



Archived by Flinders University

This is the peer reviewed version of the following article:
Barr, S., & Askell-Williams, H. (2020). Upgrading
Professional Learning Communities to Enhance Teachers'
Epistemic Reflexivity About Self-regulated Learning. In
Teacher Education in Globalised Times (pp. 349–366).
Springer Singapore.,

which has been published in final form at
https://doi.org/10.1007/978-981-15-4124-7_19

Copyright © 2020 Springer Singapore

Title: Upgrading professional learning communities to enhance teachers' epistemic reflexivity about self-regulated learning

Author Name, Affiliation, city, country and Corresponding author's email address

| |
|--|
| Shyam Barr* |
| University of Canberra, 11 Kirinari St, Bruce ACT 2617 shyam.barr@canberra.edu.au |
| Helen Askeell-Williams Flinders University, Sturt Rd, Bedford Park SA 5042 |

*Corresponding author

Abstract

Globalisation, the evolution of artificial intelligence, and information and communication technology are rapidly changing social and workforce landscapes. As a result, pre-service and in-service teacher education providers must prepare teachers to meet the needs of their students' futures. This chapter argues for teacher education to reshape teachers' epistemic cognition and epistemic reflection (i.e., key components of teachers' identities) to deeply engage with the 21st century capability of self-regulated learning (SRL). We propose that epistemic reflexivity is a key process underpinning teachers' decisions about whether and how to explicitly teach strategies for SRL. We introduce a new process-model of epistemic reflexivity and provide examples of how pre-service and in-service teacher educators can 'upgrade' professional learning communities to incorporate epistemic reflexivity as a core educative process. Additionally, we provide practical examples of implementing professional education for epistemic cognition and reflection.

Author bios

Shyam Barr

Shyam Barr is an Assistant Professor of Learning Sciences in the Faculty of Education at the University of Canberra. His research considers educational leaders and teachers' knowledge, beliefs and practices related to self-regulated learning, and how innovative models of professional education can bring about sustained improvements in schools. Prior to his work as a researcher, Shyam has held different consultancy, leadership and classroom teaching positions in local and international schools for over 12 years. Building on this experience, he now works in close partnerships with schools to enhance sustained implementation of evidence-based initiatives for high quality teaching and learning.

Helen Askill-Williams

Helen Askill-Williams is an Associate Professor in Cognitive Psychology and Educational Practice in the College of Education, Psychology and Social Work at Flinders University. Her research interests include motivation, cognition and metacognition during learning, and mental health promotion in educational settings. Helen currently leads an Australian Research Council Discovery Grant project investigating the problem of the long-term sustainability of effective educational initiatives once start-up enthusiasm and funding run out.

A 100-word (approx.) explanation of how your chapter aligns to the book theme/s.

This chapter argues for the inclusion of education about epistemic cognition, particularly epistemic reflexivity, in pre-service and in-service teacher education courses in order to improve teachers' knowledge, dispositions and actions for developing students' 21st century capabilities such as self-regulated learning (SRL). We propose that fostering teachers' epistemic reflexivity has the potential to bridge the current gap, locally and globally, between best available SRL research and teachers' classroom practices. We present a new process-model of teachers' epistemic reflexivity that can be developed in teacher professional learning communities. Higher education providers have a responsibility to support the development of teachers' abilities to promote students' 21st century capabilities. This is a matter of social justice: to ensure that every child is provided with the capabilities they need to thrive in response to local and global societal demands.

Definitions of words used in your chapter specific to your country or cultural context.

The book will feature a glossary to ensure our international audience are well informed.

| Keyword | Definition |
|---------------------------------------|---|
| Epistemic Reflexivity | A person's inner dialogue related to knowing and knowledge that leads to action. |
| Epistemic cognition | How one thinks about knowing and knowledge (e.g., thinking about developing, assessing and applying knowledge). |
| Professional Learning Community (PLC) | A mode of professional education that involves teachers engaging in shared problem-solving with the aim of addressing classroom challenges. Typically, this includes collaborative meetings, consideration of student work and the trialing of new teaching strategies. |
| PLC-ER | A professional learning community that includes explicit educative tools to engage teachers in epistemic reflexivity. |

| | |
|---------------------------------|---|
| Century 21st capabilities | A set of general capabilities (e.g., critical thinking, problem solving, collaboration) believed to be necessary for succeeding in the 21 st century. |
| Student self-regulated learning | When students set goals, select their learning strategies throughout the task and regularly monitor and evaluate the effectiveness of their approaches to learning (Zimmerman, 2008, 2013). |

Introduction

Teacher education plays a fundamental role in the preparation of teachers entering the workforce and the provision of opportunities for continuous professional education for practicing teachers. In this volume, teacher education is placed under the microscope as authors identify how universities and professional education providers are responding to global educational issues. Globalisation, the evolution of artificial intelligence (AI), and information and communication technology (ICT) are rapidly changing the job landscape. Automation of routine tasks creates a need for the current workforce to engage in a continuous process of upskilling. As a result, increased attention is being directed towards the development of students' 21st century capabilities so that they are well-equipped as life-long learners (Council of Australian Governments Education Council, 2019) to thrive in this ever-changing world. However, a focus on 21st century capabilities requires substantial change in teachers' knowledge, beliefs and pedagogical practices, leading to pressure being placed on teacher education providers to reconsider the effectiveness of current professional education that adequately equips teachers to, in turn, prepare their students for future workforces and societies. As such, teacher education needs to not only adaptively respond to current changes, but anticipate future requirements and changes, and begin to reshape with the future in mind. Teacher education must be proactive in this change.

Our chapter argues for teacher education to engage with a reshaping of teachers' epistemic cognitions and epistemic reflection (i.e., key components of teachers' identities) in relation to the 21st century capability of self-regulated learning (SRL). We position teachers' epistemic reflexivity as a key process underpinning teachers' decisions about explicitly teaching strategies for SRL to their students. We propose a new process-model of epistemic reflexivity and provide an example of how pre-service and in-service teacher educators can 'upgrade' professional learning communities to incorporate epistemic reflexivity as a core educative process.

Globalisation and increase in AI and ICT

The current job landscape is changing rapidly with enhanced technology, artificial intelligence, and a proliferation of information through online education. Jobs that require repetitive or routine tasks are being replaced by robotics/machines, creating a need for the current workforce to engage in a process of ongoing upskilling. To succeed in this evolving world, researchers (e.g., Dede, 2010; Voogt & Roblin, 2012) have advocated that both current and future workforces (i.e., current students) require 21st century capabilities. These include high level communication skills, problem solving capabilities and the ability "to adapt and innovate in response to new demands and changing circumstances" (Binkley et al., 2012, p. 17). Additionally, due to globalisation, the world's increasing complexity necessitates "fundamental

reforms” in how individuals are supported as learners (World Economic Forum, 2017, p. 15), and therefore how students are supported to develop 21st century capabilities.

21st century capabilities

Students’ 21st century capabilities are included in global discussions about how to best prepare students for the future (OECD, 2018). Many researchers, global organisations and educational bodies have attempted to define 21st century capabilities, resulting in no current universal definition. Some researchers (e.g., Binkley et al., 2012; Voogt & Roblin, 2012) have conducted a comparative analysis of the international frameworks about 21st century skills and attempted to synthesise frameworks into a single framework. For example, Binkley et al. (2012, pp. 18-19) conducted an analysis of twelve frameworks of 21st century skills from around the world, and identified ten shared skills (1. Creativity and innovation, 2. Critical thinking, problem solving, decision making, 3. Learning to learn, Metacognition, 4. Communication, 5. Collaboration, 6. Information literacy, 7. ICT literacy, 8. Citizenship, 9. Life and career, and 10. Personal and social responsibility). A similar list of capabilities was produced by Voogt and Roblin (2012) in their synthesis of international frameworks for 21st century competences. Other authors (e.g., Kereluik, Mishra, Fahnoe, & Terry, 2013) have synthesised frameworks into three broad knowledge categories (e.g., *foundational knowledge (to know)* including core content knowledge, cross-disciplinary knowledge and digital/ICT literacy; *meta knowledge (to act)* including creativity and innovation, problem-solving and critical thinking, thinking, and communication and collaboration; and *humanistic knowledge (to value)* including life/job skills, ethical/emotional awareness and cultural competence). Whether presented as a list of key skills (e.g., Binkley et al., 2012) or three broad categories of knowledge (e.g., Kereluik et al., 2013), students require opportunities to develop these 21st century capabilities.

Globally, it has been acknowledged that formal education plays a critical role in the development of students’ 21st century capabilities (Council of Australian Governments Education Council, 2019; Ministerial Council on Education, Employment, Training and Youth Affairs, MCEETYA, 2008; OECD, 2018). Although many organisations and researchers have advocated for the incorporation of the teaching of 21st century skills into formal education, and teachers have been reported to value knowledge that underpins 21st century capabilities (Mishra & Mehta, 2017), very few have reported successful attempts at integrating these general capabilities into the curriculum. Locally, it seems that governing bodies (e.g., ACARA, 2019; AITSL, 2019) continue to list aims that include a focus on 21st century capabilities, but researchers have flagged that realisation of such aims in classroom contexts requires substantial work. For example, Care and Kim (2018) stated that the “introduction of twenty first century curricula requires knowledge and understanding of how the aspirations in mission

statements translate into the particulars of what students need to learn and know how to do, and of what teachers need to teach and know how to assess” (p. 21-22). Poor implementation of 21st century capabilities in classrooms was also documented in the comparative review by Voogt and Roblin (2012) who reported good consistency between frameworks, but stated that “intentions and practice seemed still far apart” (p. 299). Although the intention is clear (i.e., to develop students’ 21st century capabilities), there is still a ‘grey area’ about how teachers translate this knowledge into actions in classrooms.

We ground our thinking of teachers’ promotion of 21st century capabilities in social cognitive theory (Bandura, 1978, 2001). We conceive of teachers’ behavior (e.g., implementation of evidence-based initiatives for students’ 21st century capabilities) existing in a reciprocally determined relationship with their personal factors (e.g., knowledge, beliefs, dispositions) and environmental factors (e.g., professional development opportunities, policy, leadership, school vision). Therefore, we envisage teachers’ adoption of evidence-based teaching practices for students’ 21st century capabilities as voluntary behaviours suggesting a need for changes in teachers’ personal factors and environmental factors.

Implementation of strategies to foster 21st century capabilities in classrooms requires further attention. Acknowledging the breadth of 21st century capabilities, in this chapter, we focus on the 21st century capability of self-regulated learning (SRL) against a background of research that has demonstrated wide variability in teachers’ implementation of evidence-based teaching practices that promote students’ SRL (e.g., Dignath & Büttner, 2018; Kistner, Otto, Büttner, Rakoczy, & Klieme, 2015).

21st century capability: Self-regulated learning (SRL)

SRL has been documented in numerous frameworks of 21st century capabilities. For example, SRL includes what Binkley et al. (2012) referred to as “Learning to learn, Metacognition” (p. 18). Additionally, the Organisation for Economic Cooperation and Development (OECD; 2005) included SRL within the 21st century capability titled “the ability to form and conduct life plans and personal projects” (p. 15), including setting goals, self-monitoring and self-evaluation, which are all considered key elements of SRL. Furthermore, Voogt and Roblin (2012) reported that aspects of SRL have been mentioned in a number of global frameworks regarding 21st century capabilities.

In Australia, increased attention has also been directed towards the skill of SRL, which will support students to evolve as life-long learners; capable of and committed to a process of ongoing upskilling and re-training (ACT Education Directorate, 2018; Council of Australian Governments Education Council, 2019; MCEETYA, 2008; OECD, 2019). Indeed, the Australian Curriculum, Assessment and Reporting Authority (ACARA, 2019) has integrated a focus on SRL within more than one category of general capabilities. For example, the personal

and social capability indicates a focus on developing self-awareness and self-management, which are two key components of SRL. Additionally, the critical and creative thinking capability highlights a need for students to be engaged in high quality metacognition, also included under the umbrella of SRL. Furthermore, Gonski et al. (2018) recommended that the Australian Government “give more prominence to the acquisition of the general capabilities e.g., critical and creative thinking, personal and social capability” (p. xii), essentially requesting that teachers adopt a greater focus on the development of student SRL skills. Recently, the Council of Australian Governments Education Council (2019) endorsed the Alice Springs (*Mparntwe*) Declaration which documented the goal that “all young Australians become...successful lifelong learners” (p. 4) and detailed this goal with a number of explicit statements related to SRL (e.g., “develop their ability and motivation to learn and play an active role in their own learning”; “are responsive and adaptive to new ways of thinking and learning”, p. 7).

Research about SRL, or components of SRL (e.g., metacognition, self-awareness), have exponentially grown over the past decade. Panadero (2017) claimed that “SRL has become one of the most important areas of research within educational psychology” (p. 1). From a social-constructivist view, we conceptualise SRL as “a broad term that encapsulates different variables that influence learning (e.g., goal orientation, self-efficacy, metacognition, motivation, volitional strategies)” (Barr & Askell-Williams, 2019, p. 2). Furthermore, while some definitions have focused on different components (e.g., egocentrism from the Piagetian perspective; language capability from the Vygotskian position), we believe SRL is best conceived as a process (Klug, Ogrin, Keller, Ihringer, & Schmitz, 2011) and highlight that metacognitive functioning plays an important role in SRL (Flavell, 1979; Winne & Hadwin, 1998).

Essentially, SRL occurs when students set goals, select their learning strategies throughout the task and regularly monitor and evaluate the effectiveness of their approaches to learning (Zimmerman, 2008, 2013). According to Zimmerman (1986), “self-regulation theory... focuses attention on *how* students personally activate, alter, and sustain their learning practices in specific contexts” (p. 307). Numerous researchers have proposed conceptual models that attempt to explain the interacting components of SRL. In a comprehensive comparative review, Panadero (2017) considered similarities and differences between six models of SRL (e.g., Boekaerts, 1997; Zimmerman, 2002). He reported that there was cross-over between the different models, primarily the understanding that SRL “includes the cognitive, metacognitive, behavioural, motivational, and emotional/affective aspects of learning” (p. 1). Furthermore, Panadero’s findings indicated that the models of SRL offer useful frameworks to support students’ development of strategic knowledge. Indeed, there is consensus that motivational, cognitive and metacognitive strategies that underpin SRL can be

explicitly taught (Donker, de Boer, Kostons, Dignath van Ewijk, & van der Werf, 2014; Kistner et al., 2010).

Unfortunately, researchers continue to observe that teachers rarely engage in explicit and sustained teaching of self-regulatory learning strategies. For example, Kistner et al. (2015) considered 20 mathematics teachers' beliefs and practices related to teaching for SRL. In their study, each teacher-participant engaged in five video-recorded lessons and completed a survey regarding their beliefs. Analysis of video-recorded lessons revealed that teachers' strategy instruction "predominantly consisted in implicit prompting of strategic behaviour" (Kistner et al., 2015, p. 192), rather than being explicitly taught. Kistner et al. reported that teachers' beliefs influenced the types of strategies taught and how they were taught. For example, they reported that teachers with relatively traditional beliefs about the teaching of mathematics were less likely to promote SRL strategies such as elaboration, while teachers with more progressive beliefs were more likely to teach SRL strategies such as monitoring and evaluation.

More recently, Dignath and Büttner (2018) conducted an observational study of 28 primary and secondary school mathematics teachers' teaching about SRL. Findings indicated that teachers rarely engaged in the explicit teaching of SRL strategies, and when they did, they typically spent more time focussed on cognitive strategies over metacognitive strategies. Analysis of interviews indicated that teachers did not possess the necessary knowledge about SRL and were also "reluctant to promote it" (p. 127). Concerns about teachers' knowledge about SRL have been raised in numerous other studies as well (e.g., Dignath-van Ewijk & van der Werf, 2012; Perry, Hutchinson, & Thauberger, 2008; Spruce & Bol, 2015) and have been used to explain the lack of explicit teaching of SRL strategies observed in classrooms. As a result, Dignath and Büttner recommended that teachers engage in appropriate professional education to support their implementation of evidence-based SRL teaching initiatives.

In our earlier research (e.g., Barr & Askill-Williams, 2019), we also found that teachers varied substantially in the knowledge and beliefs that they possessed about SRL. We have argued that personal factors (e.g., knowledge about SRL, beliefs related to SRL) provide the foundation that underpins teachers' thinking and decision-making about SRL: These personal factors need to be elevated to the highest quality. For example, a teacher with high quality knowledge of SRL would understand the process of SRL and the different motivational, cognitive and metacognitive strategies that underpin effective SRL. Additionally, they would possess high quality knowledge about pedagogical strategies to foster students' SRL knowledge. With regard to teachers' beliefs about SRL, as an example, teachers' high quality beliefs about SRL would include social-constructivist beliefs (Dignath-van Ewijk & van der Werf, 2012), high self-efficacy for fostering students' knowledge about SRL and high expectations of students' capability for SRL (Spruce & Bol, 2015). We argue that professional

education should continue to aim to develop teachers' high quality knowledge and beliefs, BUT possessing high quality knowledge and suitable beliefs about SRL is not sufficient in itself: teachers also need to enact those knowledge and beliefs, which requires teachers to engage in high quality epistemic cognition about SRL, particularly epistemic reflexivity about SRL.

Teachers' epistemic cognition about SRL

Teachers' epistemic cognition about SRL refers to how teachers think about the knowing of, and the knowledge of, SRL. More broadly, epistemic cognition can be understood as a process of developing, assessing and applying knowledge (Hofer & Bendixen, 2012), influenced by one's prior knowledge, beliefs and attitudes (Greene & Yu, 2016). Recently, studies have demonstrated connections between teachers' epistemic cognition and their teaching practices (Greene, Sandoval, & Bråten, 2016), hence our interest in teachers' epistemic cognition about SRL. In a developing model of teachers' epistemic cognition about SRL (Barr & Askell-Williams, 2019), based upon the work of Zimmerman (2002), we view epistemic cognition about SRL occurring over three phases, the *Forethought phase*, *Performance phase* and *Self-Reflection phase*. During the *Forethought phase*, teachers engage in epistemic reflexivity (detailed in the section below), effectively thinking and making decisions about their teaching actions (e.g., setting epistemic aims, selecting reliable processes to achieve their epistemic aims). The *Performance phase* involves the implementation of the teaching actions, and the *Self-Reflection phase* is when the teachers reflect on their teaching actions and assesses whether they have achieved their set knowledge aims. Teachers' epistemic cognition about SRL is a complex process: for the purpose of this chapter we focus on teachers' epistemic reflexivity about SRL and its relationship with teachers' teaching practice about SRL.

Teachers' epistemic reflexivity

Teachers' epistemic reflexivity has emerged as an important aspect of teachers' professional work, with researchers (e.g., Lunn Brownlee et al., 2019) arguing that educators need to enhance their flexible thinking modes related to epistemic matters. Epistemic reflexivity is a process of self-talk about knowing and knowledge: it occurs predominantly within the forethought and performance phases of teachers' epistemic cognition about SRL. For example, teachers' epistemic reflexivity about SRL refers to the inner dialogue that occurs during teachers' decision making and problem solving about knowing and knowledge related to SRL (e.g., lesson planning, enactment of lesson plan). We conceive epistemic reflexivity to be similar to "other reflexive terms... [namely] reflexive thinking, reflexive mediation and reflexive deliberation" (Barr & Askell-Williams, 2019, p. 4). The following paragraphs document

the way different researchers have attempted to describe epistemic reflexivity, its key components and the key moment of the epistemically reflexive dialogue.

Drawing on Mead's (1934) and Peirce's (1984) work, Wiley (2010) explained that the more general concept of 'reflexivity' involves three components existing on a timeline: I (present), me (past), and you (future). Other researchers (e.g., Fives, Barnes, Buehl, Mascadri, & Ziegler, 2017) have referred to the three components as subject-object-subject (i.e., I-me-you) and proposed that reflexivity can be distinguished from other forms of reflection by a "mental and self-referential 'bending back' upon oneself" (Archer, 2010b, p. 3). According to Feucht, Lunn Brownlee, and Schraw (2017), "reflection becomes reflexivity when informed and intentional internal dialogue leads to changes in educational practices, expectations, and beliefs" (p. 234).

Reflexivity and its relationship with behavior has been a topic of interest to researchers for many years. James (1892/2001) argued that self-questioning (e.g., "Will you or won't you have it so?" p. 327) was a key-part of decision making. Since James' (1890/2007) research into principles of thought and introspection, many researchers have focused on the nature of inner dialogue (e.g., Bakhtin, 1929/1973; Mead, 1934; Peirce, 1984; Vygotsky, 1962). Archer's (2000, 2003, 2007, 2010a, 2010b) extensive program of research advocated that reflexivity happens over three moments. The idea that reflexivity occurs as three moments is common among other models of reflexivity (Lunn Brownlee, Ferguson, & Ryan, 2017; Wiley, 2010).

Different models have been proposed to explain the different moments of reflexivity, and more recently, of epistemic reflexivity. Table 1 shows our comparison of the naming and time dimensions in three extant models.

Table 1: Comparison of the moments of the reflexive (self) conversation

| Researcher(s) | Moments in the reflexive conversation |
|--|--|
| Archer (2000) | Discernment Deliberation Dedication |
| Wiley (2010) | Defining (similar to a combination of Archer's Discernment and Deliberation) Choosing Enacting |
| Lunn Brownlee et al. (2017); Lunn Brownlee et al. (2019) | Reflect-discern (similar to a combination of Archer's Discernment, Deliberation and Dedication moments) Reflexivity- deliberate Resolved action- dedicate |

From Table 1, one of the most prominent models of reflexivity proposed by Archer (2000) is the Discernment, Deliberation and Dedication (DDD) scheme. In this scheme, the *discernment* moment is when a person lists any projects of concern or value. During the *deliberation* moment, the individual critically evaluates the worth of each project, engaging in a temporary prioritisation of the projects of concern. The final moment of Archer's DDD scheme is *dedication*, whereby the individual decides which project of concern(s) will be acted upon. Similarly, Wiley (2010) documented three moments of the reflexive conversation as *Defining* (i.e., listing projects of concern and prioritising based on value; like Archer's discernment and deliberation moments), *Choosing* (i.e., selecting the project of concern that will be progressed to action; similar to Archer's dedication moment) and *Enacting* (i.e., the action taken).

Building on Archer's (2000) work, Lunn Brownlee et al. (2019) described three moments termed *Reflect-discern*, *Reflexivity-deliberate* and *Resolved action-dedicate*. The *reflect-discern* moment involves a consideration of an epistemic aim (knowing and/or knowledge related goal) or potential problem. This is followed by the *reflexivity-deliberate* moment where teachers engage in a critical evaluation of their concerns drawing on their personal and contextual factors. Lastly, the *resolved action-dedicate* moment involves the implementation of the chosen action.

Our analysis of the various definitions of these three moments of reflexivity suggests key differences between the models. For example, Wiley (2010) includes the *enacting* moment that acknowledges the action that can result from the reflexive conversation. Lunn Brownlee et al.'s (2019) current interpretation of Archer's (2000) work appears different, in that Lunn

Brownlee et al. define their second moment of the reflexive conversation as 'reflexivity/deliberate'. While on face-value this may appear similar to Archer's second moment *deliberation*, it is confused by Lunn Brownlee et al.'s interpretation of Archer's first moment *discernment* as the setting of epistemic aims. In our view, the setting of an epistemic aim implies a decision has been made about which epistemic aim is of greatest value. We have highlighted substantial variation in some of these prominent models of reflexivity and epistemic reflexivity (refer Table 1) and we propose a new process model of epistemic reflexivity comprising *four* moments Discernment, Deliberation, Decision and Deed (DDD-D) as listed in Figure 1.

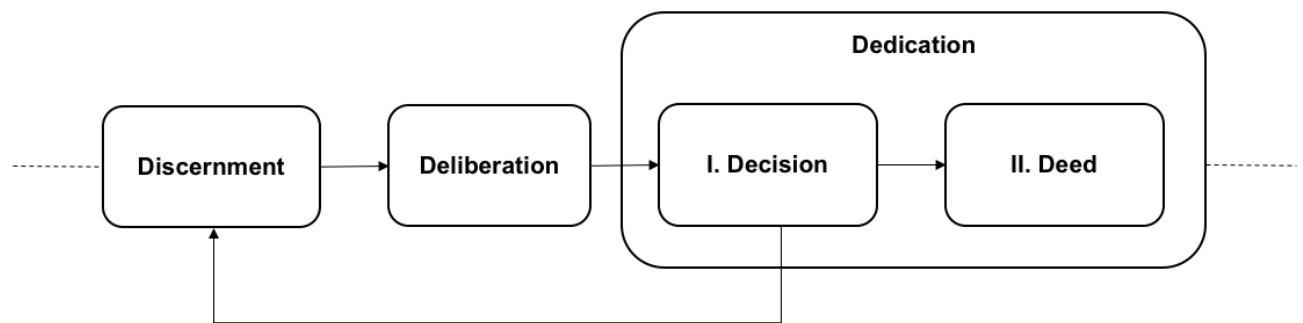


Figure 1: DDD-D process of epistemic reflexivity

From the model in Figure 1, a teacher engaged in epistemic reflexivity about SRL would list the development of students' knowledge about SRL as a project of concern and a potential epistemic aim (*discernment*). The teacher would then *deliberate* the potential epistemic aim about SRL in relation to a range of personal factors (e.g., knowledge, motivations, values), contextual factors (e.g., school priority, Australian Curriculum) and other potential epistemic aims. A *decision* would be made as to whether the epistemic aim about SRL and the associated methods to achieve it should be progressed. For teachers, the decision might be documented in a lesson plan as a first level of commitment reflecting the decision. Then, the teacher may implement the chosen actions in their classrooms (i.e., *deed*). However, this is not always the case, for between lesson planning and the lesson itself a teacher might return to the *discernment* moment of the process of epistemic reflexivity about SRL. Our model brings together the key moments of prior models but acknowledges the potential to change one's *decision* before *deed* – a key point of difference from previous models. A teacher engaged in high quality epistemic reflexivity would deem SRL as highly valuable, prioritise the teaching of SRL among other teaching actions, decide on suitable epistemic aims and teaching actions about SRL, and enact these actions in their practice.

Teachers' epistemic reflexivity is a critical process in the decision making and enactment of SRL teaching initiatives in regular classrooms. Our argument is that to ensure that SRL teaching initiatives become embedded and sustained in practice, beyond the

development of teachers' high quality knowledge and beliefs about SRL, teachers' epistemic reflexivity about SRL needs to be addressed during their professional education. The following section documents a professional education model for developing teachers' epistemic reflexivity.

Promoting teachers' epistemic reflexivity about SRL: Professional Learning Communities (PLCs)

Evidence-based approaches to teacher education, for example PLCs, provides opportunities for school improvement. Some researchers have argued that there is no shared definition or model of practice of PLCs (e.g., Dogan, Pringle, & Mesa, 2016) and in our search of the literature, we conclude a similar finding. However, there is some consensus that a PLC consists of a group of educators engaging in shared problem-solving with the aim of addressing classroom challenges. PLCs have been repeatedly shown to be effective for promoting change in schools (refer Dogan et al., 2016; Vangrieken, Meredith, Packer, & Kyndt, 2017; Vescio, Ross, & Adams, 2008). As one example, Gore and colleagues (e.g., Beveridge, Mockler, & Gore, 2018; Bowe & Gore, 2016; Gore, Griffiths, & Ladwig, 2004) have conducted a substantial program of research about Quality Teacher Rounds, a framework for teacher education that includes PLCs as a key component. Their program of research has included a series of randomised controlled trials that has demonstrated that PLCs are an effective method of professional education that can be utilised to effectively shift teachers' personal factors, such as their knowledge and beliefs.

As a result of the evidence-base surrounding the positive effects associated with PLCs, the Australian Government (e.g., Victoria State Government, 2019) and schools continue to embrace PLCs as a useful mode of professional education. While PLCs have been presented as an evidence-based method of professional education for reshaping teachers' knowledge and beliefs (Bowe & Gore, 2016; DuFour & Eaker, 1998) and this is a highly useful starting point for developing teachers' knowledge and beliefs about SRL, we argue that possessing high quality knowledge and beliefs is simply not enough. In addition, teachers' reflexive decision making also needs to be supported, and this has substantial potential to be achieved in the PLC context. Based on our search of the literature, researchers have rarely explored how PLCs can explicitly prompt teachers' epistemic reflexivity. The following section details our proposed PLC-ER, an extended PLC model that incorporates an explicit focus on improving epistemic reflexivity (ER).

Upgrading PLCs to PLC-ERs for enhanced teaching practice about SRL

A PLC-ER includes all the elements of a typical PLC (e.g., opportunities for teacher collaboration, a focus on student learning), meaning that it is well placed to support the

development of teachers' high quality knowledge and beliefs about SRL. In addition, a PLC-ER includes explicit educative tools to engage teachers in each moment of the DDD-D process model of epistemic reflexivity (refer Figure 1), namely, the *discernment moment*, the *deliberation moment*, the *decision moment* and the *deed moment*. The following sections provide scenarios showing how education for epistemic reflexivity might appear in a PLC-ER. Following these scenarios, we provide practical examples demonstrating how we have implemented aspects of the DDD-D model for teachers' epistemic reflexivity in our own classroom-based research.

Teachers' discernment moment about SRL

For example, teachers involved in a PLC-ER would have opportunities to consider their projects of concern, that is to be explicitly engaged in the *discernment* phase. This might involve a facilitator or teacher-leader explicitly asking the teachers to list all their projects of concern (e.g., subject-content, general capabilities, SRL, wellbeing, pastoral care). Explicit engagement in the *discernment phase* allows teachers to recognise the many projects of concern that they are balancing. In the context of promoting SRL in the classroom, the aim is to have SRL listed as a project of concern. If the promotion of SRL is not listed, then this is an opportunity for a facilitator or group leader to prompt discussions about the value of equipping students with good quality SRL strategies.

Teachers' deliberation moment about SRL

Following the listing of their projects of concern, the teachers would be encouraged to critically reflect on each project, debating its value in relation to their own personal factors (e.g., knowledge, motivations, self-beliefs) and environmental factors (e.g., school vision, mission, values, policies). During this moment, the teachers would prioritise their concerns from most valuable to least valuable. While promoting SRL in the classroom might be listed by teachers as a project of concern (i.e., *discernment*), the teachers' *deliberation* is important as it questions where promoting SRL sits within their project priorities. If the promotion of SRL is not prioritised it is unlikely to gain the attention it deserves and therefore may not be enacted in the classroom. We argue that this early phase may be the barrier for teachers' implementation – that is, balancing the different projects of concern to ensure that students are well-equipped with all the necessary 21st century skills. Again, a facilitator can use pedagogical tools such as evidence and discussion to elevate SRL to a high priority project.

Teachers' decision moment about SRL

To encourage teachers in the *decision moment* of epistemic reflexivity about SRL, teachers can be encouraged to create lesson plans that include epistemic aims (as learning

objectives/outcomes) and appropriate pedagogical strategies (e.g., explicit teaching of SRL strategies) related to the development of students' SRL capabilities. A pre-formatted lesson plan template might include explicit prompts for SRL (e.g., include a learning outcome for SRL). However, the DDD-D process acknowledges that while a teacher may have made decisions during their lesson planning for the promotion of SRL in the classroom, the space (e.g., time delay) between *decision* and *deed* means that teachers may need to return to the discernment and deliberation moments to reevaluate their projects of concern.

Teachers' deed moment about SRL

The teachers' teaching actions (i.e., *deed moment*) often occurs in the context of their own classrooms. Collecting data from lessons is a common practice in PLCs. Data about teachers' *deed moment* might include colleagues observing lessons that have an explicit focus on the teaching of SRL strategies and creating opportunities (such as providing time) for students to engage in SRL. The Assessing how Teachers Enhance Self-Regulated Learning observation instrument (ATES; Dignath-van Ewijk, Dickhäuser, & Büttner, 2013) offers a useful tool to support teachers in documenting the *deed moment* of epistemic reflexivity about SRL.

We propose that supporting teachers to engage in epistemic reflexivity about teaching SRL is more likely to lead to sustainable changes in their practice, compared to simply providing them with, for example, information about the value of SRL and a checklist of SRL strategies. To investigate our proposal, in an earlier study, (a precursor to this chapter), we evaluated the effects of a researcher-facilitated PLC-ER about SRL with four science teachers in an independent school in Melbourne (see Barr & Askill-Williams, 2019). As part of the PLC-ER intervention, during conversations, the facilitator engaged teachers' epistemic reflexivity about SRL with the intention of supporting changes in teachers' knowledge, beliefs and teaching practice about SRL. During these conversations, teachers were prompted to discuss the different and competing learning aims, the different modes for how the aims might be achieved and how these aims related to the school's strategic direction. Lesson plans were crafted (i.e., *decision moment*) and teachers were asked to implement and complete a self-reflection of their implemented actions (*explicit prompt for the deed moment*). Analysis of teachers' pre-post interviews and self-reported teaching actions alongside their lesson plans revealed that the PLC-ER enhanced teachers' knowledge, beliefs and practices about SRL (Barr & Askill-Williams, 2019).

Building on this research, we are currently investigating the effects of a facilitated PLC-ER about SRL on school middle-leaders' (e.g., Heads of departments, Subject Coordinators) epistemic cognition (including knowledge, beliefs and epistemic reflexivity) and practice, teachers' self-systems about SRL, and students' SRL. Specifically, following each

PLC-ER meeting, school middle-leaders have been asked to think-aloud while completing a lesson planning template that includes prompts for teachers' epistemic reflexivity about SRL. Our preliminary findings suggest that a facilitated PLC-ER about SRL supports teachers and school middle-leaders' engagement in epistemic reflexivity and leads to sustained improvements in their explicit teaching of SRL strategies.

We propose that PLCs can be upgraded to incorporate explicit education to engage teachers in epistemic reflexivity that can lead to an increased likelihood of sustained implementation of evidence-based practices designed to develop students' knowledge about SRL.

Implications for policy, research, and practice

Students who are left to discover 21st century skills such as SRL by themselves are at the mercy of chance or good fortune, such as availability of family members who can teach those skills. Overcoming the gap between research that shows that explicit SRL instruction works, contrasted against reports from classrooms that explicit and sustained SRL instruction is relatively rare, requires a new approach, such as the focus on epistemic reflexivity that we advocate in this chapter.

We have argued that to support the development of students' 21st century capabilities such as SRL, teachers' epistemic reflexivity must highly value and prioritise SRL, to support teachers' sustained implementation of evidence-based teaching about SRL. Upgrading the current model of PLCs to PLC-ERs provides an exciting pathway to achieving enhanced teachers' epistemic reflexivity about SRL. Higher education institutions and schools could incorporate our suggested educative tools into their existing PLC structures, to encourage teachers to explicitly engage in a process of epistemic reflexivity, whether about SRL or other 21st century capabilities or topics of interest. Teachers who are more epistemically cognisant of their stance and epistemically reflexive about their practices regarding explicit teaching of SRL will contribute to learners being more effective lifelong learners who have skills to effectively contribute to their own growth and to society at large.

PLCs are being implemented locally (e.g., ACT Education Directorate, 2018; New South Wales State Government, 2019; Victoria State Government, 2019) and globally (e.g., Vangrieken et al., 2017). Therefore, 'upgrading' PLCs to our PLC-ER model is not a matter of implementing a new structure. Rather, our suggested changes are 'potential tweaks' to current professional education. While in this chapter we have discussed building on the well-evidenced PLC model of professional development, we envisage that embedding epistemically reflexivity into other professional education models could also be achieved.

Conclusions

In this chapter, we advocate that to achieve sustained implementation of evidence-based interventions that support students' 21st century capabilities (e.g., SRL), teachers need to engage in high-quality epistemic reflexivity about 21st century capabilities. We have highlighted that, in the context of SRL, concerns have been raised about the quality of teachers' knowledge and beliefs, and subsequently their teaching practice about SRL. Following a critical evaluation of current models of epistemic reflexivity, we have proposed the DDD-D process model of epistemic reflexivity. We argue for the incorporation of educative tools that will engage teachers in epistemic reflexivity during their initial teacher education and ongoing professional education. The sustained promotion of students' SRL in classrooms requires substantial change in teachers' self-systems about SRL (e.g., knowledge, beliefs, attitudes, perceptions, values), and also teachers' re-prioritisation of their educational goals and practices. In other words, in addition to professional education that addresses teachers' knowledge and beliefs about SRL, teachers need to engage in high quality epistemic reflexivity about SRL.

Providing high quality education with a focus on 21st century capabilities to all students is a social justice issue. It is about ensuring that every child is prepared to thrive in an ever-changing world. By both developing teachers' knowledge and beliefs about SRL and explicitly engaging teachers' epistemic reflexivity about SRL, we argue there is greater likelihood of evidence-based SRL teaching initiatives being sustainably translated into teachers' practices, and thus preparing students to thrive in this ever-changing world.

References

- ACARA. (2019). Retrieved from <https://www.australiancurriculum.edu.au/>
- ACT Education Directorate. (2018). The future of education: An ACT education strategy for the next ten years. Retrieved from https://www.education.act.gov.au/_data/assets/pdf_file/0015/1231080/Future-Of-Education-Final-Strategy_Web.pdf
- AITSL. (2019). National professional standards for teaching. Retrieved from <http://www.aitsl.edu.au/australian-professional-standards-for-teachers/standards/overview/organisation-of-the-standards>
- Archer, M. S. (2000). *Being human: The problem of agency*. Cambridge, England: Cambridge University Press.
- Archer, M. S. (2003). *Structure, agency and the internal conversation*. Cambridge, England: Cambridge University Press.
- Archer, M. S. (2007). *Making our way through the world human reflexivity and social mobility*. Cambridge, England: Cambridge University Press.
- Archer, M. S. (2010a). *Conversations about reflexivity*. London, England: Routledge.
- Archer, M. S. (2010b). Introduction: The reflexive re-turn. In M. Archer (Ed.), *Conversations about reflexivity* (pp. 1-14). London, England: Routledge.
- Bakhtin, M. (1929/1973). *Problems of Dostoevsky's poetics* (C. Emerson Ed. Vol. 8). Minneapolis, MN: University of Minnesota Press.
- Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist*, 33(4), 344-358. <https://doi.org/10.1037/0003-066X.33.4.344>
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology*, 52(1), 21-41. <https://doi.org/10.1146/annurev.psych.52.1.1>
- Barr, S., & Askill-Williams, H. (2019). Changes in teachers' epistemic cognition about self-regulated learning as they engaged in a researcher-facilitated professional learning community. *Asia-Pacific Journal of Teacher Education*, (online early). <https://doi.org/10.1080/1359866X.2019.1599098>
- Beveridge, L., Mockler, N., & Gore, J. (2018). An Australian view of the academic partner role in schools. *Educational Action Research*, 26(1), 1-17. <https://doi.org/10.1080/09650792.2017.1290538>
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17-66). Dordrecht, Netherlands: Springer.
- Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students. *Learning and Instruction*, 7(2), 161-186. [https://doi.org/10.1016/S0959-4752\(96\)00015-1](https://doi.org/10.1016/S0959-4752(96)00015-1)
- Bowe, J., & Gore, J. (2016). Reassembling teacher professional development: The case for Quality Teaching Rounds. *Teachers and Teaching*, 23(3), 352-366. <https://doi.org/10.1080/13540602.2016.1206522>
- Care, E., & Kim, H. (2018). Assessment of twenty-first century skills: The issue of authenticity. In E. Care, P. Griffin, & M. Wilson (Eds.), *Assessment of teaching of 21st century skills: Research and applications* (pp. 21-40). Cham, Switzerland: Springer.
- Council of Australian Governments Education Council. (2019). *Alice Springs (Mparntwe) Education Declaration*. Retrieved from <https://www.reviewmelbournedeclaration.edu.au/>

- Dede, C. (2010). Comparing frameworks for 21st century skills. In J. Bellanca & R. Brandt (Eds.), *21st century skills* (pp. 51-76). Bloomington, IN: Solution Tree Press.
- Dignath, C., & Büttner, G. (2018). Teachers' direct and indirect promotion of self-regulated learning in primary and secondary school mathematics classes – insights from video-based classroom observations and teacher interviews. *Metacognition and Learning*, 13(2), 127-157. <https://doi.org/10.1007/s11409-018-9181-x>
- Dignath-van Ewijk, C., Dickhäuser, O., & Büttner, G. (2013). Assessing how teachers enhance self-regulated learning: A multiperspective approach. *Journal of Cognitive Education and Psychology*, 12(3), 338-358. <https://doi.org/10.1891/1945-8959.12.3.338>
- Dignath-van Ewijk, C., & van der Werf, G. (2012). What teachers think about self-regulated learning: Investigating teacher beliefs and teacher behavior of enhancing students' self-regulation. *Education Research International*, Article ID 741713, 1-11. <https://doi.org/10.1155/2012/741713>
- Dogan, S., Pringle, R., & Mesa, J. (2016). The impacts of professional learning communities on science teachers' knowledge, practice and student learning: A review. *Professional Development in Education*, 42(4), 569-588. <https://doi.org/10.1080/19415257.2015.1065899>
- Donker, A. S., de Boer, H., Kostons, D., Dignath van Ewijk, C. C., & van der Werf, M. P. C. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review*, 11(2014), 1-26. <https://doi.org/10.1016/j.edurev.2013.11.002>
- DuFour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement*. Bloomington, IN: Solution Tree.
- Feucht, F. C., Lunn Brownlee, J., & Schraw, G. (2017). Moving beyond reflection: Reflexivity and epistemic cognition in teaching and teacher education. *Educational Psychologist*, 52(4), 234-241. <https://doi.org/10.1080/00461520.2017.1350180>
- Fives, H., Barnes, N., Buehl, M. M., Mascadri, J., & Ziegler, N. (2017). Teachers' epistemic cognition in classroom assessment. *Educational Psychologist*, 52(4), 270-283. <https://doi.org/10.1080/00461520.2017.1323218>
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, 34(10), 906-911. <https://doi.org/10.1037/0003-066X.34.10.906>
- Gonski, D., Arcus, T., Boston, K., Gould, V., Johnson, W., O'Brien, L., . . . Roberts, M. (2018). *Through growth to achievement: Report of the review to achieve educational excellence in Australian schools*. Canberra: Commonwealth of Australia.
- Gore, J. M., Griffiths, T., & Ladwig, J. G. (2004). Towards better teaching: Productive pedagogy as a framework for teacher education. *Teaching and Teacher Education*, 20(4), 375-387. <https://doi.org/10.1016/j.tate.2004.02.010>
- Greene, J. A., Sandoval, W. A., & Bråten, I. (2016). An introduction to epistemic cognition. In J. A. Greene, W. A. Sandoval, & I. Bråten (Eds.), *Handbook of epistemic cognition* (pp. 1-14). New York, NY: Routledge.
- Greene, J. A., & Yu, S. B. (2016). Educating critical thinkers: The role of epistemic cognition. *Policy Insights from the Behavioral and Brain Sciences*, 3(1), 45-53. <https://doi.org/10.1177/2372732215622223>
- Hofer, B. K., & Bendixen, L. D. (2012). Personal epistemology: Theory, research, and future directions. In K. Harris, S. Graham, & T. Urdan (Eds.), *APA educational psychology*

- handbook, Vol 1: Theories, constructs, and critical issues* (pp. 227-256). Washington, DC: American Psychological Association.
- James, W. (1890/2007). *The principles of psychology* (Vol. 1). New York, NY: Cosimo.
- James, W. (1892/2001). *Psychology: The briefer course*. New York, NY: Dover.
- Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education*, 29(4), 127-140. <https://doi.org/10.1080/21532974.2013.10784716>
- Kistner, S., Otto, B., Büttner, G., Rakoczy, K., & Klieme, E. (2015). Teaching learning strategies: The role of instructional context and teacher beliefs. *Journal for Educational Research Online*, 7(1), 174-195. Retrieved from <http://www.j-e-r-o.com/index.php/jero/article/download/542/228>
- Kistner, S., Rakoczy, K., Dignath van Ewijk, C. C., Otto, B., Büttner, G., & Klieme, E. (2010). *Teachers' promotion of self-regulated learning in classrooms and its effects on student performance*. Paper presented at the Annual meeting American Educational Research Association, Denver, CO.
- Klug, J., Ogrin, S., Keller, S., Ihringer, A., & Schmitz, B. (2011). A plea for self-regulated learning as a process: Modelling, measuring and intervening. *Psychological Test and Assessment Modeling*, 53(1), 51-72. Retrieved from http://www.psychologie-aktuell.com/fileadmin/download/ptam/1-2011_20110328/04_Klug.pdf
- Lunn Brownlee, J., Ferguson, L. E., & Ryan, M. (2017). Changing teachers' epistemic cognition: A new conceptual framework for epistemic reflexivity. *Educational Psychologist*, 52(4), 242-252. <https://doi.org/10.1080/00461520.2017.1333430>
- Lunn Brownlee, J., Rowan, L., Ryan, M., Walker, S., Bourke, T., & Churchward, P. (2019). Researching teacher educators' preparedness to teach to and about diversity: investigating epistemic reflexivity as a new conceptual framework. *Asia-Pacific Journal of Teacher Education*, 47(3), 230-250. <https://doi.org/10.1080/1359866X.2018.1555794>
- MCEETYA. (2008). *Melbourne declaration on educational goals for young Australians*. Retrieved from http://www.curriculum.edu.au/verve/resources/national_declaration_on_the_educational_goals_for_young_australians.pdf
- Mead, G. H. (1934). *Mind, self and society: From the standpoint of a social behaviourist* (C. W. Morris Ed.). Chicago, IL: The University of Chicago Press.
- Mishra, P., & Mehta, R. (2017). What we educators get wrong about 21st-Century learning: Results of a survey. *Journal of Digital Learning in Teacher Education*, 33(1), 6-19. <https://doi.org/10.1080/21532974.2016.1242392>
- New South Wales State Government. (2019). Quality Teaching Rounds. Retrieved from <https://education.nsw.gov.au/teaching-and-learning/professional-learning/quality-teaching-rounds>
- OECD. (2005). The definition and selection of key competencies [Executive Summary]. Retrieved from <http://www.oecd.org/pisa/35070367.pdf>
- OECD. (2018). The future of education and skills: Education 2030. Retrieved from [https://www.oecd.org/education/2030/E2030_Pposition_Paper_\(05.04.2018\).pdf](https://www.oecd.org/education/2030/E2030_Pposition_Paper_(05.04.2018).pdf)
- OECD. (2019). *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*. Paris: OECD Publishing.
- Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.00422>

- Peirce, C. S. (1984). *Writings of Charles S. Peirce: A chronological edition. Volume 2, 1867-1871* (E. C. Moore Ed.). Bloomington, IN: Indiana University Press.
- Perry, N. E., Hutchinson, L., & Thauberger, C. (2008). Talking about teaching self-regulated learning: Scaffolding student teachers' development and use of practices that promote self-regulated learning. *International Journal of Educational Research*, 47(2), 97-108. <https://doi.org/10.1016/j.ijer.2007.11.010>
- Spruce, R., & Bol, L. (2015). Teacher beliefs, knowledge, and practice of self-regulated learning. *Metacognition and Learning*, 10(2), 245-277. <https://doi.org/10.1007/s11409-014-9124-0>
- Vangrieken, K., Meredith, C., Packer, T., & Kyndt, E. (2017). Teacher communities as a context for professional development: A systematic review. *Teaching and Teacher Education*, 61(January 2017), 47-59. <https://doi.org/10.1016/j.tate.2016.10.001>
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, 24(1), 80-91. <https://doi.org/10.1016/j.tate.2007.01.004>
- Victoria State Government. (2019). Professional learning communities. Retrieved from <https://www.education.vic.gov.au/school/teachers/management/improvement/plc/Pages/default.aspx>
- Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, 44(3), 299-321. <https://doi.org/10.1080/00220272.2012.668938>
- Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: MIT Press.
- Wiley, N. (2010). Inner speech and agency. In M. Archer (Ed.), *Conversations about reflexivity* (pp. 17-38). New York, NY: Routledge.
- Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277-304). Mahwah, NJ: Lawrence Erlbaum Associates.
- World Economic Forum. (2017). *Annual Report 2016-2017*. Retrieved from http://www3.weforum.org/docs/WEF_Annual_Report_2016_17.pdf
- Zimmerman, B. J. (1986). Becoming a self-regulated learner: Which are the key subprocesses? *Contemporary Educational Psychology*, 11(4), 307-313. [https://doi.org/10.1016/0361-476X\(86\)90027-5](https://doi.org/10.1016/0361-476X(86)90027-5)
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2
- Zimmerman, B. J. (2008). Theories of self-regulated learning and academic achievement: An overview and analysis. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 1-38). Mahwah, NJ: Routledge.
- Zimmerman, B. J. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational Psychologist*, 48(3), 135-147. <https://doi.org/10.1080/00461520.2013.794676>