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DOES COGNITION MATTER? CURRENT PEDAGOGICAL PRACTICE AND THE NEED FOR REFORM

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Abstract

Recent debate in the educational sphere highlights the continuing dilemma that is the creation and implementation of a true 21st century classroom in secondary schools across Australia. A difficulty with these ongoing attempts to reform teaching and learning is the behaviourist educational paradigm through which Western schools operate. This traditional perspective influences the ways in which modern researchers, policy-makers, teachers and the wider community all conceptualise education and its purpose. As such, this paper aims to establish that this understanding of education needs to be overthrown, in light of a changing global context and the evolving needs of students. Thus, an alternative paradigm will be discussed, specifically with reference to the explicit and effective incorporation of metacognition and metacognitive strategies, which are conducive to lifelong learning. For such a teaching and learning focus to become a reality, however, the re-training of needs of educators would be extensive, as would be the restructuring of pre-service teachers' programs. This paper therefore aims to establish the need for future research into education programs, as well as the current ability of teachers to incorporate further skills and instruction into their pedagogical practice. Such evidence would contribute to the ongoing discussion surrounding the creation and application of modern schooling practices.

The Need for a 21st Century Classroom

The creation of a 21st century classroom is a key priority of practicing teachers, educational policy-makers and researchers in the field. To achieve this goal, policy-makers and researchers continue to investigate new teaching methods, and attempt to implement educational reform in various schooling systems globally. A review of student achievement results and extant literature on educational reform clearly demonstrates that there are significant obstacles impeding the success of such attempts (Brown, Collins, & Duguid, 1989; Ironside, 2006; Ritchhart, 2015; Ritchhart, Church, & Morrison, 2011; Shepard, 2000). To truly change the basic nature of classrooms and schooling institutions, educational theorists posit that it is necessary to consider even the fundamentals of the behaviourist paradigm through which education has been, and continues to be, conceptualised (NACCE, 1999; Ritchhart, 2015; Robinson, 2010; Shepard, 2000). Such a holistic and critically reflective examination of educational reform, taking into account new ways of thinking about education and its function, could lead to the true creation of a modern educational system, able to meet the evolving learning needs of students in the 21st century.

Recent Australian Policy Concerns and Reforms

Australia is a clear example of recent attempts to implement educational reform, and thus create a 21st century classroom. Policy-makers, under the scope of the Australian Curriculum, Assessment and Reporting Authority (ACARA), are in the process of enacting a nation-wide curriculum across various key learning areas (KLAs) in Stages 4 and 5 (ACARA, 2015, 2016). Curriculum and administrative changes for Stage 6 teaching and learning are also being proposed in NSW (BOSTES, 2016b). Such alterations to the skills and content included in the curricula are aimed at the creation of a more effective, 21st century classroom environment which better caters to the evolving needs of students.

Consistent with this aim, the new outcomes and content requirements of the Australian Curriculum focus on the incorporation of cross-curriculum priorities such as ICT capability and sustainability into the content, skills, and pedagogical practices across KLAs (ACARA, 2015). 'Critical and creative thinking' is also one of these cross-curriculum priorities, meaning that it is intended to be a focal point

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of the syllabus, demonstrating a shift in the priorities of education, away from rote-learning of content and toward the ability to engage intellectually with various challenges that may arise (ACARA, 2016). The inclusion of such skills as extensions of the curriculum highlights the time pressure experienced by teachers and students alike, with educators needing to be increasingly selective about time spent on specific skills (Ritchhart, 2015). The relative significance of content and higher-order thinking skills such as metacognition therefore needs to be given greater consideration.

Further reform of educational practice within Australia has meant a change to the vocation itself, evident in the ongoing attempts to standardise professional quality and accountability, through the Australian Institute for Teaching and School Leadership (AITSL). The coming need for all NSW teachers (both those who have entered the profession as New Scheme teachers, and those practicing pre-2004) to prove that their teaching practice meets the Australian Professional Teaching Standards further demonstrates this pressure to standardise (BOSTES, 2016a).

Fundamentally, such changes to both curricula and teaching accountability demonstrate the ongoing concern held by government bodies about student learning and achievement. With sliding Programme for International Assessment (PISA) and National Assessment Program – Literacy and Numeracy (NAPLAN) scores over the past decade, Andreas Schleicher, the education chief of the Organisation for Economic Co-operation and Development (OECD) argues that a significant problem faced by Australia is a failure to inject money into education, specifically to improve the quality of teachers, who must work within an inflexible and demanding educational framework (Bagshaw & Smith, 2016; Henebery, 2016). Rather than altering this traditional framework, attempted reforms such as the establishment of AITSL arguably serve to reinforce behaviourist educational paradigms in which standardisation and assessment are of key significance. This is clear in the manner in which teachers are required to demonstrate their proficiency through meeting set criteria.

Such attempts at change demonstrate that whilst a 21st century classroom is seen as an imperative, the Australian government continues to operate through the same pedagogical perspective as in the past (Ritchhart, 2015; Ritchhart et al., 2011; Shepard, 2000). With both teachers and students being required to produce standardised data to prove their learning, the underlying assumptions of the behaviourist educational framework continue to be perceived as appropriate. A review of extant literature and even mass media, however, would suggest that this is no longer the case, with Australia continuing its backwards slide along the OECD educational rankings (Bagshaw & Smith, 2016; Henebery, 2016). This continued flaw in Australian educational practice supports the notion that students are no longer being taught in the most effective manner possible. A re-evaluation and re-conceptualisation of education and its purpose is therefore required, to ensure that students are being taught in a fashion that suits their future roles.

Current Schooling System

As Sir Ken Robinson argued in his TEDTalk, 'Changing Education Paradigms,' our current schooling system is based on a 19th century economic and intellectual model of schooling in which standardisation predominates (NACCE, 1999; Ritchhart, 2015; Robinson, 2010). The academic culture of the Industrial Revolution and the Enlightenment period, in which the behaviourist education paradigm was created, no longer exists. Thus, a new educational climate needs to be created, based on the evolved needs of children and teenagers in the present time. An issue with this goal, a difficulty perhaps more pressing than it was in the 19th century, is that policy-makers, researchers and teachers cannot know what demands will be made of students in the world to come (Eisner, 2003; Ritchhart, 2015). Students, therefore, need to learn skills rather than content, to best equip them for an "unknowable" future (Eisner, 2003, p. 6; Ritchhart, 2015).

This rapidly-evolving future, dependent on the effects of globalisation and technology, means that workers of the future will not need to be the "well-disciplined employees" of the 19th century, but rather creative, innovative and critically-thinking individuals who can better cater to the diverse and changing needs of society and of the economy (NACCE, 1999; Ritchhart, 2015; Robinson, 2010). It is

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important to note the term 'evolving,' given that it is likely that current students will need to be able to continually update and change their skills over the course of their lives, meaning that students of the future need to be lifelong learners to be successful. Consequently, higher-order thinking skills such as metacognition will be increasingly valuable to such students.

Further inherent within this 19th century educational paradigm are "assumptions about social structure and capacity," which contribute to the difficulties faced by teachers, researchers and policy-makers in their ongoing attempts to create a new model of education for the 21st century (Robinson, 2010). This notion that cultural, intellectual and economic assumptions and values are embedded within behaviourist educational paradigms is echoed by many researchers (Boaler, 2008; Breithecker, 2006; Ritchhart, 2015; Robinson, 2010; Shepard, 2000). Western pedagogical traditions educate students in the internalising of these dominant beliefs and values, a "hidden curriculum" that underlies educational policy, content and assessment (Breithecker, 2006). For example, Boaler (2008, p. 183) argues that those "students who learned traditionally only knew they were doing well if they were doing better than others," leading to categorisation of learning according to ability. Similarly, Robinson (2010) argues that this kind of academic distinction is embedded "deep in the gene pool of…education," wherein "there are only two types of people - academic and non-academic; smart people and non-smart people." This disparity can be more clearly defined, however, as the gap between those students who have independently acquired metacognitive skills, and those who have not (Joseph, 2009). The need to incorporate explicit metacognitive instruction into the curriculum is thereby made clear, to allow all students equal opportunities throughout their schooling.

The need to formulate a new educational paradigm is, therefore, evident - without it, the Australian government's policy of 'inclusion' cannot succeed, for embedded within the foundations of the behaviourist paradigm are assumptions about students' inherent ability and mental capacity, as well as assumptions about the purpose of schooling (Boaler, 2008; Ritchhart, 2015; Robinson, 2010). This is in contrast with those researchers, often working within European educational frameworks, who posit that teaching and learning practices may also be "important sources for the teaching of values, as well as the messages that teachers convey concerning respect and responsibility" (Boaler, 2008, p. 171; Ritchhart, 2015). This notion of a 'hidden curriculum,' can be taken further in the direction of student responsibility for their own metacognitive practices, for which learners will ultimately need to be accountable. The need to explicitly teach metacognition as a significant element of a 21st century classroom becomes evident as a means of ensuring students' future autonomy in the learning processes.

Educational Paradigms: the Ongoing Influence of Ways of Thinking

An understanding of the influence of educational paradigms upon educational reform is necessary to understand the significance of proposed teaching and learning strategies such as metacognition, as these paradigms continue to shape the very thoughts, values, beliefs and practices of teachers, policy-makers, parents, students and researchers alike. The nature of these paradigms is that they have been internalised throughout the course of these people's lives, and as such, they unconsciously influence behaviour. This is made clear in the existence of the 'theory-practice gap' and in the continued failure of educational reforms that have been recently implemented in various schooling systems globally.

The Behaviourist Model

A key issue impeding the implementation of a true 21st century classroom is the 'theory-practice gap' between the research and methodologies that would be ideal, and the everyday reality of Australian high school classrooms. The literature on changed educational paradigms, metacognition, and the need for reform spans decades, yet Western nations remain structured around a 'factory-model' of education dating from the 19th century (Ritchhart, 2015; Robinson, 2010).

Such a conceptualisation of education began in the era of the Industrial Revolution and the Enlightenment, a time in which scientific principles and the idea of objectivity were paramount

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(Brown et al., 1989; Ritchhart, 2015; Ritchhart et al., 2011; Robinson, 2010; Shepard, 2000). This is expressed clearly in the behaviourist model of education which pervades modern schools, and schools of the past (Cohen, 1990; Ritchhart, 2015; Ritchhart et al., 2011; Robinson, 2010; Shepard, 2000). This behaviourist paradigm incorporates many of the outdated beliefs about what the education system should achieve for students, demonstrably embedded in notions of standardised assessment as a measure of student learning and teacher performance, as highlighted in recent Australian policy (Ironside, 2006; Marshall, 1987; Ritchhart, 2015; Shepard, 2000). Given that this behaviourist educational paradigm arose with the development of schooling itself, it is arguably difficult for researchers, policy-makers and practicing teachers alike to fundamentally move away from this educational perspective. This difficulty in transforming education is clear, with researchers arguing that there exists a 'theory-practice gap' primarily because the beliefs and values of teachers and of schooling institutions are indirectly communicated to students in all aspects of teaching and learning, thus ensuring that the paradigm is perpetuated (Askell-Williams, Lawson, & Skryzpiec, 2012; Boaler, 2008; Cohen, 1990; Ritchhart, 2015).

The significant influence of such traditional values and beliefs is an ongoing difficulty in successfully implementing educational reforms. Shepard argues that these traditional and culturally-embedded "belief systems of teachers, parents, and policy-makers derive from these old theories" of assessment, academic ability, and curriculum content and outcomes (Shepard, 2000, p. 95). Without a reimagining of each of these different aspects of schooling, it is difficult to see how education could reform holistically. Reiterating this significance of patterns of thought and beliefs, Ritchhart (2015, p. 41) argues that teachers are "guided profoundly and implicitly by their belief sets…about teaching, learning, and the meaning and purpose of school," which further confirms the notion that without changing these underlying assumptions, the culture of schools and classrooms will not change. For example, the implicit and underlying assumptions of the schooling system, with its associated pressures of time, assessment and reporting, means that many teachers often convey an orientation towards simply completing work and tasks, rather than an implicit understanding of school as a means of learning and gaining deeper understanding (Marshall, 1987). This is consistent with Brown et al. (1989, p. 32) who argue that behaviourist educational pedagogies often encourage an implicit "separation between knowing and doing, treating knowledge as an integral, self-sufficient substance, theoretically independent of the situation in which it is learned and used." Without altering such assumptions and embedded values, there will continue to be a breach between educational research and the pedagogical practices and values of teachers and schools.

To elaborate, the fundamentals of this traditional behaviourist paradigm are clearly embedded in the differentiated and sequential curriculum, and the standardised assessments of learning that have characterised Western curricula and the new Australian Curriculum also (Shepard, 2000). Despite recent educational reform and a reimagining of curriculum and content, Australia has failed to move away from the behaviourist paradigm typified by a 'factory model' of schooling (Robinson, 2010). The language inherent in this idea is thought-provoking, as it highlights the continued use of 'work metaphors' to discuss the education system (Marshall, 1988; Ritchhart, 2015; Robinson, 2010). This is significant because it exposes the underlying behaviourist principles of objectivity and scientific measurement, wherein an "input-output model" is used to assess student and teacher achievement, based on the output of students (Bandura, 2001, p. 2; Marshall, 1987, 1988, 1990; Ritchhart, 2015). This is perhaps most evident in the final product of the majority of Stage 6 students: an Australian Tertiary Admissions Rank (ATAR). ACARA uses such student performance data to evaluate the performance of schools, thus holding teachers accountable for student learning (ACARA, 2013). In this kind of environment, the focus of both teachers and students, and schools as institutions, is going to be on producing the desired results - highlighting the focus on product rather than process (Marshall, 1987, 1988, 1990; Ritchhart, 2015; Ritchhart et al., 2011). It is clear that the desired 'result' or 'outcome' of education is also a concept which needs to be considered in future conceptualisations of educational reform. It is further clear that to achieve successful educational reform, a similar revolution needs to occur in the way in which teachers are trained – both preservice teachers and those currently practicing, to ensure that appropriate beliefs and understandings of education are perpetuated within schools and classrooms.

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An Alternative Educational Framework: the Social-Cultural Paradigm

In line with this argument for a new conceptualisation of education, Shepard (2000, p. 95) argues that this standardisation of both assessment and of curriculum "presents a barrier to the implementation of more constructivist" and social-cognitive educational paradigms, as opposed to the traditional behaviourist and associationist models. As previously stated, these traditional models are built around types of learning that are sequential, explicit, externally motivated through positive reinforcement, and clearly defined by the learning activities of the classroom (Ritchhart, 2015; Shepard, 2000). This learning is therefore difficult for students to apply to new situations and contexts. Similarly, Brown et al. (1989) postulate that behaviourist models perpetuate the divide between learning and applying knowledge. Furthermore, Shepard (2000, p. 100) claims that these leftover beliefs about the role of education, and its scientific measurement (seen clearly in practices of standardisation), have caused "thoughtful classroom practices" to suffer, which was not the intention of the existing educational paradigm or of the reforms initiated by policy-makers.

Therefore a change in educational approaches towards newer models based on a truer understanding of cognition and social learning is of great importance, and will benefit both teachers and students alike. These newer theories emphasise authentic learning, in terms of the way thinking is approached in the classroom (Brown et al., 1989; Ritchhart, 2015). This refers to the idea that learning should be situational and social in nature and purpose, adhering to the true thinking of a particular domain (Beyer, 1998; Brown et al., 1989; Hattie, Biggs, & Purdie, 1996; Shepard, 2000). For example, students should be encouraged to position themselves cognitively as a practitioner in the field that they are studying, such as a historian in history, or an economist in economics (Beyer, 1998; Brown et al., 1989). This is particularly applicable in high school, where there are multiple distinct areas of learning. Hattie et al. (1996) demonstrate that learning should be contextual and situational if it is to be successful, with "a high degree of learner activity and metacognitive awareness," to reinforce the cognitive culture of the specific KLA. Similarly, research demonstrates that teachers themselves often "belong to distinctive subject subcultures" which can therefore influence their respective approaches to teaching and learning, as befits their specific classroom environment. A greater focus on ways and modes of thinking can therefore serve both teachers and students, highlighting the significance of authentic cognition (Grossman & Stodolsky, 1995, p. 5).

This preoccupation with authenticity is supported by Immordino-Yang (2008, p. 68), who argues that within "constructivist approaches…learning is an active, iterative process in which a student acts on and perceives the environment, in part through engaging in social interactions." Such constructivist and social-cognitive models therefore account for the influence of the classroom environment, the 'thinking culture' in which student learning takes place (Beyer, 1998; Brown et al., 1989; Immordino-Yang, 2008; Ritchhart, 2015). This further allows learning and understanding to be more flexible and transferable, as there is true learning taking place, rather than memorisation and replication of information for the purposes of tests and assessments (Ritchhart, 2015). The real-world applications of such thinking and learning would be extensive, and of enormous benefit to students entering a world driven by technological, social and economic change of an unprecedented scale.

Such learning theories and paradigms are closely related with theories of metacognition, which centre on teaching students *how* to think, rather than *what* to think. The issues arising out of the literature, then, becomes less about what kind of learning revolution should take place, and more about how this focus on thinking can become a priority within the schooling system and within individual classrooms. To achieve this, the theory-practice gap must be narrowed, so that such findings in literature can be better enacted within the classroom environment.

How to Narrow the Gap

The theory-practice gap, incorporating issues of teacher values, standards, and measures of learning, also stretches to teacher education. Evidently, teachers have themselves been educated in a system dominated by behaviourist educational paradigms, this pattern may extend even through to their tertiary studies.

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Cohen (1990, p. 311) maintains that "failed efforts to improve teaching and learning are an old story," a story dominated by the lack of effective teacher education in new educational paradigms. This is made clear in the case study of 'Mrs. O.' a teacher who believed she had successfully implemented innovative reforms in her classroom, yet she continued to operate within a behaviourist paradigm, reinforcing traditional classroom behaviour and expectations (Cohen, 1990). This particular case study highlights the difficulty in initiating educational reform when practitioners are teaching and learning within a traditional educational paradigm, holding the traditional beliefs and values associated with this behaviourist model (Cohen, 1990). Without being made aware of the limitations of past educational paradigms and their associated modes of thinking, teachers cannot hope to possess the understanding required to move beyond these paradigms (Ritchhart, 2015). It is evident that behaviourist paradigms of teaching and learning contribute to "a distorted view of teaching and learning that is self-reinforcing and divorced from" the perpetuation of true learning (Ritchhart et al., 2011, p. 25). Thus the ongoing attempts to move towards newer, cognition-based, constructivist, and social-learning educational theories. In aiming to develop and ultimately implement these constructivist and social-cognitive educational paradigms, policy-makers and researchers, as well as the wider community, must consider the aim and purpose of education. Without a solid understanding of this underlying goal, change will merely continue to maintain the behaviourist paradigms of the past with the pre-existing conceptualisation of the purpose of education remaining.

Similarly, Shepard (2000, p. 103) reasons that "the successes of progressive education reforms never spread widely because such innovative practice requires 'infinitely skilled teachers' who have never been prepared in sufficient numbers to sustain" such reform initiatives. This highlights the imperative need to re-educate teachers and policy-makers themselves, in order to enact true change and minimise the ongoing need for a "separate translation phase" between research and teaching methods (Cohen, 1990; Shepard, 2000, p. 104). This 'translation phase' merely extends the time between the identification of successful pedagogies in educational research, and the implementation of these pedagogies. Similarly, it highlights the need to investigate teachers' attitudes, beliefs and values towards education, the curriculum, and metacognition. This is because such teacher attitudes serve to reinforce this 'translation phase,' as teachers and researchers may be operating from fundamentally different perspectives – that is, educational paradigms. Thus, a reconsideration of educational paradigms must occur in alignment with re-training of teachers and a re-structuring of pre-service teachers' educations, to ensure that new goals are made for modern classrooms of the 21st century, in line with extant literature.

Further in line with this critical examination of educational paradigms, the need to re-evaluate the role of education within a broader social context also becomes clear. With a changed understanding of what education should do for students, teachers, researchers and policy-makers may be able to more successfully change schooling institutions, through changing what 'output' is expected of both teachers and students. Ritchhart (2015, p. 30) posits that teachers often have "a tendency to see the barriers, constraints, and structures" of schools as being "impenetrable." Such obstacles to true learning and teaching are multifaceted, bringing the 'resource question' to the fore of this discussion. Without the necessary resources, such as time, funding, tools and classroom support, it will remain difficult to reconceptualise education and to truly reform the classrooms of the modern era (Ritchhart, 2015; Ritchhart et al., 2011; Ritchhart & Perkins, 2008; Robinson, 2011). Teachers currently face great amounts of pressure – to add more to this would arguably fail to benefit either teachers or students. This links in with the need to change the perspectives of not only teachers, and future teachers, but of society more broadly, to ensure that the community understands the benefits of such changes.

The Teaching of Skills: Effective Thinking

To cater to the learning needs of students in the present era, schooling institutions need to fundamentally change, as do pedagogical practices and methods of assessment (Askell-Williams et al., 2012; Cohen, 1990; Eisner, 2003; Lipsett, 2008; Ritchhart, 2015; Ritchhart et al., 2011; Shepard, 2000). A fundamental shift is needed in thinking – that is, educational paradigms need to change so

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that a new understanding of schooling can be conceptualised. This is abundantly clear, and openly admitted by both policy-makers and researchers. A review of the literature over the past few decades demonstrates a change in beliefs regarding the goals of education, with researchers, teachers and even students arguing that students of the 21st century need to be learning skills – that is, *thinking* skills – rather than curriculum content (Ritchhart, 2015; Ritchhart et al., 2011; Robinson, 2010). As such, the explicit teaching of metacognition has become a common theme throughout the literature, as has a concern with both critical and creative thinking (Boaler, 2008; Haston, 2007; Ritchhart, 2015; Ritchhart et al., 2011; Robinson, 2010; Shepard, 2000). Teaching such skills would then allow students to more effectively apply and transfer their learning, gaining confidence in their ability to work autonomously (Brown et al., 1989; Ford & Opitz, 2002; Joseph, 2009; Ritchhart, 2015; Ritchhart et al., 2011; Shepard, 2000; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003; Tanner, 2012). As previously stated, this is of paramount importance given that the purpose of education is to prepare students for their futures in a world that cannot even be conceptualised at this point (Robinson, 2010).

Metacognition

As a point of clarification, 'cognition' refers simply to 'thinking.' Flavell (1979) first used the term 'metacognition' to refer to the act of thinking about the processes behind thinking (Earli, 2016; Tanner, 2012). Essentially, rather than simply thinking about a task, a student engaged in metacognitive behaviour would be considering what kind of thinking they would need to engage in to best complete the task (Downing, Kwong, Chan, Lam, & Downing, 2009; Earli, 2016; Flavell, 1979; Ritchhart, 2015; Ritchhart et al., 2011).

To understand metacognition, it is necessary to understand the different ways in which it has been conceptualised. Flavell (1979) initially explored the realm of metacognition, defining separate components to the process itself. The first of these, metacognitive knowledge refers to cognitive schemas (a framework of pre-existing knowledge and understandings, into which new learning can be incorporated and linked, and relationships discovered). Secondly, metacognitive experiences "accompany and pertain to any intellectual enterprise," such as unconscious knowledge or intuition (Flavell, 1979, p. 906). Third and fourth, there are cognitive goals and actions or strategies. Actions and strategies refer to cognitive knowledge about the thinking processes needed to engage with or achieve the cognitive goals, which are simply the desired outcome of the thought process itself (Flavell, 1979). Flavell (1979) definitions continue to serve their purpose in delineating the multifaceted nature of metacognition. However, modern theorists have refined this definition further, positing that metacognition "involves knowing how to reflect and analyse thought, how to draw conclusions from that analysis, and how to put what has been learned into practice" (Downing et al., 2009, p. 610). Similarly, Tanner (2012, p. 114) states that metacognition incorporates "an emphasis on planning, monitoring, and evaluating" learning and thinking processes. This ability to reflect on one's own thought processes, or those of another, is a key component of metacognition, and it is the element of metacognition that this paper is concerned with. As such, this paper explicitly defines metacognition as the ability to reflect on and analyse thought processes, being concerned with *how* an individual thinks about a particular problem or task An individual with strong metacognitive skills is therefore able to think about how best to achieve a cognitive goal, and select which thought processes will be most effective in allowing them to achieve this.

Research has demonstrated the efficacy of metacognitive awareness in improving the learning outcomes of students (Armstrong, 2012; Downing et al., 2009; Joseph, 2009; Ritchhart, 2015; Ritchhart et al., 2011; Tanner, 2012). The literature demonstrates that students who tend to succeed in academic endeavours also tend to use metacognitive skills, consciously or unconsciously, while the reverse is also true (Joseph, 2009; Tanner, 2012). If all students were explicitly taught metacognitive skills and made aware of their thought processes, it is possible that this gap between achieving students and non-achieving students would narrow, contributing to the elimination of outdated performance-based distinctions within the classroom, as all students would be considered able (Joseph, 2009; Robinson, 2010; Tanner, 2012). This is in line with Dweck (2007), who argues that the mind-set of students plays a significant role in their ability to learn. The link with metacognition is clear, as students who believe themselves to be capable of developing and extending their own intelligence are

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able to work towards achieving it (Dweck, 2007). Similarly, a mind-set wherein students are self-reflective and active in improving their learning, would therefore create better learning outcomes for those students (Joseph, 2009; Ritchhart, 2015; Ritchhart et al., 2011; Tanner, 2012). Furthermore, explicit teaching of metacognition within classrooms has been linked with improved performance at measures of academic achievement, thinking skills, understanding, and even personal development (Joseph, 2009; Tanner, 2012). The need to teach metacognition explicitly is thus demonstrated.

It is also important to note that the "quality of teachers' knowledge" about metacognition has a significant impact upon the learning achievements of students. Joseph (2009, p. 100) reasons that the majority of "teachers have well-developed metacognitive skills because their roles require insightful, highly conscious cognitive activity and practical intelligence." In fact, the need for metacognitive knowledge and understandings is embedded within AITSL's new teaching standards, and it is therefore an expectation that teachers be able to reflect on their own learning and teaching processes to be successful educators, and to meet the standards. Like many high-achieving students, who utilise metacognitive strategies unconsciously, it does not necessarily follow that teachers are aware of these skills, nor might the majority of teachers possess the requisite understanding to explicitly impart these skills to their students (Cohen, 1990; Joseph, 2009; Ritchhart, 2015; Ritchhart et al., 2011; Robinson, 2011; Shepard, 2000; Tanner, 2012). Thus, the need for further research into teacher abilities and training programs is necessary, to benefit students and potentially result in a truly modern classroom environment.

Furthermore, despite the fact that metacognition is a skill that would clearly benefit a variety of professions, including teaching, it is also clear that many university students, including those training to become teachers, did not learn metacognition whilst at school, and many do not learn it even during tertiary education (Askell-Williams, Lawson, & Murray-Harvey, 2007; Askell-Williams et al., 2012; Downing et al., 2009; Lipsett, 2008; Ritchhart, 2015; Tanner, 2012). With this reported lack in explicit and effective teaching of metacognition in university studies, it may be that many teachers themselves have never been explicitly taught metacognition, and like many high achieving students in the classroom, it may be that teachers have simply begun using some of these metacognitive strategies unconsciously (Joseph, 2009; Tanner, 2012). This is made more likely when one is reminded that the term was not defined in the literature until 1979, meaning that some practicing teachers may never have heard it. Kiewra (2002, p. 71) contends that many university students are not even successful learners, because as students themselves, they "are rarely instructed *how* to learn," a deficiency that extends to their primary and secondary levels of education, in which explicit instruction of learning strategies "is rarely incorporated into the curriculum," due to the teacher focus on content over skills. If teachers themselves lack this fundamental knowledge, it can hardly be expected that teachers be able to explicitly and efficaciously impart this knowledge to students throughout their secondary schooling. Reinforcing this, Askell-Williams et al. (2007) argue that the instructional metacognitive knowledge of student teachers needs to be expanded upon, as these students themselves are not focusing on metacognition as a potential strategy for learning success.

This highlights the need for an evaluation of teacher training courses, to ensure that future practitioners are aware of the latest educational research and the nature and significance of metacognition (Cohen, 1990; Shepard, 2000). Similarly, the need for current teachers to undergo further training is also made clear (Cohen, 1990). Such updating of teacher education would ensure that teachers possess the requisite skills to not only succeed as teachers, but also to enable their students to succeed in their future endeavours. An entirely separate issue, which needs further consideration, would be the ability of teachers, given the resources available to them, to successfully implement such teaching and learning strategies into their daily classroom practice (Ritchhart, 2015).

Suggested Metacognitive Strategies

The need for metacognitive instruction is clear, and several researchers, institutions, and schools have attempted to incorporate the educational research into their teaching practices. For example, institutions such as Harvard have implemented research-based teaching strategies under the auspices of Project Zero, the Making Learning Visible project, and the Cultures of Thinking project (Harvard-

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University, 2015; Ritchhart, 2015; Ritchhart et al., 2011; Tishman, 2016). Schools worldwide have participated in such endeavours, with Bialik College in Melbourne, Australia, a major participant in such educational research, using metacognition to aid in their goal of creating specific cultures of thinking at the school (Bialik-College, 2016; Ritchhart, 2015; Ritchhart et al., 2011).

As such, there is a great deal of literature on how to incorporate metacognitive instruction, both implicitly and explicitly, into everyday classrooms. Harvard researchers posit that "thinking routines operate as tools for promoting thinking," and as such have created series of thinking routines applicable in both primary and high schools (Ritchhart, 2015; Ritchhart et al., 2011). A thinking routine, such as the ones utilised as a part of the Harvard University Graduate School of Education's initiatives, is essentially a practice used to explicitly scaffold one's thinking (Ritchhart et al., 2011). Kiewra (2002, p. 71) similarly argues that teachers who wish to effectively teach their students how to think critically and reflect on their thinking must "know two things: (a) which strategies are effective and (b) how to teach them by embedding strategy instruction into content teaching." Such strategies include the aforementioned thinking routines developed by researchers at Harvard University (Ritchhart, 2015; Ritchhart et al., 2011). The successful use of these routines takes time, with many teachers initially incorporating the use of these routines into the traditional classroom environment, with limited success in actually teaching metacognition (Ritchhart, 2015; Ritchhart et al., 2011). It is clear that whilst there are strategies available, further teacher training and access to resources (including another teacher or researchers to explain phenomena) is of primary importance also (Cohen, 1990; Ritchhart, 2015; Ritchhart et al., 2011; Shepard, 2000).

This is made clear in the second component of Kiewra (2002) criteria for successful teaching further supports the need for an increased focus on metacognition in teacher-training. Successfully 'embedding' metacognitive instruction into classroom practice is difficult, particularly when that classroom practice occurs within a behaviourist paradigm of education, which minimises the focus on skills and critical thinking (Cohen, 1990; Ritchhart, 2015; Ritchhart et al., 2011). It may be, then, that models of reform focusing on changing the culture of schooling institutions may significantly benefit educators and students alike. A greater focus on thinking, and on thinking processes, would undoubtedly aid teachers in refining their own understanding of metacognition, and would further serve to ensure that such thinking skills became the priority, rather than an addendum to existing curriculum content and outcomes (Ritchhart, 2015). Such skills would further ensure that students were able to cope with the demands of the modern world.

Conclusions

Extant literature and recent educational policy and curriculum changes highlight the ongoing attempts to conceptualise and implement a true 21st century classroom in Australian secondary schools, to better cater to the evolved needs of contemporary students. The significance of this is evident, given the continuously changing needs of a globalising society and growing economy. This paper posits that accounting for this 'unknowable' future means that teachers must equip students with the skills they will need to continue learning well into their careers and lives after schooling. Thus, teachers need to prioritise the explicit and effective instruction of higher-order thinking skills within the classroom. Future research is needed to clarify the current role of metacognition in Australian secondary schools, with reference to the newly implemented Australian Curriculum. This paper suggests that further research is also needed to broaden understandings about why metacognition may not be taught, either effectively or explicitly, in existing classrooms.

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