critical thinking. In M. Spector, B. Lockee, M. Childress (Eds.), *Learning, Design, and Technology*. Springer, Cham.

Tiruneh, D.T., Verburgh, A., & Elen, J. (2014). Effectiveness of critical thinking instruction in higher education: A systematic review of intervention studies. *Higher Education Studies*, *4*(1), 1-17.

Tsui, L. (2002). Fostering critical thinking through effective pedagogy: Evidence from four institutional case studies. *The Journal of Higher Education*, *73*(6), 740-763.

Uluçınar, U., & Aypay, A. (2018). An evaluation of the relationship between pre-service teachers' critical thinking dispositions and democratic values in terms of critical pedagogy. *Journal of History Culture and Art Research*, *7*(3), 1-17. DOI:http://dx.doi.org/10.7596/taksad.v7i3.1545

Urbani, J.M., Roshandel, S., Michaels, R., & Truesdell, E. (2017). Developing and modeling 21st-century skills with preservice teachers. *Teacher Education Quarterly*, *44*(4), 27-50.

Verburgh, A. (2019). Effectiveness of approaches to stimulate critical thinking in social work curricula. *Studies in Higher Education*, *44*(5), 880-891. DOI:10.1080/03075079.2019.1586336

Voogt, J., & Roblin, N.P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, *44*, 299-321.

Wang, S. (2017). An exploration into research on critical thinking and its cultivation: An overview. *Theory and Practice in Language Studies*, *7*(12), 1266-1280. http://dx.doi.org/10.17507/tpls.0712.14

Watts, M., & Lawson, M. (2009). Using a meta-analysis activity to make critical reflection explicit in teacher education. *Teaching and Teacher Education*, *25*, 609–616.

Williams, R.L. (2005). Targeting critical thinking within teacher education: The potential impact on society. *The Teacher Educator*, *40*(3), 163-187. DOI:10.1080/08878730509555359

Wisdom, S., & Leavitt, L. (Eds.). (2015). *Handbook of research on advancing critical thinking in higher education*. Information Science Reference. USA: Hershey PA.

W.K. Kellogg Foundation. (2004). *Logic model development guide: Using logic models to bring together planning, evaluation, and action*. Michigan, USA.