

Chapter # 23

CRITICAL THINKING DISPOSITIONS IN THE UNIVERSITY STUDENT POPULATION:

A narrative synthesis of the concept

Sharmila Fathima¹, Ron Salden¹, Chia Ping Lee¹, Terry Lansdown², & Deborah Ann Hall^{1,2}

¹Heriot-Watt University, Malaysia

²Heriot-Watt University, United Kingdom

ABSTRACT

Experts in the field of critical thinking (CT) make a conceptual distinction between CT skills and dispositions. While CT skills are the cognitive abilities to think critically, CT dispositions are the ingrained habits and attitudes that motivate individuals to apply those skills in given situations. Despite the rapid growth of CT research over the past three decades, most work has concentrated on CT skills rather than dispositions. Hence, there is a lack of consensus on the dispositional dimension, specifically how it is measured and how it can be nurtured by educators. This chapter addresses how CT dispositions have been defined in the literature. A systematic review methodology was used to search Web of Science, Scopus and PsycINFO databases from 1988 to 2022. Of 1014 records screened, 63 met the inclusion criteria. Findings were synthesised to create a single conceptual framework comprising 26 distinct dispositions. While our framework shows strong alignment with previous models, it adds new knowledge by highlighting the role of affective components, such as empathy. The framework provides a unified basis for advancing research, assessment, and pedagogy for CT dispositions in education settings. Moreover, critical evaluation of current measurement instruments reveals limited coverage and highlights the need for more comprehensive tools.

Keywords: critical thinking, dispositions, systematic review, higher education.

1. INTRODUCTION

Critical thinking (CT) is widely regarded as a cornerstone of higher education, central to preparing students for academic success, professional competence, and civic responsibility. While the skills component of CT, such as analysis, evaluation, and inference, has received substantial scholarly attention, researchers have increasingly emphasised that skills alone are insufficient. The capacity to think critically is deeply influenced by dispositions. CT disposition refers to the inclination or tendency to engage in CT, characterised by specific attitudes and habits of mind that enhance reasoning and decision-making. These are tendencies to approach problems, decisions, and learning with open-mindedness, inquisitiveness, truth-seeking, and perseverance, among others. Without such dispositions, even individuals well trained in reasoning skills may fail to apply them when most needed (Facione, 1990; Ennis, 1996).

The growing recognition of dispositions as a core aspect of CT reflects a shift in educational philosophy. Early work in the 1990s distinguished between the processes of reasoning, the skills of CT, and the results or outcomes of CT, such as sound decision-making and effective problem-solving. Within this broader context, dispositions came to be seen as the motivational and attitudinal drivers that determine whether cognitive skills are enacted in

practice. An individual may be capable of evaluating an argument, for instance, but without dispositions such as truth-seeking or willingness to question assumptions, that skill may remain dormant. This interplay between ability and disposition has been likened to a "two-sided coin," both elements essential for authentic CT (Dwyer, 2017). The work of Dwyer and colleagues advanced the field by taking an innovative student-centred approach to co-produce a definition and a conceptual framework (Dwyer et al., 2014; 2017; Quinn et al., 2020).

Despite agreement about the importance of CT dispositions, Quinn et al. (2020) summarise challenges in integrating different perspectives on CT dispositions, notably definitional disparities between authors, a general lack of specificity in operational definitions, and probable conceptual overlap across individual CT dispositions. For example, seminal instruments such as the California Critical Thinking Disposition Inventory (CCTDI; Facione & Facione, 1992) operationalised seven broad dispositions. Other researchers, however, argued that these categories were either too narrow or too culturally situated, limiting their applicability in diverse educational settings (Ku, 2009; Halpern, 2014). In response, alternative measures such as Sosu's (2013) Critical Thinking Disposition Scale (CTDS) and Quinn et al.'s (2020) Student-Educator Negotiated Critical Thinking Dispositions Scale (SENCTDS) were developed, each proposing slightly different conceptualisations.

2. BACKGROUND

University students are at a pivotal developmental stage where higher-order thinking and decision-making skills are cultivated. Focusing on their dispositions provides context-specific insights into how educational practices can better nurture critical thinking for their academic and professional success (Dwyer et al., 2017). Given the rapid expansion of empirical studies on CT dispositions in the past three decades, there is a need for rigorous synthesis. To date, no review has comprehensively mapped the landscape of dispositions identified since the Delphi report (Facione, 1990). Previous reviews have either focused primarily on CT skills (Abrami et al., 2015) or on pedagogical interventions without addressing the conceptual foundations of CT dispositions (Lai, 2011a). As a result, researchers and educators face a fragmented picture, making it difficult to design curricula, interventions, or assessments that holistically address students' dispositional readiness for CT.

The present study seeks to address this gap by systematically reviewing the literature on CT dispositions. Through this review, we aim to make three contributions to the field. First, we briefly describe the body of work. Second, we create a unified conceptual framework of CT dispositions that consolidates the full range of CT dispositions proposed in the literature. Third, by evaluating established instruments in light of our unified framework, we highlight gaps in measurement, drawing attention to important traits that remain under-assessed. In doing so, this review responds to ongoing calls for a richer integration of dispositions into CT research and practice.

3. METHODOLOGY

This study adopted systematic review methods for the search strategy. Where appropriate, our reporting was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021). However, risk of bias assessment and quantitative synthesis of effect measures were not relevant for our narrative-based synthesis.

3.1. Search Strategy

Three major databases of indexed journals (i.e. Web of Science, Scopus and PsycINFO) were searched. The goal of the search was to identify the articles that defined and described CT dispositions in the field of education, particularly higher education (university). Phrase searching with quotation marks and logical operators increased the precision of the search by narrowing results to exact matches, while truncation broadened the search by finding variations of a word stem. Search terms were limited to the title, abstract or keywords. One search syntax was defined as: ("critical think*" OR "think* critically") AND disposition AND (teach* OR learn*). The other was: ("critical think*" OR "think* critically") AND disposition AND (questionnaire OR survey OR instrument OR inventory OR index OR scale NOT validity). The full set of articles for screening included those identified by either search syntax. The search was conducted in March 2022.

3.2. Inclusion and Exclusion Criteria

Inclusion criteria were: 1) Work that defined CT dispositions along with the characteristics of the individual CT dispositions. 2) Work that reported participants recruited through university or participants aged at least 18 years. Work could be either empirical research or literature reviews or other theoretical articles.

Exclusion criteria were: (1) Work published before 01 January 1988 because 1988 was the date of a landmark study by Facione (published in 1990) which identified CT dispositions as separate from CT skills, (2) Work investigating CT dispositions in the context of a broader research question (such as how CT dispositions relate to academic performance, or how to enhance CT dispositions), 3) Work published as a conference proceeding, because this is often not peer-reviewed and so quality is less assured, 4) Work published as a book chapter, again for the same reason, 5) Work published in a non-English language because this was determined by the resources available within the research team, and 6) Studies reporting participants under the age of 18 years or high-school students or elementary-school students. Automatic filters were used to apply four of the exclusion criteria: (1) only articles published on or after 1988, (3 & 4) work reported in conference proceedings or book chapters, and (5) work published in a non-English language.

3.3. Screening and Selection Process

Study screening and selection consisted of two phases conducted independently by two of the co-authors (SF and DAH). In the first phase, the titles and abstracts of all retrieved articles were independently screened against the inclusion and exclusion to avoid selection bias. In the second phase, the full text of all remaining articles was reviewed for eligibility. Lastly, the reference lists from the selected records were also screened for potential articles that met the inclusion criteria. Rater agreement was 97% on study screening decisions, the remainder were resolved by mutual discussion, keeping in mind the objectives for this review.

3.4. Data Extraction

A structured data extraction spreadsheet in Excel was used to capture information consistently across records. Extracted data included: Year of publication; Country of study; Study type (quantitative, qualitative, mixed methods, conceptual/theoretical, review); Study setting (multi-discipline or single discipline); Description of the discipline; Study design (Cross-sectional, Longitudinal); Aims of the study; Sample size; CT dispositions identified or defined in the study (i.e. names and descriptions). Coder initials and article code (each article was given a code number) were also recorded.

Data was extracted independently by four coders: three of the co-authors (SF, RS, DAH) and one Psychology intern. SF extracted data for the full set of included articles. Simultaneously, RS and DAH each independently extracted data for half of the set. Coders focused on extracting the core content - specifically the names, descriptions and number of CT dispositions. The Psychology intern was responsible for collecting more straightforward bibliographic details, such as year of publication, country etc.

SF pooled the data extraction across coders and any inconsistencies were resolved by checking against the article. Data is available (Hall & Fathima, 2025).

3.5. Data Synthesis

A narrative synthesis approach was employed to capture how the CT dispositions were conceptualised and how the concepts were operationalised. Names and descriptions of CT dispositions identified from the literature were printed on individual paper cards to aid the process of synthesis. Synthesis used a card-sorting technique to help categorise the different names and descriptions into discrete CT disposition groups. This method is recognised as a valid technique to organise qualitative data, particularly in exploratory contexts where categories must emerge from complex data (Spencer, 2009). In educational contexts, this method encourages deeper reflection, shows how participants organise concepts, supports collaborative sense-making, and helps develop conceptual frameworks. Sorting was conducted in an office space with a large table. SF, RS, and DAH collaboratively grouped cards by conceptual similarity and negotiated differences of opinion until categories were agreed, and dispositions reported only once were discarded. Any dispositions that did not align with existing categories were temporarily grouped under a miscellaneous label and were later reassigned to the most suitable categories in the list. SF then reviewed the initial sort independently to consider refinements. Finally, the categories and their definitions were evaluated for clarity, shared with two co-authors (CPL, TL), who evaluated their clarity, coherence, and consistency against the original sources. Their feedback informed further refinement to ensure conceptual accuracy and reliability. The final conceptual framework represented our best efforts to synthesise the literature, identifying discrete CT dispositions that were supported by the body of published work. The Data is available for review (Hall & Fathima, 2025).

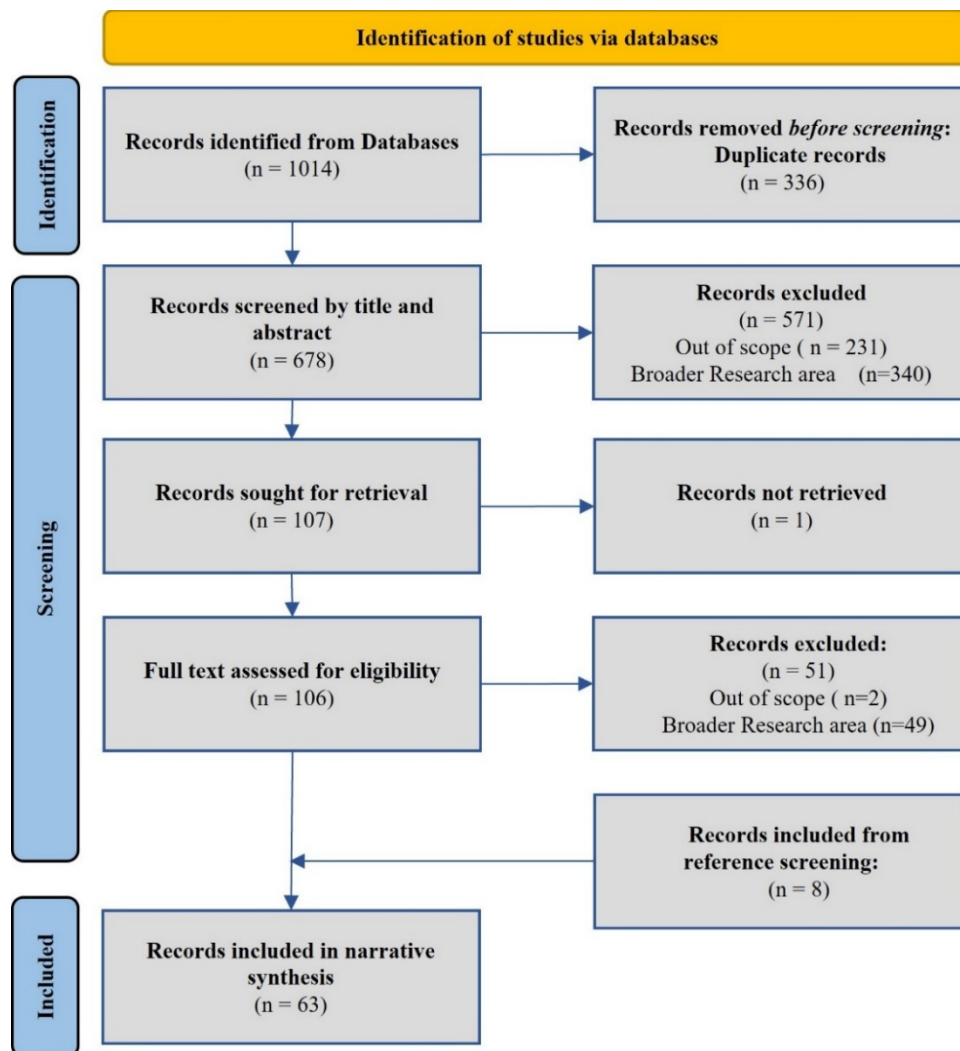
4. RESULTS

4.1. Selected Records

The flowchart in Figure 1 depicts the stages of the review process. A total of 1014 records were initially identified through the database searches. After removing 336 duplicates, 678 unique records remained for title and abstract screening. Of these, 571 were excluded due to being out of scope or addressing a broader research area. The most common reasons for exclusion under the category 'out of scope' were records that focused exclusively on the skills aspect of CT without addressing the dispositional component, as well as records involving participants under the age of 18, such as high school or elementary school students. For the 'broader research area' category, records were excluded if they primarily examined the relationship between CT and academic performance or explored general strategies for enhancing CT, without a specific focus on critical thinking dispositions. From the remaining 107 records, one record could not be retrieved in full despite efforts to obtain it through institutional access and interlibrary loan and was therefore excluded. Next, 106 records were assessed for eligibility using the full text screening and out of these 51 were excluded, mostly

due to the broader research area category. Additionally, eight relevant records were identified through reference list screening of the included full-text articles. These records were likely not captured by the initial search syntax because their titles, abstracts, or keywords did not explicitly mention the phrase ‘CT disposition’, even though the full texts included relevant data. A total of 63 records were included for narrative synthesis.

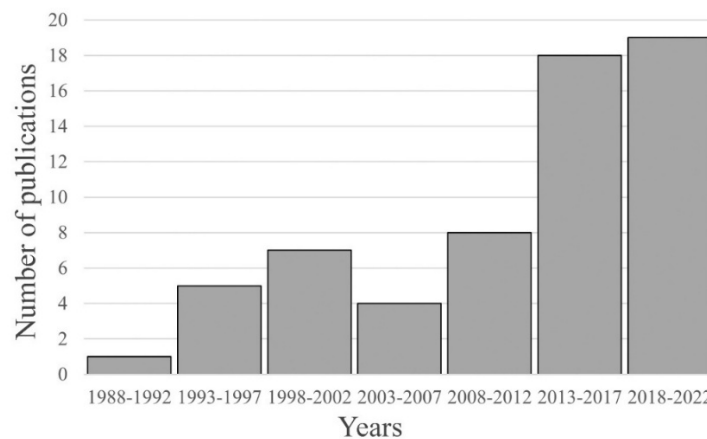
Figure 1.
PRISMA flowchart showing the search, screening and exclusion/inclusion
of published work.



4.2. Characteristics of the Included Records

The 63 records comprised 38 quantitative and 7 qualitative empirical studies, 2 mixed-methods studies and 16 theoretical (conceptual) or review papers. There has been a steady growth in scholarly interest in CT dispositions as shown by the growth in publications, particularly in the last decade (Figure 2).

Figure 2.
Rise in publications addressing CT dispositions over time.



Of the 47 articles reporting an empirical study, the sample size varied widely (median=320). The smallest sample was 11 participants in a mixed methods study involving surveys and interviews (Raymond & Profetto-McGrath, 2005), while the largest sample included 1,557 nursing students in a quantitative study (Facione, 2000).

The records spanned a diverse range of disciplines, such as Education, Dental Medicine, Clinical Medicine, Physical Therapy, Psychology, Nursing, Pre-Service Teacher Training, Social Work, Educational Psychology, Teacher Education, Higher Education Teaching, Nutrition, and Behavioural Sciences. In addition, several records were interdisciplinary in nature, involving participants from multiple academic fields.

The majority of the empirical studies employed cross-sectional survey designs (n=44), reflecting a dominant reliance on questionnaires to measure CT dispositions. This approach is useful for its efficiency in gathering data from large samples and for identifying general patterns or associations. A smaller number of studies used interviews (n= 5), focus groups (n= 2) and observations (n= 3) to gain qualitative insights.

Scholarly work on CT dispositions has largely been dominated by the U.S.A. (43%, 27/63 records), followed by Europe (19%, 12/63 records). There were limited contributions from Asian, African and Pacific regions.

Figure 3.
Geographical distribution of research on CT dispositions
(contributing countries shaded in grey).



The number of total CT dispositions presented in each record varied considerably (median=5). The greatest number was 19 CT dispositions reported by nursing educators (Gordon, 2000).

4.3. Categories and Descriptions of Critical Thinking Dispositions

The data synthesis generated 26 distinct CT disposition categories (Table 1, Figure 4). Where possible, the names and descriptions were inspired by the work of Dwyer (Dwyer et al., 2017; Quinn et al., 2020).

Table 1.
Names and descriptions of the 26 CT dispositions within the unified conceptual framework.

#	Name	Description
1	Analyticity	The propensity to use logic and proof; to understand challenging circumstances; disposed to predicting negative effects; to be tactical and habitually well-planned; to gauge how one develops their arguments and their ability to anticipate potential roadblocks to problem solving; seek justifications and supporting evidence for beliefs, opinions, attitudes, arguments and ideas; to evaluate arguments, assumptions and perspectives critically; to restrain from irrational behaviour.
2	Attentiveness	To possess the willingness to focus and concentrate, coupled with an awareness of one's surroundings, the context, potential consequences, and possible obstacles; to see the situation in its entirety; to show a consistent interest in staying well-informed, being mentally alert, and directing focused attention toward the issue at hand.
3	Courage	To be daring and adventurous, to be ready to face challenges.
4	Creativity	A propensity for novel idea generation and visualisation; to think out of the box; to find creative ways to think and conduct,

		demonstrating criticality as a component of the creative thinking process with others.
5	Empathy	An inclination to respect each person's worth and dignity by learning about their perspectives, taking into account their feelings, and avoiding being judgmental; showing concern for others' well-being; to understand and acknowledge others' emotions.
6	Fair mindedness	A propensity for fair thinking and attitude; to be able to reason through complex ethical issues.
7	Flexibility	To be willing to look for alternatives, being adaptable when taking other perspectives into account; to resolve, re-address, and re-analyse complex situations using a variety of procedures to get a fresh perspective.
8	Inquisitiveness	A propensity to have curiosity; to possess a strong desire to fully understand something or to uncover the solution to a problem, even accepting that an answer might not be immediately apparent; to have a sustained interest in comprehending a task and its associated demands, available options and limits.
9	Intellectual honesty	The propensity to be honest in admitting one's own presumptions and biases; to strive to advance not only one's own but also others' ways of thinking; to question one's own assumptions.
10	Intrinsic goal orientation	A propensity to have a positive and enthusiastic attitude towards a task and the process of acquiring new knowledge; to be driven to find answers primarily by internal motivation, rather than by external rewards or incentives.
11	Learning to choose	The propensity to make a final decision that is presented in the oral or written way of reasoning, artistic or scientific form; valued as a personal disposition and for personal favour; to understand that critical choices are valuable in terms of proving one's ideas and actions in learning and daily life situations.
12	Need for cognition	A propensity to enjoy engaging in deep thought and working to complete cognitively complex tasks, a process that involves active thinking and rethinking; to modify routines and behavioural patterns for one's own benefit and the benefit of others.
13	Objectivity	The propensity to overcome personal prejudices and impartiality.
14	Open mindedness	The propensity to be flexible in cognitive thinking; to be able to resist rigid thinking; to consider and tolerate diverse or contradictory viewpoints; to set aside one's own biases and self-interests to genuinely consider perspectives different from their own; to be receptive to feedback, accepting positive comments and thoughtfully considering criticism or constructive suggestions; to be willing to update one's knowledge in light of new ideas and experiences; and to explore such new alternative or unusual ideas.
15	Perseverance	An inclination to being resilient and maintaining motivation when working through complex, frustrating, or difficult tasks, rather than giving up; to have the drive to complete tasks accurately and a sustained desire for progress.

Critical Thinking Dispositions in the University Student Population:
A narrative synthesis of the concept

16	Precision	The tendency to make thoughtful decisions after thorough consideration, to exercise intellectual caution, seek accuracy, to be precise about thinking.
17	Prudence/Maturity	A propensity to be prudent in forming, suspending, or modifying judgement; understanding that there may be several feasible options; to have an understanding of the necessity of coming to a conclusion even in the absence of comprehensive knowledge.
18	Recognise uncertainty	The tendency to accept doubt and uncertainty; to recognise one's own limited knowledge.
19	Reflection	The inclination to thoughtfully examine one's own behaviours, attitudes, beliefs and as well as the motivations behind them; to acknowledge the limits of one's current understanding and recognise uncertainty; to approach decision-making with the understanding that certain issues are complex and may have multiple reasonable solutions; to base judgments on thorough analysis and evaluation, considering feasibility, established standards, specific contexts and existing evidence.
20	Resourcefulness	The inclination to be ready to use existing resources to solve problems; to actively search for supplementary external resources when needed; to have the flexibility to shift between different problem-solving strategies or knowledge domains to discover new approaches or information; to make the most of available resources; to be able to adapt oneself and improve when challenges arise and critically analyse why or how something went wrong.
21	Scepticism	A propensity to question assumptions; to delay judgement before considering all the information; to establish a position and be prepared to change position when the evidence and reasoning are sufficient; to examine the findings from a variety of perspectives; to be critical towards newly encountered information; to have a tendency to doubt and recheck knowledge.
22	Self-confidence	The propensity to have a confident reliance on one's own reasoned judgments; to acknowledge one's personal context, such as life experiences, existing knowledge, biases, cultural background and environment, when evaluating problems and arguments; to be confident in one's ability to process feedback constructively; to confidently guide others towards rational problem resolution; to recognise that sound reasoning is fundamental to leading a rational life and developing a more equitable world.
23	Self-correction	The inclination to distance oneself from one's own convictions, self-awareness and mindfulness; to be willing to give up ineffective tactics in an effort to self-correct; to restrain from making judgments based on prior assumptions.
24	Systematicity	The disposition to carefully plan, classify, concentrate, and locate a propensity to attempt to tackle issues in a methodical manner with precision and discipline, the value of structure, attention, and assiduity in solving issues of all complexity levels, the propensity for gathering and using information to solve complex issues, the ability to carefully choose and employ reliable criteria for evaluation, search diligently for

		pertinent information, identify motives and suspend hasty conclusions.
25	Truth seeking	The inclination to have a genuine desire for knowledge; to actively seek and offer both supporting reasons and opposing arguments to become well-informed and to inform others; to be prepared to question widely held beliefs and social norms; to be honest and objective in their pursuit of truth, even when findings challenge their self-interest or existing convictions; to be willing to revise their views when new evidence emerges.
26	Valuing critical thinking	The disposition to be aware of the value of critical thinking.

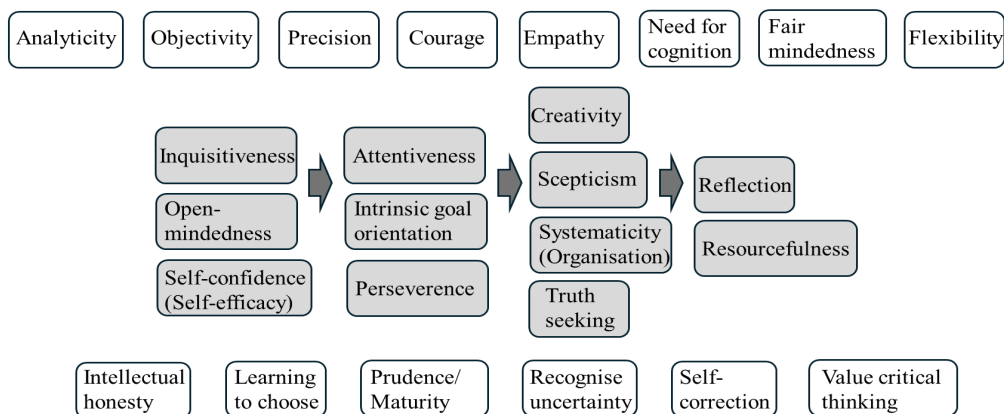
4.4. Evaluating the Unified Framework of CT Dispositions

To strengthen its theoretical basis, our unified synthesis of CT dispositions was compared with Dwyer et al.'s (2017) framework. Our synthesis of the literature confirmed 10 of Dwyer's CT dispositions (Figure 4, grey shaded boxes), while two others (i.e. systematicity/organisation and self-confidence/self-efficacy) had reasonable conceptual equivalence, but with naming differences. Systematicity reflects structured, disciplined engagement with information and problem solving, while self-confidence reflects faith in one's own reasoned judgments. This widespread commonality indicates good conceptual consistency across the field in how CT dispositions are construed. While Dwyer's category of clarity (Dwyer et al., 2017) was not directly retained, its conceptual meanings were subsumed under the alternative constructs (i.e. truth-seeking and intellectual honesty).

Despite these similarities, other scholars have identified other important habits or attitudes. Our synthesis highlighted 14 additional CT dispositions which captured cognitive, affective/motivational and metacognitive dimensions not recognised in Dwyer's framework (Figure 4, white boxes).

Figure 4.

Comparative evaluation of the unified conceptual framework of CT dispositions. Dispositions in grey shaded boxes confirm the same constructs as Dwyer et al. (2017). Here they are arranged in putative antecedent and succedent interdependencies following Dwyer et al. (2017). Dispositions in white boxes expand on other important habits of mind reported in the published literature.



4.5. Evaluating the Unified Framework of CT Dispositions against Established Measurement Instruments

To address whether existing measurement instruments completely represent the entire concept of CT dispositions, we examined the subscales of the CCTDI (Facione & Facione, 1992), SENCTDS (Quinn et al., 2020), and CTDS (Sosu, 2013). Table 2 highlights the relatively limited content validity between instruments. The CCTDI measures seven dispositions, the CTDS measures two dispositions, and the SENCTDS measures six dispositions. Only open-mindedness is measured by all three instruments, while many dispositions are absent.

Table 2.
Comparative mapping of the 26 CT dispositions on the instruments.

#	Name	CCTDI (Facione & Facione, 1992)	CTDS (Sosu, 2013)	SENCTDS (Quinn et al., 2020)
1	Analyticity	✓		
2	Attentiveness			✓
3	Courage			
4	Creativity			
5	Empathy			
6	Fair mindedness			
7	Flexibility			
8	Inquisitiveness	✓		
9	Intellectual honesty			✓
10	Intrinsic goal orientation			
11	Learning to choose			
12	Need for cognition			
13	Objectivity			
14	Open mindedness	✓	✓	✓
15	Perseverance			✓
16	Precision			
17	Prudence/Maturity	✓		
18	Recognise uncertainty			
19	Reflection			✓
20	Resourcefulness			
21	Scepticism		✓	
22	Self-confidence (Self-efficacy)	✓		
23	Self-correction			
24	Systematicity (Organisation)	✓		✓
25	Truth seeking	✓		
26	Valuing critical thinking			

5. FUTURE RESEARCH DIRECTIONS

One of the limitations of this work is that the 26 CT dispositions do not necessarily represent distinct constructs. For example, open-mindedness is defined as the inclination to think in a flexible way (a stable personality trait), while flexibility is more about willingness to look for alternatives (motivation). Halpern (2014) defined flexibility as a unique disposition, while Dwyer et al. (2017) merged this into open-mindedness. This lack of clear conceptual definition creates significant challenges for measurement. Three instruments which purport to measure CT dispositions fail to capture the full multi-dimensionality of the concept. This finding highlights the need for a new tool that is not only more comprehensive in scale but is also psychometrically robust. We recognise the challenge in meeting this need. For example, SENCTDS was created from an initial pool of 167 scale items spanning 13 CT dispositions. Nevertheless, poor results for structural and convergent validity eliminated seven of those 13 dispositions (Quinn et al., 2020). Factor analysis demonstrated significant cross-loading which is indicative of conceptual overlap. Until that need is better met, current instruments remain psychometrically inferior, limiting efforts to build a holistic profile of students' CT dispositions and weakening the ability of educators to cultivate well-rounded critical thinkers. Our findings clarify the breadth of CT dispositions. Meaningful progress would be made if scholars could identify which of these 26 CT dispositions are conceptually distinct. This in turn could guide the development of measurement tools that have better psychometric properties.

We believe that a more comprehensive understanding of CT dispositions can not only inform students' assessment but also shape their teaching and learning. Another valuable research direction would therefore be to design learning environments that recognise antecedent and succedent interdependencies between CT dispositions (Dwyer et al., 2017) and are effective in fostering them (Loyens et al., 2023). For example, with respect to a broad developmental sequence for learning, we may look to Dwyer's analysis of putative interdependencies between CT dispositions (Dwyer et al., 2017). Although their findings from focus group discussions and interpretive structural modelling are preliminary, results suggest that inquisitiveness, open-mindedness and self-efficacy are foundational for CT, while reflection and resourcefulness seem to be more highly dependent on the influence of other CT dispositions (see Figure 4). A logical pedagogical recommendation would therefore be for students to first gain mastery of inquisitiveness, open-mindedness and self-efficacy, before practicing reflection and resourcefulness. Moreover, 'later maturing' dispositions tend to draw on numerous habits of mind. For example, resourcefulness has meta-cognitive elements (e.g. flexibility to shift strategies), affective elements (e.g. (confidence, persistence) and motivational features (e.g. willingness to search for resources).

6. DISCUSSION

Our unified framework builds on Facione's (1990) anchor and comprises cognitive, affective/motivational and metacognitive dimensions. By drawing on both empirical and theoretical studies spanning a wide range of disciplines such as nursing, medicine, and teacher education, it provides a comprehensive, universal framework of 26 CT dispositions. To our knowledge, this is the first rigorous synthesis of the literature on CT dispositions in university students using replicable research methods (Page et al., 2021) and comparing the findings to previous conceptual frameworks (Dwyer et al., 2017; Facione, 1990).

The identified dispositions are grounded in complementary theoretical perspectives. Virtue epistemology frames them as stable intellectual character traits oriented towards knowledge and understanding (Baehr, 2011). From the perspective of Motivation theory (Ryan & Deci, 2020), dispositions such as inquisitiveness and intrinsic goal orientation help explain why individuals are willing to initiate and sustain engagement in effortful cognitive work, particularly in complex or uncertain contexts. Metacognition research (Lai, 2011b) highlights how dispositions such as reflection and self-correction enable learners to monitor and regulate their thinking. Together, these perspectives show why these dispositions matter for learning and intellectual development.

The review shows a degree of geographic concentration, with most studies conducted in Western contexts, which may limit the cultural generalisability of the identified dispositions. Restricting the review to English-language publications may have excluded relevant studies in other languages. Synthesis decisions such as consolidating overlapping constructs and grouping conceptually similar dispositions required interpretive judgment. While these decisions may limit exhaustiveness, they also strengthened conceptual clarity by reducing redundancy and enabling coherent categorisation.

A number of the CT dispositions (e.g. courage, creativity, empathy) are often missing from CT disposition lists in early literature. This is because early research focussed on a relatively cognitive, logic-oriented conception of CT; with associated popular measurement instruments such as CCTDI (Facione & Facione, 1992). Dispositions such as creativity and empathy do not fit neatly into this schema. For example, good creative ideas are not necessarily logical or practical, so while creativity can support CT, it needs to be applied alongside CT and with care for it to be effective. Delving more deeply into the reasons for the omission goes beyond the scope of this book chapter, but interested readers are signposted to Dwyer et al. (2017).

Empirical evidence from employer expectations indicates that dispositions are differentially emphasised across disciplines (Cruz et al., 2021). In STEM (Sciences, Technology, Engineering and Mathematics) field, greater emphasis is placed on analyticity, inquisitiveness and systematicity. Health-related disciplines, such as Biomedicine, emphasise truth-seeking, empathy, maturity and scepticism. In the Social sciences, inquisitiveness and maturity are particularly salient, whereas the Humanities place greater weight on analyticity, open-mindedness, and creativity (Cruz et al., 2021).

While the debate on whether CT is generic (Siegel, 1988; Davies, 2013) or domain-specific (McPeck, 1981; Moore, 2011) is ongoing, contemporary research adopts an intermediate view, treating CT as broadly applicable but shaped by disciplinary norms, since standards of evidence and reasoning vary across knowledge fields (Abrami et al., 2015). This position is particularly salient for CT dispositions. For instance, deficits in empathy disposition carry different professional implications in nursing as compared to engineering. These considerations point to the value of a critical-thinking-across-the-curriculum approach, in which academic departments identify priority dispositions, embed them within authentic disciplinary tasks and assessments, and reinforce their development longitudinally (Ennis, 2013). Given that dispositions are partly implicit, their assessment should triangulate validated instruments with performance-based evidence and reflective justification. Equally important, faculty play a central role in making dispositional norms visible by modelling practices such as intellectual honesty, openness to alternatives, and reasoned scepticism, while explicitly linking these habits of mind to disciplinary standards and professional practices (Facione et al., 1995).

Overall, efforts to nurture CT in higher education should address not only cognitive skills, but also the dispositional foundations that motivate and sustain critical engagement across diverse and challenging contexts. We would argue that teaching transfers better when dispositions are cultivated alongside skills. Embedding these dispositions within the curriculum further is anticipated to better prepare students for lifelong learning, equipping them with adaptable habits of mind to evaluate, synthesise, and apply knowledge in ways that can foster innovation, inform decision-making, and facilitate meaningful contributions to society.

REFERENCES

- 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.
- Baehr, J. (2011). *The inquiring mind: On intellectual virtues and virtue epistemology*. OUP Oxford.
- Cruz, G., Payan-Carreira, R., Dominguez, C., Silva, H., & Morais, F. (2021). What critical thinking skills and dispositions do new graduates need for professional life? Views from Portuguese employers in different fields. *Higher Education Research & Development*, 40(4), 721-737.
- Davies, M. (2013). Critical thinking and the disciplines reconsidered. *Higher Education Research & Development*, 32(4), 529-544. doi:10.1080/07294360.2012.697878
- Dwyer, C. P., Hogan, M. J., Harney, O. M., & Kavanagh, C. (2017). Facilitating a student-educator conceptual model of dispositions towards critical thinking through interactive management. *Educational Technology Research and Development*, 65(1), 47-73.
- Dwyer, C. P., Hogan, M. J., Harney, O. M., & O'Reilly, J. (2014). Using interactive management to facilitate a student-centred conceptualisation of critical thinking: a case study. *Education Technology Research and Development*, 62, 687-709.
- Ennis, R. H. (1996). Critical thinking dispositions: Their nature and assessability. *Informal Logic*, 18(2&3), 165-182.
- Ennis, R. (2013). Critical thinking across the curriculum: The Wisdom CTAC Program. *Inquiry: Critical thinking across the disciplines*, 28(2), 25-45.
- Facione, P. A. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction* (The Delphi Report). American Philosophical Association.
- Facione, P. A. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking skill. *Informal logic*, 20(1).
- Facione, P. A., & Facione, N. C. (1992). *The California Critical Thinking Dispositions Inventory (CCTDI) and CCTDI Test Manual*. Millbrae: California Academic Press.
- Facione, P. A., Sanchez, C. A., Facione, N. C., & Gainen, J. (1995). The disposition toward critical thinking. *The Journal of general education*, 44(1), 1-25.
- Gordon, J. (2000). Congruency in defining critical thinking by nurse educators and non-nurse scholars. *Journal of Nursing Education*, 39(8), 340-351.
- Hall, D., & Fathima, S. (2025, September 2). *Critical thinking dispositions in the university student population*. Retrieved from osf.io/3dtxg
- Halpern, D. F. (2014). *Thought and knowledge: An introduction to critical thinking* (5th ed.). New York: Psychology Press.
- Ku, K. Y. L. (2009). Assessing students' critical thinking performance: Urging for measurements using multi-response format. *Thinking Skills and Creativity*, 4(1), 70-76.
- Lai, E. R. (2011a). Critical thinking: A literature review. *Pearson's Research Reports*, 6(1), 40-41.
- Lai, E. R. (2011b). *Metacognition: A Literature Review* (Research Report). Pearson.
- Loyens, S. M. M., van Meerten, J. E., Schaap, L., & Wijnia, L. (2023). Situating higher-order, critical, and critical-analytic thinking in problem- and project-based learning environments: A systematic review. *Educational Psychology Review*, 35(39).
- McPeck, J. E. (1981). *Critical thinking and education*. Routledge.

Critical Thinking Dispositions in the University Student Population:
A narrative synthesis of the concept

- Moore, T. J. (2011). Critical thinking and disciplinary thinking: A continuing debate. *Higher Education Research & Development*, 30(3), 261-274. doi:10.1080/07294360.2010.501328
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M.,... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *British Medical Journal*, 372(71).
- Quinn, S., Hogan, M., Dwyer, C., Finn, P., & Fogarty, E. (2020). Development and validation of the Student-Educator Negotiated Critical Thinking Dispositions Scale (SENCTDS). *Thinking Skills and Creativity*, 38, Article 100710.
- Raymond, C. L., & Profetto-McGrath, J. (2005). Nurse educators' critical thinking: Reflection and measurement. *Nurse Education in Practice*, 5(4), 209-217.
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary educational psychology*, 61, Article 101860.
- Siegel, H. (1988). *Educating reason: Rationality, critical thinking and education*. New York, NY: Routledge.
- Sosu, E. M. (2013). The development and psychometric validation of a Critical Thinking Disposition Scale. *Thinking Skills and Creativity*, 9, 107-119.
- Spencer, D. (2009). *Card sorting: Designing usable categories*. Rosenfeld Media.

ACKNOWLEDGEMENTS

The authors wish to thank Nicole Yee who assisted the project as a Psychology intern. SF was supported by a James Watt PhD scholarship awarded by Heriot-Watt University Malaysia.

AUTHORS' INFORMATION

Full name: Sharmila Fathima

Institutional affiliation: Heriot Watt University

Institutional address: Heriot-Watt University, No 1 Jalan Venna P5/2, Precinct 5, 62200 Putrajaya, Malaysia

Biographical sketch: Sharmila Fathima is a PhD candidate at the School of Social Sciences. With over a decade of professional experience as an educator, her research centers on the development of critical thinking skills and dispositions, with a broader commitment to youth empowerment, mentorship, and community engagement. Her scholarly interests lie in advancing education as a transformative tool for positive social change and innovation.

Full name: Ron Salden

Institutional affiliation: Heriot Watt University

Institutional address: Heriot-Watt University, No 1 Jalan Venna P5/2, Precinct 5, 62200 Putrajaya, Malaysia

Biographical sketch: Ron Salden is Associate Professor in Psychology, School of Social Sciences, Heriot-Watt University Malaysia, and senior fellow of the Higher Education Academy (UK). He has published several peer-reviewed articles on educational psychology and has contributed to large research projects in Europe and USA.

S. Fathima, R. Salden, C. Lee, T. Lansdown, & D. Hall

Full name: Chia Ping Lee

Institutional affiliation: Heriot Watt University

Institutional address: Heriot-Watt University, No 1 Jalan Venna P5/2, Precinct 5, 62200 Putrajaya, Malaysia

Biographical sketch: Chia Ping Lee is Associate Professor in Electrical and Electronic Engineering, School of Engineering & Physical Sciences, Heriot-Watt University Malaysia. She has published several research papers in Journals and Conferences. Her teaching interests include communication systems, electromagnetism, and engineering mathematics.

Full name: Terry Lansdown

Institutional affiliation: Heriot Watt University

Institutional address: Heriot-Watt University, Edinburgh Campus, Edinburgh, EH14 4AS

Biographical sketch: Terry Lansdown is Associate Professor in Psychology, School of Social Sciences, Heriot-Watt University. His primary research investigates social distractions in cars and trucks to encourage safe and efficient driving. He has published over 30 articles in peer-reviewed journals.

Full name: Deborah Ann Hall

Institutional affiliation: Heriot Watt University

Institutional address: Heriot-Watt University, Edinburgh Campus, Edinburgh, EH14 4AS

Biographical sketch: Deborah Hall is Professor of Psychology, Heriot-Watt University. She has published almost 200 peer-reviewed journal articles across the fields of neuropsychology, cognitive neuroscience, hearing science, translational health sciences and educational psychology. She is also the recipient of several multi-million UK research grants.