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Delineating the parameters of integrated thinking: A synthetic literature review

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Background: Many accounting professional bodies, of which the South African Institute of Chartered Accountants (SAICA) is one, expect academics to develop integrated thinking skills in their students during higher education. Integrated thinking is, however, often confused with critical thinking, systems thinking and design thinking.

Aim: This article aims to delineate the concept of integrated thinking by analysing the similarities and differences between integrated thinking, integrative thinking, critical thinking, systems thinking and design thinking.

Conclusion: Integrated thinking is a higher-order thinking skill with a strong emphasis on the ability to think in a creative manner. Although there are differences between integrated thinking and other higher-order thinking skills, there are also similarities. This article sets integrated thinking apart from other higher-order thinking skills.

Contribution: Limited research has been conducted to distinguish integrated thinking from integrative thinking, critical thinking, systems thinking and design thinking. This article endeavours to identify the true nature of integrated thinking by comparing it with other higher-order thinking skills. If lecturers at higher education institutions are to develop integrated thinking skills, it is important for them to have a clear understanding of what integrated thinking is, and how it differs from other thinking models. Without a grounded understanding of what integrated thinking is, it is nearly impossible to develop it in students.

Keywords: integrated thinking; integrative thinking; systems thinking; design thinking; critical thinking; higher education.

Introduction

The International Integrated Reporting Council's (IIRC's) introduction of the term integrated thinking initiated its use by accounting professional bodies globally (IIRC n.d.). From a professional accounting point of view, it is important to realise that integrated reporting is the outcome of integrated thinking within an organisation (McGuigan et al. 2020). The introduction of the concept of integrated thinking prompted many professional accounting bodies to necessitate the development of integrated thinking skills within the higher education of prospective professional accountants. The South African Institute of Chartered Accountants (SAICA) is one such professional accounting body. South African Institute of Chartered Accountant's new Chartered Accountant (CA) of the Future Competency Framework requires SAICA-accredited universities to develop integrated thinking skills within students during higher education (SAICA 2021a). However, it is acknowledged in the literature that lecturers do not understand exactly what integrated thinking means, let alone how to teach or assess it (Booth, McLean & Walker 2009). There are other closely related higher order thinking skill models, such as critical thinking, design thinking and systems thinking. For higher education institutions to develop integrated thinking skills, it is important that they need to fully understand the meaning of integrated thinking and be able to delineate it from other said types of higher-order thinking skill models. From an accounting education perspective, lecturers are expected to specifically develop integrated thinking skills in students. Without a clear understanding of what integrated thinking is, and how it differs from other higher-order thinking models, this will be a near impossible task. The risk of not understanding what exactly integrated thinking entails will result in an uninformed teaching and learning approach, which will not lead to the development of integrated thinking skills. For many years, the development of critical thinking skills was emphasised in accounting education (Marx, Mohammadali-Haji & Lansdell 2020; Terblanche 2019). Now an additional thinking skill, that is integrated thinking, is added to the curriculum. It is especially important for educators to understand the difference

between critical thinking and integrated thinking so that one is not developed at the expense of the other. This article therfore helps provide more clarity on what exactly integrated thinking is and how it differs from other thinking models. Accounting education lecturers will benefit from this article and so will lecturers of other disciplines where the development of integrated thinking skills is important.

The IIRC defines integrated thinking as an organisation's active examination of the connections between its many operating and functional units and the capitals it utilises or affects (IIRC 2021). However, despite the IIRC's Integrated Thinking and Strategy Group's exploration of integrated thinking on an organisational level, there are continuous and ongoing calls for more clarification and explanations regarding integrated thinking in general and from an educational perspective (Feng, Cummings & Tweedie 2017; McGuigan et al. 2020). There are numerous practitioner publications relating to integrated thinking published by professional accounting bodies, such as the Chartered Institute of Management Accountants (CIMA 2017), the IIRC (2020) and SAICA (2021b); but despite their significant value, these sources cannot replace the thorough, independent study conducted by other scholars (Ecim & Maroun 2022). Most of the academic research relating to integrated thinking deals with the concept at the organisational level (Busco, Granà & Achilli 2021; Dumay & Dai 2017; Ecim & Maroun 2022; Guthrie & Parker 2016), and there remains a void in the research on the development of integrated thinking within an individual (McGuigan et al. 2020). In other words, from an accounting education perspective, much research has been conducted on the development of integrated thinking within organisations, but less research has been conducted on exactly how to develop integrated thinking skills in students studying towards a professional accounting qualification. The concept of integrated thinking is still unclear and only gained popularity as a research topic in recent years (Maroun, Ecim & Cerbone 2022; McGuigan et al. 2020). Much literature is available on the respective topics of critical thinking, design thinking, systems thinking and integrated thinking; however, little comparison between the different models of thinking has been conducted. This article strives to mark the differences and similarities between the said thinking models. As mentioned previously, it is important for a lecturer to understand exactly what integrated thinking is in order to successfully develop it in students.

Methods

The methodology provided by Schirmer (2018) for conducting and producing a synthetic literature review was adhered to, and an archive research design was employed. A synthetic literature review seeks to generate a new and more valuable theoretical perspective by systematically integrating the results of past studies, rather than describing and reflecting on the results of previous studies (as is normally done in literature reviews) (Wallis & Wright 2020). The Framework Sequence as described by Schirmer (2018) includes the following sequential steps:

Selecting the research and relevant literature

The ProQuest and Google Scholar databases were explored for literature relevant to the research problem. BOX 1 sets out the keywords and Boolean operators used for this study.

Analysing the studies

All the selected literature was critically analysed to determine the gaps as well as inconsistencies relating to the delineation of the concept of integrated thinking. This was done by identifying the justification, analysis, methodology, findings, conclusions and interpretation of each study (Schirmer 2018). A diverse range of worldwide literature was chosen and studied, with consideration given to publications from authoritative institutions and authors recognised as experts in their fields. In order to acquire a worldwide view on the topic, the authors rather studied literature from a global viewpoint of just a single geographic perspective. Preference was given to peer-reviewed journal articles. Originally, approximately 110 sources were consulted, but based on the above inclusion criteria and preferences, some sources were excluded in this study. Ultimately, 69 sources were selected to write up this study. The sources selected to perform this study include journal articles (both peer reviewed and non-peer reviewed) (45), Doctoral theses (2), books (6), documents published on websites (13) and conference proceedings (3). The study was conducted during the period June 2022–May 2023 in South Africa.

Identifying the patterns and trends in the literature

The main objective of this article is to delineate integrated thinking from critical thinking, systems thinking and design thinking in order to gain a clear understanding of what exactly integrated thinking is. All sources were examined in order to identify the unique characteristics of each thinking model. These characteristics were then compared across the different thinking models examined in order to identify patterns and differences. In this process, the similarities and differences between the different thinking models became clear.

Writing the literature review

Once the first three steps of the Framework Sequence were completed, the literature review (which follows in the next section) was written.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

BOX 1: Keywords and Boolean operators.

'integrative thinking' AND 'integrated thinking'
'integrated thinking' OR 'integrative thinking' AND 'systems thinking'
'integrated thinking' OR 'integrative thinking' AND 'design thinking'
'systems thinking' AND 'design thinking'
'integrated thinking' OR 'integrative thinking' AND 'critical thinking'
'process of integrated thinking'

Review findings

This section discusses the results of the literature review of the differences and similarities between integrated thinking, integrative thinking, critical thinking, systems thinking and design thinking. The process of integrated thinking is also discussed. Firstly, the concept of integrated thinking on its own is discussed, followed by comparisons with other thinking models in order to differentiate integrated thinking from other thinking models. This section consists of the following subsections:

1. *Integrative versus integrated thinking* – the concepts of integrated and integrative thinking are distinguished from each other.
2. *The elusive definition of integrated thinking on an individual level* – the fact that no single definition exists for integrated thinking is discussed.
3. *Integrated thinking model* – a model that discusses the interactions between integrated thinking, creative thinking, basic thinking and critical thinking.
4. *Integrated thinking versus critical thinking* – the differences between integrated thinking and critical thinking are discussed.
5. *Integrated thinking versus systems thinking and design thinking* – the differences and similarities between integrated thinking, systems thinking and design thinking are discussed.

Integrative versus integrated thinking

The IIRC (2020), and other global professional bodies, such as SAICA (2021b), refer to the term 'integrated thinking'. However, the term 'integrated thinking' is sometimes used interchangeably with 'integrative thinking'. There seems to be uncertainty about which concept arises first in the human mind and from an organisational perspective: integrated thinking or integrative thinking (McGuigan et al. 2020). Recent literature published in 2020 argues that integrative thinking arises in an individual, which then leads to the possibility of integrated thinking taking place within an organisation (McGuigan et al. 2020). This implies that before integrated thinking can develop within an organisation, integrative thinking abilities must first be developed within the individuals in the organisation. Integrative thinking necessitates an individual's conscious and continual growth of their ability to manage complexity, adaptability and open-mindedness in order to cognitively process the world around them (Miller 1981). Research on the development of integrative thinking in fields other than accounting during higher education seems to prefer the term integrative thinking over integrated thinking (Kallio 2011; Lattemann & Fritz 2014; O'Keefe et al. 2021; Ortega, Lagoudas & Froyd 2017). This confirms the views of McGuigan et al. (2020) as these articles refer to the development of integrative thought within an individual. However, in order to avoid confusion, this article will consistently refer to the term integrated thinking as opposed to integrative thinking as this is the preferred term for the professional accounting bodies IIRC, IFAC and SAICA.

The elusive definition of integrated thinking on an individual level

The concept of integrated thinking is still vague and only gained popularity as a research topic in recent years (Adams 2017; Busco et al. 2021; Ecim & Maroun 2022; Maroun et al. 2022; McGuigan et al. 2020). Decision-making is inherently an ambiguous process and not all problems merit the use of integrated thinking; it is usually applied when solving complex and/or ill-structured problems (Martin & Austen 1999). Integrated thinking is described as an art that involves a creative process and emphasises that it is not an algorithm or formula (Martin & Austen 1999). Integrated thinkers manage tension while embracing complexity, tolerating uncertainty and producing innovative solutions to issues (Martin & Austin 1999).

Although there is no central definition for integrated thinking (Lattemann & Fritz 2014), research by academics and institutions in the field of integrated thinking has provided some definitions for integrated thinking that include:

- Integrated thinking combines creative imagination, logic and intuition in order to create holistic solutions (Douglas 2006).
- It is the ability to face the conflict of opposing ideas constructively and design a creative resolution in the form of a new concept. The elements of the opposing ideas are incorporated, but the solution is superior to the opposing ideas rather than choosing one to the detriment of the other (Martin 2009).
- Integrated thought is the ability to create and understand situations that combine technical and non-technical concepts through the recognition of interconnected principles (Barac et al. 2020).
- Integrated thinking consists of a variety of components, such as connecting knowledge and skills from multiple sources and experiences; applying theory to practice in different environments; using varied and sometimes conflicting viewpoints and contextual recognition of issues and positions (Huber, Hutchings & Gale 2005).

Integrated thinking model

Despite the fact that there is no central definition to describe integrated thinking (as described in the previous section), the IOWA State Department of Education developed an 'Integrated Thinking Model' to assist in further understanding the concept of integrated thinking. According to this model, integrated thinking is a combination of basic thinking, creative thinking and critical thinking (Burklund et al. 1989:16). Figure 1 visually illustrates the interconnectivity between the diverse types of thinking, and it is clear that Integrated thinking is the culmination of integrating all three types of thinking. The thinking types are described as follows (Burklund et al. 1989):

- *Basic thinking:* this type of thinking is not a form of higher-order thinking as it deals with the ability to absorb and recall accepted knowledge.
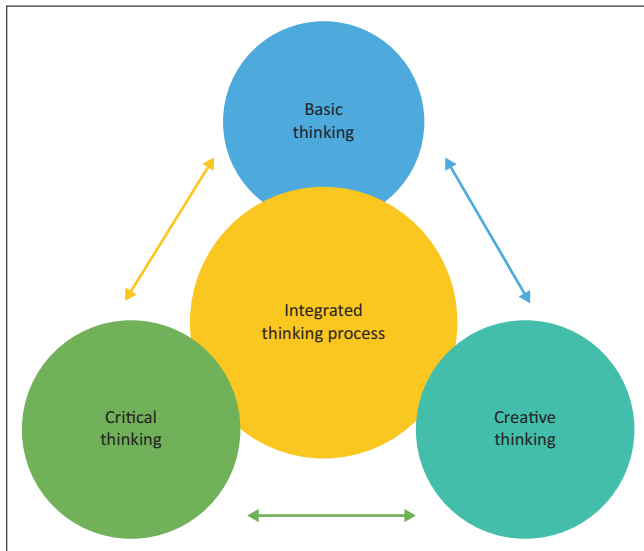
FIGURE 1: Integrated thinking model.

- *Critical thinking:* this type of thinking is described as reorganised knowledge and involves analysing, connecting and evaluating information in order to come to a conclusion.
- *Creative thinking:* this type of thinking is described as generated knowledge and the process of synthesising and imagining leads to the generation of new knowledge.

Critical thinking, integrated thinking, design thinking and systems thinking are often likened to each other. Whilst there are similarities, there most definitely are also differences. The next two sections list the differences and similarities between integrated thinking and other types of thinking in the pursuit of delineating the parameters of integrated thinking.

Integrated thinking versus critical thinking

Roger Martin, a previous Dean of the Rotman School of Business at the University of Toronto, published several books relating to integrated thinking and is well known for his work on integrated thinking (Martin 2007, 2009; Martin & Austen 1999). Martin believes that critical thinking is based on choosing the better of several options (Wallace 2011). Martin (Wallace 2011) strongly believes that once you have taught your students critical thinking, they will not necessarily be able to think in an integrated manner and meaningfully across disciplines. According to Martin (Wallace 2011), the ability to teach integrated thinking is a separate science. Boix Mansilla (2016) makes a strong point that interdisciplinary synthesis requires intentional instruction, it is not just an add-on or a process that simply happens on its own.

Graham Douglas (2006) agrees with the views of Martin and states that each individual has a critical mind and an integrated mind and believes that the critical mind is merely a component of an integrated mind. This choice of wording suggests that the integrated mind goes beyond the critical mind. In training individuals to think critically, reasoning is dehumanised, and individuals are taught to think 'inside the box' (Douglas 2006:5). This type of thinking cannot deal with the increasingly interdependent world in which humans function and it is crucial to, in addition to teaching critical thinking, teach individuals to think in an integrated manner (Douglas 2006). Based on the views of Martin and Douglas discussed earlier, it is the authors' conclusion that integrated thinking is the pinnacle of higher-order thinking skills. In order to understand the difference between integrated thinking and critical thinking, it is important to revisit Bloom's Taxonomy, as revised in 2001 (Dwyer, Hogan & Stewart 2014). Bloom's Taxonomy is a multi-tiered approach for categorising thought, based on six cognitive levels of complexity (Forehand 2005). The taxonomy is hierarchical, with higher levels subsuming lower levels (Forehand 2005). A student who is able to create is thus also able to evaluate, but a student who is able to evaluate cannot necessarily create. From this perspective, a student who is able to think in an integrated manner can thus also think critically. But a student who can think critically is not necessarily able to think in an integrated manner.

In order to differentiate integrated thinking from critical thinking, it is important to understand exactly what critical thinking entails. Once a thorough understanding of critical thinking is established, the differences between critical thinking and integrated thinking can be determined. Critical thinking involves the application of cognitive abilities that are intentional, motivated and goal-directed to make decisions and find solutions to issues (Halpern 2013). Critical thinking is a metacognitive process that increases the chances of generating a rational conclusion to an argument or solution to a problem through purposeful, reflective judgement (McGuigan & Kern 2016). The teaching of critical thinking skills still receives a lot of attention in the educational arena as it allows students to go beyond the simple retention of information (Terblanche 2018).

Critical thinking equips the individual to gain a more complicated understanding of the information provided (Fogarty 2010). Critical thinking involves application, analysis and evaluation of an issue presented. In none of the definitions of critical thinking by three well-known researchers, Ennis (1985), Paul (1992) and Halpern (2013), the concept of creativity is stated. Thus, critical thinking involves higher-order thinking skills, but not necessarily the ability to create (and be creative). In the literature relating to integrated thinking, there is a significant link between integrated thinking and the ability to be creative (Chang et al. 2015, Martin 2009; McGuigan & Kern 2016; McGuigan et al. 2020; Miller 1981; Oliver, Vesty & Brooks 2016; Sill 1996; Syolendra & Laksono 2019; Wang & Ruhe

2007). The decision-making approach to complex issues in an integrated manner is based on finding new, creative solutions rather than simply choosing the best solution from a list of alternatives (Martin 2009). The ability to create and be creative is seen as the pinnacle of Bloom's Taxonomy (refer to Figure 2).

Integrated thinking versus systems thinking and design thinking

In the interest of clearly demarcating the concept of integrated thinking, it is important to analyse the similarities and differences between integrated thinking, design thinking and systems thinking. The literature underpinning the definition, use, tenets and visual representation of each thought process was analysed and is summarised in Table 1. As can be seen from Table 1, each of the types of thinking analysed has a few definitions that have developed over time and lack a central definition, which makes the analysis of the differences and similarities between them difficult. The lines between the different thinking methods seem blurred. Systems thinking is sometimes described as a component of design thinking (Long 2012) and other times as separate but related to design thinking (Patel & Khanjan 2017) and sometimes they are regarded as not related at all (Greene, Gonzalez & Papalambros 2017). Integrated thinking is thought to have its theoretical roots in soft systems thinking and is akin to a systems thinking perspective (Oliver et al. 2016). On the other hand, integrated thinking is also described as the thinking method that design thinkers use (Dunne, Martin & Rotman 2006). As can be seen from this discussion, the lines between integrated thinking, systems thinking and design thinking are extremely blurred.
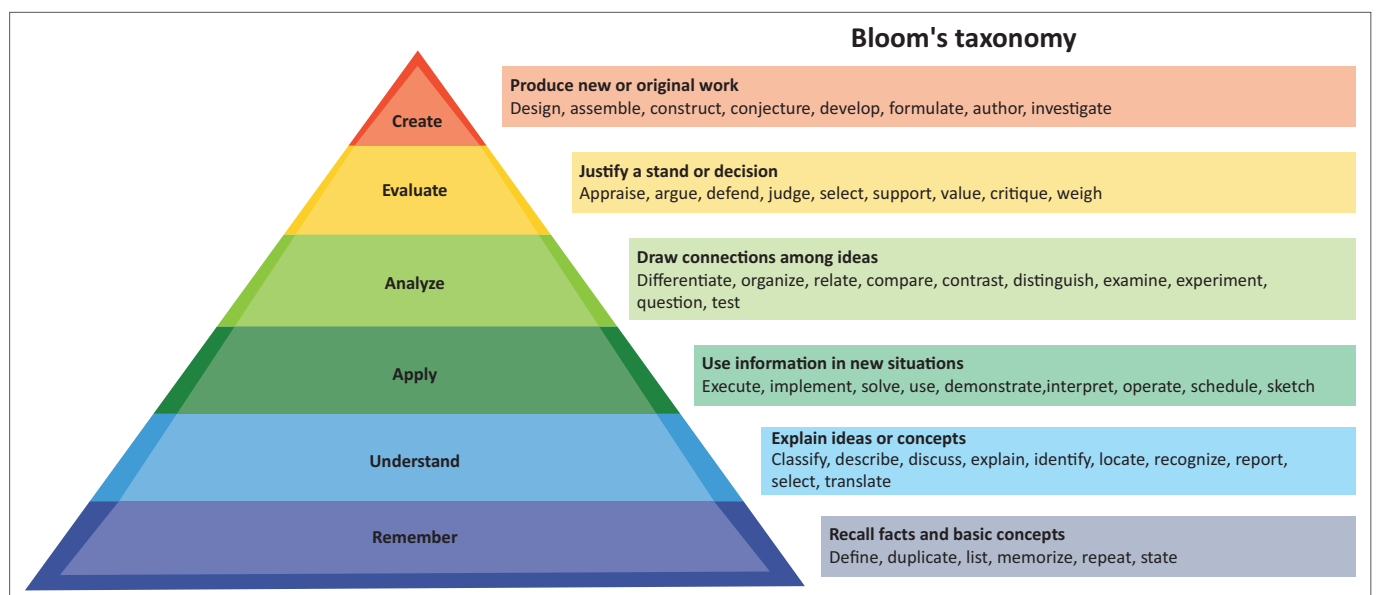
From the literature summarised above in Table 1, the following conclusions can be made:

Similarities of all three thinking skill models:

- Endeavour to solve complex (also known as wicked) problems (Martin 2009; Monat & Gannon 2015; Oliver et al. 2016).
- Require higher-order thinking skills (Barac et al. 2020; Frank 2012; Greene et al. 2017).
- Require a multidisciplinary approach to solving complex problems (Greene et al. 2017; Miller 1978; Patel & Khanjan 2017).
- Are recognised models to develop higher-order thinking skills during higher education (Matthews & Wrigley 2017; McGuigan et al. 2020; Ison 1999).
- Require the ability of abductive reasoning in addition to inductive and deductive reasoning (Lattemann & Fritz 2014; Leavy 2011; Martin 2007; Pourdehnad et al. 2011).

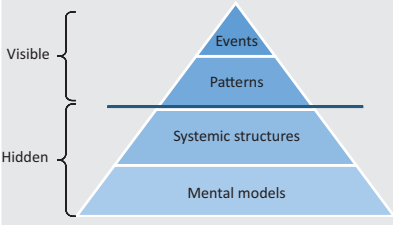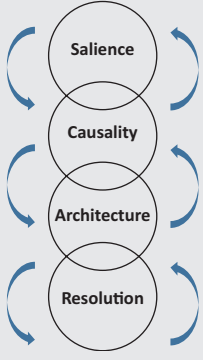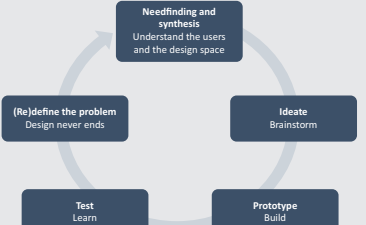### Differences between the three thinking skill models:

- Whilst creativity is a crucial tenet for integrated thinking and design thinking, it is not that important for systems thinking (Patel & Khanjan 2017).
- Design thinking focuses on the effort to create value in the first place and is a prototype and consumer driven, while on the other hand, systems thinking entails coordinating improvement across a full ecosystem (Patel & Khanjan 2017). In contrast, integrated thinking attempts to add sustainable value over the short, medium and long term to an organisation by thinking across capitals (Dumay & Dai 2017; IIRC 2020).
- Systems thinking arose from the consideration of social systems while design thinking arose from the consideration of products and/or artifacts (Pourdehnad et al. 2011). Integrated thinking is a broader concept that can include the consideration of social systems

Bloom's taxonomy

Create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

Evaluate — Justify a stand or decision
Appraise, argue, defend, judge, select, support, value, critique, weigh

Analyze — Draw connections among ideas
Differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

Apply — Use information in new situations
Execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

Understand — Explain ideas or concepts
Classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

Remember — Recall facts and basic concepts
Define, duplicate, list, memorize, repeat, state

Source: Armstrong, P., 2010, *Bloom's taxonomy*, viewed 31 March 2023, from https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
FIGURE 2: Bloom's revised taxonomy.

TABLE 1: Systems thinking, integrated thinking and design thinking.

Systems thinking	Integrated thinking	Design thinking
Origin: Origin is in General Systems Theory (Bertalanffy 1968). The term was coined by Barry Richmond in 1987 (Arnold & Wade 2015; Richmond 1994).	**Origin:** Individual perspective: Integrated thought, first coined by Graham Douglas in 1986, challenged critical thinking by fostering imagination and concentrating on making unexpected ties (Zhu, n.d.). Organisational perspective: The IIRC released the International Integrated Reporting Framework in December 2013 and introduced the concept of Integrated Thinking (IIRC 2021; SAICA 2015).	**Origin:** The concept of design thinking (from a designer perspective) originated in 1969; however, design thinking from a non-designer perspective started to gain popularity in the 2nd decade in the 21st Century (Brenner & Uebernickel 2016).
Definition(s): The art and science of predicting behaviour with increased accuracy by understanding its underlying structure and in a nutshell, systems thinking is about having an eye on both the forest and the trees at the same time (Arnold & Wade 2015; Richmond 1994). Contrary to linear thinking, systems thinking emphasises the relationships between system components rather than the components alone (Cabrera, Colosi & Lobdell 2008). As opposed to analytical or dissective thinking, systems thinking uses a holistic and integrated approach (Monat & Gannon 2015). Systems thinking is a collection of complementary analytical skills that helps people get better at recognising and comprehending systems, forecasting their behaviours and producing changes to them that will have the intended results and these abilities function as a system (Arnold & Wade 2015).	**Definition(s):** Individual perspective: The ability to face the conflict of opposing ideas constructively and design a creative resolution in the form of a new concept (Martin 2009). The elements of the opposing ideas are incorporated, and the solution is superior to each other rather than choosing one at the detriment of the other (Martin 2009). The Carnegie Foundation for the Advancement of Teaching and AACU point out that integrated thinking consists of a variety of components such as connecting knowledge and skills from multiple sources and experiences; applying theory to practice in different environments; using varied and sometimes conflicting viewpoints and contextual recognition of issues and positions (Huber et al. 2005). Organisational perspective: The IIRC defines integrated thinking as an organisation's active consideration of the relationships between its many operating and functional units, as well as the capitals it uses or affects (IIRC 2021). Integrated thinking contributes to integrated decision-making and activities that address value generation, preservation and erosion in the short, medium and long term (IIRC 2021).	**Definition(s):** Design thinking is the use of design techniques and tools in a professional or social setting to solve complex problems (Lattemann & Fritz 2014). To solve complicated problems, design thinking involves thinking like a designer rather than actually being a designer (Elsbach & Stigliani 2018). Design thinking is an innovative, human-centred, methodical and cross-disciplinary approach to problem solving (Elsbach & Stigliani 2018). Design thinking involves people working together in multidisciplinary teams (Patel & Khanjan 2017).
Use: Used to solve complex problems where the focus is put on the whole and its intrinsic qualities (soft systems thinking) rather than the specific characteristics of the components (hard systems thinking) (McGuigan et al. 2020; Oliver et al. 2016). Methodology arose from the consideration of social systems (Pourdehnad, Wexler & Wilson 2011).	**Use:** Individual perspective: Integrated thinking is used to solve complex problems by embracing complexity and tolerating uncertainty in the search for creative solutions (McGuigan et al. 2020; Martin 2009). By tolerating ambiguity and uncertainty the integrated thinker is not pushed towards closure and does not seek an either or solution but has the ability to produce a completely new and innovative option not considered before (Martin & Austen 1999). Organisational perspective: Revolutionises business thinking by combining the collective mindset of management to an integrated one (Ghio & McGuigan 2020). Thinking across capitals leads to the creation of short-, medium- and long-term value and sets the tone for integrated reporting (Busco, et al. 2021; Dumay & Dai 2017; IIRC 2020).	**Use:** Design thinking is used to solve complex problems by using creativity to prioritise the consumer and/or user's needs (Monat & Gannon 2015). Although it is an ideology based on designers' workflows for outlining design stages, the goal of design thinking is to give all professionals a standardised innovation process to produce innovative solutions to challenges, whether they are related to design or not (Han 2022). Methodology arose from the consideration of products or artefacts (Pourdehnad et al. 2011).
Tenets: Interdependence between parts of a system, multidisciplinary, differentiation, regulation, abductive reasoning, abstraction, multi-finality (Greene et al. 2017; Patel & Khanjan 2017; Pourdehnad et al. 2011).	**Tenets:** Complexity, creativity, uncertainty, ambiguity, adaptability, open-mindedness, multi-disciplinary, abductive reasoning (Martin 2007, 2009; Miller 1981).	**Tenets:** Multi-disciplinary, creativity, human-centred, prototype driven, abductive reasoning, ideation based (Patel & Khanjan 2017; Pourdehnad et al. 2011).
Visual representation of process: *Source*: (Monat & Gannon 2015:18) Interpretation of visual representation: The iceberg model is a tool for shifting a viewpoint and seeing beyond the immediate events that everyone observes. It assists in determining the underlying reasons of those events. This is attainable by investigating deeper levels of abstraction inside the system that are not immediately apparent.	**Visual representation of process:** *Source*: (Martin 2007:7) Interpretation of visual representation: Integrated thinkers follow a multi-directional and non-linear method to solve problems. They welcome complexity and consider as many features of the problem that are salient in order to come to a creative solution. Integrated thinkers are able to visualise the whole whilst working on individual parts of the problem.	**Visual representation of process:** *Source*: (Brenner & Uebernickel 2016:11) Interpretation of visual representation: During a design thinking project the micro process illustrated above will be performed several times. A broad understanding of the problem or need is gained before ideas are formulated. Based on the ideas formulated, a prototype is built that can be tested. If the prototype is appropriate for the problem or need, the process stops. If not, the problem is redefined and the micro process is repeated.

and products and/or artifacts but is not limited to these considerations. Integrated thinking focuses on adding value to all stakeholders in a sustainable manner (Busco et al. 2021). From an organisational perspective, integrated thinking is the foundation required for successfully integrated reporting (IIRC 2020, 2021).

- Systems thinking involves a set of tools, models and simulations that enable the individual to focus on the interrelatedness of system components (Greene et al. 2017), whereas integrated thinking and design thinking are more of a multidirectional thinking process that enables the individual to come up with creative and valid solutions (Brenner & Uebernickel 2016; Martin 2009).

Process of integrated thinking

Although the concept of integrated thinking was developed by Graham Douglas, the majority of research relating to integrated thinking from an individual perspective was conducted by Roger Martin (Leavy 2011; Martin 2007, 2009; Martin & Austen 1999). Martin believes that integrated thinking is a process and describes the process as consisting of four mental activities or steps: salience, causality, sequencing (which he later changed to architecture) (Martin 2007) and resolution (Martin & Austen 1999). The process of integrated thinking is illustrated in Figure 3. Figure 3 also illustrates that the four steps cannot always be performed rigidly and in this particular order. Often it is necessary to revisit a previous step and sometimes even to go back to the beginning, and this fluidity is referred to as integrated integrity (Martin 2007; Martin & Austen 1999). Integrated thinking is thus a non-linear process. One of the crucial components of integrated thinking is that pragmatism serves as its empirical basis (Hartz-Karp & Marinova 2020). In writing his seminal book *The Opposable Mind: How Successful Leaders Win through Integrated Thinking*, Martin interviewed successful and prominent leaders in business, the arts and the not-for-profit sector (Martin 2009). Based on the feedback from the interviewees, it was concluded that these individuals can hold competing ideas in tension at the same time in order to come up with an original solution (Hartz-Karp & Marinova 2020; Martin 2009). The differences between conventional thought and integrated thought are illustrated in a visual manner in Figure 3.

Martin unpacks the four steps to the process of integrated thinking as follows (Martin 2007, 2009; Martin & Austen 1999):

- *Salience* is the process of deciding what information is relevant to the decision and what is not. In other words, one should be cognisant of what to pay attention to.
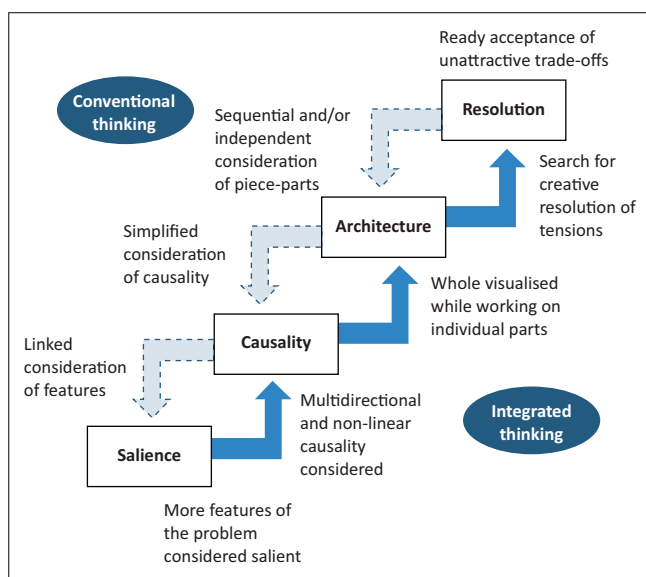
Source: Martin, R.L. & Austen, H., 1999, 'The art of integrative thinking', *Rotman Management*, Fall 1999, pp. 2–5

FIGURE 3: Integrated versus conventional thinking.

By eliminating the information that is not relevant to the decision, some of the overwhelming variables can be reduced. This process requires sifting through all the information carefully. Integrated thinkers take a more substantial view of what is salient, which is one of the ways they differ from conventional thinkers. An ill-structured problem results from more noticeable features. The chaos is acceptable to integrated thinkers, though. Integrated thinkers really welcome it because the disarray reassures them that they have not omitted details important to consider the issue as a whole. Integrated thinkers embrace complexity as they are aware that it leads to the best solutions.

- *Causality* implies that relationships are identified between the information provided. Integrated thinkers do not hesitate to investigate causal links that are multi-directional and non-linear, which is the second distinction between them and conventional thinkers. If, for example, a case study requires a decision between leasing or buying new manufacturing equipment and from an accounting perspective the leasing option makes more sense, one needs to also ask the following questions:

  ▪ What are the accounting implications of buying versus leasing the manufacturing equipment?
  ▪ What will the taxation implications be should it be decided to lease the equipment?
  ▪ Are there any governance issues to consider if the asset is leased?
  ▪ Over the medium to long term, what will the implications be on the organisation's cash flow?
  ▪ Are any stakeholders influenced by this decision?

It could be that even though leasing would make sense from an accounting point of view, it is not effective from a taxation perspective and therefore, leasing is not the correct decision. The list of questions can potentially be much longer, but the gist of determining causality is to realise that for every decision there are multiple consequences, and these interactions must be considered before making a final decision:

- *Architecture* is the phase where, based on the decisions made during salience and causality, a model is created or built. The model is not always an either/or decision. It might be that neither option A nor option B is appropriate and that an option C must be constructed. The third distinction between integrated and conventional thinking lies in the architecture of the decisions. Integrated thinkers avoid dividing an issue into separate, independent components and working on each component independently. They work on each component of the problem while keeping the whole firmly in mind.
- *Resolution* consists of the ultimate decision and reasons that support a specific decision. The final distinction between integrated and conventional thinkers is that integrated thinkers, as opposed to conventional thinkers, will never accept unfavourable trade-offs; instead, they will always look for a creative approach to resolve tensions.

Conclusion

Several professional accounting bodies now require universities to develop integrated thinking skills during the higher education of prospective professional accountants. The concept of integrated thinking is, however, vague as there are many different working definitions. Furthermore, there are dissimilarities and also similarities between integrated thinking and other higher-order thinking skills, such as critical thinking, systems thinking and design thinking. This article sets out these said similarities and differences in order to delineate the concept of integrated thinking.

There has been little study to differentiate integrated thinking from integrative thinking, critical thinking, systems thinking and design thinking. This article contributes to the body of research by comparing integrated thinking to other higher-order thinking skills in an attempt to determine its true nature. If higher education lecturers want to successfully develop integrated thinking skills in students, it is critical that they understand what integrated thinking is and how it differs from other thinking models. It is nearly impossible to develop integrated thinking in students unless lecturers have a clear concept of what it is.

This article is merely a starting point to delineate the concept of integrated thinking, and it is recommended that further research is conducted to provide even more structure and guidelines for academics and students to differentiate integrated thinking from other higher-order thinking skills.

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References

Adams, C.A., 2017, *Understanding integrated reporting: The concise guide to integrated thinking and the future of corporate reporting*, Routledge, Oxford.

Armstrong, P., 2010, *Bloom's taxonomy*, viewed 31 March 2023, from https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/.

Arnold, R.D. & Wade, J.P., 2015, 'A definition of systems thinking: A systems approach', *Procedia Computer Science* 44(C), 669–678. https://doi.org/10.1016/j.procs.2015.03.050

Barac, K., Plant, K., Kunz, R. & Kirstein, M., 2020, 'Generic skill profiles of future accountants and auditors – Moving beyond attributes', *Higher Education, Skills and Work-based Learning* 11(4), 908–928. https://doi.org/10.1108/HESWBL-08-2020-0180

Bertalanffy, L., 1968, *General system theory: Foundations, development, applications*, Penguin Books, London.

Boix Mansilla, V., 2016, 'Interdisciplinary learning: A cognitive-epistemological foundation', in R. Frodeman (ed.), *Oxford handbook of interdisciplinarity*, pp. 261–275, Oxford University Press, Oxford.

Booth, A., McLean, M. & Walker, M., 2009, 'Self, others and society: A case study of university integrative learning', *Studies in Higher Education* 34(8), 929–939. https://doi.org/10.1080/03075070902773818

Brenner, W. & Uebernickel, F., 2016, *Design thinking for innovation: Research and practice*, Springer, Switzerland.

Burklund, C., Garvin, K., Lawrence, N. & Yoder, J., 1989, *A guide to developing higher order thinking across the curriculum*, IOWA State Department of Education, Des Moines, pp. 1–85.

Busco, C., Granà, F. & Achilli, G., 2021, 'Understanding integrated thinking: Evidence from the field, the development of a framework and avenues for future research', *Meditari Accountancy Research* 29(4), 673–690. https://doi.org/10.1108/MEDAR-04-2021-1263

Cabrera, D., Colosi, C. & Lobdell, C., 2008, 'Systems thinking', *Evaluation and Program Planning* 31(3), 299–310. https://doi.org/10.1016/j.evalprogplan.2007.12.001

Chang, Y., Li, B., Chen, H.C. & Chiu, F.C., 2015, 'Investigating the synergy of critical thinking and creative thinking in the course of integrated activity in Taiwan', *Educational Psychology* 35(3), 341–360. https://doi.org/10.1080/01443410.2014.920079

CIMA, 2017, *Integrated thinking*, viewed 06 November 2023, from https://www.https://www.aicpa-cima.com/resources/download/integrated-thinking.

Douglas, G., 2006, *Achieving sustainable development: The integrative improvement institutes project*, viewed 08 January 2024, from https://mpra.ub.uni-muenchen.de/14624/.

Dumay, J. & Dai, T., 2017, 'Integrated thinking as a cultural control?', *Meditari Accountancy Research* 25(4), 574–604. https://doi.org/10.1108/MEDAR-07-2016-0067

Dunne, D., Martin, R.L. & Rotman, J.L., 2006, 'Design thinking and how it will change management education: An interview and discussion', *Academy of Management Learning & Education* 5(4), 512–523. https://doi.org/10.5465/amle.2006.23473212

Dwyer, C.P., Hogan, M.J. & Stewart, I., 2014, 'An integrated critical thinking framework for the 21st century', *Thinking Skills and Creativity* 12, 43–52. https://doi.org/10.1016/j.tsc.2013.12.004

Ecim, D. & Maroun, W., 2022, 'A review of integrated thinking research in developed and developing economies', *Journal of Accounting in Emerging Economies* 13(3), 589–612. https://doi.org/10.1108/JAEE-02-2022-0046

Elsbach, K.D. & Stigliani, I., 2018, 'Design thinking and organizational culture: A review and framework for future research', *Journal of Management* 10(6), 2274–2306. https://doi.org/10.1177/0149206317744252

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

Feng, T., Cummings, L. & Tweedie, D., 2017, 'Exploring integrated thinking in integrated reporting – An exploratory study in Australia', *Journal of Intellectual Capital* 18(2), 330–353. https://doi.org/10.1108/JIC-06-2016-0068

Fogarty, T.J., 2010, 'Revitalizing accounting education: A highly applied liberal arts approach', *Accounting Education* 19(4), 403–419. https://doi.org/10.1080/09639284.2010.501629

Forehand, M., 2005, 'Bloom's taxonomy: Original and revised', *Emerging perspectives on learning, teaching, and technology*, 8, 41–44.

Frank, M., 2012, 'Engineering systems thinking: Cognitive competencies of successful systems engineers', *Procedia Computer Science* 8, 273–278. https://doi.org/10.1016/j.procs.2012.01.057

Ghio, A. & McGuigan, N., 2020, 'A life of good governance, positive activism, accountability & integrated thinking: An interview with Mervyn King', *Journal of Management Inquiry* 29(4), 475–483. https://doi.org/10.1177/1056492620901794

Greene, M.T., Gonzalez, R. & Papalambros, P., 2017, 'Design thinking vs. systems thinking for engineering design: What's the difference?', in A. Maier, S. Škec, H. Kim, M. Kokkolaras, J. Oehmen, G. Fadel, et al. (eds.), *21st International conference on engineering design*, Canada, Vancouver, August 21–25, pp. 1–10.

Guthrie, J. & Parker, L.D., 2016, 'Whither the accounting profession, accountants and accounting researchers? Commentary and projections', *Accounting, Auditing and Accountability Journal* 29(1), 2–10. https://doi.org/10.1108/AAAJ-10-2015-2263

Halpern, D.F., 2013, *Thought and knowledge: An introduction to critical thinking*, Psychology Press, New York, NY.

Han, E., 2022, *What is design thinking and why is it important*, viewed 15 April 2023, from https://online/hbs.edu/blog/post/what-is-design-thinking.

Hartz-Karp, J. & Marinova, D., 2020, 'Using deliberative democracy for better urban decision-making through integrative thinking', *Urban Science* 5(1), 3. https://doi.org/10.3390/urbansci5010003

Huber, M.T., Hutchings, P. & Gale, R., 2005, 'Integrative learning for liberal education', *Peer Review* 7(4), 4–7.

IIRC, n.d., *The IIRC*, viewed 30 March 2023, from https://integratedreporting.org/theiirc-2/.

IIRC, 2020, *Integrated thinking & strategy: State of play report*, viewed 30 March 2023, from https://integratedreporting.org/wp-content/uploads/2020/01/Integrated-Thinking-and-Strategy-State-of-Play-Report_2020.pdf.

IIRC, 2021, *International integrated reporting framework*, viewed 30 March 2023, from https://integratedreporting.org/wp-content/uploads/2021/01/InternationalIntegratedReportingFramework.pdf.

Ison, R., 1999, 'Applying systems thinking to higher education', *Systems Research and Behavioural Science* 16, 107–112. https://doi.org/10.1002/(SICI)1099-1743(199903/04)16:2<107::AID-SRES278>3.0.CO;2-E

Kallio, E., 2011, 'Integrative thinking is the key: An evaluation of current research into the development of adult thinking', *Theory & Psychology* 21(6), 785–801. https://doi.org/10.1177/0959354310388344

Lattemann, C. & Fritz, K., 2014, 'Learning integrative thinking', in M. Searson & M. Ochoa (eds.), *Society for information technology & teacher education international conference*, March 17, 2014, pp. 1850–1857, Association for the Advancement of Computing in Education (AACE), Jacksonville, FL.

Leavy, B., 2011, 'Roger Martin explores three big ideas: Customer capitalism, integrative thinking and design thinking', *Strategy and Leadership* 39(4), 19–26. https://doi.org/10.1108/10878571111147369

Long, C., 2012, 'Teach your students to fail better with design thinking', *Learning & Leading with Technology* 39(5), 16–20.

Martin, R.L., 2007, 'Becoming an integrative thinker', *Rotman Magazine*, Fall 2007, pp. 4–9.

Martin, R.L., 2009, *The opposable mind: How successful leaders win through integrative thinking*, Harvard Business Press, Boston, MA.

Martin, R.L. & Austen, H., 1999, 'The art of integrative thinking', *Rotman Management*, Fall 1999, pp. 2–5.

Maroun, W., Ecim, D. & Cerbone, D., 2022, 'Refining integrated thinking', *Sustainability Accounting, Management and Policy Journal* 14(7), 1–25. https://doi.org/10.1108/SAMPJ-07-2021-0268

Marx, B., Mohammadali-Haji A. & Lansdell, P., 2020, 'University accounting programmes and the development of Industry 4.0 soft skills', *Journal of Economic and Financial Sciences* 13(1), 1–17. https://doi.org/10.4102/jef.v13i1.470

Matthews, J. & Wrigley, C., 2017, 'Design and design thinking in business and management higher education', *Journal of Learning Design* 10(1), 41–54. https://doi.org/10.5204/jld.v9i3.294

McGuigan, N., Haustein, E., Kern, T. & Lorson, P., 2020, 'Thinking through the integration of corporate reporting: Exploring the interplay between integrative and integrated thinking', *Meditari Accountancy Research* 29(4), 775–804. https://doi.org/10.1108/MEDAR-04-2020-0872

McGuigan, N. & Kern, T., 2016, 'Creactive accounting education: Visioning future-oriented accounting programs through a reflective unlearning of current practice', *Journal of University Teaching and Learning Practice* 13(2), 1–23. https://doi.org/10.53761/1.13.2.8

Miller, A., 1978, 'Conceptual systems theory: A critical review', *Genetic Psychology Monographs* 97(1), 77–126.

Miller, A., 1981, 'Integrative thinking as a goal of environmental education', *Journal of Environmental Education* 12(4), 3–8. https://doi.org/10.1080/00958964.1981.9942635

Monat, J.P. & Gannon, T.F., 2015, 'What is systems thinking? A review of selected literature plus recommendations', *American Journal of Systems Science* 2015(1), 11–26.

O'Keefe, P.A., Horberg, E.J., Sabherwal, A., Ibasco, G.C. & Binti Zainal, A., 2021, 'Thinking beyond boundaries: A growth theory of interest enhances integrative thinking that bridges the arts and sciences', *Organizational Behavior and Human Decision Processes* 162, 95–108. https://doi.org/10.1016/j.obhdp.2020.10.007

Oliver, J., Vesty, G. & Brooks, A., 2016, 'Conceptualising integrated thinking in practice', *Managerial Auditing Journal* 31(2), 228–248. https://doi.org/10.1108/MAJ-10-2015-1253

Ortega, P.E., Lagoudas, M.Z. & Froyd, J.E., 2017, 'Overview and comparison of assessment tools for integrative thinking', in *ASEE Annual conference and exposition, conference proceedings*, Columbus, Ohio, June 24, 2017.

Patel, S. & Khanjan, M., 2017, 'Systems, design, and entrepreneurial thinking: Comparative frameworks', *Systemic Practice and Action Research* 30(5), 515–533. https://doi.org/10.1007/s11213-016-9404-5

Paul, R., 1992, 'Critical thinking: What, why, and how', *New directions for community colleges*, 77(2), 3–24.

Pourdehnad, J., Wexler, E.R. & Wilson, D., 2011, 'Integrating systems thinking and design thinking', *The Systems Thinker* 22(9), 2–6.

Richmond, B., 1994, 'System dynamics/systems thinking: Let's just get on with it', *System Dynamics Review* 10(2–3), 135–157. https://doi.org/10.1002/sdr.4260100204

SAICA, 2015, *Integrated thinking: An exploratory survey*, viewed 02 April 2023, from https://www.saica.co.za/portals/0/technical/sustainability/saicaintegratedthinkinglandscape.pdf.

SAICA, 2021a, *CA(SA) Competency framework: Guidance on the content, development and assessment of competencies in the academic programme*, viewed 02 April 2023, from https://www.saica.org.za/initiatives/competency-framework/ca2025.

SAICA 2021b, *The exploration and development of the concept of integrated thinking*, viewed 06 November 2023, from https://saicawebprstorage.blob.core.windows.net/uploads/resources/the-concept-of-integrated-thinking.pdf.

Schirmer, B., 2018, 'Framework for conducting and writing a synthetic literature review', *International Journal of Education* 19(1), 94–105. https://doi.org/10.5296/ije.v10i1.12799

Sill, D., 1996, 'Integrative thinking, synthesis and creativity in interdisciplinary studies', *Journal of General Education* 45(2), 129–151.

Syolendra, D.F. & Laksono, E.W., 2019, 'The effect of discovery learning on students' integrated thinking abilities and creative attitudes', *Journal of Physics: Conference Series* 1156(1), 1–5. https://doi.org/10.1088/1742-6596/1156/1/012018

Terblanche, E.A.J., 2018, 'Developing critical thinking in auditing students through technology-based educational interventions: A conceptual framework', PhD thesis, Dept. of Accounting, University of South Africa.

Terblanche, J., 2019, 'Cultivating socially just responsible citizens in relation to university accounting education in South Africa', PhD thesis, Dept. of Accounting, Stellenbosch University.

Wallace, L., 2011, *One more note about integrative thinking*, viewed 03 March 2023, from https://www.theatlantic.com/national/archive/2011/01/one-more-note-aboutintegrative-thinking/70470/.

Wallis, S.E. & Wright, B., 2020, *Synthetic literature reviews: An introduction*, viewed 06 November 2023, from https://www.researchtoaction.org/2020/05/synthetic-literature-reviews/.

Wang, Y. & Ruhe, G., 2007, 'The cognitive process of decision making', *Journal of Cognitive Informatics and Natural Intelligence* 1(2), 73–85. https://doi.org/10.4018/jcini.2007040105

Zhu, P., n.d., 'An integrative mind', *Future of CIO*, viewed 23 June 2023, from http://futureofcio.blogspot.com/2015/02/an-integrative-mind.html.