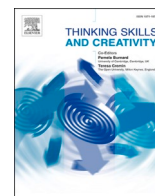


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Thinking Skills and Creativity

journal homepage: www.elsevier.com/locate/tsc

Towards developing a critical learning skills framework for master's students: Evidence from a UK university

Mei Lin^{a,*}, Lana Y J Liu^b, Think Ngoc Pham^c^a School of Education, Communication, and Language Sciences, Newcastle University, Newcastle Upon Tyne, UK^b Newcastle University Business School, Newcastle University, Newcastle Upon Tyne, UK^c Faculty of Sport, Health and Social Sciences, Solent University, Southampton, UK

ARTICLE INFO

Keywords:

Critical learning skills
Master's students
Learning outcomes

ABSTRACT

There are various arguments surrounding critical thinking, from it being an innate ability to its perceived absence due to cultural backgrounds, to diversities in the presentation of critical thinking. Less attention, however, is placed on the cognitive complexity embedded in critical thinking performance, particularly the important role of knowledge understanding and application when becoming a critical thinker. While there are generic statements stipulating learning outcomes and expectations, operationalising them in the curriculum design, learning activities and assessments by students is less transparent. Thus, this study aims to propose and validate a *critical learning skills (CLS) framework* to contextualise expected learning outcomes through a visual roadmap for successful achievement at the master's level. We assume that being a critical thinker entails various critical learning skills, and that critical thinking performance is closely related to knowledge understanding and application. The CLS framework includes four components: information gathering, building understanding, knowledge application and productive thinking. The descriptors of each component were generated after analysing the keywords stated in the learning outcomes in the qualification descriptors at the master's level in the UK context. A questionnaire and confirmatory factor analysis were used to validate the framework with a sample of 132 master's students from two programs at one UK university. The results indicate that the framework is reliable and valid. The potential of using the CLS framework as a guide for future research and postgraduate teaching and learning are discussed. The framework can be applied to master's programs in other contexts.

1. Introduction

Students who travel abroad to study master's programs at UK universities are expected to develop perceived learning skills, from which they can complete the registered programs and develop critical thinking and independent learning abilities successfully. However, the timeframe of master's programs and expected performance of critical thinking and independent learning are challenges to an increasingly diverse student population who require motivation, subject knowledge and academic study skills. Although learning outcomes are expressed at the master's level, how students can achieve them successfully is less contextualised.

The postgraduate sector in the UK has witnessed an expansion in student numbers (McPherson et al., 2017) because obtaining a

* Corresponding author.

E-mail address: Mei.Lin@newcastle.ac.uk (M. Lin).

<https://doi.org/10.1016/j.tsc.2023.101267>

Received 20 September 2022; Received in revised form 27 February 2023; Accepted 1 March 2023

Available online 3 March 2023

1871-1871/© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

master's degree is perceived as vital for better career prospects and improvements in employability skills (Brown, 2014; Donaldson & McNicholas, 2004). Gaining more intellectual benefits is another reason for students to study abroad, as they can engage with cutting-edge ideas and concepts, emerging issues, and critical debates at the forefront of the discipline (Foskett & Foskett, 2006). Most master's programs taught in the UK are provided on a full-time basis of 12 months, to a linguistically and culturally diverse student population. Increased diversity in learning motivation is a fundamental aspect of postgraduate education dynamics. Some students pursue a master's degree to broaden their in-depth disciplinary knowledge, while others with little or no previous knowledge can take a conversion master's program to change their career direction (House, 2010; Sastry, 2004).

1.1. Assumptions about master's students as 'experts' in learning

There is a conventional assumption that master's students are 'experts' in learning, in the sense that they have successfully completed their undergraduate study, during which they have acquired the necessary learning skills and become familiar with a range of learning activities or tasks (Tobbell & O'Donnell, 2013). They have gained experience in organising information and ideas (Elliott et al., 2018), planning and monitoring their learning process (Davies, 2011), or engaging in productive group work (Dytham, 2019).

However, transitioning to postgraduate education is argued to be a much more complex process than what has normally been assumed, entailing a mix of 'confusion, anxiety and self-doubt' (McPherson et al., 2017, p. 47). Master's students, within a relatively short timeframe, are expected to quickly adapt to and become engaged in the activities of critiquing academic research, drawing comparisons and contrasts between theoretical explanations, and demonstrating application skills for solving problems. However, there are ongoing concerns about the mismatch between staff assumptions and master's students' understanding and interpretation of critical analysis, evaluation, or synthesis for solving problems (Bamber et al., 2019). It remains unclear as to what approach students should adopt when asked to engage in critical thinking and deeper learning, or how exactly the notions of critical analysis, evaluation and synthesis should be unpacked, contextualised and applied within the discipline they are pursuing.

As mentioned above, although master's students have gained some experience working with knowledge and information, they are required to display a higher level of connections between various ideas and strands of thought in their field of study (Elliott, Kadi-Hanifi, & Solvason, 2018). This means that master's students need to devote more time and effort to engaging with the academic literature (Evans et al., 2018), from which they could show an increased ability to apply information and make judgments about the evidence they collect, rather than simply regurgitating the information that they have read so far (Fakunle et al., 2016; Hart, 2018). Nevertheless, many institutions do not provide adequate support and guidance for this complex and challenging endeavour because this set of skills is assumed to have been developed and mastered at the undergraduate level (Hubbard & Dunbar, 2017).

Another distinctive feature of master's-level studies is that students, in the process of gaining an in-depth and critical understanding of a subject-specific topic, should be much more independent (Casey et al., 2017; O'Donnell et al., 2009). Therefore, despite previous engagement with a broad array of academic tasks at the undergraduate level, the transitions to new learning environments and learning tasks (e.g. critical thinking-related tasks, multi-cultural group work) might pose challenges for many master's students in the process of building an independent learning habit (Bamford, 2004; Shaheen, 2016). This level of independence, foregrounded throughout any master's program, requires students to construct more metacognitive knowledge and skills on one hand, but becomes challenging for those who got used to a more teacher-directed method of instruction in their previous education on the other hand (Gu, 2011; Young & Schartner, 2014).

Conversion master's students might encounter challenges due to the differences in the nature of disciplinary culture (Macfadyen et al., 2019), requiring great amounts of effort to make cognitive, behavioural and emotional adjustments (Sheriston et al., 2019). With a diverse range of educational and academic experiences, master's students in conversion programs might struggle to find the starting point for putting scientific critique into practice because of a lack of disciplinary knowledge (Turner, 2007).

New knowledge enables students to challenge preconceptions that they have previously held. Regardless of the master's programs, the pursuit of rich learning opportunities stimulates students' enthusiasm and motivation within the cycles of exploration, reflection and consolidation of new knowledge. However, the taken-for-granted assumption that master's students will not take on learning tasks like empty vessels and can easily apply knowledge to different learning contexts may marginalise students' diverse educational and academic backgrounds, practical expertise and learning needs. Therefore, further attention is warranted to the academic support for master's students, from which they will be able to develop and master the understanding of 'learning to learn' – understanding the notion of 'learning' and being an independent learner, as well as understanding the notion of 'knowledge' and being a competent knowledge constructor (Wingate, 2007, p. 394).

1.2. Expected learning outcomes at the master's level

The UK Quality Assurance Agency (QAA) for Higher Education's vision of learning outcomes and expectations, irrespective of discipline, has provided helpful guidelines for curriculum design and development, thereby potentially enhancing the teaching and learning quality at the master's level. However, Holmes (2019) argues that the current operationalisations of learning outcomes have limitations because the benefits and opportunities that the learning outcomes should have delivered are not fully realised and grasped. Some scholars have also raised the possibility of reconceptualising the notion of learning outcomes, embedding more students' perspectives in outlining the learning outcomes, and more importantly, enhancing students' understanding of the benefits of learning outcomes (Brooks et al., 2014; Dobbins et al., 2016). Otherwise, there might be a danger that learning outcomes merely direct students' attention to what they believe has been or has not been instructed by their teachers. In this case, students might fail to take advantage of the learning outcomes to develop their own self-responsibility and independent learning skills.

As suggested, it is pertinent to work towards some kinds of institutional practices, providing increased support for master's students from an early stage of their academic journey to the completion of master's-level studies (Macleod, Barnes, & Huttly, 2019). This is because there is still a tension between the expected learning outcomes and experiences of academic staff and master's students, even though some efforts have been made to meticulously examine the gaps and put forward solutions. For example, the expected learning outcome for an independent learner has been characterised in different modes of communication – induction programs, lectures and seminars, program material, and academic support programs. However, Mckendry and Boyd (2012) contend that the lack of consensus surrounding the conceptualisation of independent learning creates confusion amongst students. It appears clear that more explicit instructional interactions between the teaching staff and students, regarding the notion of being an independent learner, are needed; otherwise, there would be a paradox that students increasingly feel isolated and incompetent (Tobbell et al., 2010). These feelings of being lost, along with a lack of understanding associated with the challenges exacerbated by the multi-dimensional concepts of critical thinking and learning engagement (Eccles, 2016; Larsson, 2017), have created potential sources of mismatch between the expected and actual learning outcomes of master's students.

1.3. Research objectives

Considering the taken-for-granted assumptions about master's students as 'experts' in learning, the potential positives of understanding 'learning to learn', and the dynamic complexity of learning outcomes, a critical question is how educators come to simplify and explicate the expected core learning outcomes and skills at the master's level for easy access and acquisition. In view of the diversity in master's students' backgrounds, experiences and expectations for academic success, this study highlights the importance of creating a more inclusive learning environment where students – regardless of the varied nature of the programs – will be clearer as to what they are expected to develop and achieve within the intensive 12-month learning journeys in the UK.

Thus, the purpose of this study is twofold: (a) to propose a *CLS framework* by explicating the keywords stated in the learning outcomes of the qualification descriptors at the master's level in the UK context (QAA, 2014) and contextualising these learning outcomes in a visual roadmap for academic success; and (b) to validate the CLS framework with a sample of 132 students from two master's programs at a research-intensive UK university: Accounting and Finance (A&F) and Second Language Education (SLE). The two programs were chosen for the validation of the CLS framework based on the diverse composition of students and the different nature of programs. Students in the two programs were diverse in their previous disciplinary, motivational, linguistic and cultural backgrounds. The A&F is a conversion program aimed at graduates from any subject at the undergraduate level who have acquired certain fundamental knowledge and understanding of numeracy. The SLE is a progression program, aimed at graduates of English language, linguistics, language teaching or applicants with two years of teaching English language on a full-time basis.

In the following sections, we will first explain why we chose the term '*critical learning skills*' to describe the CLS framework in detail and justify it with a critique of the relevant literature. We then describe the methodology used and the findings of the framework's validation. Based on the results, we will discuss the potential for using the CLS framework as a guide for teaching and learning practices at the master's level, as well as for future research.

2. The critical learning skills framework

2.1. Why coin the term '*critical learning skills*'?

We chose the term '*critical learning skills*' instead of '*critical thinking skills*' for our framework, based on a critical review of different debates about critical thinking. One dominant trend, dating back to 1990, is that critical thinking is a Western concept (Atkinson, 1997; Egege & Kutieleh, 2004) and therefore, students from non-Anglo-Saxon backgrounds lack critical thinking skills in their academic studies (Huang, 2008; Shaheen, 2016).

However, the negative impact of cultural influence on students' thinking has been challenged by some scholars, evidencing that critical thinking was promoted by Confucian doctrines thousands of years ago in Chinese history (Li & Wegerif, 2014; Li, 2015). Other scholars who focus on the absence of critical thinking of students from different cultural backgrounds argue for different ways to demonstrate critical thinking (Matsuda, 2001) and stress that being different is not deficient (Heng, 2018). What is less clear is how this difference is considered when defining critical thinking and academic assessments. Instead of debating whether critical thinking is an innate ability or cultural effect, some scholars have criticised the educational system for its constraint in developing students' critical thinking (e.g. McGuire 2007).

This view has also been echoed by many students we taught or supervised by their typical statements where they state that they were never taught critical thinking at the undergraduate level; therefore, critical thinking is an abstract or unknown concept to them. Some students misinterpret critical thinking as criticising or oversimplifying it, giving two viewpoints. In terms of practice, students constantly request a demo or exempla as a formula for their assignments, although this will not always lead to successful outcomes because it is written for a specific purpose or argument. A scrutiny of these debates and reflections on our experiences working with master's students in the A&F and SLE programs draws our attention to the essence of learning under this overall critical-thinking debate.

In addition, a short period for the transition to study in a different teaching and learning context is often overlooked amidst the complexity involved in the cognitive process of learning to become critical thinkers. Existing studies reveal that master's students' learning journeys are filled with confusion, often resolved by trial and error (e.g. Fakunle et al. 2016). Therefore, we propose this CLS framework to deconstruct the critical thinking concept and create different transparent learning skills and engagements that require

students to succeed. We present this framework as a visual roadmap and hope that it can ease students' transition to master's study and increase their academic success in grasping the expected requirements of being independent, engaged and critical.

2.2. The 'new' insights offered in the CLS framework

We found that the integrated framework of understanding thinking and learning in post-16 contexts by Moseley et al. (2005) to define the notion of CLS was very useful. Moseley's model consists of three cognitive components: *information-gathering*, *building-up understanding* and *productive thinking*, plus self-regulated and reflective thinking which permeates all activities in these components. We adopted the names of the three components from Moseley et al.'s model but revised and updated their features to constructively align with the master's students' learning outcomes, as defined by the QAA.

Knowledge application is the 'new' component that we found necessary to add to this framework. This allows us to explicitly unpack the relevant sub-skills that master's students need to equip themselves for applying 'extensive or specialist knowledge of literature and scholarship' (Wong et al., 2021, p.9). Therefore, our proposed CLS framework comprises of four components: *information gathering (IG)*, *building understanding (BU)*, *knowledge application (KA)* and *productive thinking (PT)*.

In the following discussion of this framework, we critique the hierarchical boundaries between lower- and higher-order thinking skills to illustrate the overlapping of lower- and higher-order thinking at the remembering, understanding and application stages. We argue that students' deficient performance in these stages will have a direct impact on successful achievement in learning. This might not have been given proper emphasis in developing master's students' critical thinking performance, when considering the master's-level learning context with a culturally and academically diverse student population. We also highlight the importance of thinking about learners' history at the master's level, as part of discussing the potential of the CLS framework.

Moseley et al.'s (2005) integrated model for understanding thinking and learning is closely associated with the features in Bloom's (1956) taxonomy of educational objectives in the cognitive domain (Higgins, 2014; Robson and Moseley, 2005). Bloom's taxonomy (Bloom, 1956) and the revised Bloom's Taxonomy (Anderson et al., 2001) have been acknowledged as useful frameworks for developing learning outcomes (Fiegel, 2013; Schoepp, 2019) and designing meaningful learning activities (Nkhoma et al., 2017). The hierarchy of cognitive functions ranges from lower- to higher-order thinking skills. The former includes *knowledge*, *understanding* and *application* as lower-order thinking skills, and *analysis*, *synthesis* and *evaluation* as higher-order thinking. The latter, built on the changes of the category names from nouns to verbs, includes *remembering*, *understanding* and *applying* lower-order thinking, as well as *analysing*, *evaluating* and *creating* higher-order thinking.

However, the differences between lower- and higher-order thinking have been contested (Virranmäki et al., 2021). According to Maude and Caldis (2019), lower-order thinking is characterised as a process in which students reproduce and apply knowledge, whereas higher-order thinking refers to an increase in complexity and cognitive demand, in which students take the initiative to process knowledge constructively and formulate thoughtful responses. DeWitt et al. (2013), on the other hand, categorises *applying* as part of higher-order thinking, as students who engaging with learning tasks at the application level are motivated to develop and practise deductive thinking (Fu et al., 2009).

If the differences in learners' history are taken into consideration, a learning task or situation that requires the performance of higher-order thinking by one student may require only lower-order thinking by another (Lewis & Smith, 1993). Within the master's-level learning context with a culturally and academically diverse student population, the learners' history (e.g. prior subject knowledge, teaching and learning styles) means that master's students, despite taking the same module or using the same materials, would approach the tasks differently. Those having acquired previous disciplinary knowledge might experience a lower level of intrinsic cognitive load than those with no or limited prior discipline-related understanding (Park et al., 2015).

For instance, regarding *remembering*, some students might proceed quickly to *recall* knowledge, whereas others might struggle at the stage of *recognising* knowledge. Although *recalling* potentially demands more cognitive effort than *recognising* (Anderson et al., 2001), the efforts that students without much prior subject knowledge have retained to *recognise* knowledge and move gradually to the stage of *recalling* knowledge could add value to their learning experiences in the UK. In other words, despite having the lowest level of thinking, the mastery of *recalling* and *recognising* would be potentially and equally considered as the practice of higher-order thinking for a particular group of master's students.

Regarding *understanding*, this category of cognitive thinking includes *interpreting*, *exemplifying*, *classifying*, *summarising*, *inferring*, *comparing* and *explaining* (Anderson et al., 2001). For example, a learning task that asks students to *interpret* will focus on how students can convert one form of information into another. At the master's level, this learning task can be alternatively designed by asking students to paraphrase while engaging with source-based academic reading and writing. This means that students need to 'reconceptualise the source text coherently with [their] own authorial intentions' (Shi et al., 2018, p. 32). However, Mori (2018) argues that students, by doing so, show signs of inferential thinking and recreation, rather than merely retelling and descriptively writing about what other scholars have found in the existing literature. In addition, in the process of paraphrasing, students need to demonstrate their profound understanding of whether the piece of information they intend to paraphrase is taken from an original or particular source that has already been paraphrased by other researchers. The process of paraphrasing should not be interpreted interchangeably as the process of summarising, as the former shows that students can interpret it, whereas the latter entails no interpretation (Davies, 2011; Neville, 2016). Paraphrasing, therefore, ensures that students not only develop a sufficient level of understanding on how to approach and handle a wide range of potentially relevant sources, but also empowers what they are paraphrasing with higher levels of reliability and validity. In this sense, *understanding* (*interpreting* or *paraphrasing* as a sub-category of *understanding*) constitutes students' efforts to demonstrate proof of critical thinking and adapt to the discourse community of their discipline. Therefore, if *understanding* is still categorised as another level of lower-order thinking, this, similar to the above discussion of *remembering*, does not seem to include all

students' varying intellectual and adaptation efforts for student diversity at the master's level.

The *applying* category includes two cognitive processes: *executing* and *implementing*, based on the level of familiarity with the learning task (Anderson et al., 2001). *Executing* involves the process of handling a familiar learning task with a fixed sequence of steps that students have already been aware of, while *implementing* requires students to fulfil an unfamiliar learning task to develop a profound level of understanding regarding the problem type and consider some possible approaches. Due to the lower level of familiarity, the latter might be more challenging and complex, as students need to contextualise the problem and reach a more comprehensive understanding of it for their successful application (Geertsen, 2003). This might potentially explain why *implementing* is perceived to overlap with the other two cognitive process categories, including *understanding* and *creating* (Anderson et al., 2001). However, even if students are asked to engage in a familiar learning task, this does not necessarily mean that all students will be able to complete the task without any difficulty, and their thinking development will be underestimated. This is because, for any learning opportunity to apply knowledge and skills, there would be some progress towards students' critical thinking development (Carey & McCardle, 2011).

2.3. Four components of the CLS framework

Drawing on the aforementioned ambiguity between higher and lower levels of thinking, we review the relevant literature as a basis for justifying and describing our proposed CLS framework in detail, with the aim of embracing all students' efforts and achievements in every aspect of their learning process.

2.3.1. Information gathering (IG)

IG is a key component that cannot be neglected in the CLS framework. It draws on the basis that master's students need to be immersed in 'their academic discipline, field of study or area of professional practice' (QAA, 2014, p.28). The idea of independent learning has been deeply embedded in the master's teaching-learning context, encouraging as well as requiring students to shift from passive recipients of knowledge to active information seekers and knowledge constructors. Apart from traditional educational materials, such as textbooks and PowerPoint slides provided by module leaders or academic tutors, students need to move beyond this starting point to develop the ability to discover the diversity of scholarly works in the field. To gain further insights into subject knowledge, wide reading should be embedded as a habit of learning, but master's students might simultaneously be inundated by a flood of information. This raises the level of effort that they should put into the process of information gathering, including differentiating primary and secondary sources, checking the relevance and reliability of information and connecting current knowledge with prior knowledge (Fig. 1).

Primary sources include empirical research or the first publication of seminal works, while literature review articles and conceptual papers are categorised as secondary sources. Interestingly, although primary sources are preferred by lecturers as ways in which students are trained to develop scientific thinking skills (Hubbard & Dunbar, 2017; Lie et al., 2016), many master's students find it difficult to gain thorough understanding (Davies, 2011). The premise is that the primary sources are grounded in the unique nature of scientific texts whereby master's students navigate academic content, discipline-specific jargon and formality in academic writing – all placed at a high scientific level (Lie et al., 2016; Snow, 2010). In this case, master's students can alternatively approach the secondary sources before returning to those primary sources, as some key findings and ideas have already been descriptively summarised and critically discussed in the secondary sources. However, the information presented in the secondary sources cannot be considered interchangeably with that of primary sources (Goodwin & McCarthy, 2020); thus, master's students should prioritise the primary sources, rather than merely relying on the interpretation and summary of information in the secondary sources (Roberts & Hyatt, 2019). As there is a lack of understanding and ability amongst students in other contexts (e.g. the USA) regarding how to distinguish between primary and secondary sources (Perry, 2017), it is essential for master's students at UK universities to gain a high level of competence in drawing rigid distinctions between these sources – an integral part of developing themselves as serious researchers (Joyner et al., 2018; Roberts & Hyatt, 2019).

The habit of reading literature extensively is incompatible with desired performance in IG and critical reading and writing, unless

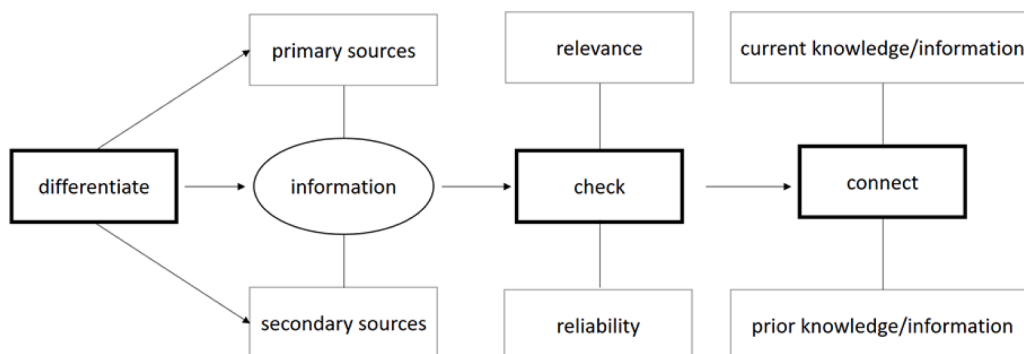


Fig. 1. Descriptors of the information gathering component.

master’s students familiarise themselves by checking the relevance and reliability of information (Evans et al., 2018; Wallace & Wray, 2016). With the support of Google Scholar search engine, university library databases, and myriad websites, master’s students find it easy to gain instant access to a large amount of academic and non-academic resources from which they nurture their conscious awareness of doing more reading. However, this process does not guarantee success in finding relevant results, causing increased negative feelings amongst master’s students (Haley & Clough, 2017). To avoid drowning in a sea of irrelevant information, it is imperative that master’s students develop a repertoire of reading strategies, whereupon they can determine the relevance of the literature from an extensive amount of knowledge and information that they have found (Grove & Gray, 2018; Wallace & Wray, 2016). Regarding the reliability of information, Whitehead and Maude (2016) warn that some potential biases might exist in the way that primary sources of literature are reviewed and covered in secondary sources of literature, stemming from a lack of rigour in the process of gathering information and reviewing literature. This, together with the amount of available literature in our internet age, requires master’s students to advance their understanding about the conditions of categorising the sources of information, for example, ‘very reliable’, ‘fairly reliable’, and ‘unreliable’, as suggested by Wallace and Wray (2016, p. 26).

Previous learning and working experiences are distinctive features of master’s students, simultaneously presenting several possibilities and conundrums that need to be clarified in the IG process. There is an intertwined relationship between prior knowledge and information about the search topic and the positive outcomes of search results, highlighting an effective IG process with high levels of evaluation and selection based on prior knowledge and information (Monchaux et al., 2015; Casey et al., 2017). As argued by Wallace and Wray (2016), the steps towards enhancing the understanding of literature are complicated by impacts of prior knowledge and information, creating some biases and dilemmas. Therefore, making connections between prior and current knowledge and information during the IG process actively privileges their decisions on selecting and evaluating literature sources.

2.3.2. Building understanding (BU)

BU entails an assemblage of master’s students’ abilities to display ‘a systematic understanding’ of the discipline-related knowledge, ‘a critical awareness’ of contemporary problems in their field of study, and ‘a comprehensive understanding of techniques’ for carrying out their own research or creating new knowledge (QAA, 2014, p.28). Developing profound understanding is a marked difference between undergraduate and postgraduate studies (Evans et al., 2018), requiring master’s students to sustain greater efforts to construct a deeper understanding of knowledge. This process can be integrated with several thinking moves, such as considering different viewpoints, linking different sources of information, and unpacking the complexity of knowledge (Ritchhart et al., 2011). It is of utmost necessity for master’s students to delve deeper into this BU process because being proficient in BU leads to their success in different forms of assessments that they will undertake, including oral presentations, exams, written assignments, and dissertations. The key descriptors of BU components are shown in Fig. 2.

Learning at the master’s level is associated with the acquisition of concepts and theories that are covered in different modules. Acquiring a sophisticated understanding of concepts and theories is an essential prerequisite for master’s students’ engagement in the production and dissemination of scholarly knowledge in their field of study. For instance, gaining a thorough understanding of research methodology has a positive impact on meeting the standards of quality research projects; however, a lack of understanding is attributed to the struggle in becoming a successful researcher (Daniel et al., 2018). For Wallace and Wray (2016), master’s students, irrespective of whether they are readers or writers, all identify the importance of articulating concepts or theories clearly and precisely. To do so, they should attempt to explain what authors mean using their own words to grasp an understanding of concepts and theories. This not only marks their sufficient understanding of the core concepts or theories related to their reading material and written work, but also enables them to discover the material more profoundly and apply the key concepts consistently throughout the written work. Noticeably, there is more than one way to define a concept, impacting the practice of selecting the most adequate definition for their work. For example, master’s students are confronted by the concept of criticality; therefore, they seek explicit definitions of what criticality means in terms of assessment from their tutors (Evans et al., 2018). Crucial insights from Wallace and Wray (2016) state that the possible definitions for one specific concept can be combined to capture the similarities and differences in how scholars and master’s students define the concept.

Efforts to construct an understanding also includes the ability to synthesise diverse sources of literature, unpack arguments

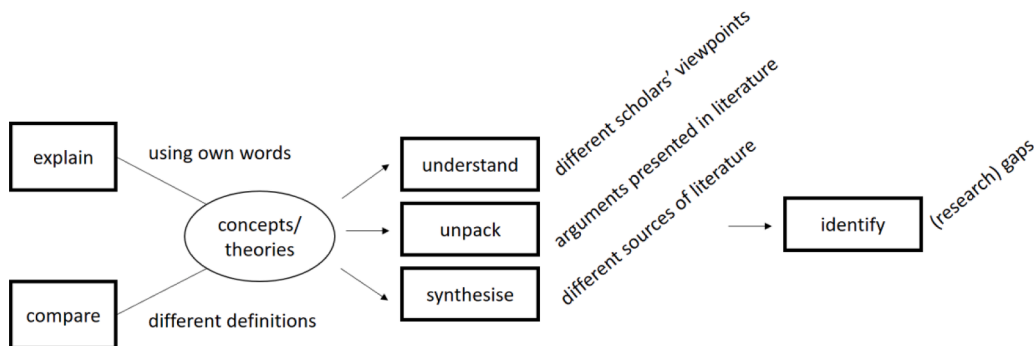


Fig. 2. Descriptors of the building understanding component.

presented in the literature and understand different scholars' viewpoints. Master's programs embrace a wide range of activities and academic requirements for synthesising multiple sources of literature, empowering students to generalise what has been explored in the existing literature, engage in understanding previous empirical and seminal works and generate new knowledge (Baron et al., 2017). In other words, master's students insist that difficulty in conducting literature synthesis precludes their confidence and academic writing (Al-Harbi & Troudi, 2020; Bamber et al., 2019; Davies, 2011). One means of digging deeper below the surface of the reading material is to unpack what the authors have explicitly argued in their works, particularly in the sense that arguments do not fulfil only one sole purpose (Sinnott-Armstrong & Fogelin, 2014); that is, justification and explanation, the two primary purposes of deploying arguments, both offer reasons, but there are dichotomies in the way that the reasons are provided. For writers, the former aims to state reasons to provide rational justifications for a disputed claim, whereas the latter is useful for answering why conclusions are established as true (Sinnott-Armstrong & Fogelin, 2014). Furthermore, Davies (2011) warns that the premises and positions for an argument are not necessarily set out clearly; however, putting forward explicit arguments is vital for progressing towards being critical. Given the complexity and importance of arguments, master's students need to practice unpacking arguments to fully understand how scholars persuade their audience readers, from which they gain insights into developing their own arguments in the writing process (Wallace & Wray, 2016). Alongside the gradual mastery of synthesising literature and unpacking arguments, mastering students' understanding of how to present different viewpoints is also powerfully reinforced.

Another critical step that should be taken as part of constructing an understanding is to uncover the gaps, flaws, and limitations presented in the reading material and gathered information. A hallmark of master's-level education is the development and use of research outcomes (Bamber et al., 2019; Daniel et al., 2018); rigorously identifying research gaps is central to conducting a literature review (Robinson et al., 2011) and empirically investigating one specific topic (Wallace & Wray, 2016). Without having an intense awareness of what has not been explored, what has been inappropriately designed and what has potentially influenced the applicability of the current research findings, it appears challenging for master's students to clearly justify the rationale for the proposed research, fill the gaps, formulate new knowledge and extend previous results (Davies, 2011; Ridley, 2012).

2.3.3. Knowledge application (KA)

The KA component is manifested in relation to the expected 'originality in the application of knowledge' (QAA, 2014, p.28), applying existing knowledge to offer fresh insights into a particular subject matter (Clarke & Lunt, 2014). Amongst the various skills required for the success of employees in the workplace, the ability to apply theoretical and conceptual knowledge to real-world settings (e.g. business) is an underlying attribute amongst fresh graduates that is highly valued by their employers (Andrews & Higson, 2008). Knowledge empowers students in both academic and workplace settings, but cannot be fully digested and exploited without students' initiatives to move beyond what they had been instructed in the taught sessions, by improving their understanding of new situations (Hockings et al., 2018) and reflectively judging their attempts to apply knowledge (Dwyer et al., 2014). The key descriptors of the BU components are shown in Fig. 3.

Master's programs offer several opportunities for students to apply their accumulation of knowledge and skills, ranging from problem-based learning activities in the taught modules (Caswell, 2017; Heaviside et al., 2018) to different forms of the dissertation in the research stage (Bamber et al., 2019). Similar to the vast array of literature that students need to check and synthesise in the IG and BU processes, it is not surprising that there is sometimes more than one possible idea, concept or method that can be applied to one specific real-world scenario, requiring students to be selective regarding which ideas, concepts or methods they are to include in the KA process. To exemplify, we examine master's students using a language-teaching module with teaching practice work collaboratively towards a problem-solving activity; they were asked to deal with lesson design or to solve critical issues in language policy (Caswell, 2017). Both bottom-up and top-down instructional approaches are useful for the design of vocabulary instruction, but the former leads to better learning gains amongst a particular group of learners (i.e. Chinese university students) (Moskovsky et al., 2015). In this

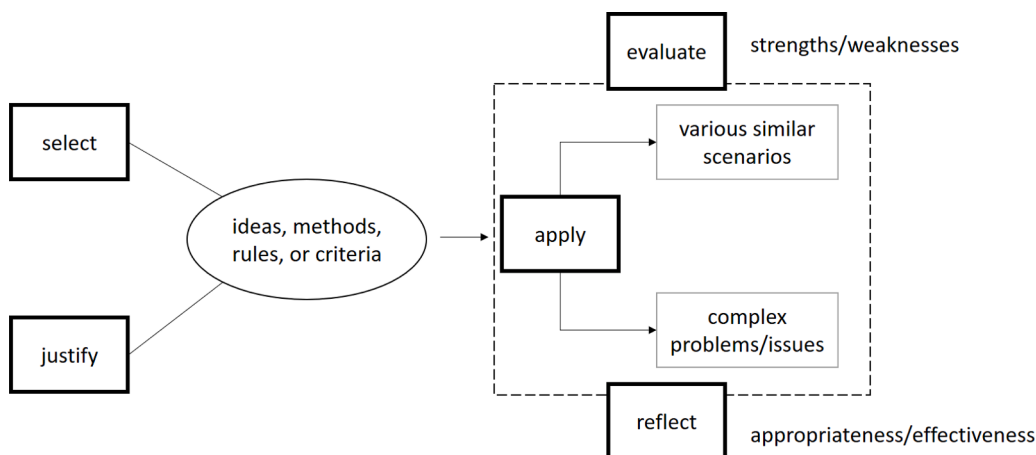


Fig. 3. Descriptors of the knowledge application component.

respect, master’s students would be able to justify cogently why they plan to use a selected instructional approach by considering relevant factors in the given activity, such as learners’ English language proficiency and vocabulary complexity, while making their selection.

Master’s students apply their repertoire of knowledge and skills to both similar scenarios and complex issues or problems; regardless of whether they apply the latter or former, they can practise evaluating its strengths and weaknesses and reflect upon the appropriateness and effectiveness of their own application. Knowledge transfer occurs when students apply what they have acquired to a different context. For example, to become critical readers, students are instructed to only feel convinced of what the authors conclude in their works if it is ‘adequately backed by the warranting provided’ (Wallace & Wray, 2016, p.45). Similar quality standards should be applied to students’ writing to demonstrate their level of critical writing. However, without developing their habits of evaluating and reflecting on how well they have applied those standards in their writing, they cannot completely put the theories into practice. In the problem-solving process, the long-term goal is to surmount hurdles and propose feasible solutions to tackle these issues (Dwyer, 2017). In addition to reaching that important endpoint, there is a need for students to evaluate whether their knowledge and skills are sufficient or whether they should be broadened to apply and achieve the ultimate goal. This is somewhat consistent with what Butterworth and Thwaites (2013) describe as reflective thinkers – those who not only focus on solving the problem, making the decision or offering a powerful argument, but also evaluating the strengths and weaknesses of the reasoning process. By doing so, masters students tend to gain more experience to ensure a better KA process in the future.

2.3.4. Productive thinking (PT)

In CLS, the PT component embraces learning outcomes that align with master’s students’ desired abilities to ‘evaluate critically current research and advanced scholarship’, ‘evaluate methodologies and develop critiques of them’, ‘make sound judgements’, ‘propose new hypotheses’ and ‘develop new skills’ (QAA, 2014, p.28). These abilities are commonly framed under the auspices of critical or higher-order thinking, which encompass the core abilities of developing divergent thinking, making logical analysis and evaluation, and drawing inferences during the processes of constructing arguments, solving problems or reaching conclusions (Dwyer et al., 2014; Paul & Elder, 2020). The key descriptors of the PT component are shown in Fig. 4.

Developing the ability to question and evaluate the evidence reported and used in existing literature is crucial in the PT process. Individuals differ from each other regarding the knowledge that they have acquired and experiences accumulated, and the way they question the value of scholarly work can vary. They need to ask themselves whether the grounds provided by the authors are sufficient for claim acceptance (Wallace & Wray, 2016). Similarly, while articulating the complexity of evidence, Swatridge (2014) stresses that it is not always easy to recognise such evidence, and even if it is already found, drawing inferences from it may still be under debate. These insights are helpful in highlighting the necessity of questioning and evaluating how the evidence is corroborated in previous research, as this encourages master’s students to actively engage in making further enquiries into the literature that they are getting immersed in.

New knowledge gains are closely linked with the habit of asking questions (Swatridge, 2014), but *Bowell and Kingsbury (2015)* argue that students seem to often be portrayed as an audience for the arguments offered to them. Accordingly, when taking one step closer to actively developing and generating their own innovative ideas, master’s students should be encouraged to step out of their comfort zone and voice scepticism towards any arguments if they think there is still space for interrogation, even if the arguments are supported or presented by influential scholars. Moreover, presenting arguments clearly is fundamental to becoming critical writers, and students – despite having the awareness of making enquiries – cannot fulfil that criterion unless they fully understand the process of advancing convincing arguments. Swatridge (2014), for instance, notes that this process entails the ability to make claims and conclusions, reason, infer and avoid vagueness and ambiguity. Unsurprisingly, some international master’s students struggle to construct logical and coherent arguments, which is related to the difficulties of writing arguments in English and grasping the complexity of formulating them (Al-Harbi & Troudi, 2020).

It is worth noting that despite its relevance to problem solving, decision making still has distinctive features in how students think productively. As argued by *Lau (2015)*, there is an opinion that a good decision is the one that happens to produce a positive outcome; however, students – without making every effort to maintain the quality of the decision-making process – probably arrive at unwise

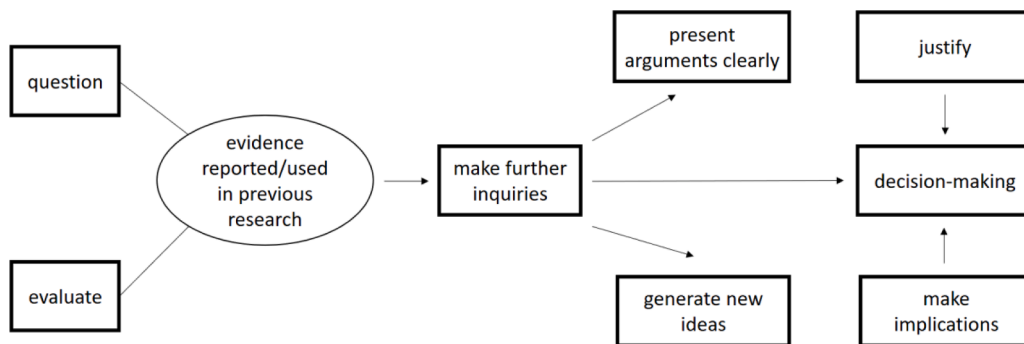


Fig. 4. Descriptors of productive thinking component.

decisions or even make the same mistakes as in the past (Russo & Schoemaker, 1990). Noticeably, the decisions made by master’s students in reading material, writing assignments, working independently/collaboratively in learning activities and doing research should not be intuitive, but rather well-informed and evidence-based. To do so, they need to provide logical explanations to support the course of action that they have followed in the entire decision-making process. In addition, students should determine how effective their decisions look by pondering the implications, a critical step that expects students to ensure a level of accuracy and objectivity while navigating towards the positive and negative outcomes of the decisions, while considering any factors that possibly affect the outcomes, re-evaluating the decisions, and making the necessary changes (Heard et al., 2020).

From the above discussions, the full descriptors for each component of the CLS is depicted in Fig. 5

3. Methodology for validating the CLS framework

3.1. Research design and participants

To validate the CLS framework, a questionnaire was administered to master’s students in two programs at a UK research-intensive university: A&F and SLE. A total of 132 full-time master’s students (80 A&F and 52 SLE) completed the questionnaires. Of the 80 A&F students, there were five British (6.25%), six European (7.5%), and 69 international (86.25%) students, while there were one European (1.92%) and 51 international (98.08%) students from the SLE program. They had been in the UK for approximately three months and their participation in this research was voluntary.

3.2. Data collection and analysis

The questionnaire included 23 items representing each descriptor/learning outcome of the CLS framework (Fig. 5): four items on IG (IG1 – IG 4), six on BU (BU1 – BU6), six on KA (KA1 – KA6), and seven on PT (PT1 – PT7). Participants’ answers to the items were rated on a four-point Likert-type scale ranging from 1 (*almost never or never*) to 4 (*all the time and nearly all the time*). Prior to distributing the questionnaire, we asked for feedback from a group of master’s students from the previous academic year to ensure that the content of each descriptor was clear.

A confirmatory factor analysis was conducted to validate the four-construct CLS framework. The four-construct model fit was evaluated globally using the Minimum Discrepancy per degree of freedom (CMIN/DF), Incremental Fit Index (IFI), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). After the model fit was evaluated, the construct reliability (CR) and average variance extracted (AVE) were calculated.

3.3. Results

3.3.1. Confirmatory factor analysis

Compared with the accepted and observed values of the fit indices (CMIN/DF \leq 3.0, IFI \geq .90, TLI \geq .90, CFI \geq .90, and RMSEA \leq .80) (Hair et al., 2013), the overall model fit indices showed that the goodness-of-fit measures were within the acceptable range (χ^2

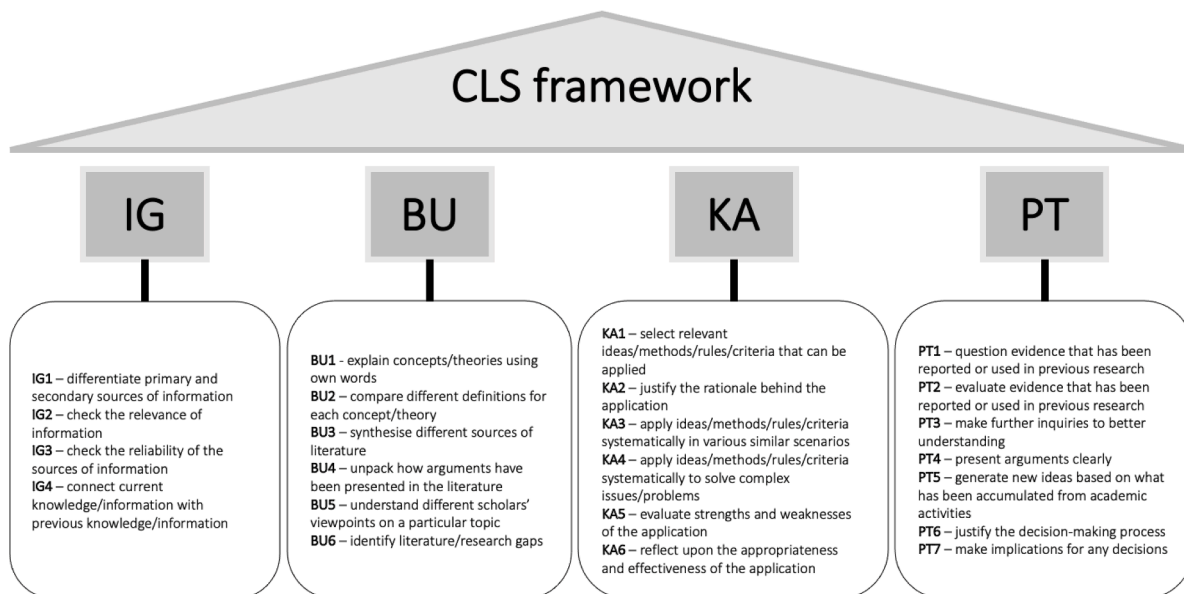


Fig. 5. Full descriptors of the CLS framework.

(224) = 364.195, $p < .001$, CMIN/DF = 1.626, IFI = .918, TLI = .905, CFI = .916, and RMSEA = .069).

Regarding the convergent validity of the scale (Table 1), all CR values surpassed the acceptable level .70 (Raykov, 1997), such as IG (CR = .887), BU (CR = .811), KA (CR = .815) and PT (CR = .835). In addition, three constructs had their estimates of AVE as being higher than the suggested threshold .50 (Nunnally & Bernstein, 1994): BU (AVE = .512), KA (AVE = .540) and PT (AVE = .525). The estimate for AVE of IG is below the threshold .50 (AVE = .487), but as supported by Lam (2012), as long as the CR value of IG (CR = .887) is well above the recommended level of .70, its reliability can be accepted. Given that AVE is more conservative in terms of how the validity is estimated, 'on the basis of p_n (composite reliability) alone, the research may conclude that the convergent of the construct is adequate, even though more than 50% of the variance is due to error' (Fornell & Larcker, 1981, p.46).

Discriminant validity focuses on whether the correlations between items measuring different constructs are relatively low. Correlations of more than .80 imply an overlap between the constructs and poor discriminant validity (Brown, 2015). The results show that the highest correlation was .789, thereby satisfying the conditions of discriminant validity (Table 2). Internal consistency reliability was tested using Cronbach's alpha coefficients (α) for the four constructs. IG ($\alpha = .787$) was greater than .70, indicating acceptable internal consistency, whilst BU ($\alpha = .861$), KA ($\alpha = .875$), and PT ($\alpha = .883$) were all greater than .80 (Table 2), showing good internal consistency (Blunch, 2012). These results reveal that the four constructs of the CLS framework are reliable and valid.

4. Discussions

Master's students' academic development, irrespective of discipline, is substantially permeated by a deluge of learning opportunities created through an intensive year in the UK, from which holders of a master's degree are expected to be well equipped with a prescribed set of learning outcomes. Consequently, master's students would be ready to either continue their studies (e.g. postgraduate research) with both subject-specific and research skills or enter the job market with employability skills. However, as 'postgraduates are a diverse group, with different levels of ability regarding academic practices, and varying degrees of familiarity with the skills necessary for success at postgraduate level in higher education' (O'Donnell et al., 2009, p. 34), the teaching and learning approaches at the master's level in the UK context must be innovated with explicitly defined sequences of outcomes. Otherwise, master's students and even teaching staff at UK universities will have been placed under pressure to fulfil academic expectations (Bamber et al., 2019; Bird, 2017; Zhou & Todman, 2008). In this study, we have argued that any master's student's intellectual and adaptation efforts when they engage themselves in any learning task should be valued equally. Therefore, our CLS framework (including IG, BU, KA and PT) is our suggestion to shift away from the unclear and arguable boundaries between lower- and higher-order thinking levels.

Empirically, the validation of the CLS framework provides a visual roadmap, potentially contributing to master's students' smoother transition and successful adjustment to academic expectations at UK universities (McClure, 2007). For instance, if master's students are aware of the specific sub-skills of searching and gathering information at an early stage of their studies, this enables them to distinguish primary and secondary sources of information, as well as devote sustained efforts to the reliability and relevance of information, rather than being puzzled about identifying the relevant types of information, search engines and academic databases during the dissertation stage (Chen et al., 2016; Oliver, 2012). This is a crucial step towards developing a comprehensive understanding of what has been found in existing literature and writing effective literature reviews. Students, upon mastering the sub-skills covered in the IG component, might familiarise themselves with the process of conducting systematic and comprehensive literature

Table 1

Loadings, composite reliability, and average extracted variance of the four-construct CLS framework ($N = 132$).

Constructs	Items	Loadings	CR	AVE
IG	IG1	.716	.887	.487
	IG2	.647		
	IG3	.786		
	IG4	.633		
BU	BU1	.643	.811	.512
	BU2	.667		
	BU3	.726		
	BU4	.763		
	BU5	.756		
	BU6	.731		
KA	KA1	.756	.815	.540
	KA2	.753		
	KA3	.714		
	KA4	.666		
	KA5	.757		
	KA6	.757		
PT	PT1	.693	.835	.525
	PT2	.625		
	PT3	.737		
	PT4	.654		
	PT5	.750		
	PT6	.808		
	PT7	.784		

Table 2
Cronbach's α and correlations of the four-construct CLS framework ($N = 132$).

Construct	Cronbach's α	IG	BU	KA	PT
IG	.787	1			
BU	.861	.699***	1		
KA	.875	.607***	.776***	1	
PT	.883	.670***	.789***	.751***	1

*** $p < .001$.

searches (Moule & Hek, 2011) and minimise any potential hidden biases when searching (Jesson & Lacey, 2006).

More noticeably, some of the key concepts related to learning outcomes at the master's level are multifaceted and broad, such as critical thinking (Huang, 2008; Larsson, 2017), independent learning (Mckendry & Boyd, 2012) and engagement (Eccles, 2016), possibly causing confusion amongst teaching staff and master's students. In this CLS framework, these three concepts are unpacked and explicated under the auspices of the IG, BU, KA and PT. Therefore, master's students can familiarise themselves with being critical, independent and engaged in each component of the CLS, thereby gaining the desired graduate attributes and employability skills. For example, in terms of PT, when students get involved in the process of questioning the evidence presented in any source of scholarly literature that they have read, there would be space for them to develop their critical thinking (Coughlan et al., 2007), independent learning (Parkin, 2021) and sense of engagement (Manarin et al., 2015).

This CLS framework can also potentially be used as a guiding framework for examining the mediating role of KA in master's students' CLS development or academic transition. In the integrated framework of understanding and learning in post-16 contexts (Moseley et al., 2005), IG, BU and PT, despite being designed in a left-to-right order, do not necessarily reflect the level of rigidity concerning their boundaries, since there can be a straightforward movement from IG to PT, as well as the transmutation between IG and BU. Students, once they exhaustively identify task-relevant information, could move towards the practice of planning what they should do subsequently, solving problems, considering alternatives and creating something new (Robson & Moseley, 2005). Cognitively, even after students effectively acquire information from diverse sources and start building a comprehensive understanding, it is still possible to return to the starting position if there is a need to gather more information (Moseley et al., 2005).

Compared with our CLS framework, even though master's students are likely to progress in their learning by initially engaging themselves in gathering essential information, consolidating their understanding and applying knowledge in various scenarios, and ultimately practising higher-order thinking skills (e.g. problem-solving, creating thinking), the four components (IG, BU, KA and PT) do not necessarily progress in a linear fashion. This means that their mastery of the first three components is likely to result in better task performance requiring PT; in other words, greater IG, BU and KA are associated with better PT. At the heart of some scholarly suggestions on the role of KA, which remains unknown in the existing literature on master's-level education, the KA construct potentially appears distinctively defined in masters students' academic and perhaps professional success. However, KA cannot be developed without positive learning gains in IG and BU. For example, echoing the need to avoid simple knowledge retention and upgrade critical reading and writing skills, Abbott (2019) posits the importance of both broadening understanding and actively engaging in the application of research skills. In other words, better IG and BU would be associated with better KA. In other words, KA can mediate the effects of IG and BU on PT. The use of the CLS descriptor to examine the mediating role of KA could provide further pedagogical insights about designing learning activities, clarify the learning outcomes that embody KA opportunities and support the learning moves from IG to PT and from BU to PT.

5. Concluding thoughts

In this study, we argue that the transition into master's programmes in the UK involves a much more complex and multifaceted cognitive and metacognitive learning process than commonly expected by both students and academic staff. To support the current diverse landscape existing at the UK master's level – particularly disseminating the simplified learning outcomes amongst both students and academic staff – we engage with relevant literature to explicate the keywords in qualification descriptors for the holders of the master's degree (QAA, 2014) to propose a CLS framework that includes four components: IG, BU, KA and PT. With a visual presentation of detailed elements and procedures, the CLS framework specifies what master's students are supposed to demonstrate in their learning process, such as gathering information effectively, building a comprehensive understanding of knowledge, applying knowledge into practice critically, and thinking productively with transformational and divergent perspectives. Our empirical validation results confirm that the CLS framework is reliable.

Pedagogically, the CLS framework can be used as a guidance on designing master's programmes, modules and learning activities. For example, a vexed question raised by Cottle (2015) indicates that some students in the MA Education programme underestimate the necessity of studying research methodology and resist gaining a better understanding of and mastering its relevant knowledge. However, the research methodology module is a core component in any accredited master's program, in which students are equipped with essential techniques and methods for being independent and critically developing more advanced scholarships in the field. Potentially, the visual roadmap presented in the CLS framework allows teaching staff and curriculum designers to break the overall learning objectives down into discrete sub-objectives. In other words, rather than asking students to critique a research paper, more specific instructions and guidelines in relation to BU, KA and PT can be applied to curriculum design to facilitate student engagement and thinking skills. This can be done as follows:

- Explaining any theory or concept embedded in the research paper using one's own words (BU).
- Unpacking how arguments were constructed and presented in that study (BU).
- Identifying any research gap presented in that paper and evaluating evidence reported to identify the research gap (BU and PT).
- Justifying the rationale behind applying the research methods in that paper to future research (KA).
- Making further enquiries to gain a better understanding of that paper (e.g. instrument design, validity and reliability, discussions, conclusions and limitations) (PT).

Our study had several limitations. First, the sample size of 132 students from two master's programs within one university could constitute an underlying limitation. Future research can replicate the validation of the CLS framework with students in other programs in the business and education disciplines, as well as expand into further disciplines with a larger sample size. Second, given that our proposed framework is universally intended for critical learning skills, future research can consider master's students' English language abilities as a potential factor affecting the development of critical learning skills, thereby meeting the needs of the increasingly diverse student population at the master's level. Third, only master's students' perspectives were considered to validate this CLS framework. Therefore, future research exploring academic staff perspectives on the CLS framework is useful, as academics in different disciplines may understand and enact learning outcomes differently.

CRedit authorship contribution statement

Mei Lin: Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Lana Y J Liu:** Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Thin Ngoc Pham:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare no conflict of interest.

Data availability

Data will be made available on request.

Acknowledgment

The authors acknowledge financial support from Newcastle University Education Development Fund.

References

- Abbott, D. (2019). Game-based learning for postgraduates: An empirical study of an educational game to teach research skills. *Higher Education Pedagogies*, 4(1), 80–104.
- Al-Harbi, N., & Troudi, S. (2020). Supervisors' written feedback on Saudi postgraduate students' problems with academic English writing in selected UK universities. A.M. Ahmed, et al. (Eds.). *Feedback in L2 english writing in the arab world* (pp. 171–200). London, UK: Palgrave Macmillan.
- Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R. et al. (Ed.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of bloom's taxonomy of educational objectives* (Complete edition). Longman.
- Andrews, J., & Higson, H. (2008). Graduate employability, 'soft skills' versus 'hard' business knowledge: A European study. *Higher education in Europe*, 33(4), 411–422.
- Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly*, 31(1), 71–94.
- Bamber, V., Choudhary, C. J., Hislop, J., & Lane, J. (2019). Postgraduate taught students and preparedness for Master's level study: Polishing the facets of the Master's diamond. *Journal of Further and Higher Education*, 43(2), 236–250.
- Bamford, J. (2004). Groupwork assessments and international postgraduate students: Reflections on practice. *Investigations in university teaching and learning*, 2(1), 25–28.
- Baron, J. S., Specht, A., Garnier, E., Bishop, P., Campbell, C. A., Davis, F. W., et al. (2017). Synthesis centers as critical research infrastructure. *Bioscience*, 67(8), 750–759.
- Bird, E. L. (2017). Student and staff perceptions of the international postgraduate student experience: A qualitative study of a UK university. *Journal of International Students*, 7(2), 329–346.
- Taxonomy of educational objectives: The classification of educational goals*. (1956). New York: Longmans, Green.
- Blunch, N. (2012). *Introduction to structural equation modeling using ibm spss statistics and amos*. Thousand Oaks, CA: Sage.
- Bowell, T., & Kingsbury, J. (2015). Virtue and inquiry: Bridging the transfer gap. *The palgrave handbook of critical thinking in higher education* (pp. 233–245). New York: Palgrave Macmillan.
- Brooks, S., Dobbins, K., Scott, J. J., Rawlinson, M., & Norman, R. I. (2014). Learning about learning outcomes: The student perspective. *Teaching in Higher Education*, 19(6), 721–733.
- Brown, A. (2014). *Gaining a master's degree: How to invest in your own future*. UK: Hachette.
- Brown, T.A. (2015). *Confirmatory factor analysis for applied research*. Guilford.
- Butterworth, J., & Thwaites, G. (2013). *Thinking skills: Critical thinking and problem solving*. Cambridge University Press.
- Carey, M. E., & McCardle, M. (2011). Can an observational field model enhance critical thinking and generalist practice skills? *Journal of Social Work Education*, 47(2), 357–366.

- Casey, D., Clark, L., & Hayes, S. (2017). *Study skills for master's level students, revised edition: A reflective approach for health and social care*. Royal College of General Practitioners.
- Caswell, C. A. (2017). Design and facilitation of problem-based learning in graduate teacher education: An MA TESOL case. *Interdisciplinary Journal of Problem-Based Learning*, 11(1).
- Chen, D. T. V., Wang, Y. M., & Lee, W. C. (2016). Challenges confronting beginning researchers in conducting literature reviews. *Studies in Continuing Education*, 38(1), 47–60.
- Clarke, G., & Lunt, I. (2014). The concept of 'originality' in the Ph. D.: How is it interpreted by examiners? *Assessment & evaluation in higher education*, 39(7), 803–820.
- Cottle, V. (2015). Troublesome learning journey. *Exploring education at postgraduate level* (pp. 3–11). Routledge.
- Coughlan, M., Cronin, P., & Ryan, F. (2007). Step-by-step guide to critiquing research. Part 1: Quantitative research. *British journal of nursing*, 16(11), 658–663.
- Daniel, B., Kumar, V., & Omar, N. (2018). Postgraduate conception of research methodology: Implications for learning and teaching. *International Journal of Research & Method in Education*, 41(2), 220–236.
- Davies, M. (2011). *Study skills for international postgraduates*. Palgrave Macmillan.
- DeWitt, S. W., Patterson, N., Blankenship, W., Blevins, B., DiCamillo, L., Gerwin, D., et al. (2013). The lower-order expectations of high-stakes tests: A four-state analysis of social studies standards and test alignment. *Theory & Research in Social Education*, 41(3), 382–427.
- Dobbins, K., Brooks, S., Scott, J. J., Rawlinson, M., & Norman, R. I. (2016). Understanding and enacting learning outcomes: The academic's perspective. *Studies in Higher Education*, 41(7), 1217–1235.
- Donaldson, B., & McNicholas, C. (2004). Understanding the postgraduate education market for UK-based students: A review and empirical study. *International Journal of Nonprofit and Voluntary Sector Marketing*, 9(4), 346–360.
- Dwyer, C. (2017). Applications of critical thinking. *Critical thinking: Conceptual perspectives and practical guidelines* (pp. 145–171). Cambridge: Cambridge University Press.
- 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.
- Dytham, S. (2019). A framework of postgraduate collaboration: Postgraduate collaborative space in a UK university. *Studies in Higher Education*, 44(3), 446–458.
- Eccles, J. S. (2016). Engagement: Where to next? *Learning and Instruction*, 43, 71–75.
- Egege, S., & Kutieleh, S. (2004). Critical thinking: Teaching foreign notions to foreign students. *International Education Journal*, 4(4), 75–85.
- Elliott, G. C., Kadi-Hanifi, K., & Solvason, C. (2018). *Your Guide to Successful Postgraduate Study*. London: SAGE.
- Evans, C., Nguyen, T., Richardson, M., & Scott, I. (2018). Managing the transition from undergraduate to taught postgraduate study: Perceptions of international students studying in the UK. *Research in Post-Compulsory Education*, 23(2), 249–265.
- Fakunle, L., Allison, P., & Fordyce, K. (2016). Chinese postgraduate students' perspectives on developing critical thinking on a UK education masters. *Journal of Curriculum and Teaching*, 5(1), 27–38.
- Fiegel, G. L. (2013). Incorporating learning outcomes into an introductory geotechnical engineering course. *European Journal of Engineering Education*, 38(3), 238–253.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Foskett, N. H., & Foskett, R. (2006). *Postgraduate study in the UK: The international students guide, postgraduate study in the UK: The international student's guide*. London: SAGE Publications. Limited.
- Fu, F. L., Wu, Y. L., & Ho, H. C. (2009). An investigation of cooperative pedagogic design for knowledge creation in web-based learning. *Computers & Education*, 53(3), 550–562.
- Geertsen, H. R. (2003). Rethinking thinking about higher-level thinking. *Teaching Sociology*, 1–19.
- Goodwin, J., & McCarthy, J. (2020). Explaining plagiarism for nursing students: An educational tool. *Teaching and Learning in Nursing*, 15(3), 198–203.
- Grove, S. K., & Gray, J. R. (2018). *Understanding nursing research E-Book: Building an evidence-based practice*. Elsevier Health Sciences.
- Gu, Q. (2011). An emotional journal of change: The case of Chinese students in UK higher education. L. Jin & M. Cortazzi (Eds.). *Researching chinese learners* (pp. 212–232). New York, NY: Palgrave Macmillan.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, 46(1–2), 1–12.
- Haley, A. N., & Clough, P. (2017). Affective experiences of international and home students during the information search process. *New Review of Academic Librarianship*, 23(4), 396–420.
- Hart. (2018). *Doing a literature review: Releasing the research imagination /Chris hart* (2nd edition.). SAGE Publications.
- Heard, J., Scoular, C., Duckworth, D., Ramalingam, D., & Teo, I. (2020). *Critical thinking: Skill development framework*. Australian Council for Educational Research. https://research.acer.edu.au/ar_misc/41.
- Heaviside, H. J., Manley, A. J., & Hudson, J. (2018). Bridging the gap between education and employment: A case study of problem-based learning implementation in Postgraduate Sport and Exercise Psychology. *Higher Education Pedagogies*, 3(1), 463–477.
- Heng, T. T. (2018). Different is not deficient: Contradicting stereotypes of Chinese international students in US higher education. *Studies in higher education*, 43(1), 22–36.
- Higgins, S. (2014). Critical thinking for 21st-century education: A cyber-tooth curriculum? *Prospects*, 44(4), 559–574.
- Hockings, C., Thomas, L., Ottaway, J., & Jones, R. (2018). Independent learning—what we do when you're not there. *Teaching in Higher Education*, 23(2), 145–161.
- Holmes, A. G. (2019). Learning outcomes—A good idea, yet with problems and lost opportunities. *Educational Process: International Journal*, 8(3), 159–169.
- House, G. (2010). *Postgraduate education in the united kingdom*. London: Higher Education Policy Institute. <https://www.hepi.ac.uk/wp-content/uploads/2014/02/45-Postgraduate-education-full.pdf>.
- Huang, R. (2008). Critical thinking: Discussion from Chinese postgraduate international students and their lecturers. *Hospitality, Leisure, Sport and Tourism Education*, 4(23), 1–12.
- Hubbard, K. E., & Dunbar, S. D. (2017). Perceptions of scientific research literature and strategies for reading papers depend on academic career stage. *PLoS one*, 12(12), Article e0189753.
- Jesson, J. K., & Lacey, F. M. (2006). How to do (or not to do) a critical literature review. *Pharmacy Education*, 6(2), 139–148.
- Joyner, R. L., Rouse, W. A., & Glatthorn, A. A. (2018). *Writing the winning thesis or dissertation: A step-by-step guide*. Corwin Press.
- Lam, L. W. (2012). Impact of competitiveness on salespeople's commitment and performance. *Journal of Business Research*, 65(9), 1328–1334.
- Larsson, K. (2017). Understanding and teaching critical thinking—A new approach. *International Journal of Educational Research*, 84, 32–42.
- Lau, J. Y. (2015). Metacognitive education: Going beyond critical thinking. *The palgrave handbook of critical thinking in higher education* (pp. 373–389). New York: Palgrave Macmillan.
- Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory into Practice*, 32(3), 131–137.
- Li, L. (2015). A Confucian perspective on teaching thinking in China. Wegerif, R., Li, L., & Kaufman, J.C. (Eds.). *The routledge international handbook of research on teaching thinking* (pp. 45–57). London: Routledge.
- Li, L., & Wegerif, R. (2014). What does it mean to teach thinking in China? Challenging and developing notions of 'Confucian education. *Thinking Skills and Creativity*, 11, 22–32.
- Lie, R., Abdullah, C., He, W., & Tour, E. (2016). Perceived challenges in primary literature in a Master's class: Effects of experience and instruction. *CBE—Life Sciences Education*, 15(4), ar77.
- Macfadyen, A., English, C., Kelleher, M., Coates, M., Cameron, C., & Gibson, V. (2019). 'Am I doing it right?' Conceptualising the practice of supervising master's dissertation students. *Higher Education Research & Development*, 38(5), 985–1000.
- Macleod, G., Barnes, T., & Huttly, S. R. (2019). Teaching at Master's level: Between a rock and a hard place. *Teaching in Higher Education*, 24(4), 493–509.
- Manarin, K., Carey, M., Rathburn, M., & Ryland, G. (2015). *Critical reading in higher education: Academic goals and social engagement*. Indiana University Press.
- Matsuda, P. K. (2001). Voice in Japanese written discourse: Implications for second language writing. *Journal of Second Language Writing*, 10(1–2), 35–53.

- Maude, A., & Caidis, S. (2019). Teaching higher-order thinking and powerful geographical knowledge through the stage 5 biomes and food security unit. *Geographical Education*, 32, 30–39 (Online).
- McClure, J. W. (2007). International graduates' cross-cultural adjustment: Experiences, coping strategies, and suggested programmatic responses. *Teaching in Higher Education*, 12(2), 199–217.
- McGuire, J. M. (2007). Why has the critical thinking movement not come to Korea? *Asia Pacific Education Review*, 8(2), 224–232.
- Mckendry, S., & Boyd, V. (2012). Defining the "Independent Learner" in UK Higher Education: Staff and Students' Understanding of the Concept. *International Journal of Teaching and Learning in Higher Education*, 24(2), 209–220.
- McPherson, C., Punch, S., & Graham, E. A. (2017). Transitions from undergraduate to taught postgraduate study: Emotion, integration and ambiguity. *Journal of Perspectives in Applied Academic Practice*, 5(2), 42–50.
- Monchaux, S., Amadieu, F., Chevalier, A., & Mariné, C. (2015). Query strategies during information searching: Effects of prior domain knowledge and complexity of the information problems to be solved. *Information Processing & Management*, 51(5), 557–569.
- Moseley, D., Baumfield, V., Elliott, J., Higgins, S., Newton, D. P., Miller, J., et al. (2005). *Frameworks for thinking: A handbook for teaching and learning*. Cambridge University Press.
- Mori, M. (2018). Our speech is filled with others' words: Understanding university student and instructor opinions towards paraphrasing through a Bakhtinian lens. *Ampersand*, 5, 45–54.
- Moskovsky, C., Jiang, G., Libert, A., & Fagan, S. (2015). Bottom-up or top-down: English as a foreign language vocabulary instruction for Chinese university students. *TESOL Quarterly*, 49(2), 256–277.
- Moule, P., & Hek, G. (2011). *Making sense of research: An introduction for health and social care practitioners*. London: SAGE.
- Neville, C. (2016). *EBOOK: The complete guide to referencing and avoiding plagiarism*. UK: McGraw-Hill Education.
- Nkhoma, M. Z., Lam, T. K., Sritatanaviriyakul, N., Richardson, J., Kam, B., & Lau, K. H. (2017). Unpacking the revised Bloom's taxonomy: Developing case-based learning activities. *Education and Training*, 59(3), 250–264.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3 ed.). New York, USA: McGraw-Hill.
- O'Donnell, V. L., Tobbell, J., Lawthom, R., & Zammit, M. (2009). Transition to postgraduate study: Practice, participation and the widening participation agenda. *Active Learning in Higher Education*, 10(1), 26–40.
- Oliver, P. (2012). *Succeeding with your literature review: A handbook for students*. Berkshire, UK: McGraw-Hill Education.
- Park, B., Korbach, A., & Brünken, R. (2015). Do learner characteristics moderate the seductive-details-effect? A cognitive-load-study using eye-tracking. *Journal of Educational Technology & Society*, 18(4), 24–36.
- Parkin, J. (2021). *International postgraduate students' experiences of independent learning within a uk higher education*. doctoral. Sheffield Hallam University. <https://doi.org/10.7190/shu-thesis-00451>
- Paul, R., & Elder, L. (2020). *Critical thinking: Tools for taking charge of your learning and your life*. Rowman & Littlefield.
- Perry, H. B. (2017). Information literacy in the sciences: Faculty perception of undergraduate student skill. *College & Research Libraries*, 78(7), 964.
- QAA. (2014). *Taught postgraduate student experience*. Gloucester: QAA. Retrieved from <https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf>.
- Raykov, T. (1997). Estimation of composite reliability for congeneric measures. *Applied Psychological Measurement*, 21(2), 173–184.
- Ridley, D. (2012). *The literature review: A step-by-step guide for students*. Los Angeles: Sage.
- Ritchhart, R., Church, M., & Morrison, K. (2011). *Making thinking visible: How to promote engagement, understanding, and independence for all learners*. John Wiley & Sons.
- Roberts, C., & Hyatt, L. (2019). *The dissertation journey: A practical and comprehensive guide to planning, writing, and defending your dissertation*. Corwin Press.
- Robinson, K. A., Saldanha, I. J., & Mckoy, N. A. (2011). Development of a framework to identify research gaps from systematic reviews. *Journal of Clinical Epidemiology*, 64(12), 1325–1330.
- Robson, S., & Moseley, D. (2005). An integrated framework for thinking about learning. *Gifted Education International*, 20(1), 36–50.
- Russo, J. E., & Schoemaker, P. J. H. (1990). *Decision traps: The ten barriers to decision making and how to overcome them*. New York: Simon & Schuster.
- Sastry, T. (2004). *Postgraduate education in the united kingdom*. Oxford: Higher Education Policy Institute.
- Schoepf, K. (2019). The state of course learning outcomes at leading universities. *Studies in Higher Education*, 44(4), 615–627.
- Shaheen, N. (2016). International students' critical thinking-related problem areas: UK university teachers' perspectives. *Journal of Research in International Education*, 15(1), 18–31.
- Sheriston, L., Holliman, A. J., & Payne, A. (2019). Student adaptability and achievement on a psychology conversion course. *Psychology Teaching Review*, 25(1), 22–29.
- Shi, L., Fazel, I., & Kowkabi, N. (2018). Paraphrasing to transform knowledge in advanced graduate student writing. *English for Specific Purposes*, 51, 31–44.
- Sinnott-Armstrong, W., & Fogelin, R. J. (2014). *Cengage advantage books: Understanding arguments: An introduction to informal logic*. Cengage Learning.
- Snow, C. E. (2010). Academic language and the challenge of reading for learning about science. *Science*, 328(5977), 450–452.
- Swatridge, C. (2014). *Oxford guide to effective argument and critical thinking*. Oxford: OUP.
- Tobbell, J., & O'Donnell, V. L. (2013). Transition to postgraduate study: Postgraduate ecological systems and identity. *Cambridge Journal of Education*, 43(1), 123–138.
- Tobbell, J., O'Donnell, V., & Zammit, M. (2010). Exploring transition to postgraduate study: Shifting identities in interaction with communities, practice and participation. *British Educational Research Journal*, 36(2), 261–278.
- Turner, Y. (2007). Reflecting on the relationship between standardised admissions, academic expectations and diverse student cohorts in postgraduate taught business and management programme. *International Journal of Management Education*, 6(1), 7–13.
- Virranmäki, E., Valta-Hulkkonen, K., & Pellikka, A. (2021). Geography curricula objectives and students' performance: Enhancing the student's higher-order thinking skills? *Journal of Geography*, 120(3), 97–107.
- Wallace, M., & Wray, A. (2016). *Critical reading and writing for postgraduates*. Los Angeles: Sage.
- Whitehead, D., & Maude, P. (2016). Searching and reviewing the research literature. Schneider, Z., et al. (Eds). *Nursing and midwifery research: Methods and appraisal for evidence-based practice* (pp. 53–72). Marrickville, Sydney: Elsevier Australia.
- Wingate, U. (2007). A framework for transition: Supporting 'learning to learn' in higher education. *Higher Education Quarterly*, 61(3), 391–405.
- Wong, B., Chiu, Y. L. T., Copsey-Blake, M., & Nikolopoulou, M. (2021). A mapping of graduate attributes: What can we expect from UK university students? *Higher Education Research & Development*, 1–16. <https://doi.org/10.1080/07294360.2021.1882405>
- Young, T. J., & Schartner, A. (2014). The effects of cross-cultural communication education on international students' adjustment and adaptation. *Journal of Multilingual and Multicultural Development*, 35(6), 547–562.
- Zhou, Y., & Todman, J. (2008). Chinese postgraduate students in the UK: A two-way reciprocal adaptation. *Journal of International and Intercultural Communication*, 1(3), 221–243.