

School Improvement Tool

Literature
review

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The *School Improvement Tool* is the second iteration of the *National School Improvement Tool*, initially developed by Professor Geoff Masters of the Australian Council for Educational Research in partnership with the Queensland Department of Education, Training and Employment.

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Introduction

This literature review aims to present a thematic synthesis (Gough et al., 2012) of the research evidence across the nine domains of the School Improvement Tool® (SIT) (previously National School Improvement Tool® [NSIT]). This review underpinned refinement of the NSIT to the SIT.

The School Improvement Tool® identifies practices of highly effective schools and schools which have undergone substantial improvement, based on evidence from the international literature. The SIT is the second iteration of the NSIT, which was developed by the Australian Council for Educational Research (ACER) in collaboration with the Queensland Department of Education, Training and Employment for the Commonwealth Department of Education, Employment and Workplace Relations, based on research evidence and a series of national consultations conducted in 2012. It provides a point of reference for key stakeholders to collectively reflect on their school's current practices and identify areas for improvement.

The SIT focuses on observable measurable practices to inform school improvement, as opposed to, for example, attributes of school leaders. Research has demonstrated that such practices can be influenced and can accumulate to substantial improvements in student outcomes (e.g., Day et al., 2016; Sammons et al., 2014; Shen et al., 2012). For example, the mixed-methods study by Sammons et al. (2014) demonstrated the substantial potential for school leaders to positively impact a broad range of educational outcomes for students, including behaviour, engagement, and academic achievement. These findings held true regardless of school sector, size, and socio-economic composition of the student population. It is important to note that some practices—school leadership practices in particular—indirectly influence student outcomes. Nevertheless, these practices are crucial to facilitate and sustain school improvement (Day et al., 2016; Shen et al., 2012; Sun & Leithwood, 2015).

There are various frameworks for school improvement in the literature (e.g., Shen et al., 2012). Although these frameworks may organise variables in different ways, the leadership practices captured within these frameworks substantially overlap. For example, Hallinger (2005) defined 'instructional leadership' as focusing on 3 core leadership practices: articulation of the school's mission, management of the instructional program, and promotion of a positive school-wide

learning climate. These practices span across the various SIT domains.

School improvement research highlights the interrelatedness of a broad range of practices at different levels, ranging from the individual student to the broader school community. All these levels need to be attended to for coherent and sustainable school improvement (Leithwood, 2011; Louis et al., 2010; Robinson et al., 2017; Yatsko et al., 2015). For example, Leithwood (2010) highlighted the interrelatedness of the impact of leadership practices on different practices such as the school's climate, social constructs, organisational structures and family influences on students' classroom and school-wide experiences, all of which influence student learning. Leithwood warned that "failure to take such interaction into account severely limits school leaders' influence" (p. 12).

The SIT does not describe all practices of highly effective schools. Rather, it focuses on those practices that are most directly related to school-wide improvements, and thus outcomes for students. As noted, research highlights the need to consider how a large range of practices at different levels of the school contribute to school improvement (Leithwood, 2011).

The SIT describes characteristics of effective practice across nine interrelated domains:

- 1 Driving an explicit improvement agenda
- 2 Analysing and discussing data
- 3 Promoting a culture of learning
- 4 Targeting school resources
- 5 Building an expert teaching team
- 6 Leading systematic curriculum implementation
- 7 Differentiating teaching and learning
- 8 Implementing effective pedagogical practices
- 9 Building school-community partnerships.

Methodology

The literature under review includes publications on school improvement, school effectiveness and school leadership. However, a stronger emphasis was placed on school improvement over school effectiveness, given its focus on improvement versus accountability (OECD, 2013). Sammons et al. (2014) reflected on the nature of research on school effectiveness and school improvement respectively. These researchers identified that research on school effectiveness is mostly quantitative in nature, whereas school improvement research mainly draws on qualitative research, reflecting stories of improvement processes. They argued that testing and building theories of school effectiveness requires researchers to draw on a combination of qualitative and quantitative evidence or mixed-methods. This literature review therefore draws on evidence from the school effectiveness and school improvement literature to provide a robust foundation to inform school improvement.

A comprehensive literature search was conducted to identify relevant publications. The literature search was restricted to sources published in English. Although preference was given to more recent sources, no restrictions were placed on the publication year. The search strategy involved searching the Australian Education Index and ERIC databases, with the keywords “school improvement”. An ancestry approach was also employed, which used reference lists of selected publications to identify relevant sources (Rorrer et al., 2008). In addition, several further rounds of targeted searches were conducted to complement the evidence base for certain domains whenever gaps had been identified.

Table 1 presents inclusion criteria for the selection of literature; and notably, exclusion criteria. Readers interested in education system improvement and leadership can consult the literature reviews supporting ACER’s Education System Improvement Tool® (ESIT) and the Principal Performance Improvement Tool® (PPIT).

A total of 118 publications met the inclusion criteria. Appendix A organises these publications into types, as per Rorrer et al. (2008): empirically-based studies (Table A.1), literature reviews/syntheses (Table A.2), and conceptual or descriptive works (Table A.3). Rorrer also distinguishes government or research centre policy papers as a fourth type. No such resources were identified in the literature search: hence these types of sources were not included. Appendix A also outlines characteristics for each reviewed publication, including author(s) and publication year, publication type, geographic focus and, where applicable, research methods and research questions, or purpose of the study. In addition, the last column identifies the alignment with specific SIT domain(s).

The review draws on a range of qualitative and quantitative evidence. Quantitative studies are useful in providing robust evidence for overall claims to effectiveness. Qualitative studies provide in-depth information about how the different domains play out in an authentic school context and provide valuable examples for practice. In addition, literature reviews and synthesis are helpful in that they provide a big picture view of certain aspects based on the broader research evidence.

Overall, the review is based upon 55 empirically-based studies, 42 literature reviews or syntheses, and 21 conceptual or descriptive works. The empirically-based studies—the largest category of publications under review—adopted a range of methods. Of the 55 studies, 24 used a quantitative approach, 21 used a qualitative approach, and 10 used mixed or multiple methods. In terms of publication type, the largest category under review are peer-reviewed journal articles ($n = 50$). In addition to the peer-reviewed journal articles, the review includes 39 research reports, 11 book chapters, 7 books, 5 conference papers, 4 professional journal articles and 2 essays. Although an effort was made to consider evidence from various international perspectives, certain geographical areas were better

Table 1 Inclusion and exclusion criteria to select literature

Inclusion criteria	Exclusion criteria
School improvement, effectiveness and leadership literatures	School system improvement and leadership literatures and accountability literatures
Focus on practices	Focus on attributes
English language	Language other than English

represented than others. Overall, most publications had an international focus, followed by research focused on the US and Australia. This review mainly draws upon evidence from mainstream primary, middle and/or high schools, with evidence from pre-school and special education contexts relatively underrepresented.

Although there is increasing recognition of the interrelatedness of student social and wellbeing scholastic outcomes, school improvement and effectiveness research has mainly focused on evidence in relation to student achievement. Hence, most studies that examined the impact of certain practices on student outcomes focused on academic outcomes. The studies that focused on academic outcomes were mostly contextualised in mathematics or literacy. Some studies combined student achievement data across a range of disciplines, and others were conducted in specific areas of curriculum. However, some studies focused on educational outcomes more broadly, including social and wellbeing outcomes. This aligns with international trends in the focus of school improvement, which has seen a shift from academic attainment to more holistic outcomes which underpin student potential to contribute to society (Robinson, 2007). Nevertheless, the research reviewed necessarily reflects “what is educationally desirable” (Hattie, 2009, p. 254), which differs across contexts.

A systematic approach was followed to extract relevant information from each of the selected publications. The full text versions of all selected publications were retrieved and read in full. Key points were recorded for each publication, which were mapped across the nine domains. Whilst the review does not claim to comprehensively cover the full evidence base, literature was sourced and read to data saturation (Saunders et al., 2018), that is, until no novel themes were evident. This approach is consistent with qualitative research methods, which place primary emphasis on obtaining a comprehensive understanding by continuing to sample until no new substantive information is acquired (Guest et al., 2020; Saunders et al., 2018).

This review provides an integrated overview of the cumulative evidence for each of the SIT domains. Although 29% of publications focused on one domain, 71% focused on more than one domain, with 4 publications contributing evidence to all domains. Figure 1 shows the number of publications that contributed evidence to each of the nine domains.

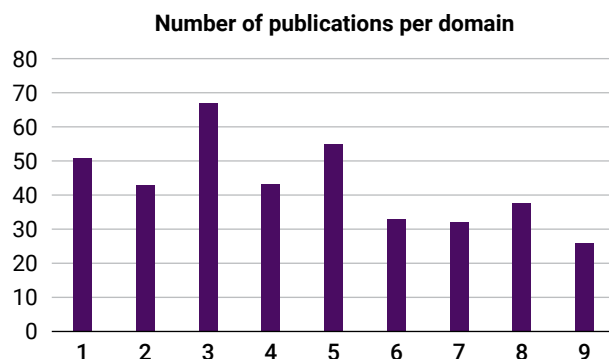


Figure 1 Number of publications that contributed evidence per domain

Once all evidence had been mapped to the relevant domains, thematic analysis was conducted using a two-step approach. First, evidence was re-organised and categorised based on the NSIT characteristics within each domain. In some cases, evidence was categorised under multiple characteristics. Next, evidence for each characteristic was examined in-depth and narratively synthesised. This process involved critical evaluation of the evidence against the original NSIT characteristic, resulting in suggested revisions, combining of characteristics and, at times, deletion of characteristics or generation of new characteristics based on themes from the analysis. Revisions were refined in various rounds of review and collaborative discussion and were further iteratively refined along development of SIT performance levels. This document presents the final version of each characteristic and the underpinning evidence base. Characteristics are presented in the order in which they appear in the SIT.

Findings are organised so that each of the nine domains can stand-alone, whilst drawing connections between cross-cutting themes. Although this leads to some repetition for those who read the document in its entirety, it allows for each domain to be considered separately. For each domain, the overall evidence is discussed first, followed by more specific discussions of evidence for each of its characteristics.

Driving an explicit improvement agenda

Overall evidence for Domain 1

The importance of school leadership direction-setting practices on school improvement has long been recognised (Leithwood, 2011; Leithwood et al., 2004; Sammons et al., 1995). Popular leadership models of transformational leadership and instructional leadership have both highlighted the importance of setting strategic direction for school improvement. Recent literature highlights the value of both models in realising school improvement (Sun & Leithwood, 2015).

Notably, evidence from the literature suggests that of all school leadership practices, those concerned with setting strategic directions are most impactful (Leithwood et al., 2004). However, the effects of these practices on student achievement are mostly indirect (Sun & Leithwood, 2015). Based on an extensive qualitative and quantitative review of research evidence, Sun and Leithwood found a non-statistically significant small correlational effect size (weighed mean $r = 0.05$) for the relationship between direction-setting practices and student achievement outcomes. However, the overall correlational effect size of direction-setting practices on a broad range of school organisation outcomes was $r = 0.44$. Their review showed that most of the research in this domain has focused on (1) developing a shared vision and consensus towards goals and (2) holding high expectations for all staff and students within the school. These practices appear important in creating a school environment where there is a shared understanding and commitment towards collective goals and a culture that is instrumental in achieving these goals, which in turn positively relates to student achievement outcomes. Furthermore, the review showed that strategic direction-setting practices had a substantial effect on teacher classroom practice. In summary, the impact of setting an explicit improvement agenda is mostly indirect, yet critical, to sustainable school improvement.

The school has developed and is implementing a coherent and context-appropriate school improvement agenda

School improvement is clearly complex. Amongst other things, it requires collaboratively determining the school's vision, mission, goals and expectations for students, analysis of student and teacher needs, including based on data, and ongoing evaluation of the results of school improvement efforts (Zepeda, 2013). The criticality of coherence and coordination in school improvement planning was a recurrent theme in the literature (Al Mekhlafi & Osman, 2019; Hopkins & Craig, 2015; Van Der Voort & Wood, 2014; Robinson et al, 2017; Sammons et al., 2014; Taylor et al., 2001; Yatsko et al., 2015).

As noted, the influence of school leaders on school improvement is often indirect (e.g., Sammons et al., 2014). Yet research shows that when school improvement efforts are focused on relevant variables in synergy, they can result in substantial improvements in student outcomes (Day et al., 2016; Louis et al., 2010). This is because school leaders play an important role in providing a common framework that guides all decisions in the school (Robinson, 2007). Based on empirical evidence, Day et al. (2016) highlighted the need for school leaders to promote school improvement "through the combination and accumulation of various relatively small effects of leadership practices" (p. 238).

Importantly, school improvement practices need to be coherent in the sense that they contribute to the same strategically identified directions. Strategic plans need to focus on long-term sustainable solutions, rather than quick fixes (Dinham, 2016; Zepeda, 2013). Research shows that many school improvement efforts fail because leaders focus their efforts on discrete aspects, rather than on a set of collective and complementary aspects

(Hopkins, 2013). For example, school improvement requires alignment of individual and organisational needs (Zepeda, 2013), including attention to professional learning for school leaders and teachers (Hopkins & Craig, 2015; Taylor et al., 2001). Further, if schools commit to multiple initiatives, this is likely to result in incoherence of improvement-focused activities, resulting in unfavourable outcomes such as increased teacher stress (Robinson et al., 2017). The criticality of coherence is aptly illustrated by Murphy (1992):

“One of the most powerful and enduring lessons from all the research on effective schools is that the better schools are more tightly linked—structurally, symbolically, and culturally—than the less effective ones. They operate more as an organic whole and less as a loose collection of disparate subsystems.” (p. 96, as cited in Robinson et al. 2017)

Three approaches to school turnaround can be distinguished based on the literature (Yatsko et al., 2015):

- *Kitchen Sink*; this approach is characterised by the use of various seemingly unconnected improvement strategies, which are not underpinned by a clear rationale.
- *Scattershot*; this approach is characterised using strategies which are not tailored to the needs of the school or evidence-informed.
- *Laser Focus*; this approach is characterised by the use of a focused set of highly strategic interventions that are evidence-informed and relevant to the school's context.

Common practices under the scattershot approach include the blind adoption of strategies that have been effective elsewhere, without taking account of the school's contextual needs (Yatsko et al., 2015). Yatsko and colleagues (2015) vividly described the shortcomings of the highly common Kitchen Sink approach, where plans lacked coherence. They identified that although teachers and school leaders worked hard, “principals struggled to effectively focus the energy and investment made by their teachers. This lack of focus left teachers rowing hard but in too many different directions” (p. 39). Initial evidence identified that only schools who took a Laser Focus approach had managed to improve student achievement outcomes using a school improvement grant (Yatsko et al., 2015).

It is clear from the research evidence that school improvement plans need to be context-appropriate and relevant to school needs (Dinham, 2016; Taylor et al., 2001; Yatsko et al., 2015; Zepeda, 2013) and evidence-informed (Taylor et al., 2001; Van Der Voort & Wood, 2014; Yatsko et al., 2015). This requires consultation with relevant stakeholders and examination and discussion of data, which are considered as distinct characteristics.

The governing body, principal, and school leaders are united, committed to, and explicit about, improving outcomes for all students

Numerous studies highlighted the importance of school leadership in articulating a school-wide vision, mission and values (Al Mekhlafi & Osman, 2019; Centre for Education Statistics and Evaluation New South Wales [CESE], 2015; Cole-Henderson, 2000; Dinham, 2016; Forsyth et al., 2011; Hallinger & Heck, 2002; Handa, 2013; Hattie et al., 2015; Hopkins, 2013; Leithwood, 2011; Leithwood et al., 2004; Sammons et al., 1995; Sun & Leithwood, 2015; Wahlstrom, 2011). For example, school vision was among the driving forces for school improvement in the quasi-experimental study by Al Mekhlafi and Osman (2019).

The terms mission and vision are often used interchangeably in the literature. In combination, these provide a distillation of the school's broad purposes, goals and values, which provide broad directions for school improvement practices. Although distributed leadership has gained popularity in recent decades, certain aspects of leadership have remained the primary responsibility of school leaders. Building a shared vision for the school is one of these aspects (Leithwood et al., 2004). Depending on school governance structures, this may also be the governing body's responsibility. Yet the development of the school's vision, mission and values can be done in collaboration with other stakeholders such as teachers and students (Taylor et al., 2011; Zepeda, 2013). Forsyth et al. (2011) highlighted that an impactful school vision, mission and values are ideally “distilled through genuine and repeated interaction over time” (p. 116). The development of school-wide values, beliefs and principles provides a strong foundation to enable school leaders to deal with ongoing challenges (Owen, 2004, cited in Conway & Abawi, 2013).

Examination of the literature makes it evident that impactful school vision and mission statements reflect a core focus on quality teaching and improving educational outcomes for students (CESE, 2015; Dinham, 2015; Taylor et al., 2001; Wahlstrom, 2011). Various studies highlighted the importance of strategic leadership to shape the school's mission as an indirect way to improve school outcomes, for example through influencing the school's culture (Day et al., 2016; Hallinger & Heck, 2002) or aspirations for teaching and learning (Cole-Henderson, 2000; Wahlstrom, 2011). School leaders need to clearly communicate a central focus on creating “an environment where each student can experience success and academic, personal and social growth” (Dinham, 2016, p. 172). This includes a focus on

student wellbeing to holistically address the needs of each child, requiring an educational focus beyond academic outcomes. Importantly, research shows that student wellbeing is positively associated with improved academic outcomes (Dinham, 2016; Otero, 2016; O'Connor et al., 2019). Specifically, evidence points to the interconnectedness of student engagement, wellbeing, and academic achievement (CESE, 2015). Research also highlights the importance of the school's vision in setting expectations for behaviour in the school, which is associated with student wellbeing (CESE, 2015).

Various studies emphasised the importance of communicating the school's aspirations and goals (Forsyth et al., 2011; Hallinger & Heck, 2002; Handa, 2013; Hattie et al., 2015; Hopkins & Craig, 2015; Leithwood et al., 2004; Zepeda, 2013). For example, principals of high-performing schools serving disadvantaged student populations in the US unanimously agreed on the importance of clear communication of the school mission statement (Cole-Henderson, 2000). Handa (2013) explained that communication of the school's vision is critical to its realisation. Specifically, communication regarding the vision needs to focus on questions of why, what, and how. Such communication of the school's vision, mission and values needs to go beyond instrumental communication. Rather, it needs to be communicated in subtle ways in all school leader and staff interactions (Forsyth et al., 2011). Further, the school's vision and shared values need to be consistently communicated with key stakeholders within the wider school community (Zepeda, 2013).

Most importantly, there needs to be strong school leader commitment to the school's mission (Wahlstrom, 2011; Zepeda, 2013) as well as shared school-wide commitment to the articulated aspirations and goals (Fullan & Hargreaves, 2016; Hattie et al., 2015; Miles & Ferris, 2015; Sammons et al., 1995; Timperley, 2012). Timperley et al. (2012) specifically highlighted the importance of student commitment to the school's strategic improvement focus. Creating shared commitment to the school's vision, mission and goals is a key school leader responsibility (Levin & Schrum, 2014). There is increasing recognition in the business and education literature that shared commitment to goals can be facilitated through collaboration, as opposed to top-down policy making (Hallinger & Heck, 2002; Sammons et al., 1995). Despite the identified importance of this characteristic, a shared commitment to the school's goals will only result in improved student outcomes if it results in shaping the desired school culture and results in appropriate actions (Hallinger & Heck, 2002).

The school has involved all stakeholders in planning for school improvement

Research shows that planning for school improvement requires effective collaboration between the school leadership team and a range of stakeholders within and outside of the school. Clear communication (Leithwood et al., 2004; Zepeda, 2013), for example in relation to expectations and data to inform decision making (Zepeda, 2013) is key to such collaborations. CESE (2015) demonstrated that effective schools are characterised as having a leadership model that is "strategic, consultative, supportive and transparent" (p. 11). Zepeda (2013) described the school improvement process as providing "an opportunity for the principal to share power through openness, dialogue, and a sincere desire to build trust" (p. 15). This resonates with research showing that distributed leadership practices are consistently used in effective schools (Sammons et al., 2014). Specifically, enacting distributed leadership enabled all to "find their niche and lead from their strengths" (Levin & Schrum, 2014, p. 648). Importantly, research shows that extending leadership influence does not result in a school leader losing one's own influence (Leithwood & Jantzi, 2011). Moreover, based on a large-scale survey of over 2,500 teachers in 90 schools, Leithwood and Jantzi (2011) found that collective leadership—a form of shared and democratic leadership in which many different stakeholders exert influence on decisions in schools—was indirectly associated with improved student achievement. This relationship was mediated by teacher motivation and characteristics of their workplace. However, the results do need to be interpreted with some caution. In their study, high-performing schools (typically serving higher SES student populations) tended to report higher degrees of parent and student influence. As such, the reported effects may be confounded by SES-related factors.

Numerous studies specifically highlight the importance of teacher involvement in school improvement planning to create consensus in school improvement efforts (CESE, 2015; Dinham, 2016; Hattie et al., 2015; Hollingworth et al., 2018; Taylor et al., 2001; Zepeda, 2013), as school improvement plans need to be "representative of what teachers want to accomplish" (Hollingworth et al., 2018, p. 1023). Some studies identified the importance of involving teachers and other staff members, families, and community members in school improvement planning (Taylor et al., 2001; Zepeda, 2013). Harris et al. (2014) highlighted the importance of students' voices in shaping a school improvement agenda. However, considering voices of "those most directly affected by school change" (p. 1) can provide highly valuable insights for school improvement. This may require a shift in, where students are viewed as "legitimate, crucial contributors to school improvement" mindset (p. 2). Hattie (2012) also identified that consideration of student perspectives is critical to sustainable school improvement.

Several studies also highlighted the value of collaboration with relevant parties external to the school for school improvement planning. For example, school leaders can collaborate with researchers through action research to improve their awareness and capability to develop school improvement plans (Van Der Voort & Wood, 2014). In

addition, schools can support one another (Farrar, 2015) or may benefit from district or system-level support in planning for improvement (McAleavy & Elwick, 2016).

The school's improvement agenda is founded upon examination of data and trends in student outcomes over time, including for students with a range of different backgrounds, characteristics, interests, and needs

Research highlights the importance of using evidence of student outcomes to inform targeted school improvement plans (Masters, 2016; Timperley, 2012; Yatsko et al., 2015; Yoon, 2016; Zepeda, 2013). Importantly, school leaders need to base their improvement plans on analysis and discussion of a range of relevant data (Masters, 2016; Taylor et al., 2001; Timperley, 2012) to identify specific needs of teachers and students within the school (Zepeda, 2013; Timperley, 2012). In addition to examination of data that are readily available, targeted school improvement requires that school leaders identify evidence in relation to all educational outcomes that the school values (Timperley, 2012). Specifically, research has identified the need for school improvement interventions to be tailored to student needs as identified through examination of data (Yatsko et al., 2015). This includes consideration of student background characteristics; "one dimension to school effectiveness must be the capacity to help students from different backgrounds to thrive" (McAleavy et al., 2018, p. 27).

School staff are united in their commitment to improve the quality of teaching and learning throughout the school and to address obstacles to school-wide improvement

The importance of school leadership setting of high expectations for ongoing improvements in teaching and learning was highlighted in various studies (Garza et al., 2014; Hopkins, 2013; Jensen & Sonnemann, 2014; Masters, 2016; Sun & Leithwood, 2015). For example, Hopkins (2013) wrote that schools need to have "an unrelenting focus on the quality of learning and teaching" (p. 319). Most importantly, there needs to be a shared commitment to the ongoing improvement of teaching and learning within the school (Fullan & Hargreaves, 2016; Goss & Hunter, 2015; Marshall & Zbar, 2013). This requires collective efficacy; the collective belief that what teachers do makes a difference to students (Hoy et al., 2006). Strong principal support is positively associated with teachers' collective responsibility for student learning and teacher professional learning community (Park et al., 2019). Several studies highlighted the importance of developing a shared vision of what good teaching looks like to facilitate shared commitment to the continuous improvement of teaching and learning (Conway & Abawi, 2013; Goss & Hunter, 2015; Marshall & Zbar, 2013), which will be addressed further in Domain 8. A clearly articulated school improvement plan with well-defined strategies can provide useful guidance for school staff to overcome potential barriers to school-wide improvement (Zepeda, 2013).

Staff communicate clearly that they expect all students to make excellent progress and have high expectations for students' cognitive, social, and behavioural engagement and wellbeing

There is compelling evidence that setting and communicating high expectations for all students is associated with improved student outcomes (e.g., Robinson, 2007). Numerous studies highlighted the importance of school-wide high expectations for every student, regardless of their individual circumstances or backgrounds (CESE, 2017; Cole-Henderson, 2000; Dinham, 2016; Hopkins, 2013; Hoy et al., 2006; Jensen & Sonnemann, 2014; Leithwood, 2011; Leithwood et al., 2004; Masters, 2011; Park et al., 2019; Sammons et al., 1995). For example, the study by Park et al. (2019) showed that teachers' group-level expectations for student learning were positively associated with their student's achievement outcomes. These expectations tended to be higher in schools where teachers took collective responsibility for raising student achievement outcomes. Given the interdependence of student achievement, wellbeing, and overall chances of success in life, schools should endeavour to contribute to achieving the best possible outcomes for all students (Otero, 2016). In this respect, research demonstrates the importance of setting high expectations for student attendance (CESE, 2017; Epstein & Sheldon, 2002), as well as positive student behaviour and engagement (CESE, 2017). Research evidence suggests that student attendance levels are significantly associated with academic outcomes (Leithwood, 2011).

The school has clearly articulated evidence-informed strategies for improving student learning, engagement, and wellbeing outcomes

School improvement ultimately requires school leaders to articulate evidence-informed strategies and implement changes based on identified needs (Handa, 2013; Hattie, 2012; Hopkins & Craig, 2015; Masters, 2011; Robinson et al., 2017; Sammons et al., 2014; Taylor et al., 2011; Thessin, 2015; Timperley, 2012; Zepeda, 2013). Development of such strategies ideally takes place in collaboration between school leaders and teachers (Zepeda, 2013). The importance of shared commitment to these strategies is crucial to school improvement (Jensen & Sonnemann, 2014; Masters, 2011), which can be facilitated by school leader modelling of changed practices (Jensen &

Sonnemann, 2014). Furthermore, research highlights the importance of specification of individual and collective roles and responsibilities in implementing improvement strategies (Handa, 2013; Thessin, 2015; Zepeda, 2013), as well as identification of timelines and required resources (Hattie, 2012; Taylor et al., 2011; Zepeda, 2013). Others have highlighted the importance of clear communication with parents¹ about planned changes and what this would mean for students and families (Levin & Schrum, 2014).

The importance of well-articulated strategies for supporting student wellbeing, engagement, and achievement is evidenced by the strong association between these two factors (Dinham, 2016; O'Connor et al., 2019). For example, high-achieving secondary schools in a case study described by Dinham (2016) were characterised by a culture that treated promotion of student wellbeing as collective responsibility. These schools had targeted wellbeing policies and procedures, which were perceived as supportive by students. Others also flagged the importance of taking a whole-school approach to enhancing student wellbeing (CESE, 2015; Hattie et al., 2015). Such a whole-school approach should focus on strengthening of protective factors, as well as teaching students how to enhance their wellbeing (CESE, 2015). In addition, schools need to have systems in place to support student social-emotional wellbeing, including mechanisms for communications and referral to internal and external support providers (Miles & Ferris, 2015).

Initiatives and programs are systematically evaluated for their effectiveness

No matter the nature of specific initiatives and programs to address improvement priorities, research consistently highlights the importance of systematic evaluations of effectiveness (Hattie, 2009; Masters, 2011; Van Der Voort & Wood, 2014; Zepeda, 2013). Furthermore, initiatives and programs that are implemented simultaneously need to coherently align with the school's approach to improvement (Robinson, 2007).

Improvement goals and targets are monitored, and the effectiveness of improvement strategies is systematically evaluated

The importance of formal goal setting for school improvement was highlighted in numerous studies (Hallinger & Heck, 2002; Hattie, 2009; 2012; Leithwood et al., 2004; Robinson, 2007; Robinson et al., 2017; Sammons et al., 1995; Taylor et al., 2011; Timperley, 2012; Zepeda, 2013). Specifically, research demonstrates the importance of setting challenging, yet achievable, clear and measurable goals against short- and long-term timelines (Hallinger & Heck, 2002; Robinson et al., 2017; Taylor et al., 2011; Timperley, 2012; Zepeda, 2013) and communication of these goals to ensure collective commitment and targeted action taking (Robinson, 2007; Sammons et al., 1995). In addition, collective commitment may be facilitated by involvement of key stakeholders such as teachers in goal setting (Zepeda, 2013), for example through staff meetings and planning days (CESE, 2015). Yet it is important to consider possible negative side-effects of overly specific goals. Hallinger and Heck (2002) warned that tightly specified goals can result in undesirable consequences, such as a reduced focus on school priorities that are hard to quantify, or distortion of job priorities. They recommend a tight linking of organisational goals and the school's mission statement.

Further, research highlights the importance of ensuring that identified goals reflect areas of priority and coherently work together to facilitate school improvement (Robinson et al., 2017; Timperley, 2012). For example, Robinson et al. (2017) found that schools who had made significant improvements had formulated 2 or 3 goals and sub-targets. In contrast, the goals of schools that had not made significant improvements were less clear. Another major difference identified between these groups of schools was the extent of vertical integration of goals. When vertical integration is strong, all activities and resources within the school are implemented to align with the overarching goals. This requires a big-picture perspective, in which school leaders can envision how the different aspects of school improvement link together and jointly contribute to achieving the school's goals. Further, the study highlighted the importance of continuity of focus as critical to achieving long-term school improvement goals.

Continuous monitoring of progress towards articulated goals and targets to evaluate the effectiveness of school improvement strategies is a critical component of the school improvement cycle (Hattie, 2009; Hattie, 2012; Hattie et al., 2015; Leithwood et al., 2004; Masters, 2011; Sammons et al., 1995; Taylor et al., 2001; Timperley, 2012; Van Der Voort & Wood, 2014; Yatsko et al., 2015; Zepeda, 2013). This includes formal and informal monitoring and evaluation in relation to classroom practices and student achievement (Hattie, 2009; Sammons et al., 1995; Zepeda, 2013) and school performance (Sammons et al., 1995; Yatsko et al., 2015; Zepeda, 2013; Hattie et al., 2015). At the school-level, formal evaluations are particularly important; these need to document progress towards school improvement goals based on evidence-informed evaluations (Masters, 2011; Van Der Voort & Wood, 2014; Zepeda, 2013). The results of such evaluations need to be shared across the school community (Masters, 2011; Zepeda, 2013). Analysing and discussing data

¹ The word 'parents' has been broadly interpreted to be inclusive of the possible range of students' caregivers and significant others. The term 'families' is used in this document to be reflective of this range.

Analysing and discussing data

Overall evidence for Domain 2

Evidence from research demonstrates the importance of analysis and discussion of data for school improvement. For example, Lai and Schildkamp (2013) provide compelling evidence for the effectiveness of data use on student learning and achievement outcomes. These researchers cite a substantial amount of rigorous large-scale studies that provide robust evidence. Similarly, Yoon (2016) cited substantial evidence pointing to the potential positive impact of data-informed practices and school effectiveness. For example, in a large-scale randomised trial, data use was identified as resulting in a significant increase in student mathematics achievement (Carlson et al., 2011, cited in Yoon, 2016).

When talking about data use in schools, it is useful to distinguish between school-level and classroom-level data use cycles. Whilst strongly interrelated, these data use cycles differ in their focus, frequency and key stakeholders involved. A common misconception is that using data for school improvement purposes is the principal's job, not the teachers' (Earl & Katz, 2002; Lai & Schildkamp, 2013). Yet research shows that the impact of analysis and discussion of data for school improvement can be maximised when it is implemented as a school-wide practice (Hattie et al., 2015; McAleavy & Elwick, 2016; Thessin, 2015; Yoon, 2016). Use of data at all levels of the system and improved data literacy amongst school staff was one of the main underpinning drivers of school improvement in London schools post 2000. Specifically, data use was characterised by "a relentless focus on the quality of learning outcomes and the action needed to improve these outcomes" (McAleavy & Elwick, 2016, p. 11).

At the classroom level, data use involves assessing where students are in their learning to enable teachers to determine the most appropriate strategies to meet learners' needs. Using evidence about student learning to inform next steps in teaching and learning is one core aspect of formative assessment (evidence in relation to formative assessment and feedback is discussed in more depth in Domains 7 and 8), a highly powerful approach to enhancing student learning outcomes (Black & Wiliam, 1998). Formative assessment can broadly be defined as "encompassing all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" (Black & Wiliam, 1998, p. 7-8). Goss and Hunter (2015) formulated 3 key recommendations for schools and teachers to enable effective use of data for school improvement: (1) develop plans for collecting and using evidence of student learning to monitor progress and facilitate targeted teaching (2) facilitate use of data by every teacher and provide the necessary time, resources and training and (3) ensure the school leadership team plays a critical role in setting expectations and identifying priorities, whilst supporting teachers' learning journeys. These recommendations corroborate key findings from a range of international empirical studies as summarised by Schildkamp and Lai (2013).

At the school leadership level, assessment data can similarly assist leaders in decision making and taking appropriate action (Masters, 2013), enabling schools to continuously monitor progress and adjust practices as needed (Earl & Katz, 2002). However, as with many school improvement practices, the impact of school leader data use on improved student outcomes is indirect (Coe et al., 2014; Shen et al., 2016; Yoon, 2016). For example, an empirical study which examined the association of school leaders' data-informed decision making found that data-informed leadership practices were positively associated with a broad range of school processes. However, no statistically significant relationship was identified between improvement of these processes and student achievement, which can be interpreted as "teachers failed to keep the momentum going to improve

student achievement” (Shen et al., 2016, p. 390). However, the relatively small sample size may have limited the researchers’ capacity to detect any statistically significant effects. These findings highlight (1) the impact of data-informed decision making for school improvement overall (2) the importance of alignment of strategic leadership and classroom practices and (3) the importance of teacher support for data-informed decision making to enable maximum impact on student outcomes.

Most importantly, it is evident that how data are used will determine the impact on school improvement. Whilst numerous studies showed that schools are drowning in data, this does not mean they necessarily use it or use it effectively to enhance student learning outcomes (Bruniges, 2013; Earl & Katz, 2002; Goss & Hunter, 2015; Hattie, 2012; Lai & Schildkamp, 2013; Renshaw et al., 2013; Schildkamp & Lai, 2013; Yoon, 2016). For example, Earl and Katz (2002) identified that for school leaders to have data is not enough, yet “in the hands (and hearts and minds) of a skilled leader, however, data can be a compelling force in improving the work of schools” (p. 1007). Schildkamp and Lai (2013) summarised research evidence about enablers and barriers to data use for school improvement, which related to the following aspects (p. 179): leadership and time; teacher collaboration; vision, norms and goals; culture of inquiry; training and support; ownership and autonomy; and available support structures.

Furthermore, research demonstrates the importance of coherence in school improvement strategies based on data, which is consistent with evidence discussed in Domain 1. Robinson et al. (2017) showed that the effects of a high school intervention focused on improving school leader and teacher capability in data use on student achievement gains varied across schools. This intervention consisted of 5 strategies: (1) establishment of student achievement databases (2) goal setting based on previous student achievement data (3) using data to monitor student progress (4) providing academic counselling to support students to meet their goals and (5) increased engagement of families in student learning. The level of coherence of school improvement practices was associated with the extent to which schools managed to raise levels of student achievement.

Based on the overall Domain 2 evidence outlined, and examination of other characteristics within the domain, the following characteristic was generated:

The principal and school leaders promote the school-wide use of data to inform school-level decisions, interventions, and initiatives, and for ongoing monitoring, evaluation, and improvement

The following discussion focuses on evidence in relation to each SIT Domain 2 characteristic.

The school has developed and is implementing a plan for the systematic collection and analysis of a range of data, including feedback from students and families, and student outcome data from quality standardised and classroom assessments

As noted, research shows that the impact of analysis and discussion of data for school improvement can be maximised when it is implemented as a school-wide practice (e.g., Hattie et al., 2015; McAleavy & Elwick, 2016). School leaders play a major role in shaping the conditions for effective data use through the development of a data use plan (Goss & Hunter, 2015; Schildkamp, 2019). Thessin (2015) describes the phenomenon ‘data paralysis’, resulting from pressure to use data without a specific focus. Hence, goal setting is critical to effective data use for school improvement (Schildkamp, 2019). Importantly, “data use does not start with data” (p. 259), but rather starts with formulating concrete and measurable goals and a plan for the systematic collection of a range of data. This requires that school leaders engage others in the school, “balance the various goals of different stakeholders with the culture, the vision, mission and values of the school” (p. 260), prioritise goals based on the school’s policy, and identify the types of data that needs to be collected. In addition, research recognises that quality of the data is paramount to its potential to facilitate school improvement (Timperley, 2012; Yoon, 2016).

Valuable data to inform school improvement can be gathered from students, providing unique perspectives (Dinham, 2016; Harris et al., 2014; Hattie et al., 2015; Thessin, 2015; Timperley, 2012; Zepeda, 2013). For example, teachers may collect data from students through surveys, interviews, focus groups or presentations (Harris et al., 2014; Hattie et al., 2015). Further, data about student learning should be used in a way that is informative to students themselves (Hattie et al., 2015). Student voices have been remarkably absent in discussions on data use (Adie et al., 2020; Harris et al., 2014; Schildkamp, 2019). For example, Adie et al. (2020) highlighted that research on data walls had failed to consider student agency.

Students can also be involved as partners in data use, where they collaborate in designing tools for data collection, collecting data, analysis, decision making and action taking (Harris et al., 2014). Schildkamp (2019) identified that whilst the literature has paid relatively little attention to data use by students, this appears to be a fruitful focus for improving student learning outcomes. Timperley (2012) also highlighted the importance of student involvement in using data for school improvement. Involving students can help schools better understand the situation in their

school, where to target improvement efforts, and evaluate the impact of actions taken. For example, evaluations of modified instruction as a result of data use should take account of evidence from students, such as by examining data from student focus groups (Handa, 2013; Thessin, 2015). In addition to involving students in data use, research suggests there are benefits to involving families (Hattie et al., 2015; Masters 2016; Robinson et al., 2017). Further detail on the range of data that the plan needs to cover is discussed under the next characteristic.

A range of data is used to identify starting points for teaching and learning, evaluate student learning, engagement, and wellbeing outcomes, monitor growth, and inform school improvement planning and progress

Various studies highlighted the importance of data use for the school-wide monitoring of student outcomes (Goss & Hunter, 2015; Hattie, 2012; Robinson et al., 2017; Schildkamp, 2019; Yoon, 2016). For example, monitoring of student progress using data from school-based assessments and externally developed assessments can reveal (in) consistencies in student achievement across the school (Hattie et al., 2015). As such, data can help identify learning needs to pinpoint starting points for improvement (CESE, 2015; Robinson et al., 2017).

Schools need to draw on a range of different data to monitor and inform school improvement (Datnow & Park, 2018; Hattie et al., 2015; Lai & Schildkamp, 2013; Thessin, 2015; Timperley, 2012), beyond readily available assessment data (Timperley, 2012). Importantly, school leaders need to be able to use data from across the curriculum to “tell the whole story of learning at the school and identify where improvements need to be made” (Renshaw et al., 2013, p. 15). If data are to be used for genuine improvement efforts, educators need to look beyond standardised assessment data (Datnow & Park, 2018). For example, schools need to consider data on student attendance levels (Hattie et al., 2015; Masters 2016), data about student wellbeing and attitudes (Hattie et al., 2015; Schildkamp, 2019) and other data including demographic data, perceptual data from students, teachers and school staff, and school process data (Bernhardt, 2002, cited in Zepeda, 2013). Moreover, effective data use requires triangulation of data from different sources (Lai & Schildkamp, 2013; Schildkamp, 2019; Thessin, 2015).

Schildkamp (2019) identified 4 different types of data that schools may use, either separately or in combination:

- *Formal data*; “any systematically collected relevant information about students, parents, schools, school leaders and teachers, and the community in which the school is located” (p. 261). These data may be quantitative or qualitative in nature.
- *Informal data*; this mainly applies to teachers in classrooms, who continuously collect data to inform conversations with students on instructional decisions.
- *Research results*; evidence from research provides a useful source of information for schools. This research evidence may come from the research literature or from a research project in which the school participated.
- *Big data*; these are data that are constantly being generated in the background, which can be analysed to, for example, monitor school performance.

Research shows that there are many misunderstandings about what counts as data (Datnow & Park, 2018; Lai & Schildkamp, 2013; Renshaw et al. 2013). For example, Renshaw et al. (2013) and Lai and Schildkamp (2013) showed that school personnel mainly thought of data as student performance data from formal tests. Further, Renshaw et al. (2013) reported that practitioners made limited reference to data about student general abilities such as critical thinking or aspects of social-emotional wellbeing.

Schildkamp (2019) emphasised the need for schools to collect different types of data that align to the school’s goals. This may include data “in areas that may be less frequently assessed, such as wellbeing, citizenship and information literacy” (p. 261). One particular risk is that schools tend to focus on collecting data for goals that are easier to measure, which can lead to an imbalance between goals and available evidence. For example, general 21st century skills such as critical thinking are harder to measure than numeracy. Yet student development of these generic skills is inherent to school improvement.

All teaching staff have access to a broad range of student data and use it to analyse, discuss, and enhance individual and cohort progress

Numerous studies highlighted the importance of data use by all staff, including teachers, for school improvement (Bruniges, 2013; CESE, 2015; Cole, 2012; Goss & Hunter, 2015; Hopkins, 2013; Masters, 2013; Robinson, 2007; Schildkamp, 2019; Timperley, 2005; Yoon, 2016; Zepeda, 2013). For example, Timperley (2005) and Goss and Hunter (2015) emphasised the importance of using assessment data to help teachers identify student learning needs and

provide targeted instruction.

One potential barrier to effective school-wide data use is a lack of access to data. For example, Renshaw et al. (2013) identified that not all school staff had equitable access to data. Hence, school leaders need to ensure teachers have access to data, for example through Learning Management Systems. Levin and Schrum (2014) found that effective and school-wide use of Learning Management Systems made a major difference to classroom practice. These systems enabled teachers to monitor student progress and differentiate their instruction accordingly. Yet availability of data itself does not guarantee this will inform changed classroom practices (Schildkamp, 2019).

Arrangements are in place for the communication of school-wide data including to families and the wider school community

The impact of the collection and analysis of data for school improvement can be maximised when it is implemented as a school-wide practice (Hattie et al., 2015; McAleavy & Elwick, 2016). The extent to which schools manage data use processes can substantially impact the success of this approach (Lai & Schildkamp, 2013; Robinson et al., 2017). Aspects that distinguished successful schools from less successful ones included the quality of data management infrastructure, routinisation of data entry, data use and reporting of data, and building of school-wide capability in data use. Earl and Katz (2002) also highlighted the importance of effective communication using data. Robinson et al. (2017) highlighted the dangers involved in making one person in the school responsible for data use. Importantly, schools need to set expectations for teachers to use data and foster teacher capability in using data for them to embed this into their daily practice.

Tools for gathering, analysing, visualising, and storing data can facilitate data use in schools (Robinson et al., 2017; Schildkamp, 2019). However, these new tools may also pose new challenges, for example in relation to misuse of data (Schildkamp, 2019). There is also a danger for technical and organisational issues to take up valuable time dedicated to data use (Robinson et al., 2017).

The international push to use data to inform educational decisions has resulted in a range of data visualisation tools. One such visualisation tool is a data wall, which visually represents student achievement data for semi-public or public display. Although technological advances have opened up opportunities for digital data visualisation, physical data walls have remained popular in schools around the world (Adie et al., 2020). Data walls are used in schools to visualise data to foster conversations and inform actions to improve student outcomes (Adie et al., 2020, Hattie et al., 2015). As such, data walls can be used to visualise individual student progress and as a “starting point for conversations focused on how learning opportunities are impacting on student-valued outcomes” (Hattie et al., 2015, p. 72). For example, Renshaw et al. (2013) showed that many Australian schools use visual data displays such as data walls accessible to teachers. Whilst not directly available to students and families, these displays often underpinned communication with students and families. However, use of data walls is not limited to staff rooms. Rather, some schools use these in classrooms and public spaces accessible to families and members of the wider community (Adie et al., 2020). However, it must be noted that the ethical implications, privacy issues, and psychological implications of publicly displaying student achievement data need to be carefully considered (Adie et al., 2020).

Anecdotal evidence suggests that data walls can productively stimulate evidence-informed conversations about student progress when these are used to inform reflection on teaching practice and planning next steps to meet learner needs (Moyle & Erfurt, 2016). Despite their potential, there is currently limited evidence that use of data walls results in effective actions for educational improvement. There are also concerns that due to the nature of data walls, there is an overemphasis on standardised assessment data in a limited number of discipline areas. Data walls do not tend to reflect a holistic and embedded approach to assessing student learning. Research points to the need for schools to carefully consider the implications and benefits of data use, in a way that is fit for purpose for facilitating school improvement (Adie et al., 2020).

Opportunities for professional learning are provided to build staff skills in analysing and interpreting data

Research highlights the importance of professional learning² to build all staff skills in analysing and interpreting data (e.g., Timperley, 2005; Yoon, 2016). School leaders also need to be data literate to be able to model, scaffold, monitor, and assist others in using data effectively (Schildkamp, 2019). Interestingly, there appears to be a negative

² This review uses the term *professional learning* rather than professional development to capture the broad range of opportunities for professional learning as an ongoing process in which professionals have agency.

relationship between principal experience and levels of data use; more experienced principals were less likely to use data for school improvement than less experienced principals. Research therefore suggests that professional learning and training in data use needs to be tailored to principal experience levels and backgrounds (Yoon, 2016). In relation to professional learning in data use, Schildkamp and Poortman (2019, cited in Schildkamp, 2019) identified the importance of the following aspects: creating appropriate structures to facilitate use of data, professional learning opportunities over an extended period of time, and explicitly linking data and instructional practice.

Research strongly suggests that teachers may not be equipped with the necessary knowledge and skills to use data effectively (Hattie et al., 2015; Goss & Hunter, 2015; Renshaw et al., 2013; Timperley, 2005). Hence, teachers need to be supported to further develop their data use knowledge and skills through formal or informal professional learning (Bruniges, 2013; Goss & Hunter, 2015; Renshaw et al., 2013; Robinson et al., 2017; Schildkamp, 2019; Thessin, 2015; Timperley, 2005). Interestingly, research suggest that teachers may be more susceptible to changing their data use practices as a result of professional learning than principals (Yoon, 2016). One effective way to do this is by facilitating collaborative data use amongst teachers (Bruniges, 2013; Renshaw et al., 2013). Involving external experts can help facilitate more sophisticated and effective data use (Schildkamp, 2019; Timperley, 2005).

School leaders regularly work with teams to review data and monitor the effectiveness of interventions and practices

Given the substantial overlap in focus, evidence in relation to this characteristic is discussed in combination with that for the next characteristic.

Time is set aside for in-depth staff discussions of achievement, engagement, and wellbeing data, and strategies for the continuous improvement of student outcomes

Research highlights the importance of school leader facilitation of data use by allocating sufficient time (Earl & Katz, 2002; Goss & Hunter, 2015; Schildkamp, 2019). Yet, several researchers warned that simply allocating time is not enough (Earl & Katz, 2002; Schildkamp, 2019; Schildkamp & Lai, 2013). Rather, school leaders need to collaboratively engage in data use with teachers. When this happens, data use becomes a collaborative effort in the school.

Research highlights the value of data-informed collaborative discussions to optimise a range of different aspects of schooling (Datnow & Park, 2018; Griffin et al., 2012; Hattie, 2012; Miles & Ferris, 2015; Ronfeldt et al., 2015; Schildkamp, 2019; Sun & Leithwood, 2015). For example, Griffin et al. (2012) concluded that collaborative discussion and joint critical evaluation of data enhanced the quality of data use. Similarly, Schildkamp (2019) emphasised the importance of critical dialogue between different stakeholders in the data use process. Importantly, these discussions should not be limited to evidence about student achievement from quantitative data but should also focus on other factors such as student wellbeing (Datnow & Park, 2018). Schools may also collaborate with other schools in data use (Farrar, 2015).

When making sense of data, it is important to not only interpret data to identify problems, but also to identify any possible causes of problems (Schildkamp; 2019; Timperley, 2012). If this step is missed, it is possible that the actions taken based on the data will not result in improvements (Schildkamp, 2019), as different causes may require different interventions (Timperley, 2012). Further, data needs to be interpreted in the local school context to inform decisions about appropriate follow-up actions (Schildkamp; 2019), which should be deliberately chosen to target identified needs and be consistent with the school-wide strategic direction (Yatsko et al., 2015).

Several studies highlighted that effective data use for informing meaningful actions requires teachers and school staff to link analysis and discussion of data to their own practices (Griffin et al., 2012; Hattie, 2012; Schildkamp, 2019). Importantly, teachers need to believe that their teaching practices make a difference to student learning outcomes (Griffin et al., 2012; Timperley, 2005; Yatsko et al., 2015).

Research also emphasises that the core focus of data use needs to be on long-term improvements, rather than improving performance at face value, which tends to be associated with a range of malpractices (Masters, 2011). A strong accountability focus can have negative consequences for the extent to which data use can result in school improvement. For example, schools may focus on improving certain accountability indicators, teach to the test, or encourage lower-performing students to quit school (Schildkamp, 2019). If schools are to promote equitable outcomes for students, discussions around data must focus on the needs of all students, not just those at a threshold (Datnow & Park, 2018).

Sometimes examining data may not reveal any new evidence or simply confirm what was already known. At other times data may reveal surprising evidence. Timperley (2005) highlighted that close examination of student achievement data can provide powerful opportunities for professional learning, especially when data reveals information that contradicts teachers' personal beliefs. To overcome equity issues, it is important that examination of data focuses on moving beyond pre-existing beliefs of student capability, emphasising capability for all students to progress and teacher responsibility for student progress. In case of lower-achieving students, fruitful discussions of data emphasise strengths and potential areas for improvement (Datnow & Park, 2018). Similarly, Griffin et al. (2012) warned against use of data using a deficit approach to remediate low-achieving students. In contrast, they proposed using student achievement evidence in a developmental approach that fosters all students' learning. They proposed that effective data use requires that "teachers work in a culture where evidence is challenged and discussed rather than one in which there is only mutual endorsement of shared teaching strategies" (p. 2).

Ultimately, the impact of data use on school improvement will depend on the extent to which it informs adequate follow-up actions. Hence, school leaders and teachers need substantial knowledge and skills to accurately interpret data and translate their interpretations into implications for teaching practice (Timperley, 2005; Yatsko et al., 2015). Actions based on data may differ in nature (Schildkamp, 2019). These may be instrumental (directly making changes), conceptual (changing thinking about a certain matter), strategic (manipulation to achieve a specific goal) or symbolic (not using data in a meaningful way). Poortman and Schildkamp (2016, cited in Schildkamp, 2019) showed that actions mostly related to the following 3 aspects of school improvement (1) curriculum (2) assessment or (3) instruction. In addition, data can be used to set or revise the school's strategic directions (Sammons et al., 2014). Data may also be misused, for example in cases of teaching to the test (Schildkamp, 2019). It is important to keep in mind that data can also be used inappropriately in ways that is harmful, for example, rigid ability grouping practices are unlikely to benefit students (Datnow & Park, 2018).

At the classroom level, teachers draw on 2 types of evidence on a day-to-day basis: data that provides insights into student achievement levels, and evidence about what works in certain circumstances (Bruniges, 2013; Masters, 2013). Research highlights the value of collaborative discussion of data to inform planning and modification of instruction to better meet student needs (Hattie, 2012; Miles & Ferris, 2015; Ronfeldt et al., 2015). Specifically, research shows that teacher collaboration in data use to inform instructional decisions is positively associated with student achievement (Ronfeldt et al., 2015). In addition, research highlights the value of school leaders encouraging teachers to make explicit how they plan to teach differently to address identified student needs. Identifying and modelling more effective teaching strategies was identified as one beneficial approach (Timperley, 2005).

There is a school-wide culture of continuous data-informed self-evaluation and reflection

Evaluation and monitoring informed by data play an important role in school improvement (Jensen & Sonnemann, 2014; Zepeda, 2013). Long-term, data use can result in improved student learning outcomes when it becomes part of "a cycle of reflective inquiry" (Lai & Schildkamp, 2013, p. 15) as a continuous process of monitoring and adjustment (Lai & Schildkamp, 2013; Timperley et al., 2007). School leaders therefore need to foster a culture in which the continuous use of data for school improvement is embedded (Schildkamp, 2019; Yoon, 2016). There are various models for data use in the literature, which broadly frame data use as a plan, do, study, act cycle (e.g., Thessin, 2015). A final but important step in the data use cycle is the evaluation of the data use process, which involves, amongst others, evaluating if the goal has been achieved (Schildkamp, 2019). Thessin (2015) noted that evaluations often tend to focus on the success of data use by examining its effect on student outcomes, overlooking examination of whether and how teaching practice has changed as a result. These findings reiterate the need to draw upon and triangulating multiple data sources (e.g., Lai & Schildkamp, 2013).

Promoting a culture of learning

Overall evidence for Domain 3

School culture has long been recognised as a key factor in school improvement (Leithwood et al., 2004; Lindahl, 2006; Louis & Lee, 2016; Park et al., 2019). For example, Macneil et al. (2009) cite a review by Wang et al. (1997), which identified that school culture was one of the most important influences on school improvement. Although there is wide consensus of the importance of school culture to school improvement, there is no widely accepted definition of school culture. This makes it challenging to identify how school cultures may be changed in a way that has a positive impact on student learning outcomes (Louis & Lee, 2016).

Much discussion in the literature has focused on defining the constructs of school climate versus culture. Lindahl (2006) argues that such a distinction is not helpful, as the two concepts are closely intertwined. There appears to be consensus that climate relates to individual perceptions and beliefs, whereas culture encompasses the collective beliefs, values, expectations, and norms. As such, assessing the school's climate is much easier than assessing its culture, which requires taking account of multiple sources of evidence at different layers of culture. The school's culture is only partly visible through, for example, the physical layout of the school, languages and symbols and behaviours of staff and students. Fundamental to the culture are individual and collective beliefs and values (Lindahl, 2006). Zepeda (2013) broadly describes school culture as "the sum of the formal and informal behaviours, norms, beliefs, values, and assumptions of the school community, and they influence the ways in which people respond to planning and implementing school improvement" (p. 24). The factors that make up school culture are strongly interrelated.

School cultures are made up of formal and informal aspects, as well as sub-cultures. Principals play an important role in shaping a school culture (Leithwood, 2011; Louis and Wahlstrom, 2011; Yoon, 2016; Zepeda, 2013) by creating and identifying its 'markers', such as the mission statement, the physical school environment, and the nature of collaboration within the school (Zepeda, 2013). School culture is strongly interrelated with all aspects of school improvement. For example, school improvement planning processes need to be congruent with the school culture to have a chance of being successful. School culture is also strongly related to the school's mission and values; ideally the aspirational values align with the actual school culture (Lindahl, 2006). For example, Macneil et al. (2009) highlighted the interrelatedness of school vision and school culture. Their quantitative study involving 29 US schools showed that student achievement outcomes were higher in schools with a healthy school culture. Louis and Wahlstrom (2011) identified that "to shape the school's culture to focus unremitting attention on student learning" (p. 52) is a principal's central job, which can be very challenging.

It is obvious that changing the school's culture is complex and takes a considerable amount of time. Yet attending to school culture is critical to sustainable school improvement and reform (Dinham, 2016; Hollingworth et al., 2018; Leithwood et al., 2004; Levin & Schrum, 2014; Rodríguez, 2008). Importantly, school culture appears to have to proceed other changes in the school (Zbar et al., 2008, cited in Jensen & Sonnemann, 2014). Louis et al. (2016) identified the importance of the following aspects in shaping a school's culture: "supportive structures, social relationships, politics, and reinforcing the norms and values that constitute a school's organization" (p. 320). Supportive structures are particularly critical in facilitating changes in school culture; if these broader structures are not changed, it would be unrealistic to expect any changes in culture to occur (Hopkins & Craig, 2015). Changing a school culture requires a combination of distributed and instructional leadership (Louis & Wahlstrom, 2011a).

Many different concepts have emerged in the literature to identify the importance of culture-related aspects in schools. Based on evidence from the literature, Louis and Lee (2016) identified 4 aspects of school culture shown to be closely related with improved student achievement outcomes:

- Academic press/emphasis; setting high academic standards for students.
- Academic support for students; supporting students in all aspects of schooling.
- Trust and respect; trust and respect and shared values between adults within the school.
- Teachers' professional culture; focusing on teacher collaboration in addressing problems in their practice. This involves reflective dialogue, sharing teaching practice, and a sense of shared responsibility for school outcomes.

Their quantitative analysis of a large-scale dataset identified that all these aspects were positively related to teachers' capacity for organisational learning. This study also highlighted that fostering a culture of teacher collaboration is particularly important in realising a shift in school culture. This aspect requires "a mutually accountable and self-critical approach to practice that is rooted in continuous inquiry" (Louis & Lee, 2016, p. 548).

One comprehensive concept that includes aspects of professionalism, a sense of community and collaboration, and a core focus on student learning is professional community. A meta-analysis on the effects of professional community in secondary schools (Lomos et al., 2011) found a moderate statistically significant effect (effect size = 0.25) of professional community on student achievement.

In another study, a school's academic emphasis, levels of interpersonal trust and collective efficacy were theorised to create a school culture of academic optimism (Hoy et al., 2006). A quantitative analysis of teacher survey data in conjunction with student achievement and demographic data provided support for this theoretical proposition. Results showed that academic optimism accounted for at least 20% of variation in student achievement outcomes across mathematics and science and reading, social studies and writing. There was more variation in academic optimism between schools than within schools, highlighting the importance of this culture-related construct as a school property.

Empirical evidence from a large-scale quantitative study by Leithwood et al. (2020) corroborates and complements the findings of previous research. Based on the findings of their study and published evidence, Leithwood et al. (2020) demonstrated the value of viewing disciplinary climate, optimal use of instructional time and academic press—an emphasis on challenging academic goals—as forming one composite variable "academic culture" (p. 584). Results from a complex quantitative analysis accounting for a broad range of leadership variables and student achievement showed that 35.8% of all variances in student achievement outcomes could be attributed to leadership practices in relation to these academic culture variables.

It is obvious that a strong school culture adds significant potential for schools to improve student outcomes. Yet improving the school culture may also have more indirect benefits. For example, an improved school culture results in improved student learning outcomes, which in turn results in higher teacher satisfaction (Louis & Wahlstrom, 2011a).

Findings from a cross-case analysis involving 4 excellent principals in the US (Hollingworth et al., 2018) identified the following leadership practices as critical to shaping a productive school culture: (1) cultivation of trust and relationships with staff (2) personally knowing their staff, including being aware of their areas of expertise, preferences and needs (p. 1025) and (3) engaging in targeted and explicit communication with staff, students and families, including having an open-door policy and being visibly present at the school. These findings were consistent with previous literature on effective principal leadership.

The culture in the school is reflective of a shared belief that all students will learn successfully and, together, school staff can make a difference to student outcomes

Research overwhelmingly demonstrates the importance of fostering a school-wide culture of high expectations for student learning (CESE, 2017; Cole, 2012; Dinham, 2016; Forsyth et al., 2011; Garza et al., 2014; Handa, 2013; Hattie, 2009; 2012; Hattie et al., 2015; Hoy et al., 2006; Masters, 2016; McAleavy et al., 2018; Park et al., 2019; Rodríguez, 2008; Sammons et al., 1995; Yatsko et al., 2015). These high expectations for student success need to be held for all students, regardless of their cultural or ethnic background or level of disadvantage (e.g., McAleavy et al., 2018). For example, Hattie (2009) showed that teacher expectations for student learning have a powerful effect on student achievement ($d = 0.43$). School leaders' expectations for student learning within their school were also associated with improved student achievement outcomes.

Leithwood and Patrician (2015) explained that setting high expectations for student learning is important because these reflect socially constructed goals that students will aim to achieve. Consequently, if expectations are low, the probability of students exceeding these expectations is also low. This idea broadly represents key concepts at the heart of motivation theories, which highlight the importance of communicating expectations and setting goals that are challenging yet achievable. Similarly, Sammons et al. (1995) explained that setting high expectations for students is tightly connected to providing a challenging learning environment, with research demonstrating that a lack of challenge is a common cause of student underachievement. Importantly, there needs to be shared commitment to high expectations for student learning by all stakeholders in the school community, including students themselves and their families (Forsyth et al., 2011).

School improvement hinges on a culture where there is “collective responsibility, for success and underperformance” (Farrar, 2015, p. 5). High expectations therefore need to be embedded in the school’s learning culture, with staff taking collective responsibility for student learning, also referred to as collective efficacy (CESE, 2015, 2017; Cole, 2012; Conway & Abawi, 2013; Hattie, 2012; Hopkins, 2013; Hoy et al., 2006; Louis et al., 2016; McAleavy et al., 2018). For example, schools taking a so-called ‘Laser Focus’ to improvement were characterised by radical changes in a school’s culture, with a key focus on teacher responsibility for student learning outcomes and high expectations for student learning (Yatsko et al., 2015). Clarke (2017) identified the importance of a schools’ culture in facilitating ongoing professional dialogues amongst school staff.

Taking responsibility for student learning may also extend beyond teachers’ scheduled classes. For example, Dinham (2016) described how teachers were willing to help students who are not in the classes they taught or helped students who sought help outside of class time. In addition, high levels of collaboration within the school were reported to enhance school-wide expectations (CESE, 2015). For example, teachers engaged in collaborative marking and shared student work samples to ensure consistency of academic standards and to cultivate high expectations.

School staff demonstrate an understanding of the importance of positive, caring, and trusting relationships to student success, and work to build mutually respectful relationships across the school community

Various studies highlighted the importance of positive, caring, trusting and mutual respectful relationships across the school community (Harris et al., 2013; Hoy et al., 2006; Leithwood et al., 2004; Louis et al., 2016; Robinson, 2007; Scott, 2015; Otero, 2016; Zepeda, 2013). For example, Scott (2015) highlighted the importance of strong interpersonal relationships to support learning and teaching and student motivation; these relationships are not limited to those within the school but extend to “other children, older peers, siblings, parents and other adults, such as teaching assistants and role models in the community” (p. 10). Louis et al. (2016) highlighted the importance of caring leadership in schools. Their large-scale quantitative analysis of teacher survey and student achievement data showed significant positive relationships between caring principal leadership, student academic support and teacher collective responsibility, and student achievement outcomes.

Research highlights the importance of interpersonal relationships for fostering teacher performance as well as student engagement and achievement (Miles & Ferris, 2015) and creating a sense of community (Leithwood et al., 2004; Sammons et al., 1995). Research shows that student achievement is maximised in schools where there is “a strong sense of community among staff and pupils, fostered through reciprocal relationships of support and respect” (Sammons et al., 1995, p. 16). Further, research highlights the importance of a school environment which is nurturing to all students and staff (McAleavy et al., 2018).

Various studies specifically highlighted the importance of a school-wide culture of trust (Anthony & Walshaw, 2007; Clarke, 2017; Conway & Abawi, 2013; Fink, 2014; Harris et al., 2013; Hoy et al., 2006; Forsyth et al., 2011; Louis & Wahlstrom, 2011b; 2011b; Robinson, 2007; Zepeda, 2013). The role of school leaders in developing and maintaining a culture of trust in schools is critical (Forsyth et al., 2011; Garza et al., 2014; Harris et al., 2013; Louis & Wahlstrom, 2011a). This requires building of trusting relationships, both within and beyond the school (Forsyth et al., 2011; Harris et al., 2013; Robinson, 2007; Zepeda, 2013).

A culture of trust is foundational to a collective focus on excellent teaching and shared responsibility for student learning (Louis & Wahlstrom, 2011a, 2012b). Specific to teaching and learning, Leithwood (2010) explained that interpersonal trust is “a belief or expectation, in this case on the part of most teachers, that their colleagues, student, and families support the schools’ goals for student learning, and will reliably work toward achieving those goals” (p. 6). According to Hattie et al. (2015) a culture of trust and transparency needs to be established before conversations challenging existing practices can meaningfully be held. Hoy et al. (2006) specifically highlighted the importance of school trust in parents and students.

Several studies specifically flagged the importance of school leader relationships with teachers (Clarke, 2017; Day et al., 2016; Garza et al., 2014; Hollingworth et al., 2018; Louis & Lee, 2016; Robinson, 2007), key external stakeholders (Day et al., 2016; Leithwood, 2011), and students (Day et al., 2016). School leaders cultivate trust and strong interpersonal relationships with staff by using strategies to explicitly demonstrate their appreciation of teachers' hard work and achievements to ensure they feel valued (Hollingworth et al., 2018). Others highlighted the importance of good supportive and trusting relationships between school staff and families (CESE, 2015; Hoy et al., 2006; Leithwood & Patrician, 2015; Zepeda, 2013).

In addition, numerous studies specifically highlighted the importance of strong teacher-student relationships (Anthony & Walshaw, 2007; CESE, 2015, 2017; Dinham, 2016; Hattie, 2009; Leithwood et al., 2004; Rodríguez, 2008; Sammons et al., 1995) or mutual respect between teachers and students (Dinham, 2016; Rodríguez, 2008). Research shows that good relationships between teachers and students are critical to student engagement and motivation (Leithwood et al., 2004). Evidence from students highlights the importance of personalised and trusting teacher-student relationships to students' schooling experience and engagement. Students specifically identified the importance of teacher support with academic as well as non-academic individual needs. A school culture where teachers cared about students and made students feel they were there to help them realise their potential was associated with higher student success (Rodríguez, 2008). In the same study, respect was identified by students as a key factor in a school culture that fosters personalised teacher-student relationships. Student participants noted that teachers must treat students respectfully to earn respect. According to these students, respectful relationships fostered their academic engagement. These findings point to the importance of school cultures that give precedence to respectful relationships (Rodríguez, 2008). One study highlighted the importance of student peer relationships for student wellbeing (CESE, 2015).

Leaders have articulated and are implementing clear school-wide strategies to establish and maintain an orderly environment that supports and encourages learning

The importance of creating an orderly school environment was highlighted in numerous studies (Cole, 2012; Cole-Henderson, 2000; Hattie, 2009; Hopkins, 2013; Hoy et al., 2006; Jensen & Sonnemann, 2014; Korpershoek et al., 2016; Leithwood, 2011; Leithwood, 2011; Leithwood et al., 2004, 2020; McAleavy et al., 2018; Shen et al., 2016; Sun & Leithwood, 2015; Zepeda, 2013). Various studies identified moderately strong associations between a school's disciplinary climate and student achievement outcomes (Hattie, 2009; Leithwood et al., 2010, cited in Sun & Leithwood, 2015; Robinson, 2007; Shen et al., 2016). The importance of an orderly climate was illustrated by the Sadadeen Primary School case study described by Hattie et al. (2015), which highlighted that when teachers have to spend most of their time on behaviour management, very little time remains for learning.

School leaders play an important role in shaping a school-wide orderly learning environment (Sun & Leithwood, 2015), for example by setting school-wide rules and expectations for managing student behaviour (CESE, 2017; Cole, 2012). Formulating underpinning frameworks for the school's culture can help clarify consistent expectations. For example, Hattie et al. (2015) illustrated how a New Zealand school used a framework that clarified the school's vision, mission, and values to motivate and evaluate teachers and set behavioural expectations for students. Consistent application of disciplinary procedures throughout the school is critical to their impact (Dinham, 2016; Leithwood, 2011).

CESE (2017) identified that the recent international literature promotes whole-school preventative approaches to student behaviour. Ideally these preventative approaches include all relevant stakeholders in the school community, including families. Research particularly highlights the importance of fostering positive student behaviour (CESE, 2015), for example by providing positive feedback (Zepeda, 2013). In addition, school leaders may use targeted interventions to facilitate a productive learning culture. Research shows a positive relationship between teacher classroom management interventions and student academic outcomes (Korpershoek et al., 2016). Specifically, Korpershoek and colleagues (2016) found a statistically significant positive relationship ($ES = 0.22$) between interventions using classroom management strategies or programs on primary students' academic, behavioural, and social-emotional outcomes. Interventions that specifically focused on student social-emotional development were particularly effective. Research also highlights the importance of celebrating student success (Dinham, 2016; Hattie et al., 2015). Principals within high-achieving secondary schools in a case study described by Dinham (2016) publicly celebrated student success in a broad range of domains, including behaviour, thereby fostering a learning culture.

Effective schools provide good working environments for all staff and students (Zepeda, 2013). In addition to creating an orderly and supportive social environment, schools need to ensure that the school's physical environment optimally supports student learning (Cole-Henderson, 2000; Dinham, 2016; Gouédard et al., 2020). Research specifically highlights the importance of a physically safe climate for student and staff learning (Garza et al., 2014).

Interactions between staff, students, families, and the wider community are caring, respectful, and inclusive

Consistent with the importance of positive, caring, trusting and mutual respectful relationships across the school community, research highlights the importance of caring, polite, and inclusive interactions (Anthony & Walshaw, 2007; Dinham, 2016; Forsyth et al., 2011; Hattie, 2012; Hollingworth et al., 2018). Facilitating harmonious interactions between school, family and the wider community contributes to the enhancing of students' aspirations, attitudes, and achievement (Anthony & Walshaw, 2007). In addition, frequent interaction between key players in the school can foster shared beliefs, attitudes, and behaviours, contributing to a culture of collective trust (Forsyth et al., 2011). Research also highlights the importance of respectful communications within the school and with the wider community (Dinham, 2016). This requires the establishment of a shared language to talk about schooling amongst all relevant stakeholders (Hattie, 2012).

In addition, research provides some specific insights into requirements for school leader interactions. One study highlighted the importance of engaging in targeted and explicit communication with staff, students, and families, including having an open-door policy and being visibly present at the school (Hollingworth et al., 2018). School leaders of high value-add schools were approachable and supported their teachers in overcoming difficulties (CESE, 2015). Another study emphasised that school leaders need to communicate openly and need to model desired behaviours within the school (Zepeda, 2013).

Specific to students, research shows the importance of respectful interactions to communicate values of care and express commitment to helping students achieve the best possible outcomes (Hattie, 2012; Rodríguez, 2008). These interactions need to foster students' sense of belonging to school and make them feel that teachers care about them and that their voice is heard (Dinham, 2016; Hattie et al., 2015; Rodríguez, 2008).

Families are viewed as integral members of the school community and partners in student learning

Research increasingly shows the importance of family-related aspects in supporting student learning. Numerous studies highlighted the importance of active family involvement in their child's schooling (CESE, 2017; Coe et al., 2014; Cole-Henderson, 2000; Dinham, 2016; Epstein & Sheldon, 2002; Forsyth et al., 2011; Fullan & Hargreaves, 2016; Garza et al., 2014; Gordon & Louis, 2009; Hattie, 2009; Hattie et al., 2015; Leithwood, 2011; Leithwood et al., 2004; 2020; Leithwood & Jantzi, 2011; Leithwood & Patrician, 2015; OECD, 2020; Otero, 2016; Sammons et al., 1995). Various studies specifically identified that families need to be considered partners in student learning (Fullan & Hargreaves, 2016; Leithwood & Jantzi, 2011; Leithwood & Patrician, 2015; OECD, 2020; Otero, 2016; Sammons et al., 1995).

Just as school cultures have a significant influence on student learning, there is substantial evidence pointing to the influence of the educational culture within students' home environments. There is some evidence that school staff can positively influence students' educational home cultures through using a range of interventions to strengthen school-home partnerships (Leithwood & Patrician, 2015). Findings from the recent study by Leithwood et al. (2020) confirmed the significance of family influence on student achievement. These researchers concluded that given the potential influence of family-related variables on student learning, it is worthwhile for school leaders to attend to these variables when determining strategies for school improvement.

One of the most important family-related variables appears to be the aspirations and expectations of parents, caregivers, and other community members (Forsyth et al., 2011; Hattie, 2009; Jeynes, 2005, cited in Leithwood & Patrician, 2015; Leithwood, 2011). For example, involvement of students' families has been identified as important in boosting school attendance rates (CESE, 2017; Epstein & Sheldon, 2002). In addition, direct family involvement in supporting their child's learning appears important to student achievement (Hattie, 2009; Jeynes, 2005, cited in Leithwood & Patrician, 2015; Leithwood, 2011). In contrast, supervisory practices were associated with negative effects (Hattie, 2009). The implication for schools is that high expectations for student learning need to be shared so these can be met or exceeded. This requires the development of a shared language to talk about learning at school and at home.

Schools may also involve families as partners in strategic decision making. Research suggests that shared teacher/family leadership and family influence in schools is positively associated with student achievement outcomes (Gordon & Louis, 2009). For example, family consultations and feedback have been identified as important in realising the school's formulated improvement goals (Hattie et al., 2015). The study by Leithwood and Jantzi (2011) consistently showed a positive relationship between the influence of staff teams and family advisory groups and student achievement outcomes. However, the study also showed that levels of family involvement were still relatively limited, pointing to challenges schools face in involving families in genuine partnerships.

Research suggests that schools need to actively design opportunities for involvement of all families (Gordon & Louis, 2009). For example, productive communication can foster school-family partnerships. Such communication needs to be frequent and go beyond formal teacher-family meetings (Leithwood & Patrician, 2015). Use of culturally-appropriate approaches to communication, including use of language spoken by families of students, was also identified as valuable in cultivating families' trust and engagement in their child's schooling (Garza et al., 2014). It appears that the overall school culture is important in determining the extent of family involvement; teachers in schools with a supportive work culture tended to share more information with families (Gordon & Louis, 2009).

Staff recognise and value students' varying individual characteristics and backgrounds, and work to implement practices responsive to their diverse needs

Schools play a vital role in helping all students to thrive, regardless of their cultural backgrounds (McAleavy et al., 2018). Hence, schools need to be culturally sensitive and communicate that all students and their language and culture are valued (Hattie et al., 2015). Similarly, Leithwood et al. (2004) emphasised the importance of a school culture that embraces multiculturalism and is free of racism. For example, schools can use language and signage in an inclusive way to ensure respectful communication (Dinham, 2016). Schools also need to ensure that curricula are locally relevant to students given their varying cultural backgrounds, discussed in Domain 6. In addition, a school culture where students' varying backgrounds are appreciated and valued requires mutual respectful relationships between teachers and students from different cultural and linguistic backgrounds (Hattie et al., 2015). Schools may need to build their staff's cultural competence. For example, Leithwood and Patrician (2015) emphasised the importance of cultural awareness amongst school staff in creating effective communication with First Nations families. School-community partnerships are an important vehicle for enhancing the cultural competence of school staff, as discussed in Domain 9.

Student and staff wellbeing are high priorities in the school and processes are in place to provide both academic and non-academic support to address individual needs

As noted, student academic outcomes and wellbeing are strongly interrelated; this also extends to school staff. Hence, promotion of student and staff wellbeing should be a priority for every school. For example, leadership of successful principals who managed to sustain school improvement (Garza et al., 2014) focused on fostering an emotionally safe climate for student and staff learning. Research also highlights the value of a culture where students feel comfortable to seek help, both within and outside of class time (Dinham, 2016).

Research evidence suggests that schools where students achieve well have a healthy balance between focusing on academic aspects of learning and student wellbeing and personal welfare (Dinham, 2016). Further, research shows the importance of creating a school culture that considers the promotion of student wellbeing as the collective responsibility of all (Cole, 2012; Dinham, 2016). Student wellbeing is fostered by school cultures which are emotionally safe. This means that they are free from negative behaviours (such as bullying) and promote positive behaviours that are associated with improved mental wellbeing, including a focus on healthy lifestyle choices (CESE, 2015). A culture where student wellbeing is promoted is associated with fewer behavioural problems and increased academic achievement (Dinham, 2016).

Research also highlights the importance of processes and structures of support in schools. For example, the presence of guidance counsellors was identified as making a difference to the extent to which students felt supported in all aspects of their lives (Rodríguez, 2008). In high-achieving secondary schools in a case study described by Dinham (2016), specific welfare teams had been established to support students. A core focus on wellbeing (CESE, 2017; Hattie et al., 2015) and connection to the wider community (Hattie et al., 2015) can help create a productive learning culture where students feel a strong sense of belonging (Hattie et al., 2015), which will be revisited in another Domain 6 characteristic as well as in Domain 9.

Leaders promote a school-wide culture of learning, collective responsibility, and continuous improvement for both staff and students

The importance of a culture of learning, collective responsibility and continuous improvement for enhancing student outcomes has been addressed under the first characteristic within this domain. These notions extend to school staff. Principals play an important role in shaping a school culture (Leithwood, 2011; Louis and Wahlstrom, 2011; Yoon, 2016; Zepeda, 2013). Research highlights the importance of a dual focus on student and staff learning in shaping effective school cultures (Hollingworth et al., 2018; Louis & Lee, 2016). Developing a culture of collective responsibility for student learning amongst teachers appears to be a key challenge for schools. Here, the importance of shared school values as envisioned in the school's improvement agenda becomes obvious. These values need to influence day-to-day classroom practices to become part of the school culture (Robinson et al., 2017).

Inquiry, creativity, and innovation are encouraged and the school works to create an attractive and stimulating environment that supports and encourages learning

Numerous studies emphasised the importance of creating a school-wide learning culture (Coe et al., 2014; Day et al., 2016; Dinham, 2016; Hoy et al., 2006; Jones & Vetere, 2017; Levin & Schrum, 2014; Miles & Ferris, 2015; Sun & Leithwood, 2015). “Successful principals build cultures that promote both staff and student engagement in learning” (Day et al., 2016, p. 253), which requires the development of a common language across the school to talk about teaching and learning (Hattie et al., 2015). Quality frameworks can contribute to meaningful discussions amongst staff about teaching and learning, as these provide school staff with a common language (Dinham, 2016). Schools that have a strong learning culture are characterised by being “capable of engineering and implementing adaptive structures and systems that respond to the changing external environment and demands” (Jones & Vetere, 2017, p. 85). The culture within the school and classrooms needs to reflect that teachers and students are working towards common goals, and teachers want students to achieve the best they can (Dinham, 2016). Continuous self-reflection (Handa, 2013; Louis & Lee, 2016) and feedback exchanges amongst all stakeholders (Hattie et al., 2015) are at the heart of a productive learning culture.

School leaders play a critical role in shaping the school's learning culture (e.g., Sun & Leithwood, 2015), considered to be one of the most important mechanisms through which school leaders can have a positive impact on student achievement (Day et al., 2016). Principals within high-achieving secondary schools in a case study described by Dinham (2016) communicated high expectations for all staff and promoted a culture that valued innovation, experimentation and risk-taking. Hattie (2009) also noted that school leaders need to set high expectations for teaching. Hopkins and Craig (2015) highlighted the importance of school leaders establishing a culture that is open to and is able to sustain changes in teaching practice. In the study by Levin and Schrum (2014), exemplary school leaders had fostered a learning culture in which leaders modelled good practice, and peer-to-peer knowledge sharing and risk-taking was valued. Two other studies highlighted the importance of school leader encouragement of initiative, risk-taking and innovation (Handa, 2013; Zepeda, 2013). This requires school leaders to cultivate trust in teachers' professionalism (Dinham, 2016) by giving them autonomy (Garza et al., 2014). Notably, professional agency was one of the key moving forces in successful London schools by experts interviewed in McAleavy et al. (2018). Schools also need to foster a culture where students are encouraged to explore their interests and learn independently (e.g., Handa, 2013), discussed in Domain 8.

One other aspect that is strongly interrelated with school culture is professional learning within the school; the school's culture can substantially influence staff openness to learning and ongoing improvement (Cole, 2012; Fullan & Hargreaves, 2016; Leithwood, 2011; Leithwood et al., 2004; Lindahl, 2006; Stoll et al., 2012; Zepeda, 2013). Over time professional learning can also be a vehicle to change school culture (Lindahl, 2006). School leaders play a key role in building the school's professional learning culture (Leithwood et al., 2004) and stimulating professional conversations (Louis & Wahlstrom, 2011). Important aspects of their role include fostering professional learning and encouraging ongoing school-wide communication around teaching and learning. “Enhancing the role of teachers individually and collectively in learning to lead the development of practice must be deeply rooted in a learning culture” (Fullan & Hargreaves, 2016, p. 2). School leaders need to create the conditions for teacher professional learning and should foster an ongoing focus on improving teaching practice (Stoll et al., 2012), and are also required to constantly learn themselves and update their knowledge based on research (Zepeda, 2013). The success of school improvement strategies such as staff coaching and mentoring depend on a productive school culture where there is interpersonal trust, honest communications, a focus on addressing issues, reciprocal feedback, collaboration, and support (Moyle & Erfurt, 2016). Evidence in relation to professional learning is discussed in more depth in Domain 5.

In addition, building and strengthening collaboration is vital to building a learning culture (Hattie et al., 2015; Leithwood et al., 2004; Levin & Schrum, 2014; Louis & Lee, 2016; McAleavy et al., 2018; Ronfeldt et al., 2015). Leithwood et al. (2004) used the term professional learning community to “signify our interest not only in discrete acts of teacher sharing, but in the establishment of a school-wide culture that makes collaboration expected, inclusive, genuine, ongoing and focused on critically examining practice to improve student outcomes” (p. 66). This places a core focus on teacher inquiry and reflection on their professional practice. For example, successful London schools had a professional culture characterised by collaboration, peer sharing and a continuous focus on growth (McAleavy et al., 2018). Evidence shows that schools where there is a sense of professional community tend to have more effective instructional practices and achieve better student academic outcomes. In such professional communities, all teachers support one another, share the same values, collectively take responsibility for student learning, and engage in sharing practices and ongoing dialogues focused on improving practices (Louis & Wahlstrom, 2011b). Hence, ensuring shared commitment of all staff to the school's strategic goals is key to a productive collaborative school culture (Garza et al., 2014; Masters, 2016).

Presence of a strong sense of professional community appears to depend on strong principal leadership, in the form of both instructional leadership and shared leadership (Louis & Wahlstrom, 2011). For example, school leaders play a vital role in facilitating the building of collaborative relationships between teachers (Harris et al., 2013). Another study emphasised the importance of a culture that fosters collaboration and involvement of teachers in school decision making (Zepeda, 2013). A school environment where each staff member takes on informal or formal leadership roles, and where teacher talent is recognised and further promoted, is facilitated by a culture that values peer collaboration and ongoing feedback on practice, use of data to inform conversations about student learning, and a continuous focus on fostering student achievement outcomes (New Leaders, 2015). Principals play a key role in stimulating a sense of shared norms and values by fostering a professional community in which leadership responsibilities are shared. “Teachers in schools whose principals consistently sought out the best ideas from teachers and parents, and in which there was shared responsibility for carrying out new plans, were able to stimulate the highest levels of student achievement” (Louis & Wahlstrom, 2011a, p. 54).

Various studies specifically highlighted the value of peer learning (Handa, 2013), including peer sharing of, for example, strategies (Chen et al., 2015; Hattie et al., 2015; Hopkins, 2013; Levin & Schrum, 2014; Louis & Wahlstrom, 2011b; McAleavy et al., 2018; New Leaders, 2015). One practice that was particularly valuable in promoting a learning culture was peer observation. This practice “became a trial for teacher leadership, as accomplished teachers were afforded opportunities to facilitate learning among their colleagues” (Clarke, 2017, p. 24). Regular staff meetings and planning days have been identified as another way to foster a whole-school collaborative culture (CESE, 2015). “Strong cultures of collective professionalism are like strong teams. They thrive on diversity and disagreement, promote good variation of style, strengths, and overall approach, and increase individual as well as collective talent” (Fullan & Hargreaves, 2016, p. 18). Specific to secondary schools, Louis and Lee (2016) highlighted the need for teacher collaboration across different curriculum areas. The value of collaboration is discussed in more depth in Domains 5 and 8.

All students, staff, and families have a sense of belonging to the school community

Research highlights the importance of creating a sense of belonging and pride for all members of the school community (Hattie et al., 2015). Various studies specifically highlighted the importance of students’ sense of belonging to the school as an aspect of school culture (CESE, 2015; Dinham, 2016; Harris et al., 2013; Hattie et al., 2015; Louis et al., 2016; Rodríguez, 2008; Sammons et al., 1995; Zepeda, 2013). Research has established that when students feel a sense of belonging within the school, this will function as a critical protective factor to their health, wellbeing and engagement in education (CESE, 2015). Caring school leadership has been associated with an increased sense of belonging of students within the school community (Louis et al., 2016).

Research particularly highlights the importance of student voice in relation to their feeling of belonging (Dinham, 2016; Harris et al., 2014; Hattie et al., 2015; Rodríguez, 2008). Students need to feel that teachers care about them and that their voice is heard (Dinham, 2016). Ensuring that student voices are heard can positively impact a school’s culture, making students feel cared for, fostering participation of students in the school community, and communicating high expectations for student learning (Harris et al., 2014). Rodríguez (2008) further provided evidence pointing to the importance of student voices to school cultures; devaluing student voices was associated with a culture in which students felt misunderstood and unheard, resulting in academic disengagement. Louis and Lee (2016) also highlighted the importance of considering student roles and perceptions in relation to school culture.

4

Targeting school resources

Overall evidence for Domain 4

Evidence from research overwhelmingly shows that how schools use resources in a targeted way is far more important than the amount of resources available (Hanushek & Woessmann, 2017; Hattie, 2009; Robinson, 2007). Most studies into spending per student and student achievement have found no consistent relation between the two (Hanushek, 2013; Hanushek & Woessman, 2017; Sammons et al., 1995). Hence it would be unreasonable to expect improved student achievement outcomes from simply increasing the amount of school resources (Hanushek, 2013; Yatsko et al., 2015). For example, the study by Yatsko et al. (2015) provides clear evidence that increased funding is not sufficient to bring about school improvement. In many of the schools who received substantial funding to dramatically turn around their performance (about USD\$900,000 per year over 3 years), practices one year into the program “were only marginally different from past school improvement efforts” (p. 28). Importantly, most schools had not managed to create a targeted school-wide strategy to improve the quality of teaching and change a culture of low expectations for student learning.

Factors that appear to make a difference in terms of resourcing include having sufficient materials, quality of instructional materials, instructional time, and teacher quality. Shortage of materials is negatively associated with student achievement, whereas quality of instructional materials, instructional time, and teacher quality are positively associated with student achievement. Research also shows there is no direct relationship between availability of IT facilities and student achievement outcomes (Hanushek & Woessmann, 2017).

However, research points to major differences within this domain internationally. Much of the published research on the importance of school resources has focused on developed, mostly English-speaking countries. Such research shows minimal associations between amount of resources with student achievement outcomes. Yet research evidence suggests that resources do make a major difference to student learning outcomes in developing countries (Hong, 2012; Murillo & Román, 2011). Hong’s (2012) analysis of large-scale international datasets showed that school-level factors (such as instructional time and teacher experience) accounted for up to 90% of the variance in developing countries, versus up to 27% in developed countries. Based on the quantitative analysis of a large-scale dataset, Murillo and Román (2011) demonstrated that the availability of basic infrastructure (such as electricity and sanitary facilities) and didactic resources (such as science labs, sports fields, libraries and computers) were significantly associated with student literacy and numeracy achievement outcomes across Latin American primary schools. Of the different resources analysed, the number of books in the library and number of school computers appeared to play the most important role in supporting student achievement. These findings suggest that allocation of resources matters most in schools that lack basic resources.

It is important to note that internationally, schools have different degrees of freedom in determining allocation of resources (Glover & Levačić, 2020). Regardless of the scope of resources available, effective planning is key to ensuring available resources are allocated strategically for maximum benefit to students.

Research suggests that strategic resourcing is an aspect of leadership which has a substantial impact on student outcomes (Robinson, 2007; $ES = 0.34$). Based on evidence gathered over 10 years of working with schools, Miles and Ferris (2015) identified 3 basic principles of strategic resource use:

- 1 *Excellent teaching for all students*; organise teachers and teams to maximise student learning and continuously grow talent.
- 2 *Personalised learning and support*; match grouping, learning time, technology, and program to students' individual needs.
- 3 *Cost effectiveness through creative solutions*; organise jobs, partnerships, and technology to maximise resources that support teaching and learning. (p. 2).

The specific circumstances within each school will determine the best approach to implementing changes according to these principles (Miles & Ferris, 2015).

Importantly, it is how resources are used in a way that is consistent with the whole-school approach to improvement, not the acquiring of resources per se that relates to student achievement outcomes (Robinson, 2007; Yatsko et al., 2015). Moreover, Robinson (2007) emphasised that "extra resources can have detrimental effects" as "multiple simultaneous initiatives can reduce the coherence of a teaching programme" (p. 13). Another study found that most schools considered additional money as something 'extra' and failed to use these funds to develop long-term strategies for sustainable school improvement (Yatsko et al., 2015). At the school-level, these researchers identified 3 issues that hindered targeted spending of school improvement grant funds: (1) many improvement strategies were not targeted with use of various seemingly unconnected strategies (2) ineffective teachers were only replaced to a limited extent, hindered by organisational processes and (3) there was a disconnect between the advocated improvement strategy and actual use of funds. In summary, research shows that how schools allocate resources can make a major difference to their effectiveness.

The school has processes in place to identify student needs and allocates financial, human, and physical resources accordingly

Schools need to strategically and efficiently manage their resources to ensure these will positively contribute to student learning outcomes. Simply put, school resource management is about turning inputs into outputs. School resources may be financial or material, and human or physical. Strategic resource management is vital in school contexts, where the future is often unpredictable (Glover & Levačić, 2020). Various studies highlighted the importance of strategic allocation of resources for school improvement (Day et al., 2016; Dinham, 2016; Al Mekhlafi & Osman, 2019; Hattie, 2012; Hopkins, 2013; Masters, 2011; McAleavy et al., 2018; Zepeda, 2013), which requires "identifying student needs and deploying staff and school resources in ways that best address those needs" (Masters, 2011, p. 4). Specifically, strategic planning requires that school leaders have a clear idea of what is required to achieve the school's goals (Miles & Ferris, 2015).

Strategic resourcing is an aspect of leadership that is associated with improved student outcomes (Robinson, 2007; $ES = 0.34$). Yet it is clear that not all use of school funds will have an impact on student outcomes (Hanushek & Woessmann, 2017; Hattie, 2009; Robinson, 2007; Yatsko et al., 2015). School leaders play an important role in indirectly influencing student achievement outcomes through strategic resourcing as aligned with teaching goals (Hattie, 2009). Based on the literature, several key considerations for strategic resource allocation can be identified.

School resources need to be strategically allocated to ensure these contribute to providing the structures needed for sustainable school improvement as aligned with the school's strategic goals (Glover & Levačić, 2020; Leithwood, 2011) and vision (Moyle & Erfurt, 2016) as formulated in the school improvement plan (Masters, 2016). In this regard, a focus on investing in long-term school improvement strategies appears vital. McAleavy et al. (2018) reported on a highly successful intervention to enhance educational outcomes for students in London schools. Importantly, they noted that the initial funding sowed the seeds for schools to continue their improvement journeys through a core focus on capability building and sustainable improvement. Dinham (2016) highlighted the importance of ensuring resources are allocated to create a pleasant environment for learning, both within classrooms and across the school. Research suggests that sharing of resources is a particularly efficient way to use resources strategically (CESE, 2015; Dinham, 2016; Hattie et al., 2015).

Glover and Levačić (2020) outlined key principles for the use of resources in schools. These include:

- *Adequacy*; resources need to be adequate to enable schools to meet minimum standards as prescribed by different levels of the education system, ensuring equality of opportunity by accounting for students' differential needs.
- *Effectiveness*; the extent to which a school is successful in meeting its objectives.
- *Efficiency*; the extent to which a school can successfully meet its objectives at minimum cost.

- *Value for money*; the combination of effectiveness and efficiency and careful management of resources to ensure best-value.
- *Transparency*; clarity on how resources have been allocated, which play an important role in accountability.
- *Equity*; fair treatment given the school's context and student needs. For example, students from disadvantaged backgrounds may require additional support.

Targeted use of school resources is tightly linked with the school's strategic planning and requires setting a realistic budget. Setting a budget takes time and is best done in consultation with key stakeholders. The budget needs to specify different streams of income as well as expenditure on resources such as school staff, the school premises, materials and services. In addition to careful planning, monitoring of resource allocation is critical to ensure these are put to best possible use and contribute to meeting the school's objectives. Budgets need to be updated when valid need for changes to resource allocation are identified (Glover & Levačić, 2020).

Glover and Levačić (2020) outlined a three-step approach to decision making regarding allocation of school resources:

- Use the school's objectives as a starting point.
- Examine the different ways in which the objectives can be achieved and calculate associated costs and benefits.
- Choose the actions that are most likely to result in achieving the objectives using available resources.

Decisions about resource allocations are informed by ongoing analyses of need using a range of quality data

As discussed, processes should be in place that enable identification of student needs to inform resource allocations. Resource allocations are most effective when targeted at personalised learning and support, and should be informed by a range of data (Miles & Ferris, 2015). School leaders can adjust strategies and resource allocation responsively to achieve intended improvement objectives (Glover & Levačić, 2020). As such, the (re)allocation of resources, as aligned to the school's strategic intent, is critical to school improvement. Further, efficient allocation of teaching and learning resources requires flexibility (Miles & Ferris, 2015).

Resources are prioritised towards evidence-informed strategies aimed at improving outcomes for students

Although schools in different parts of the world may not have access to resources that would best enable them to achieve their objectives, effective planning is key to ensuring limited resources are allocated strategically for maximum benefit to students (Glover & Levačić, 2020). Glover and Levačić's principles for the use of resources in schools, discussed earlier, provide a helpful guiding framework.

In prioritising resource allocations, it is vital to consider the evidence base for proposed strategies. For example, research has demonstrated that instructional time is weakly yet significantly related to student achievement in developed countries. These findings suggest that instructional time alone only accounts for part of the variance, but time on task and quality of instruction may be more important (Hong, 2012). Research also suggests that devoting resources to provide opportunities for teachers to collaborate may be fruitful; such resources appear best targeted on collaboration around assessment (Ronfeldt et al., 2015).

Further, a persistent misconception is that smaller class sizes result in higher student achievement (Levačić and Vignoles, 2002, cited in Glover & Levačić, 2020); research evidence on this matter is inconclusive. Overall, the evidence suggests that use of resources to reduce class size may have a small positive effect on student achievement, but the exact mechanisms by which it results in improved outcomes are unclear (Hattie, 2009). Although smaller classes lend themselves to more personalised learning experiences, teachers rarely adopt changed practices as a result of reduced class size. Hattie's interpretation of this evidence is that although increasing class size needs to be avoided, decreasing class size as a stand-alone measure is unlikely to result in improved student outcomes. There also does not appear to be a consistent relationship between teacher pay (as determined by experience and level of education) and student achievement (Hanushek, 2013).

Evidence from the literature shows that investing in teaching quality is one of the most important strategic uses of financial resources for enhancing student achievement (Hanushek, 2013; Hattie, 2009). Hence school leaders need to strategically allocate resources for professional learning to align with the school's strategic direction (Cole, 2012; Dinham,

2016; Glover & Levačić, 2020; Gouédard et al., 2020). For example, principals of high-achieving secondary schools in a case study described by Dinham (2016) allocated significant funds to facilitate teacher professional learning. Yet it is important to realise that for professional learning to have a positive impact on student learning outcomes, it is insufficient to simply make time and resources available (Alton-Lee, 2011; Bruniges, 2013; Timperley et al., 2007).

The key feature of leadership that makes a difference when it comes to resourcing is ensuring that resources (including material and human resources, most importantly teachers) are dedicated to pedagogically sound purposes (Robinson, 2007). Hence, numerous studies specifically highlighted the importance of aligning resources to support effective classroom practices (AITSL, 2017; Anthony & Walshaw, 2007; Dinham, 2016; Gouédard et al., 2020; Leithwood et al., 2004; Leithwood, 2011; Miles & Ferris, 2015; Zepeda, 2013). For example, school leaders need to ensure teachers have access to high quality resources to support their day-to-day feedback practices (AITSL, 2017). Another study highlighted the importance of providing the necessary resources for removing obstacles to teacher success (Zepeda, 2013). Interestingly, evidence by Leithwood (2011) demonstrated the relatively higher perceived importance of provision of instructional resources and materials in low-performing versus high-performing schools. Highly effective teachers in the case study described by Dinham (2016) were “highly critical and selective users of resources” (p. 104). These findings highlight the need to tailor resource allocation to specific needs identified within the school.

Leaders make the best possible use of available staff expertise, experience, aspirations, and interests to meet the learning needs of all students

Teachers have been described in the literature as “one of schools’ most important resources” (Loeb et al., 2012, p. 271). Yet how teachers are deployed within the school can make a major difference. In strategically allocating resources to meet the school’s needs, school leaders may choose to allocate resources in ways that represents “a fundamental shift from the traditional, typical way of organizing schools” (Miles & Ferris, 2015, p. 3), for example by using flexible student groupings and team teaching rather than allocating one teacher to a group of students.

Staff selection, training and management are important mechanisms by which schools can use resources to ensure they meet ever-changing contextual demands (Glover & Levačić, 2020). For example, high-achieving secondary schools in a case study described by Dinham (2016) appointed new teachers in a way that suited the needs of the school.

Research also highlights the importance of considering teachers’ strengths, expertise, aspirations, and interests in determining deployment (Hollingworth et al., 2018; Loeb et al., 2012; Miles & Ferris, 2015). Prior research evidence suggests that more novice teachers are more often assigned to disadvantaged or lower-achieving students than their more senior colleagues, which is potentially detrimental to both teacher retention and student learning. A similar trend was found in a large-scale quantitative study in Florida public schools. However, the researchers showed that more effective schools were more strategic in assigning teachers to classes where they can have maximum impact and provide most benefit to the school (Loeb et al., 2012).

Efficient allocation of teaching and learning resources requires flexibility. By using flexible groupings and schedules, schools can allocate resources based on ever-changing individual student needs. This may involve flexible teacher rostering, using non-traditional staffing arrangements such as shared roles or school-community partnerships (Miles & Ferris, 2015).

Research evidence strongly suggests that effective collaboration between teachers and team teaching positively contribute to student achievement. Successful collaboration requires strategic use of resources, including (1) deliberate assignment of teachers to teams (2) regular assessment of student learning using common assessment instruments (3) collaborative planning for data analysis, discussion and planning for instructional adjustments and (4) team leadership to provide expert guidance (Miles & Ferris, 2015). Teacher collaboration in selection and/or design of teaching and learning resources can result in higher efficiency, higher consistency in curriculum implementation and better consistency of evidence for evaluating the impact of teaching practices (Hattie, 2012). The importance of collaboration between teachers is discussed in more depth in Domains 5 and 8.

School leadership is another important consideration for staff deployment and development within the school, which requires “a physical as well as an intellectual investment” (Clarke, 2017, p. 24). To adequately support teacher leadership development, school leaders need to allocate school resources in a way that makes taking up leadership responsibilities attractive for teachers (including provision of financial incentives) and enables professional learning and knowledge sharing. Specifically, school leaders need to make sure that taking on formal leadership roles is not simply added on to teacher existing roles, but rather, scheduling and school systems need to be used flexibly to optimise teacher responsibilities to ensure the school’s strategic priorities are met (New Leaders, 2015).

Resources are prioritised towards school-wide approaches for students requiring additional or specialist support

Resources need to be allocated in a differentiated way to enable equitable access to the full curriculum for all students, regardless of their needs, background, or the school's location (Glover & Levačić, 2020; Jackson, 2019). This includes allocating resources to implement school-wide programs and interventions for students requiring additional specialist support, which is elaborated in Domain 7.

Resources are flexibly deployed and monitored to target identified needs

Research highlights the importance of flexible deployment of resources and ongoing monitoring of resource allocations to ensure these adequately meet identified needs (Gouëdard et al., 2020; Miles & Ferris, 2015). Specific to curriculum, planning and implementation within schools requires school leaders to allocate appropriate time and resources to teachers (Chen et al., 2015). Research highlights the importance of flexibility in resource allocation to best enable schools to implement the curriculum in a way that meets ever-changing individual student needs, for example through non-traditional staffing arrangements such as shared roles, or school-community partnerships (Miles & Ferris, 2015). Targeted use of resources also appears critical to enabling teachers to differentiate instruction (Scott, 2015; Miles & Ferris, 2015). Specifically, research shows that differentiated teaching and learning requires careful consideration of use of resources, such as flexibility of access to a range of resources, time and space (Scott, 2015). For example, schools may use flexible student grouping and targeted expert support or flexible scheduling of lessons based on students' achievement in relation to curriculum standards (Miles & Ferris, 2015). In addition, adequate allocation of resourcing, including funding, technology and investment in professional learning are critical to curriculum implementation (Gouëdard et al., 2020).

Staff and school time is used efficiently and effectively, and instructional time is prioritised

Optimal use of staff and school time is related to an orderly school climate and academic press (Leithwood et al., 2020), as well as strategic resource allocations to pedagogically sound purposes (Robinson, 2007). As noted, research highlights the need to consider opportunities for teachers to collaborate (Ronfeldt et al., 2015). Research also highlights the need to prioritise effective instructional time (e.g., CESE, 2017).

Available resources are allocated to ensure the physical environment, facilities, and technologies are used to maximise student learning

Research also highlights the importance of strategic allocation of resources to ensure the school's physical environment optimally supports student learning (Cole-Henderson, 2000; Dinham, 2016; Gouëdard et al., 2020). For example, principals of high-performing schools serving disadvantaged student populations in the US unanimously identified their resources and facilities were adequate. These principals reported that having attractive learning facilitates was important to create a sense of pride within the school (Cole-Henderson, 2000). Research also highlights the importance of school leader budgeting for and management of facilities to ensure the work of teachers in classrooms is optimised (Dinham, 2016), which includes adequate funding for technology (Gouëdard et al., 2020).

Research particularly highlighted the importance of purposeful use of technology to maximise student learning (Hattie, 2009; Miles & Ferris, 2015), which can have positive effects on student achievement ($d = 0.37$; Hattie, 2009) as well as engagement and attitudes. When used in a meaningful way, technology can provide many affordances for teaching 21st century skills in a way that is engaging for students (Fullan & Hargreaves, 2016; Scott, 2015). For example, it can open up opportunities for learning outside of the school context, draw on various types of resources from different platforms, or enable students to produce something new or share their learning, such as through social media (Scott, 2015). According to Hattie (2009), successful use of technology hinges upon the use of diverse teaching strategies and multiple opportunities for practice, sufficient training in use of technology for teachers and learners, capitalisation on student-directed learning and peer support, and opportunities for feedback. Teachers may also use technology to communicate feedback. In particular, students in the Presbyterian Ladies' College case study described by Hattie et al. (2015) highlighted the value of having a written record of feedback for future reference in their learning portal. Furthermore, research shows that the purposeful use of tools to reduce cognitive load (such as calculators and materials students can manipulate) can be beneficial for student learning (Hattie, 2009).

Building an expert teaching team

Overall evidence for Domain 5

There is overwhelming evidence that teacher quality is a major influence on student outcomes (Darling-Hammond, 2000; Hattie, 2012; Leithwood et al., 2004); a substantial proportion of student learning outcomes can be attributed to teachers (Darling-Hammond, 2000). For example, based on a large-scale analysis of evidence from state policies, case studies of policymaking and student achievement data, Darling-Hammond (2000) concluded that the impact of teacher quality variables was more strongly associated with student achievement outcomes than factors such as class size or student background factors, such as language background.

Numerous studies highlighted the importance of professional learning for school improvement (e.g., Al Mekhlafi & Osman, 2019; Coe et al., 2014). It is important to realise that although the ultimate purpose of school improvement and reform is to improve student learning outcomes, this often requires adults in the schools to learn first (Hattie et al., 2015). For example, Coe et al. (2014) concluded that “teacher learning drives student learning” (p. 40). The best evidence synthesis by Timperley et al (2007) cited research providing substantial evidence for the effects of teacher professional learning and development on student learning outcomes. Hence, school leaders need to build the collective capability of the whole school team using professional learning that is evidence-informed, fit to needs identified through data use, and encourages collaboration, reflection and feedback (Handa, 2013).

It is clear that school leaders can have important indirect effects on student outcomes by promoting and facilitating professional learning to enhance teacher quality (Day et al., 2016; Dinham, 2016; Hattie, 2009). Cole (2012) emphasised the need for school leaders to directly link professional learning to school performance. He proposed the following definition: “Professional learning is the formal and informal learning experiences undertaken by teachers and school leaders that improve their individual professional practice and the school’s collective effectiveness as measured by improved student engagement and learning outcomes.” (p. 6). These effects of professional learning on student outcomes are indirect, as professional learning needs to result in changed teacher knowledge and skills, followed by changed practice, which can subsequently impact student outcomes. For example, professional learning was amongst the driving forces of school improvement in the quasi-experimental study by Al Mekhlafi and Osman (2019). It appears that a focus on enhancing pedagogical strategies is vital to the effectiveness of professional learning, as this will determine the extent to which it can result in higher student achievement and improved wellbeing (Stoll et al., 2012).

Various studies provided in-depth insights into effective versus ineffective approaches to professional learning. In their best evidence synthesis, Timperley et al. (2007) provided an extensive summary of evidence for effective professional learning; that is, professional learning which resulted in improved teaching practices and student learning outcomes. Key points related to aspects such as the professional learning context and content. For example, their study highlighted the value of engaging external partners with expertise, provision of opportunity for professional interaction, and content which draws clear connections between theory and practice. Importantly, many of these aspects were necessary yet insufficient to impact student achievement outcomes (Timperley et al., 2007). Further, these researchers found little evidence that an unstructured approach to professional learning (which relies on providing teachers with time and resources) had positive effects on student learning outcomes. Yet, a highly prescriptive approach to professional learning was also found to be ineffective. A key focus on equipping teachers to continue to improve their practice appears

vital. Further, professional learning needs to align with identified student needs, gaps in teacher knowledge and skills, as well as whole-school goals (e.g., Dinham, 2016). Although teacher agency and modes of communication in professional learning are important, high quality professional learning content which links theory to practice is critical for professional learning to have an impact on student learning outcomes (Campbell et al., 2015). Meta-analytic evidence suggests that a strong practical approach rather than theoretical approach is most effective, with approaches such as demonstration of practice, feedback and opportunity to practice new learnings showing the most potential (Hattie, 2009). According to Timperley (2012), a key feature of effective professional learning is a focus on generating a thorough understanding of why the modified practices are more effective than previously used practices.

Leithwood et al. (2004) emphasised that teachers' influence on students is not only from individual contributions within their classrooms, but also through their broader role within the school community. Hence, effective professional learning results in changed practice, teacher individual capability (including knowledge and skills, motivation, and confidence) as well as teacher interpersonal capability (including critical reflection on practice and collaboration) (Stoll et al., 2012). Research shows that teachers in effective schools were more likely to engage in improvement-focused activities such as professional learning and collaboration to improve their teaching (CESE, 2015). This highlights the need for school leaders to prioritise building social capability within the school (Conway & Abawi, 2013).

Based on the overall Domain 5 evidence outlined and examination of other characteristics within the domain, the following characteristic was generated:

The principal and school leadership team work to build a professional learning community characterised by ongoing collaboration and teamwork

The following discussion focuses on evidence in relation to each SIT Domain 5 characteristic.

A school-wide plan for professional learning is in place and monitored for impact

As noted, school leaders play an important role in promoting and facilitating professional learning to enhance teacher quality with the aim to improve student outcomes (e.g., Day et al., 2016; Dinham, 2016). As outlined in Domain 4, this requires strategic allocation of resources for professional learning (e.g., Cole, 2012). Levin and Schrum (2014) found that exemplary school leaders found ways to ensure ongoing professional learning for all teachers in their schools, despite funding limitations. Schools in their study mainly used in-school professional learning, which ensured the focus of these initiatives was relevant to the school's needs. Professional learning was both formal and informal, and involved peer sharing and modelling of practice. Beyond initial facilitation through resource provision, research also highlights the major role of school leaders in creating an environment that supports and facilitates ongoing professional learning (Coe et al., 2014; Stoll et al., 2012). Regular evaluation of teachers' professional learning plans is vital (Cole, 2012).

The plan aligns with school improvement priorities and individual staff needs

Professional learning needs to be guided by and be consistent with a school's strategic direction (CESE, 2015; Handa, 2013; Jones & Vetere, 2017; Stoll et al., 2012; Zepeda, 2013). Hence, there is a need for strong alignment between school goals, specific needs identified through data use, and a school-wide professional learning agenda (Robinson et al., 2017; Stoll et al., 2012).

Importantly, professional learning needs to align with identified priorities in the school as evidenced by analysis of data (Handa, 2013; Miles & Ferris, 2015; Robinson et al., 2017; Sammons et al., 2014; Timperley, 2012; Zepeda, 2013), for example in relation to identified student needs (Dinham, 2016; Stoll et al., 2012) or gaps in teacher knowledge and skills (Dinham, 2016). It has been argued that professional learning for 21st century learning needs to address both individual and organisational learning needs (Scott, 2015). Some researchers have argued that planning of professional learning needs to align with teacher-identified learning needs (Hollingworth et al., 2018). Nevertheless, it is critical to consider cohesion of professional learning plans. If different individuals within the school engage in a variety of professional learning initiatives, this can lead to fragmentation and implementation of a large number of surface-level initiatives, which erodes coherence of practice across the school (Jones & Vetere, 2017; Robinson et al., 2017). In addition, research has shown that professional learning often fails to result in improved teaching practice and student achievement when it is offered as a one-shot, stand-alone opportunity for learning, disconnected from teachers' school contexts (Cole, 2012). Evidently, professional learning also needs to align with systemic priorities such as curricular reform (Gouédard et al., 2020).

School leaders place a high priority on attracting, retaining, and developing the best possible teachers

There are 3 ways in which school leaders can exert influence over the quality of teachers in their school (Loeb et al., 2012): (1) hiring quality teachers (2) retaining quality teachers and dismissing teachers whose performance is unsatisfactory (3) providing professional learning. Loeb et al. assert that the third option is most likely to be most feasible and effective.

Research evidence overwhelmingly demonstrates the importance for schools to recruit (Fullan & Hargreaves, 2016; Garza et al., 2014; Hopkins, 2013; Loeb et al., 2012; Masters, 2011; McAleavy & Elwick, 2016; Miles & Ferris, 2015; Sammons et al., 1995; Zepeda, 2013) and retain high quality teachers (Cole-Henderson, 2000; McAleavy & Elwick, 2016; Miles & Ferris, 2015; Loeb et al., 2012; Zepeda, 2013). Ideally, school leaders strategically recruit teachers in a way that fills identified expertise gaps in the teaching team (Miles & Ferris, 2015).

Although teacher quality is a key factor in improving student outcomes (Hong, 2012), research has shown mixed effects of teacher quality on student outcomes in developing countries. In one study (Hong, 2012), teacher experience was the strongest school-level predictor of students' mathematics achievement in developing countries. However, a consistently negative relation was identified between teaching experience and student achievement in developed economies. These findings highlight the need to consider a broad range of variables when considering teaching quality, and flag the importance of teacher professional learning regardless of teacher experience levels.

Results from a large-scale quantitative study in Florida public schools (Loeb et al., 2012) identified 4 key findings in relation to teacher quality and school effectiveness: (1) more effective schools attracted and hired more effective teachers (2) more effective schools more equitably assigned novice teachers to high-need classes (3) teacher effectiveness was more rapidly catalysed in more effective schools compared to less effective schools and (4) retention rates of quality teachers were higher in more effective compared to less effective schools. Although teacher hiring may to some extent be influenced by geographical or other contextual factors, these findings confirm the importance of school leadership and personnel management for school improvement.

Several other studies highlighted the importance of strategic staff selection and management mechanisms. For example, attracting and retaining high quality (trainee) teachers was a key aspect underpinning the continued success of London schools in the study by McAleavy et al. (2018). Another study highlighted that providing opportunities for teacher leadership and financially rewarding teachers for taking on leadership responsibilities was an important strategy for retaining the best teachers (New Leaders, 2015). Yet schools also need to have mechanisms in place to deal with teachers whose performance is unsatisfactory. For example, recruiting the best teachers and replacing ineffective teachers was identified as a key strategy in effective schools (Sammons et al., 1995). Replacing ineffective teachers is recognised as a key strategy for turning around underperforming schools (Yatsko et al., 2015). Stability within the teaching team appears to positively relate to student achievement (Cole-Henderson, 2000), highlighting the importance of retaining expert teachers. Although in some cases replacing teachers whose performance is consistently unsatisfactory may be needed (Loeb et al., 2012; Miles & Ferris, 2015), providing professional learning may be effective (Loeb et al., 2012).

The importance of prioritising continued opportunities for professional learning of all teachers for school improvement was identified in numerous studies (Al Mekhlafi & Osman, 2019; Coe et al., 2014; Cole-Henderson, 2000; Dinham, 2016; Fullan & Hargreaves, 2016; Garza et al., 2014; Handa, 2013; Hopkins, 2013; Leithwood et al., 2004; Leithwood, 2011; Scott, 2015; Stoll et al., 2012; Timperley et al., 2007; Zepeda, 2013). In contrast to popular belief, research evidence shows that teacher expertise is gradually built through learning and professional growth, and is not an innate ability (Dinham, 2016). School leaders need to "support, develop, and nurture staff" (Zepeda, 2013, p. 14) to build an expert teaching team. Professional learning can effectively be sustained by utilising internal school expertise, regular school meetings and regular improvement-focused peer observation and feedback (CESE, 2015).

Teachers continuously work to develop deep understandings of how students learn within particular curriculum areas, including common misconceptions and effective interventions

As noted, research evidence has highlighted the importance of teacher pedagogical knowledge in addition to content knowledge (e.g., Anthony & Walshaw, 2007; Coe et al., 2014). In other words, teachers need to have in-depth understandings of how students learn in the discipline to teach effectively (Coe et al., 2014; Hattie, 2012). Developing in-depth understandings of how students learn therefore seems an important focus for ongoing professional learning. A best-evidence synthesis of international research evidence found that effective professional learning deepens teachers' theoretical knowledge by linking curriculum-specific pedagogical knowledge to knowledge about assessment (Alton-Lee, 2011; Timperley et al., 2007). Professional learning that focuses on enhancing in-depth theoretical understandings and professional reflection is particularly impactful and sustainable (Timperley et al., 2007).

Research shows that professional learning needs to build on evidence about effective teaching and learning (Alton-Lee, 2011; Bruniges, 2013; Stoll et al., 2012). In contrast to the inconsistent evidence about the importance of content knowledge, there is strong and consistent evidence pointing to the importance of teachers' knowledge of teaching and learning (Darling-Hammond, 2000). More specifically, recent research has identified the need for teachers to have a deep understanding of the discipline as well as developmental trajectories students typically follow (Hattie, 2012; Griffin et al., 2012). In the assessment literature, one way in which these developmental trajectories have been operationalised is by constructing learning progressions. Research shows that enhancing teacher capability to use assessment to identify specific learning needs is a particularly fruitful professional learning focus (Timperley et al., 2007). When coupled with knowledge of learning progressions, such insights can help teachers make evidence-informed decisions and take appropriate actions to best support students.

Teachers in the school are experts in the fields in which they teach and eager to expand their disciplinary knowledge to learn how to improve their current teaching practices

The importance of deep teacher disciplinary knowledge was highlighted in numerous studies (Anthony & Walshaw, 2007; Coe et al., 2014; Cole-Henderson, 2000; Darling-Hammond, 2000; Dinham, 2016; Leithwood et al., 2004; Masters, 2011; Sammons et al., 1995). Meta-analytic evidence suggests that teacher disciplinary knowledge positively contributes to student achievement, but the effect is small ($d = 0.09$) (Hattie, 2009). However, it must be noted that the number of meta-analyses on the topic is limited. Based on a review of the literature, Darling-Hammond (2000) warned that although evidence points to the positive relationship between teachers' disciplinary knowledge and student achievement, research findings are not consistently positive. This is in line with Sammons et al.'s (1995) conclusion that teachers' knowledge of the discipline is essential, yet is insufficient for effective teaching. The importance of disciplinary knowledge was also illustrated by Anthony and Walshaw (2007), who stated that there is "convincing evidence that teacher knowledge is a prerequisite for accessing and assessing students' thinking" (p. 54), which is critical to teacher facilitation of "advancing their students' thinking" (p. 54). Overall, research shows that the combination of disciplinary and pedagogical knowledge appears to be paramount; this is often referred to as pedagogical content knowledge (Anthony & Walshaw, 2007; Coe et al., 2014; Darling-Hammond, 2000; Leithwood et al., 2004).

Further, research highlights the importance of teacher commitment to continuous learning and improvement, regardless of their level of expertise (Dinham, 2016; Masters, 2016). Planning of professional learning needs to align with teacher-identified learning needs (Hollingworth et al., 2018). Active involvement of teachers in determining their professional learning needs has been associated with teacher critical reflection and engagement in their own learning (Campbell et al., 2015).

Leaders expect all teachers to be reflective practitioners and be individually and collectively committed to the continuous improvement of teaching to enhance student learning

Research highlights the importance of fostering a culture of continuous improvement of teaching through professional learning (Coe et al., 2014; Cole, 2012; Fullan & Hargreaves, 2016; Stoll et al., 2012). There appears to be a positive association between school leader setting of high expectations for teacher practice and student achievement outcomes (Cole-Henderson, 2000).

Various studies highlighted the importance of teacher reflection on their professional practice for continuous improvement (Clarke, 2017; Coe et al., 2014; Dinham, 2016; Hattie, 2012; McAleavy & Elwick, 2016). For example, McAleavy and Elwick (2016) stated that effective teachers are reflective practitioners. In reflecting on and improving their professional practice, teachers may draw on evidence about the impact of their teaching (Dinham, 2016; Hattie, 2012; Marshall & Zbar, 2013) or feedback from multiple sources, including students (Dinham, 2016; Marshall & Zbar, 2013). For example, feedback may come from peer observation, peer discussions, student surveys, observations by students, and student assessment data (Marshall & Zbar, 2013). Research suggests that when teachers see the impact of changed practices as a result of professional learning, this often stimulates further professional learning (Dinham, 2016; Hattie, 2012). Further, a recent study highlighted the importance of critical teacher reflection based on theory when implementing new strategies (Robinson et al., 2017). Rather than discarding strategies if they do not work straight away, deeper theoretical reflection is needed for teachers to examine how they can make strategies work within their context.

Another key focus area that emerged from the literature is collective efficacy of the teaching team (Dinham, 2016; Fullan & Hargreaves, 2016; Leithwood, 2011; Leithwood et al., 2020), which means that teachers share a belief that, together, they can make a difference to students' learning (Fullan & Hargreaves, 2016). Teacher collective efficacy is indirectly associated with improved student achievement; when teachers believe that together they can realise the

best possible outcomes for students, this helps them persist in the face of challenges (Leithwood, 2011). As such, it is a prerequisite for teachers taking shared responsibility for all students' learning, which has been highlighted as critical to school improvement (Cole, 2012; Dinham, 2016; Masters, 2016). Leithwood identified that the evidence on collective teacher efficacy was relatively limited, yet noted that "their results are both consistent and impressive" (p. 6). More recent research from the US identified that collective efficacy was one of the main influences on student achievement (Fullan & Hargreaves, 2016). Based on examination of prior research, Leithwood et al. (2020) concluded that collective teacher efficacy is moderately to strongly associated with student achievement. Consistent with previous research, findings from their large-scale empirical study similarly showed a statistically significant relationships between teacher self-reported collective efficacy and student achievement outcomes. Inevitably, strong collective efficacy goes hand in hand with individual and collective teacher expertise. Research shows that teachers can overcome challenges associate with student background characteristics when they are "more skillful at supporting disadvantaged students from different ethnic backgrounds" (McAleavy et al., 2018, p. 30) and have high expectations. School leaders can enhance collective efficacy amongst the teaching team by providing clear strategic direction, involving staff in school improvement decisions and providing opportunities for staff to collaborate (Leithwood et al., 2020).

The principal and school leaders lead and model professional learning and build networks with other schools and learning organisations

Beyond encouraging and facilitating professional learning in the school, research also highlights the importance of school leaders leading and modelling professional learning. For example, the meta-analysis by Robinson (2007) showed a large effect of school leader promotion of and participation in teacher learning and development ($ES = 0.84$). This finding pertains to formal as well as informal professional learning. Timperley et al. (2007) highlighted the powerful effect of school leaders leading and facilitating within-school professional learning. Research shows that professional learning is most effective when schools use a whole-school approach, to ensure the approach is "collective, relevant and sustainable" (CESE, 2015, p. 12). This may involve some staff attending formal professional learning, followed by internal school knowledge sharing.

When school leaders provide opportunities for teacher professional learning and learn alongside teachers, they model the desired school culture and foster a culture of trust (Hollingworth et al., 2018). Research also highlights the importance of joint teacher and principal involvement in planning for professional learning (Cole-Henderson, 2000). Planning for and facilitating professional learning requires school leaders to understand what needs to be done to improve teaching and learning for them to be able to promote such improvements. Levin and Schrum (2014) also found that effective professional learning was differentiated according to teachers' levels of knowledge. Leaders can foster staff development within their schools through modelling, individual support and providing intellectual challenge (Leithwood et al., 2004). Several other studies also highlighted the power of modelling examples of practice, which may be facilitated using video (Campbell et al., 2015; Hattie, 2009; Hattie et al., 2015; Hopkins & Craig, 2015; Levin & Schrum, 2014). With respect to translating what has been learned into classroom practice, allocating time to enable teachers to plan for implementation appears particularly important (Levin & Schrum, 2014). School leaders need to ensure staff are afforded sufficient time beyond the immediate professional learning initiative (Timperley et al., 2007). In addition, research has highlighted the value of providing guidance through protocols that help translate principles into classroom practice (Hopkins & Craig, 2015), as well as the development of practice frameworks (Campbell et al., 2015).

Professional learning is often thought of as something that takes place external to the school. Yet research evidence has long pointed to the need for professional learning interventions to be school-based, as opposed to one-off presentations by external experts (Sammons et al., 1995). More recent evidence shows a continuing trend favouring school-based professional learning over externally-facilitated professional learning (Cole, 2012; Timperley, 2005). McAleavy and Elwick (2016) demonstrated the relative effectiveness of in-school professional learning over occasional attendance of external courses. One reason for the relatively higher effectiveness of in-school professional learning is that contextualised professional learning can help overcome difficulties in transferring new knowledge and skills to teachers' own classrooms (Timperley, 2005). McAleavy and Elwick (2016) provided a telling example to illustrate the powerful effects of within-school professional learning; after a coach demonstrated a particular strategy with the teacher's own students, this teacher was surprised how well this had worked, substantially increasing buy-in.

Further, research highlights the importance of school leaders' active leadership for within-school initiatives (Timperley et al., 2007). For example, school leaders scoring high on 'instructional actions' provided differentiated opportunities for teacher professional learning. In a study amongst 127 US schools, supporting instructional actions was more common in primary compared to secondary schools. In secondary schools, there was a negative

relationship between limited creation of an instructional ethos and provided limited direct support for teachers' instructional actions and student mathematics achievement (Wahlstrom, 2011).

Several studies highlighted the importance of active school leader participation in professional learning (Fullan & Hargreaves, 2016; Hattie, 2009; Hopkins & Craig, 2015; Leithwood, 2011; Robinson, 2007). For example, evidence from Leithwood (2011) showed that principals in high-performing schools were more likely to participate in professional learning than principals in low-performing schools. Dinham (2016) highlighted the importance of school leader facilitation of professional learning by actively learning from others, including teachers and students.

Further, school leaders play an important role in supporting informal professional learning within schools, which is part of what is known in the literature as instructional leadership. School leaders need to directly support teachers in their day-to-day classroom practice, for example through observations, informal conversations, and assessment of teacher performance (Sammons et al., 1995) or teacher observation and improvement-focused feedback (Coe et al., 2014; Robinson, 2007). In a study by Wahlstrom (2011), school leaders scoring high on 'instructional actions' directly supported teachers in improving their instructional practice by providing suggestions on how to improve. These school leaders were involved in planning lessons to ensure alignment with standards, and frequently and spontaneously observed teachers' classroom practices to provide improvement-focused feedback. In contrast, low-scoring school leaders made fewer classroom observations, which were often planned in advance and followed by little to no feedback, thus failing to "link their observations to any discussion about instructional practice or any attempt at broader efforts to unite teachers around a vision for the school" (p. 78). The study by Wahlstrom (2011) highlighted the missed opportunities for department heads to provide instructional leadership in secondary schools.

Research suggests that involvement of principals and external experts in classroom observations for teacher development is particularly beneficial (Coe et al., 2014), as long as there is a core focus on improvement. Research by Leithwood (2011) showed that principals identified classroom observations and teacher monitoring as important to instructional effectiveness. However, a much smaller proportion of teachers identified these practices as beneficial. These findings highlight the importance of ensuring that peer observations and mentoring are indeed perceived as beneficial and improvement-focused (rather than compliance-focused) by teachers. Principal and teacher perceptions of mentoring for new teachers were more aligned, although only about one third identified these practices as important. Some differences in perceptions were also identified in the importance of principal accessibility for instructional support (half of the principals versus a quarter of teachers).

Though research highlights the value of within-school professional learning, this does not mean that professional learning should be limited to the bounds of the school. Building of networks with other schools and/or learning organisations is critical to ongoing professional learning of school staff. Expert teachers often kept up to date with developments in their field and share their expertise through networking, group memberships and committees (Dinham, 2016). Teachers may undertake individual professional learning through, for example, conference attendance, participation in professional networks, and consulting relevant literature (Cole, 2012). Recent research specifically highlights the value of cross-school collaborations (Clarke, 2017; Cole, 2012; Farrar, 2015; Fullan & Hargreaves, 2016; McAleavy & Elwick, 2016; Stoll et al., 2012). For example, schools may share outstanding practices or engage in cross-school coaching relationships (Farrar, 2015; McAleavy & Elwick, 2016). In addition, research increasingly recognises the value of new and flexible approaches to professional learning, including online learning communities and online courses (Dinham, 2016). School leaders can support teacher learning by encouraging and facilitating membership of professional organisations, conference attendance, sharing of literature, and sharing of teacher expertise across the district (Zepeda, 2013). Actively engaging in research can also be a helpful way to help teachers sustain professional learning (Stoll et al., 2012). As for distribution of professional learning, research identified the value of resource identification, workshops, staff meetings, teacher learning communities, videos demonstrating practice and student discussion of the impact of certain practices, written distribution of learnings (newsletters, reports, publications in journals, social media) and development of practice frameworks (Campbell et al., 2015). In this regard, social media provides novel opportunities for knowledge sharing that reaches far beyond the bounds of the school.

Mechanisms are in place to support internal leadership development

Research has demonstrated the importance of principals sharing of leadership responsibilities (Campbell et al., 2015; Handa, 2013; New Leaders, 2015; Sammons et al., 1995). This involves allocating responsibilities to administrative school leaders as well as teachers and middle leaders in roles such as year level leader or instructional coach (New Leaders, 2015): "By sharing and distributing leadership, principals can focus their time and energy on their most important responsibilities whilst drawing on and strengthening the skills of their entire staff to support school improvement" (p. 4). Naturally, this requires development of leadership capability across the school (Hopkins, 2013).

The value of teacher leadership has received substantial attention in the literature over the past decades (Campbell et al., 2015; Handa, 2013; Zepeda, 2013) and is increasingly being recognised in schools (Dinham, 2016). For example, research by Leithwood et al. (2004) showed that successful school leaders typically involved several teachers in leadership. Effective sharing of leadership responsibilities requires attention to the development of leadership capability (Campbell et al., 2015). Indeed, principals within high-achieving secondary schools in a case study described by Dinham (2016) actively identified leadership potential in teachers and then coached them. In another study, leadership development was a core focus of professional learning in successful London schools, with many effective teachers moving on to leadership positions (McAleavy et al., 2018).

Explicit attention to development of leadership capabilities is critical (Coe et al., 2014; Garza et al., 2014) as many teachers have not had the opportunity to learn how to effectively lead other adults (New Leaders, 2015). By supporting the development of teachers' leadership capabilities, school leaders can foster both individual and organisational leadership capability (Zepeda, 2013). School leaders need to "provide enabling conditions and expectations to support teachers to be the developers of their own and their peers' leadership" (Campbell et al., 2015, p. 103). Research highlights the importance of deliberate teaching of capabilities and providing opportunity for practice in an authentic context, supported by frequent feedback and opportunity for reflection. Schools may also partner with external institutions such as universities or research focused not-for-profit organisations to provide evidence-informed professional learning (New Leaders, 2015).

Campbell et al. (2015) examined the impact of explicit projects to support the development of teacher leadership. In this context, teacher leadership is not limited to formal leadership roles, but rather refers to the practices of "influencing, (co)developing and sharing professional knowledge" (p. 96). This involves "learning about new ideas, working with one's colleagues (as well as their students), learning to communicate with others and becoming articulate about how to share one's newfound ideas" (p. 97). This definition of teacher leadership resonates with research by Leithwood et al. (2004) who noted that although involving teachers in school-wide decision making is important, teachers are likely to be most interested in decision making that is directly relevant to their classrooms. Campbell et al. (2015) concluded that the Teacher Learning and Leadership Program (TLLP) project had "a profound positive effect on teachers and their practice" (p. 98). These findings showed that teacher expertise and informal leadership capabilities can be enhanced when they are given the opportunity to take the lead and manage a project, collaborate with others within their school and in other schools, and implement professional learning to achieve the project's aim. For example, projects in their study aimed to enhance cultural awareness or aimed to develop classroom-level resources. Many participants reported positive effects of enhanced teacher knowledge, skills and practice on student outcomes, such as engagement, achievement and motivation.

In the teacher leadership project reported in Campbell et al. (2015) teacher professional learning was informed by active participation in research, self-reflection, and collaboration with others. To some extent, teachers participated in workshops and conferences and learned from experts external to the school; these opportunities for professional learning had been identified by teachers themselves. School leaders can also foster teacher leadership by placing them in charge of meetings or professional learning initiatives (Hollingworth et al., 2018). Research also highlights the important roles of school leaders in creating appropriate structures to foster teacher leadership, such as professional learning communities (New Leaders, 2015). In addition, teachers need to be given appropriate financial compensation for taking on leadership responsibilities (New Leaders, 2015).

Further, school leaders play an important role in supporting the development of teacher capability for leadership to realise the school's strategic priorities and to identify and train future school leaders (New Leaders, 2015). School leaders and teacher leaders can also benefit from cross-school collaborations and support (New Leaders, 2015). Research shows that principal-to-principal mentoring and coaching relationships are beneficial for both the less experienced and more experienced principal (Moyle & Erfurt, 2016).

School leaders ensure that ongoing opportunities are created for teachers to work together and to learn from each other's practices

In discussing evidence for Domain 3, it was identified that building and strengthening collaboration is important in building a learning culture (Leithwood et al., 2004). According to Fullan and Hargreaves (2016), the effectiveness of professional learning is not dependent on the amount and quality of program delivery. Rather, they posit that the development of a professional culture of collaboration is key to individual and collective learning of teachers. Hence, school leaders need to ensure that opportunities are created for teachers to work together and to learn from each other's practices. Research also highlights the importance of providing opportunities for staff to collaborate for fostering collective efficacy, which has been linked with improved student outcomes (Leithwood et al., 2020).

Numerous studies highlighted the importance of teacher collaboration (Anthony & Walshaw, 2007; Clarke, 2017; Cole, 2012; Dinham, 2016; Fullan & Hargreaves, 2016; Hattie et al., 2015; Hopkins, 2013; Jensen & Sonnemann, 2014; Leithwood, 2011; Leithwood et al., 2004; Masters, 2016; Stoll et al., 2012). For example, evidence from OECD countries (Schleicher, 2016, cited in Fullan & Hargreaves, 2016) showed a positive relationship between teacher professional collaboration and student achievement. Although many have argued for collaboration between teachers, Fullan and Hargreaves (2016) warn that “collaboration is not an end in itself” (p. 13). For collaboration to contribute to school improvement, time collaborating must be spent wisely. Thus, the nature of collaboration ultimately determines its potential to positively impact on student learning. One approach to support effective collaboration is by drawing on empirical evidence. As outlined earlier, cross-school collaborations and professional networks can be powerful.

Further, research suggests that the impact teachers can have on student learning is maximised when effective processes are in place for teachers to share their practices with peers (Marshall & Zbar, 2013). Research shows that teacher collaboration spanning a range of instructional domains is positively associated with student achievement, with higher quality collaborations resulting in greater student achievement gains (Ronfeldt et al., 2015). Another study identified that teachers in effective schools were more likely to engage in collaboration to improve their teaching (CESE, 2015). Anthony and Walshaw (2007) showed that teachers’ collaborative efforts and interpersonal support to maximise learning outcomes for all students influenced the effectiveness of pedagogy in schools. Another study showed that teacher engagement in professional behaviours such as providing collegial support was associated with improved student outcomes (Coe et al., 2014).

The effects of teacher collaboration on student outcomes may also be culturally dependent. For example, a recent quantitative study using data from the Trends in Mathematics and Science Study (TIMSS) showed that, in the US, collaborative lesson planning was positively associated with student achievement (Reeves et al., 2017). Further, US teachers reported increased job satisfaction when they had more opportunities to visit other classrooms. These findings were inconsistent with those found in Japan, where sharing teaching experiences was positively related to teacher confidence. The researchers pointed to differences in teachers’ work conditions across these systems, with a traditionally strong focus on collaboration in Japan, whereas teaching is a highly solitary profession in the US. These results demonstrate that the relative value of such collaborative practices depend on the broader cultural contexts as well as the nature of teachers’ work.

The role of school leaders in facilitating productive collaboration is vital (Cole, 2012; Handa, 2013; Zepeda, 2013). School leaders need to ensure teachers are given the necessary opportunities and time for collaborative learning (Cole, 2012; Zepeda, 2013), for example by allocating time for teachers to share strategies (Handa, 2013). Research also highlights the importance of school leader encouragement of teacher collaboration (Ronfeldt et al., 2015).

Collaboration within schools may take many different forms. Teachers can learn from one another in collaboration through, for example, assessment of work samples, lesson planning and mentoring (Masters, 2016). Teachers may also engage in joint development or co-construction of teaching practice (Stoll et al., 2012), for example through team teaching (Hattie, 2009; Hopkins & Craig, 2015; Jensen & Sonnemann, 2014). Research also highlights the importance of regular dialogue with a focus on teaching and learning (Handa, 2013; Levin & Schrum, 2014) and the importance of collaboration between teachers to learn from each other’s classroom practices (Garza et al., 2014) and share expertise within the school (Dinham, 2016). Interestingly, teacher collaboration for instructional improvement purposes was perceived to be more important by teachers in high-performing schools compared to teachers in low-performing schools. The opposite was true for provision of instruction resources, suggesting a stronger emphasis on professionalism (Leithwood, 2011).

In addition, research shows that providing opportunities for professional interaction is vital to effective professional learning (Timperley et al., 2007). Collaboration within schools can be regarded as part of professional learning, and can take place through, for example, structured meetings, formal and informal discussions, coaching or mentoring, and demonstrations of teaching (Cole, 2012). Thus, it is important to realise that professional learning may be highly informal, for example involving teachers talking to one another and collaborating (Dinham, 2016).

The importance of within-school collaborative ongoing professional learning was emphasised in various studies (Bruniges, 2013; Dinham, 2016; Hopkins & Craig, 2015; Timperley et al., 2007). For example, Dinham (2016) showed that professional learning in high-performing schools was mostly internal. Another study highlighted that “Professional development needs to be job-embedded, promote discussion, and supported through such methods as peer coaching, mentoring, and action research” (Zepeda, 2013, p. 136).

Teachers may also embark on internal professional learning journeys aligned to the school’s priorities or identified

student learning needs, for example through “collective professional inquiries in teams across the school” (Hattie et al., 2015, p. 48). Research also highlights the importance of school-wide dissemination of individual staff’s learnings (Dinham, 2016; Leithwood, 2011). For professional development to result in changed practices, teachers need to understand why they need to do something differently. Collaboration and collaborative reflection can be an effective way to challenge existing perceptions (Stoll et al., 2012). One structured form of collaboration that has recently gained popularity is use of dedicated teams, most often referred to as professional learning communities (Anthony & Walshaw, 2007; Campbell et al., 2015; Hattie et al., 2015; Hopkins & Craig, 2015; Leithwood, 2011; New Leaders, 2015), which have substantial potential to support organisation-wide learning (Leithwood, 2011). Professional learning communities can also be used to foster teacher leadership (New Leaders, 2015). Research points to two other key mechanisms to support within-school professional learning: (1) observations and feedback, and (2) coaching and mentoring.

Numerous studies emphasised the potentially powerful impact of peer observations and improvement-focused feedback on teacher professional learning (Clarke, 2017; Coe et al., 2014; Handa, 2013; Hattie et al., 2015; Hopkins & Craig, 2015; Jensen & Sonnemann, 2014; Marshall & Zbar, 2013; Moyle & Erfurt, 2016; Stoll et al., 2012; Zepeda, 2013). For example, Jensen and Sonnemann (2014) highlighted that teacher collaboration through observation and peer feedback is powerful in improving student outcomes. Other studies highlighted the importance of peer observations (Stoll et al., 2012) or feedback for professional learning more generally (Dinham, 2016; Fullan & Hargreaves, 2016; Marshall & Zbar, 2013; Stoll et al., 2012). School leaders play an important role in facilitating teacher-teacher observations, for example by arranging a substitute teacher (Hollingworth et al., 2018).

Further, various studies highlighted the importance of coaching and/or mentoring for teacher professional learning (Clarke, 2017; Cole, 2012; Dinham, 2016; Handa, 2013; Hattie, 2012; Hattie et al., 2015; Hopkins & Craig, 2015; McAleavy & Elwick, 2016; Moyle & Erfurt, 2016; Stoll et al., 2012; Zepeda, 2013). International research evidence provides strong support for the powerful effects of mentoring and coaching as ongoing approaches to staff improvement compared to traditional models of professional learning. Both processes evolve around asking questions to support informed strategic decision making. Moyle and Erfurt (2016) highlight that the “use of coaching and mentoring strategies for deliberate school improvement involves several intersecting education theories and practices to bring about school change” (p. 7); these relate to improving student achievement outcomes, teacher professional learning, and use of ongoing coaching and mentoring to optimise learning of all staff within the school. Yet it is important to realise that the coaching or mentoring skills of those involved are critical; effective use of coaching and mentoring may therefore require substantial professional learning for coaches and mentors.

Leading systematic curriculum implementation

Overall evidence for Domain 6

The nature of curriculum is widely debated. In essence, curriculum is a plan which outlines a learning trajectory (van den Akker, 2010, cited in Gouédard et al., 2020). Central to this plan are objectives of learning; what students should learn, be it knowledge, values, competencies, or attitudes. Based on the OECD glossary, Voogt et al. (2018b) described curriculum as an agreement “on why, what, how, when and where to educate and learn” (p. 7). Research has demonstrated that “curriculum choice, curriculum materials and curriculum breadth are important” (Hopkins, 2013, p. 308). It is also important to note that curricula are highly context-specific, reflecting political and cultural values (Gouédard et al., 2020). Namely, a curriculum is the policy vehicle for realising desired societal outcomes (Voogt et al., 2018b). How curricular outcomes manifest themselves (attained curriculum) depends on how it is implemented (implemented curriculum) in relation to the system-level curriculum (intended).

In recent years, there has been an international trend to give schools and teachers greater responsibility and autonomy in curricular decision making within a system-level framework (Gouédard et al., 2020; Hairon et al., 2018; OECD, 2020). Although there is some evidence that student achievement is positively associated with higher levels of school autonomy, there does not appear to be a direct relationship between school autonomy and innovative curriculum implementation (Voogt et al., 2018b). Interestingly, data from PISA (Program for International Student Assessment) 2015 showed that in countries where student achievement is systematically monitored, the association between school autonomy and student achievement was stronger (OECD, 2016, cited in Voogt et al., 2018b). In terms of impact on student outcomes, Sammons et al. (1995) highlighted the importance of consistent curriculum coverage. Yet these researchers also identified the need for curriculum implementation to be adaptive to student needs. This resonates with OECD (2020) statements that curriculum implementation is necessarily contextualised to enable schools to appropriately cater for student needs within their context.

One key concept in relation to curriculum implementation in school is curriculum flexibility. Curricula can be flexible in relation to what, how, where and when students learn (Tucker & Morris, 2011, cited in Voogt et al., 2018b). The extent to which schools and teachers can exert autonomy in flexible curriculum implementation depends on centrally-determined student achievement standards and how the outcomes of education are regulated at the system level, for example, through assessment. Research suggests that greater curriculum flexibility is associated with improved student learning outcomes, but some conditions need to be in place to ensure that teachers are adequately equipped to undertake this complex task (Jackson, 2019).

Curriculum implementation success cannot simply be evaluated by looking at fidelity of implementation. In monitoring the success of curriculum implementation by teachers, many have attempted to formulate indicators for measuring effective implementation. Such attempts are unproductive for various reasons, including difficulty of defining measurable indicators, the impossibility of defining adequate versus poor curriculum implementation, as well as inconsistency with a bottom-up vision to curriculum which aims to strengthen teacher autonomy and adaptation. Rather, there is a need to focus on integrity

of implementation, reflecting appropriate enactment and modification of local curricula within broad curriculum structures. Effective implementation of curriculum is therefore inextricably linked with other aspects such as pedagogy, resourcing, differentiation, and school culture (Gouédard et al., 2020).

A report by the OECD (2020) highlighted that many countries across the world have recently engaged in curriculum reform to ensure students are adequately equipped for an uncertain future. The OECD identified that, despite best efforts, substantial time lags in curriculum implementation have been observed. Various reasons are provided for these time lags: “a lack of stakeholder buy-in, insufficient teacher preparation or teacher capability to implement reforms, and variations in the pace of change across regions, localities or schools in decentralised education systems” (p. 9). The time needed to implement curriculum tends to be underestimated in educational policy.

The OECD has articulated a vision for student learning in 2030 (OECD, 2019, cited in OECD, 2020). The following elements are regarded as critical to student learning for the future:

- 1 *Student agency*; which relates to students’ capability and motivation to influence their own lives and society more broadly; “the capacity to set a goal, reflect, and act responsibly to effect change. It is about acting rather than being acted upon, shaping rather than being shaped, and making responsible decisions and choices rather than accepting those determined by others” (p. 17).
- 2 *Core foundations*; which encompass a range of “conditions and core skills, knowledge, and attitudes and values that are prerequisites for further learning across the entire curriculum” (p. 18). The core foundations include numeracy and literacy as well as digital literacy, data literacy, and social, emotional and physical wellbeing.
- 3 *Transformative competencies*; which relate to student empowerment to realise wellbeing and sustainability. These competencies include “creating new value, reconciling tensions and dilemmas, and taking responsibility” (p. 18).
- 4 *Knowledge*; which encompasses (inter)disciplinary knowledge, procedural knowledge and epistemic knowledge.
- 5 *Skills*; which is the goal-directed use of processes using knowledge. Types of skills are classified as “cognitive and metacognitive; social and emotional; and practical and physical” (p. 18). Examples include critical thinking and resilience.
- 6 *Attitudes and values*; which relate to an individual’s beliefs and principles which guide their thinking and actions.
- 7 *Anticipation-Action-Reflection competency*; which reflects an individual’s competency to continuously act more responsibly in a way that contributes positively to their individual needs as broader societal issues.

Recent international trends in curriculum have placed greater responsibility for curricular planning on schools and teachers, who are required to flexibly implement curriculum in a way that best meets their students’ needs (OECD, 2020).

The school has an explicit, coherent, and sequenced whole-school plan for curriculum implementation that is widely shared with stakeholders

Given the importance of school-level curriculum implementation, it is not surprising that various studies highlighted the importance of aspects related to planning of curriculum implementation (e.g., Moss et al., 2019; Ronfeldt et al., 2015). Across the reviewed studies, themes relevant to curricular planning included time and opportunity to learn, collaboration, school-wide consistency, and cross-curricular connections.

Research suggests that a backward design approach (Wiggins & McTighe, 2005; cited in Moss et al., 2019) is effective in ensuring alignment of learning goals, assessment, and learning activities. As such, teachers need to plan curriculum implementation based on the curricular standards to be achieved. In one study, planning what to teach (content) was perceived by teachers as critical to successful student learning (Dinham, 2016). Another study highlighted that sufficient time needs to be allocated to ensure students are provided opportunities to (1) engage in learning foundational disciplinary knowledge and skills, as well as (2) explore their (extracurricular) interests (Miles & Ferris, 2015). One study highlighted that implementing curricula in a way that draws cross-disciplinary connections can make learning more meaningful for students (Moss et al., 2019). Other studies highlighted the importance of providing opportunities for students to practice skills over time (Dinham, 2016; Hattie, 2009) or to apply knowledge and skills in various contexts (Scott, 2015). For example, Hattie (2009) computed an effect size of 0.71 for spaced versus massed practice, highlighting the importance of frequent opportunities for practice that are spaced out over time. This research evidence has important implications for curricular planning. Time allocations for covering curriculum content needs to be appropriate to the type of learning to be achieved, as specified in the learning intention. It is also important to consider that students within the same classroom may be working towards different goals (Hattie, 2009).

The importance of teacher planning of curriculum is aptly illustrated by Anthony and Walshaw (2007). Based on a best-evidence synthesis, these researchers concluded that “it is evident that the opportunity to learn is influenced by what is made available to learners” through “sustained integration of planned and spontaneous learning opportunities made available by the teacher” (p. 3). Research shows the importance of allowing sufficient time for covering curriculum content, thus providing opportunity to learn. Yet, the amount of time students engage in learning is a much stronger predictor of student achievement outcomes than instructional time per se (Leithwood, 2011). This appears to be determined by curricular planning as well as pedagogical practices. Evidence from student surveys suggests that teachers in high-performing schools use more effective teaching strategies and provide more effective learning time than teachers in lower-performing schools (CESE, 2015).

Various studies highlighted the importance of collaboration in planning for curriculum implementation (Dinham, 2016; Hattie, 2009; Hattie et al., 2015; Robinson, 2007; Ronfeldt et al., 2015). For example, research shows that teacher collaboration in curricular planning and assessment is positively associated with student achievement (Ronfeldt et al., 2015). Specifically, teachers and school leaders need to share a common sense of progression through the curriculum across different school years to optimise continuity of learning, which includes having a shared understanding of assessment standards and notions of quality (Hattie, 2009). In addition, schools may wish to involve students in curricular planning; this was identified as having benefits in the New Zealand case study reported by Hattie et al. (2015): “students feel they have had a stake in deciding what they will learn next and this has helped them to take ownership of their learning” (p. 204).

Several studies specifically highlighted the critical role of school leaders in collaborative curricular planning. For example, school leaders’ participation in coordination, planning and evaluation of curriculum implementation was associated with improved student achievement outcomes (Hattie, 2009). Collaboratively coordinating and reviewing curriculum across the school, by principals and other school leaders, was identified as strongly impacting on student outcomes ($ES = 0.42$; Robinson, 2007), these effects were larger in primary compared to secondary schools. According to Hattie et al. (2015), collaborative curricular planning can enhance school-wide consistency. Another study showed that a whole faculty approach to curricular programming was key to setting students up for success as they progressed through different school years (Dinham, 2016).

Several studies specifically highlighted the importance of principal or school leader practices to support effective curriculum implementation. One study highlighted that the role of school leaders in curriculum implementation is critical, as they play a mediating role between policy aspirations and classroom-level implementation. School leaders can support systematic curriculum implementation by ensuring alignment with school-wide agendas and teacher professional learning, supporting collaboration in planning for curriculum implementation, and clearly communicating these plans to relevant stakeholders (Gouédard et al., 2020). School leaders also need to use data to inform management of curriculum (Sammons et al., 2014). Moreover, research suggests that school leaders play a vital role in coordinating the curriculum across different school year levels to ensure coherence and alignment of learning experiences and sufficient opportunity to learn (Robinson, 2007). A similar point was made by Masters (2011), who highlighted the importance of “ensuring whole-school curriculum clarity and vertical alignment to provide continuity of student learning across grades” (p. 4). Further, school leaders play an important role in ensuring alignment of curriculum implementation with the school’s strategic direction, including its vision and values (Chen et al., 2015).

One major recent trend in curriculum is a shift away from a focus on academic outcomes, to a focus on processes of learning and student wellbeing. In addition, there is increasing recognition that students may progress through the curriculum in non-linear ways. Another trend is use of technology to support curriculum implementation (OECD, 2020). Together, these trends have placed greater responsibility for curricular implementation on schools and teachers, acknowledging their roles in flexibly implementing curriculum in a way that best meets their students’ needs. Based on an in-depth qualitative case study, Moss et al. (2019) concluded that a conceptual framework that includes consideration of the school community context, systemic curriculum mandates, and assessment to support professional dialogue can enhance cross-disciplinarily curricular planning and implementation.

School leaders and teachers understand and work within the school’s shared curriculum expectations, participating in collaborative processes to ensure alignment between curriculum, teaching, learning, and assessment

Various studies highlighted the importance of shared staff understandings of curriculum expectations (Hattie, 2012; Hattie et al., 2015; Gouédard et al., 2020; Miles & Ferris, 2015). When planning lessons, teachers need to consider the proportions of different types of knowledge to be addressed, including surface, deep and conceptual

knowledge (Hattie, 2012). Time allocations for covering curriculum content need to be appropriate to the type of learning to be achieved, as specified in the learning intention (Hattie, 2009). To achieve consistent progress of student learning as they move through different years of schooling with different teachers, teachers need to have consistent understandings of curricular standards to enable reliable assessment of student learning (Hattie et al., 2015). In addition, teachers need to thoroughly understand curriculum standards and success criteria to enable them to monitor student progress and plan their teaching accordingly (Hattie et al., 2015). Successful curriculum implementation requires that teachers have a thorough understanding of what learning progressions across the curriculum look like, and which hurdles students are likely to encounter on their learning journeys (Hattie, 2012). Teachers may not be able to accurately interpret the curriculum and criteria for student success, preventing them to use these effectively in teaching and learning (Hattie et al., 2015). It is evident that having a thorough understanding of curricular expectations is fundamental to effective pedagogical practices. For example, Hattie and colleagues highlighted that “Effective feedback requires an understanding not only of the broad outcomes set out in the national curriculum but also of the smaller steps it takes to achieve them” (2016, p. 150).

Teachers are recognised in the literature as playing a pivotal role in curriculum implementation; how they interpret curriculum will directly impact their enactment in the classroom (Gouédard et al., 2020). Research also shows that teachers’ sense of autonomy in curriculum is highly related to their historical and cultural contexts (Voogt et al., 2018b). Although there are large differences in the extent to which schools and teachers are granted autonomy and flexibility in curriculum internationally, all teachers need to use their judgements to some extent when implementing curriculum (Jackson, 2019). Teachers therefore need to be supported to autonomously make decisions about tailoring the curriculum to specific local contexts and student needs (Gouédard et al., 2020). Giving teachers autonomy in designing and implementing curricula within their school has been linked to more innovative curriculum implementation (Chen et al., 2015). Curriculum implementation that leaves room for teacher autonomy yet sets clear shared expectations can be supported by clear curriculum frameworks providing, for example, pedagogical guidance and materials such as textbooks and IT tools (Gouédard et al., 2020). In addition, research highlights the importance of personalising the curriculum to meet students’ needs (Hopkins, 2013; Jackson, 2019). For example, monitoring of student progress in relation to curricular outcomes is important in pacing curriculum coverage; teachers need to ensure there is flexibility in how and at what pace students move through the curriculum (Hattie, 2009; Louis & Wahlstrom, 2011b; Scott, 2015; Zepeda, 2013). As such, teachers play a critical role in balancing learning opportunities that are planned with spontaneous opportunities for learning (Anthony & Walshaw, 2007).

The importance of teacher collaboration to ensure enactment of shared curriculum expectations was highlighted in several studies (Cole, 2012; CESE, 2015; Hattie, 2012; Leithwood, 2011), with research suggesting that “co-planning of lessons is the task that has one of the highest likelihoods of making a marked positive difference on student learning” (Hattie, 2012, p. 66). For example, Hattie (2012) highlighted the importance of joint teacher planning of lessons as aligned with curricular expectations, and discussing the relevant learning outcomes and success criteria. Specifically, he stated that having a shared understanding of what progression of learning across the curriculum looks like is critical, claiming that “Sharing a common understanding of progression is the most critical success factor in any school” (p. 60). Such shared understandings can be fostered using a variety of methods, such as moderation, collaborative marking, and collaborative analysis of student achievement data. Collaborative lesson planning was also identified to be beneficial for facilitating alignment of the curriculum and instructional approaches across different school years and discipline areas (CESE, 2015).

Curriculum is developed in consultation with students, families, and the wider community to ensure flexibility, relevance, meaningful adaptation to local contexts, and responsiveness to students’ learning needs, interests, and background

Curriculum implementation is necessarily contextualised within schools to enable schools to appropriately cater for student needs within their context (OECD, 2020). Schools play an important role in ensuring that curricula are locally relevant to ensure students are exposed to meaningful learning experiences that they will find engaging. Using a singular approach to implementing the curriculum is likely to result in suboptimal opportunities for learning for many students (Subban, 2006). Based on the literature, 2 key aspects can be identified with respect to curriculum implementation: (1) designing the curriculum to be responsive to local needs (Hairon et al., 2018; Hattie et al., 2015; OECD, 2020) and (2) ensuring shared understandings of the curriculum plan by all relevant stakeholders (Gouédard et al., 2020; Leithwood & Patrician, 2015; OECD, 2020).

All school staff play an important role in curriculum design for the school in response to specific contextual needs and student needs (Hairon et al., 2018). Hairon et al. (2018) defined school-based curriculum development as “an endeavour to increase schools’ autonomy so as to meet the individual needs of the school encompassing the needs

of school leaders and teachers, students, and parents, but also satisfying the needs of the wider community such as district and state policymakers.” (p. 522). Schools can make curriculum locally relevant and enhance student engagement by seeking “to align the values of the local community with the learning it offers students across the curriculum” (Hattie et al., 2015, p. 261). Ensuring that the curriculum is relevant to learners and resonates with their day-to-day life experiences appears critical to student engagement in their learning (CESE, 2015).

Teachers may tailor curriculum content to be inclusive of students’ various cultural backgrounds (Moss et al., 2019). Curriculum flexibility can have benefits to schools and communities by enabling local innovations and a stronger sense of community ownership of the curriculum, which in turn makes the curriculum more relevant to students (Hattie et al., 2015; Jackson, 2019). In addition, research clearly highlights the need for teachers to build on students’ existing knowledge and skills in positive ways (e.g., Scott, 2015; see also Domains 2 and 7). Jackson (2019) referenced Boomer’s model of curriculum negotiation (1992), which accounts for teacher and student negotiations of intent and realisation of learning. This model clearly shows that the intended (official) curriculum is only one aspect that influences the process of curriculum negotiation, which determines the actual teaching and learning that will take place.

In addition, seeking input from students in curriculum design has been highlighted as valuable (Hattie et al., 2015). The OECD (2020) flagged that more research is needed on how schools and communities design curricula within the boundaries of national or systemic frameworks. Specifically, they noted that “a better understanding is needed of how schools and communities can be prepared to develop a quality curriculum that is timely and future-oriented” (p. 65), noting that this is highly likely to depend on the local context.

As identified in the previous sub-section, involving a range of stakeholders in curriculum planning can have substantial benefits. In addition to evidence already discussed, research highlights the importance of broad communication of curriculum expectations. For example, clearly communicating curriculum expectations was one key strategy for schools to support family involvement in their child’s schooling (Leithwood & Patrician, 2015). Beyond the obvious stakeholders of school leaders and teachers, Gouédard et al. (2020) highlighted that “all stakeholders need to be aware, and understand, what the curriculum implementation strategy entails for them and how they are involved” (p. 43). These findings highlight the importance of communicating plans for curriculum implementation within the school community, including to families and students. The OECD (2020) also highlighted the importance of family support for student learning, attitudes, and wellbeing, emphasising the need for schools to communicate curricular expectations to families and involve them as partners in the schooling of their children.

Although research highlights the importance of curriculum planning, student learning outcomes are ultimately determined by the extent to which students actively engage in meaningful learning activities (Hopkins, 2013). This requires giving priority to ensuring that learning experiences are appropriately challenging for all students (CESE, 2015; Voogt et al., 2018a). As previously discussed, a key consideration in curriculum implementation is providing appropriate opportunity to learn, meaning that time for learning is maximised by ensuring students have access to a range of learning activities over time and are meaningfully engaged (Anthony & Walshaw, 2007; Leithwood, 2011).

Research highlights the importance of flexibly tailoring curriculum implementation to meet student needs (Hairon et al., 2018; Hopkins, 2013; Jackson, 2019; Sammons et al., 1995; Scott, 2015). As noted, one key consideration is pacing of curriculum content (Louis & Wahlstrom, 2011b; Scott, 2015). As such, students within the same classroom may be working towards different goals (Hattie, 2009). Hattie (2009) highlighted the benefits of allowing gifted students to work through the curriculum at their own pace, whilst also citing evidence suggesting that this approach was beneficial for all students. Curriculum flexibility is also associated with other benefits that are not directly reflected in student achievement outcomes. For example, greater curriculum flexibility affords students more opportunity for agency and deep learning, and can greatly enhance their overall motivation to learn (Jackson, 2019). Flexible curriculum implementation can also help sustain student engagement across the school year (CESE, 2015). Importantly, tailoring curriculum implementation to meet student needs requires teachers to use assessment mechanisms such as questioning to establish where learners are at in relation to their learning goals (Scott, 2015). Another key strategy to foster student engagement is ensuring what is taught is relevant to students (CESE, 2015).

The school’s curriculum implementation plan focuses on building students’ disciplinary knowledge and skills, as well as broader capabilities and dispositions

Several studies highlighted the importance of a strong focus on a range of curriculum areas and foundational skills (Dinham, 2016; Garza et al., 2014; Hattie, 2009; Hattie et al., 2015). Unfortunately, a widespread but unfounded misconception is that teaching disciplinary content knowledge is the same as applying superficial and rote learning

strategies. Research shows that students require foundational disciplinary knowledge to inform application of cross-curricular skills such as creative thinking (Dinham, 2016). For example, evidence from 50 meta-analyses about reading instruction suggest that “actively teaching the skills and strategies of reading” (Hattie, 2009, p. 129) is necessary across the entire curriculum. Research particularly highlights the importance of perceptual skills as foundational to the development of reading fluency, which underpins student capability to learn effectively across the curriculum.

Leithwood et al. (2004) warned that there is a tendency for schools to narrow curriculum for disadvantaged students, placing a main focus on ‘the basics’. However, exposure to the full breadth of the curriculum is essential to student engagement in learning and their future participation in society (Anthony & Walshaw, 2007; Garza et al., 2014; Leithwood et al., 2004; Voogt et al., 2018a). Therefore, teachers need to ensure their teaching targets foundational as well as broad learning outcomes, including broader skills, attributes, and dispositions relevant to life beyond school (Hattie, 2012; OECD, 2019, cited in OECD, 2020). Such an approach appears to be in place in highly effective schools. For example, prioritising student achievement in core learning areas (literacy and numeracy) and development of lifelong learning attributes was central to the successful school improvement efforts of one of the case study schools as reported by Hattie et al. (2015).

Further, research highlights the importance of ensuring students are exposed to an inter-connected comprehensive curriculum (Anthony & Walshaw, 2007; Garza et al., 2014; Hattie, 2012; Leithwood et al., 2004; Moss et al., 2019; OECD, 2019, cited in OECD, 2020; Scott, 2015). Curriculum needs to provide all students with equitable opportunity to learn and enable them to realise their potential, regardless of their individual backgrounds or the school location. Schools and teachers must therefore have high expectations for all students and ensure all students are exposed to challenging learning experiences across the curriculum (Voogt et al., 2018a). This requires a focus on a broad range of skills and capabilities, beyond traditional academic outcomes.

For example, research has demonstrated the positive impact of providing opportunities for social and emotional learning on student engagement, behaviour, and attendance (CESE, 2015). Meta-analytic evidence (Hattie, 2009) shows that social skills programs, aiming to foster students’ “social appropriateness, social problem-solving skills, self-control, or social perspective” (p. 150) substantially enhanced students’ peer relations and other social outcomes. Moreover, implementation of such programs was associated with small improvements in academic outcomes ($d = 0.10$ to 0.20). Hattie warned that these outcomes were all short-term, highlighting the need for an ongoing focus on social skill development across the curriculum.

Across the world, 21st century curriculum emphasises desirable features of student profiles, such as agency, capacity for transformation, critical thinking and problem-solving. These competencies are often considered to be transferrable and are mostly taught embedded within disciplinary areas (OECD, 2020). Twenty-first century curriculum need to be flexible and comprehensive with a key focus on deep thinking, reasoning, and dispositions needed to prepare students for the many challenges they are likely to face over the course of their lives (Scott, 2015). Another study highlighted the importance of 21st century competencies such as critical thinking (Chen et al., 2015).

In addition, research shows that implementing curriculum in a way that draws cross-disciplinary connections can make learning more meaningful for students (Moss et al., 2019). Based on an in-depth qualitative case study, Moss et al. (2019) concluded that a conceptual framework that includes consideration of the school community context, systemic curriculum mandates, and assessment to support professional dialogue can enhance cross-disciplinarily curriculum planning and implementation. Meta-analytic evidence on integrating areas of curriculum overall showed positive effects ($d = 0.39$; Hattie, 2009), although effects varied for each discipline and student age; this approach was less effective at the secondary education level. Overall, the evidence shows that successful curriculum integration requires “thematic instruction” and “an emphasis on process skills” (p. 152), as well as substantial teacher expertise.

Research also highlights the value of extracurricular activities, although their impact on student learning outcomes is often indirect (CESE, 2015; Hattie, 2009; Leithwood et al., 2004). Based on evidence from student surveys, it appears that students in effective schools are more likely to actively participate in extracurricular activities (CESE, 2015). Leithwood et al. (2004) identified the importance of extracurricular activities in student overall involvement in schooling. Another study similarly identified that the opportunity to engage in extracurricular activities was associated with improved student feelings of connectedness to school (CESE, 2015). Extracurricular programs have a small positive impact on student achievement ($d = 0.17$) but appear important to student engagement and behaviour in school (Hattie, 2009). Further, there is some evidence that engaging in one extracurricular area may positively impact outcomes in other curriculum areas. For example, studying creative drama or arts was associated with slightly improved student achievement in other curriculum areas. It seems that the involvement in these curricular areas is beneficial to student engagement in schooling overall, which in turn positively affects

their achievement (Hattie, 2009). Positive effects ($d = 0.52$) were also found for outdoor or adventure programs, potentially due to their strong focus on “facing challenge, seeking feedback, adapting to peer cooperative learning, and enhanced self-regulation about one’s skills and strengths” (Hattie, 2009, p. 157), the impact of which appears to endure beyond the initial experience.

Assessment processes are aligned with the school’s curriculum plan and designed to establish where students are in their learning and monitor learning progress over time

Various studies highlighted the importance of assessment processes to monitor student progress against curriculum outcomes (Hattie, 2009; Hattie et al., 2015; OECD, 2016, cited in Voogt et al., 2018b; Robinson, 2007; Scott, 2015; Zepeda, 2013). Evaluation and assessment of student learning needs to be aligned with curriculum (Gouëdard et al., 2020; Miles & Ferris, 2015; Zepeda, 2013), which requires adequate understanding of assessment standards and notions of quality (Hattie, 2009; Hattie et al., 2015). As noted, strong alignment between curriculum and assessment can be achieved using a backward design approach (Wiggins & McTighe, 2005; cited in Moss et al., 2019). To foster student beliefs in their own learning, assessment needs to focus on student achievement of curriculum goals as opposed to social comparisons (Hattie, 2012). Importantly, assessment needs to cover the full breadth of the curriculum to ensure curriculum components are taught as well as assessed (Moss et al., 2019).

Research shows that frequent assessment of student learning can be beneficial for student outcomes ($d = 0.34$). Its power lies in the generation of feedback used by teachers to modify their instruction based on evidence of student learning progress. When used in this way, an effect size as high as 0.90 may be achieved. For example, teachers can use assessment to actively identify and subsequently remediate student misconceptions (Hattie, 2009). Having a clear plan in place for how student progress across the curriculum will be monitored is valuable, which may require assistance from a more experienced colleague. Schools may also use technology, such as Learning Management Systems, to assist in monitoring student progress over time (Hattie et al., 2015).

The role of learners in the assessment process, tightly intertwined with the learning process, must not be overlooked. Research highlights the importance of teachers making curriculum expectations and success criteria explicit to students (Hattie, 2012). This means that teachers need to help students understand what they are expected to learn and help them understand the nature of progress within a certain domain. For example, they may show students rubrics (Masters, 2011; Scott, 2015), overviews of typical student progress, or examples of student work at a particular performance level (Masters, 2011). Teachers can make curriculum content more relevant and engaging for students by clarifying short-term as well as long-term learning goals (Scott, 2015). There is also research evidence to suggest that having a clear idea of expectations for learning can foster student self-regulated learning and independence in learning; this evidence is discussed in Domain 7.

Strategies and processes are in place to provide students and their families with information about curriculum intentions, student achievement, and progress over time

Research highlights the importance of communicating information about student progress to students and their families. For example, reporting to students and families serves the important purpose of demonstrating progress against curriculum intentions over time (Dinham, 2016; Hattie, 2012; Hattie et al., 2015; Renshaw et al., 2013). Reporting how students are progressing is important in communicating to families how they can help (Hattie et al., 2015). The Swedish case study described by Hattie et al. (2015) illustrated how teachers created visual displays of learning progression and success criteria as aligned to the curriculum, which was highly informative for communicating expectations and progress to students as well as their families. Further, providing concrete examples of what students have learned can enhance parental involvement in their child’s learning (Hattie et al., 2015). Technology, such as e-portfolios, can be used for reporting progress in relation to curriculum goals (Scott, 2015). Learning Management Systems can assist in lowering the labour intensity of timely reporting on student progress and next steps in learning. For example, Hattie et al. (2015) described how the Presbyterian Ladies’ College in Melbourne, Australia used an online portal to frequently communicate feedback to students and families. In addition to reporting of point-in-time progress against curriculum intentions, teachers need to provide both students and families with a “clear picture of expected progress” over time (Hattie et al., 2015, p. 172).

Opportunities for professional learning are provided to build staff capability in curriculum implementation and review

Various studies highlighted the importance of professional learning for staff in planning, developing, and implementing curriculum (Anthony & Walshaw, 2007; Chen et al., 2015; Hattie et al., 2015; Jackson, 2019; Moss et al., 2019; OECD, 2020; Sinnema, 2016, cited in Voogt et al., 2018b), which is particularly important given the shifts towards more responsibility and flexibility for schools in implementing curriculum (Jackson, 2019; OECD,

2020). Research shows that careful consideration must be given to teacher capacity and willingness to engage in curriculum design and implementation, which may initially require substantial support and professional learning (Sinnema, 2016, cited in Voogt et al., 2018b). For example, specific to planning for teaching of mathematics, Anthony and Walshaw (2007) identified the importance of professional learning to ensure teachers are able to develop opportunities for fostering mathematical understanding as a cross-curricular approach. In addition, research highlights the importance of teacher professional learning to enable them to keep up with continuously evolving curriculum. At times, the innovative skills covered in the curriculum and teacher capabilities may misalign, for example in the case of technology (Chen et al., 2015).

The school has processes in place to review and refine curriculum to maximise outcomes for all students

In addition to the value of teacher collaborative discussions of curriculum previously noted, research shows the importance of ongoing review of curriculum across the school (Cole, 2012; Robinson, 2007). Collaboratively coordinating and reviewing curriculum across the school was identified as strongly impacting on student outcomes ($ES = 0.42$; Robinson, 2007), with evidence suggesting these effects were larger in primary compared to secondary schools. Cole (2012) highlighted the importance of collaborative planning and reviewing educational programs at different levels, ranging from an entire term to lesson activities. Research highlights the importance of monitoring student progress and adjustment of curriculum planning based on evidence (Hattie et al., 2015; Robinson, 2007).

Differentiating teaching and learning

Overall evidence for Domain 7

Numerous studies highlighted the importance of teachers providing differentiated instruction (e.g., CESE, 2015; Hopkins, 2013; Masters, 2011; Miles & Ferris, 2015; OECD, 2020; Robinson, 2007). There are various perspectives on differentiation in the literature. For example, Tomlinson and Imbeau (2010, cited in Van Geel et al., 2019) identified the need to modify content, process and product to variations in student readiness, interest, and their learning profiles. Others (e.g., Bosker, 2005, cited in Van Geel et al., 2019) have defined differentiation more broadly, taking the approach that any aspect of education can be tailored to student needs. Subban (2006) traced the philosophy underpinning differentiated instruction back to the works of Vygotsky. This theoretical perspective highlights the importance of the nature of teacher-student relationships as collaborative, the physical learning environment, and adjustment of learning activities to students' individual interest, backgrounds, and ability levels.

Through synthesising the literature, Handa (2013) identified 5 dimensions of differentiation:

- *Outcomes*; learning outcomes can be tailored to individual student levels to be challenging yet achievable.
- *Content*; content can be varied to meet diverse student needs, for example by varying the complexity, pace, and authenticity. In differentiating content, teachers need to ensure their instruction focuses on big ideas and concepts, emphasises depth, and is grounded in real-world problems that students can relate to.
- *Process*; teaching strategies can be differentiated to meet student needs and foster their interest and curiosity. For example, students can be provided with the opportunity for extension using inquiry approaches.
- *Product*; the nature of student work can be differentiated to meet diverse student needs. For example, students can develop open-ended products that are targeting a student-identified audience or apply what they have learned to a new situation.
- *Learning environment*; the learning environment can be differentiated by providing opportunity for student choice, negotiation, and independence. Other approaches to differentiating the learning environment include using flexible student grouping approaches, valuing student ideas and diversity, and encouraging respectful social interactions.

Deunk et al. (2015) described differentiation as encompassing a combination of teacher attitudes, knowledge, and practices to adapt their instruction to individual student needs. This requires teachers to set individual learning goals, determine where students are at, and provide instruction based on their knowledge of what strategies are effective for students with differential needs. Some studies have reported positive effects on lower-achieving students when teachers use differentiation to ensure all students achieve minimum goals. However, differentiation is particularly powerful to ensure all students realise their potential, including high-achieving students.

Although many researchers have advocated differentiated instruction, and this approach has strong theoretical groundings, the empirical evidence base is somewhat mixed. Evidence pertaining to narrow and broad approaches to differentiation has often been conflated in the literature, resulting in a somewhat distorted and at times conflicting evidence base

(Deunk et al., 2015). For example, one literature review showed that teachers can raise student achievement levels by differentiating their instruction based on information from in-depth analysis of assessment evidence (Robinson, 2007). In contrast, a large-scale experimental study found that students who had participated in a 5-month differentiated interest-based reading intervention performed at least as well or better than students in the control group (Reis et al., 2011). These findings suggest that differentiated instruction was just as effective as, or more effective than, a traditional one-size-fits-all whole-class approach. Yet research in kindergarten showed overall positive effects for students of all achievement levels when using ability grouping to support differentiated instruction (Deunk et al., 2015). Deunk et al. (2015) highlighted the interconnectedness of differentiated teaching and learning with other aspects of school improvement: "Implementing differentiation practices cannot be done in isolation, and moreover synergetic effects can be expected when differentiation is one of the many elements of a well-designed comprehensive program" (p. 34). Research evidence shows small effects of differentiated practice as part of a whole-school program, yet it is unclear to what extent these effects can be attributed to teachers' differentiation practices.

Although the importance of differentiated teaching is widely recognised, differentiation has long been recognised as a complex skill (Miles & Ferris, 2015; Van Geel et al., 2019). Targeted and flexible use of resources can assist teachers in realising differentiated instruction (Miles & Ferris, 2015). Van Geel et al. (2019) emphasised that the critical feature of successful differentiation is the extent to which teachers can match adaptations to student needs. Specifically, they identified that "the core of differentiation is in teachers' deliberate and adequate choices concerning instructional approaches, and materials, based on well-considered goals and thorough analyses of students' achievement, progress, and instructional needs, combined with continuous monitoring during the lesson." (p. 60-61). This requires a range of differentiation skills, as well as knowledge about students and disciplinary knowledge (Van Geel et al., 2019).

Based on the overall Domain 7 evidence outlined and examination of other characteristics within the domain, the following characteristic was generated:

There is a school-wide shared understanding of, and commitment to, differentiated teaching and learning

The following discussion focuses on evidence in relation to each SIT Domain 7 characteristic.

Teaching practices across the school reflect the belief that, although students are at different stages in their learning and may be progressing at different rates, all students are capable of learning successfully if given appropriate learning opportunities with the necessary support

As identified in Domain 1, there is compelling evidence for the importance of setting high expectations for all students (e.g., Dinham, 2016; Hattie, 2009; Yatsko et al., 2015). For example, teacher expectations showed strong associations with student achievement outcomes (Hattie, 2009; $d = 0.43$). The core focus of differentiation needs to be on ensuring all students make adequate progress, irrespective of their starting points (Hattie, 2012; Subban, 2006). Research therefore highlights the importance of school-wide beliefs that all students can progress if given the right support (Hattie et al., 2015).

Specifically, research highlights the importance of teacher beliefs in student potential to learn (Anthony & Walshaw, 2007; Hattie, 2012; Masters, 2011) if appropriately supported (Hattie et al., 2015; Masters, 2011), regardless of their achievement levels (CESE, 2015; Hattie, 2012; Masters, 2011; Yatsko et al., 2015) or background (Dinham, 2016; Yatsko et al., 2015). This requires teachers to recognise that students may have different starting points for learning and may progress at different rates (Masters, 2011). Learning goals and success criteria need to be formulated in a way that communicates high expectations for all students, regardless of their starting point (Hattie et al., 2015). Importantly, teachers need to motivate students by engaging them in striving to achieve appropriate learning goals and evaluate their own progress (Hattie, 2012). In differentiating teaching and learning, it is important that teachers focus on learning progress as opposed to ability. Not labelling students is vital in setting high expectations for all, as 'pigeonholing' students can result in self-fulfilling prophecies (Dinham, 2016). Furthermore, teachers need to be observant to ensure recognition of students exceeding learning outcome expectations and ensure all learners are appropriately challenged (Hattie, 2009).

Teachers use evidence from a range of assessments to establish where students are in their learning as a starting point for differentiating their teaching

Numerous studies have highlighted the importance of teacher use of assessment to establish where learners are in their learning journeys to inform decisions about teaching to best meet student needs (Anthony & Walshaw, 2007; Black & Wiliam, 1998; Datnow & Park, 2018; Griffin et al., 2012; Hattie, 2012; Hattie et al., 2015; Hopkins, 2013; Masters, 2011; 2013; McAleavy & Elwick, 2016; Miles & Ferris, 2015; Robinson, 2007; Subban, 2006; Van Geel et al., 2019). For example, research shows that teachers can raise student achievement levels by differentiating their instruction based

on information from in-depth analysis of assessment evidence (Robinson, 2007). This is because taking account of what students already know and can do can help teachers better target their teaching approaches. Knowledge about what students know and can do is critical to enable teachers to overcome the difference between where students are currently at in relation to the goal (Hattie, 2012). Hence, assessment plays a key role in determining starting points for teaching and learning (Anthony & Walshaw, 2007; Hattie, 2012; Masters, 2011). Assessment can sometimes demonstrate gaps in student knowledge, requiring teachers to return to fundamental concepts before progressing through the curriculum (Hattie et al., 2015). However, differentiation requires that teachers use assessment evidence to build on students' strengths, not just remediate their deficiencies (Hattie et al., 2015; Subban, 2006).

Teachers need to ensure students can demonstrate their learning in a variety of ways, using a range of assessment approaches that suit their individual circumstances (Scott, 2015; Subban, 2015). Hence, teachers also need to differentiate assessment to accurately gauge where students are at (CESE, 2015; Handa, 2013; Scott, 2015; Subban, 2006) and give all learners the opportunity to experience success (Subban, 2006).

Teachers may draw on a range of evidence gathered using formal and informal assessment methods to inform decisions about differentiation (Datnow & Park, 2018; Hattie, 2012). Structured classroom interactions are important sources of information for teachers, but informal conversations may also provide valuable information on student thinking and prior knowledge. Teachers need to ask open-ended questions and listen carefully to student responses to identify student thinking and starting points for further teaching and learning (Hattie, 2012). At the classroom level, the study by McAleavy and Elwick (2016) highlighted the importance of teacher capability to analyse data and use this to inform their teaching (further evidence in relation to teacher analysis of data was discussed in Domain 2). Research evidence showing benefits of collaboration in examination of student data to inform instructional decisions for student achievement is emerging (Ronfeldt et al., 2015).

Teachers design learning experiences that reflect students' learning needs, levels of readiness, interests, aspirations, and motivations to ensure that all students are appropriately engaged, challenged, and extended

As noted, the effectiveness of differentiation depends on the extent to which teachers match adaptations to meet student needs (Van Geel et al., 2019). Differentiated teaching and learning can help ensure that learning opportunities are accessible to all students, regardless of their level of (dis)advantage or needs (Scott, 2015). Hence, differentiation can foster student engagement (CESE, 2015), learning, and motivation by catering to student interest and giving all learners the opportunity to experience success (Subban, 2006), which has also been associated with improved wellbeing outcomes (CESE, 2015). As previously discussed, differentiation requires understanding where students are in their learning (e.g., Miles & Ferris, 2015). This is in sharp contrast to a one-size-fits-all approach to education. As noted in Domain 6, using a singular approach to implementing the curriculum is likely to result in suboptimal opportunities for learning for many students (Subban, 2006). Effective teaching therefore requires adaptation or modification of curriculum materials to individual student needs (Handa, 2013; Zepeda, 2013). Ideally, teachers are supported in adapting curriculum to individual student needs at a systemic level (Gouëdard et al., 2020).

Teachers' choices regarding instructional approaches need to be targeted based on consideration of student needs (Van Geel et al., 2019). Students differ in their levels of readiness (current ability level), interest, and learning profiles (Tomlinson, 2000, cited in Subban, 2006). Regardless of individual student differences, teachers need to ensure that all students are appropriately challenged (Anthony & Walshaw, 2007; Hattie, 2012; Hopkins, 2013; Masters, 2011; Tomlinson, 2004, cited in Subban, 2006), meaningfully engaged (Anthony & Walshaw, 2007; Hattie, 2009; 2012; Scott, 2015) and receive the necessary support to achieve the best possible outcomes (CESE, 2017; Hattie, 2012; Masters, 2011). For example, this requires teachers to establish appropriately challenging learning intentions (Deunk et al., 2015; Hattie, 2009), design challenging learning tasks (Hopkins, 2013; Tomlinson, 2004, cited in Subban, 2006), provide learning experiences that are considered meaningful by students (CESE, 2015), and ensure learning experiences are targeted at the appropriate level for students with a range of ability levels within a class (Anthony & Walshaw, 2007).

Differentiation requires teachers to draw from a combination of methods and approaches as appropriate for each individual student (Dinham, 2016), based on their knowledge of what strategies are effective for students with differential needs (Deunk et al., 2015). As a starting point, learning intentions and success criteria need to be appropriate to the range of student achievement levels (Deunk et al., 2015; Hattie, 2012). For example, teachers can differentiate learning goals for students for whom goals do not seem achievable in the short term by breaking these down into smaller steps against which progress can be established (Scott, 2015). Although students generally still work towards the same curriculum standards, they do so at a different pace (Subban, 2006). In addition, teachers need to design learning activities or tasks at appropriately challenging levels. Research in mathematics education showed that teachers often designed activities which were suitably challenging for average-performing students,

thereby limiting the opportunities to learn for novices or more proficient students (Anthony & Walshaw, 2007). Teachers also need to be responsive to students' social and cultural backgrounds to ensure learning experiences encourage meaningful engagement in learning (Anthony & Walshaw, 2007).

In a differentiated classroom, scaffolding and supportive interactions (Anthony & Walshaw, 2007; Coe et al., 2014) and mutual feedback interactions play an important role in facilitating student progress (AITSL, 2017). Although students may initially need substantial support, such support can be reduced once students become more proficient (Masters, 2011). When providing feedback, teachers need to gradually remove explicit support as students become more proficient and more capable of self-regulating their learning (Hattie, 2012). Specifically, evidence from the literature suggests that pedagogical strategies need to be differentiated according to the complexity of the task and the ability of the learner. More complex learning tasks and high ability students benefit more from inquiry-focused and self-directed strategies, whereas more direct guidance is needed for learning tasks with low complexity for lower-ability or novice students (Jones & Vetere, 2017).

Research suggests that providing individualised instruction is somewhat beneficial to student learning ($d = 0.23$), yet Hattie (2009) noted that in relation to whole-class instruction, "one of the major skills of teachers is to manage such classes, optimise peer co-teaching (even though this is not so common) and capitalise on the similarities and differences among the students" (p. 198). Given the difficulties in completely personalising instruction to individual needs within a classroom context, it is not surprising that studies have specifically focused on student grouping practices to facilitate differentiated instruction (CESE, 2015; Deunk et al., 2015; Hattie, 2009). Use of ability grouping for differentiation has been widely debated, with research showing somewhat conflicting findings (Duenk et al., 2015). For example, Hattie examined evidence for within class grouping of students (combining short- and long-term grouping) and found a small positive effect ($d = 0.16$). However, the key message pertaining to the effectiveness of grouping practices was that "the instructional materials and the nature of instruction must be adapted for these specific groups" (p. 95) so they are appropriately challenging for students (Hattie, 2009). Another study found that research in kindergarten showed overall positive effects for students of all achievement levels when using ability grouping to support differentiated instruction. In contrast, research in primary education shows that homogenous grouping is not more effective than whole-class instruction (Deunk et al., 2015). Another study concluded that students benefit from working in heterogenous groups, but that grouping by ability was detrimental (Anthony & Walshaw, 2007). Another study identified that ability grouping is likely to benefit high achieving students, have no effect on average-achieving students, and have negative effects for lower-achieving students (Deunk et al., 2015). However, Deunk et al. (2015) warned that "the effects of grouping as such are difficult to interpret as long as it is unknown what the teacher does with these groups" (p. 48). In other words, the quality of differentiation by teachers appears more important than the nature of grouping mechanisms. Deunk et al. (2015) concluded that students may benefit from being grouped in homogenous or heterogenous groups, as long as teachers hold high expectations for all students, grouping is based on students' demonstrated abilities, and groups are flexible and allow students to move up from a low-achieving group.

Although there is often an emphasis on supporting students who fall behind, differentiation should maximise each learner's potential, regardless of their individual starting points (Deunk et al., 2015; Subban, 2006). For teachers to effectively facilitate all students' learning, they need to be able to identify and use strategies for all levels of the learning progression (Griffin et al., 2012). Differentiation also requires extension of learners who are at a more advanced level to ensure they remain challenged and engaged (CESE, 2015; Hattie, 2009; Hattie et al., 2015; Subban, 2006). Research suggests that although grouping can have small to moderate effects for gifted students, the most effective way to support gifted students to realise their potential was through acceleration, meaning that they are allowed to progress through the curriculum at a higher pace (Hattie, 2009; $d = 0.88$).

Further, there is some evidence that technology may be used to effectively facilitate differentiation (Deunk et al., 2015; Hattie et al., 2015; Scott, 2015; Voogt et al., 2018a). For example, computer programs may suggest student groupings and instructional strategies based on data. Research shows that such use of technology can positively affect teachers' practice and student achievement outcomes (Deunk et al., 2015; Voogt et al., 2018a). However, teachers may require substantial professional learning to effectively use technology for differentiation (Voogt et al., 2018a).

The perspectives of students, families, and relevant professionals inform adjustments to teaching, learning, and assessment to best meet student needs

No evidence specific to this characteristic was identified in the literature reviewed, possibly given its primary focus on school improvement as opposed to supporting individual students. Broader bodies of literature, including on educational adjustments in assessment and student wellbeing and engagement, corroborate the importance of this characteristic.

Teachers continuously monitor individual student progress and adjust their teaching in response to evidence of student progress and feedback

The importance of assessment in establishing starting points for teaching and learning has already been discussed. However, it is important to note that differentiation requires continuous monitoring of student progress and adjusting instruction based on identified needs to ensure appropriate student progress (Hattie, 2012; Hattie et al., 2015; Masters, 2011; McAleavy & Elwick, 2016; Scott, 2015; Van Geel et al., 2019). This requires ongoing evaluation of student progress based on evidence from various sources, including informal and formal assessment methods (Hattie, 2012; Hattie et al., 2015), self-reflection (Hattie et al., 2015), as well as student feedback (AITSL, 2017; Dinham, 2016; Hattie, 2012; Hattie et al., 2015; Office for Standards in Education, Children's Services and Skills [Ofsted], 2009, cited in Hopkins, 2013). Importantly, research suggests that teachers will first need to equip students with the language and skills to discuss their learning for them to be able to provide feedback to the teacher (Ofsted, 2009, cited in Hopkins, 2013).

Effective differentiation requires teachers to integrate disciplinary knowledge and pedagogical knowledge, to enable them to identify patterns in student responses and modify their practices appropriately (Hattie, 2012) based on in-depth understandings of strategies to progress student learning (Hattie et al., 2015). Teachers therefore need to plan for gathering evidence about student progress towards learning goals to inform next steps in teaching and learning (AITSL, 2017) and adjust teaching strategies in response to evidence of impact (Hattie, 2012). There are different ways in which teachers may differentiate teaching and learning to provide opportunities for students to achieve learning goals. Overall, the literature shows that different approaches may have differential effects for high versus low ability students (Voogt et al., 2018a), indicating a need to carefully consider how all students' learning can be optimised (Hattie, 2009).

Some researchers have argued that strong interpersonal relationships between students and teachers are necessary for teachers to be able to respond appropriately to students' needs (Hattie et al., 2015). For example, Dinham (2016) identified that personally knowing students is instrumental to catering to their specific needs. He claimed that teachers need to personally know their students and pay careful attention to individual student needs, as evidenced by, for example, changes in levels of engagement or health.

Teachers encourage and assist students to monitor their own learning and to set goals for future learning

Research on differentiated teaching and learning also highlights the importance of student active participation in their learning, for example through awareness of how they are progressing (Subban, 2006) and goal setting (Hattie, 2012). Various studies highlighted the need for students to assess their own learning and monitor their own progress (AITSL, 2017; Dinham, 2016; Hattie, 2012; Hattie et al., 2015; McAleavy & Elwick, 2016; Scott, 2015). Research shows that students learn more when they are capable of monitoring their own progress. Yet the provision of effective feedback through self-assessment requires training (AITSL, 2017). Hence, teachers play an important role in equipping students with the knowledge and skills to self-assess (Dinham, 2016; Hattie, 2012; Hattie et al., 2015; McAleavy & Elwick, 2016). Importantly, teachers need to foster student capability to self-regulate their learning and reduce dependence on teacher guidance. This requires transparency of learning outcomes and what the pathway to success looks like (Hattie, 2012; Masters, 2011). Specifically, teachers need to help students understand curriculum standards and success criteria so they can apply these to monitor their own progress (Hattie et al., 2015) and set realistic but challenging goals (Hattie, 2012). Teachers may use technology to support differentiated teaching and learning, for example through e-portfolios for learners to monitor progress and set personal goals (Scott, 2015).

Targeted interventions are in place for students identified as requiring additional support

The key to effective differentiation is to maximise each learners' potential, regardless of their individual starting points (Subban, 2006). Some students may require additional support. Monitoring of student progress using a range of data sources is critical to ensuring students in need of support are identified and provided with targeted interventions (McAleavy & Elwick, 2016; Miles & Ferris, 2015). For example, research highlights the importance of support for students who fall behind (Hattie, 2009; Hopkins, 2013) or for students who are disengaged (CESE, 2017). By illustration, Hattie (2009) showed that when students do not make adequate progress, study skills interventions can be beneficial to target cognitive, metacognitive or affective aspects of learning ($d = 0.59$). Further, research shows that comprehensive interventions for students with disability can substantially enhance achievement outcomes (Hattie, 2009; $d = 0.77$). Importantly, teachers and school leaders need to have an in-depth understanding of strategies to progress student learning to adequately support students based on identified needs (Hattie et al., 2015).

8

Implementing effective pedagogical practices

Overall evidence for Domain 8

There is a strong evidence base for the impact of pedagogy on student outcomes (Anthony & Walshaw, 2007; Coe et al., 2014; Dinham, 2016; Hopkins, 2013), identified by some as the single most important factor for improving student learning (Louis & Wahlstrom, 2011b). For example, a large-scale best evidence synthesis showed the critical importance of teacher pedagogical decisions for student learning outcomes (Anthony & Walshaw, 2007). Although instructional time per se is moderately associated with student achievement outcomes, there is a strong association between the amount of time spent engaged in learning by students and their academic outcomes (Leithwood, 2011). Time spent engaged in learning hinges upon the optimal use of instructional time through effective pedagogical practices (Leithwood et al., 2020).

Research evidence about which pedagogical approaches are most effective is ambiguous (Louis & Wahlstrom, 2011b). Evidence from meta-analyses suggests that various pedagogical strategies can produce educationally powerful ($ES > 0.40$) effects; these included problem-based learning, cooperative learning, direct instruction, and peer tutoring (Hattie, 2012). Mourshed et al. (2017) conducted a large-scale quantitative analysis of PISA science data gathered in 72 countries across the world to identify which factors are most strongly associated with student achievement. Two findings were consistent across all regions in the world:

- 1 Students' mindsets (including motivation and self-belief) were the strongest predictor of academic achievement
- 2 The best achievement outcomes were achieved in classrooms which were dominated by teacher-directed instruction and used some inquiry-based instruction.

These findings point to the importance of building students' beliefs in their own capabilities to learn and the importance of sustaining effort in the face of challenging circumstances. They also highlight the importance of using a range of mainly teacher-guided pedagogical practices.

Coe et al. (2014) identified that how effective pedagogy is best determined is a topic of debate. Whilst acknowledging limitations, the commonly accepted approach to determining effectiveness is by its impact on student learning as evidenced by assessment outcomes. Others have argued that the focus needs to go beyond academic outcomes, but rather also include social outcomes of learning (Anthony & Walshaw, 2007). Caution must be taken in defining effective pedagogy in highly specific ways; "trying to reduce great teaching to constituent elements is that the whole may be greater than the sum of its parts. The choices a teacher makes in orchestrating their skills may be an essential part of what makes them effective" (Coe et al., 2014, p. 10). Yet, theories of effective pedagogy must be specific enough to guide pedagogical action. It has been suggested that pedagogy needs to be informed by theory, evidence, and collaborative teacher enquiry about classroom practices (Hopkins, 2013). In addition, pedagogical practices need to be fit for purpose and align with curricular objectives or standards and pedagogical strategies outlined in curriculum frameworks (Gouédard et al., 2020; Hopkins, 2013).

Given the powerful impact of pedagogical practices on student outcomes, changing the day-to-day classroom practices in schools is considered to be the most effective strategy for improving student achievement (Masters, 2011). Research therefore highlights the important role of school leaders in promoting effective pedagogical practices. As previously noted, the impact of school leaders on student outcomes is mostly indirect, yet school leaders can have a vital impact on student achievement through their influence on improvement of pedagogical practices (Day et al., 2016; Hopkins, 2013; Zepeda, 2014).

The principal has clearly articulated their expectations for the school-wide use of effective, evidence-informed teaching strategies

As previously mentioned, research highlights the importance of school-wide consistency in expectations for evidence-informed effective pedagogical practices (Cole, 2012; Marshall & Zbar, 2013; Masters, 2011). Various other studies highlight the importance of school leaders ensuring school-wide pedagogical consistency (Conway & Abawi, 2013; Hattie et al., 2015).

Establishing a school-wide instructional approach can help “make best practice common practice” (Cole, 2012, p. 16) across the school, and can help identify the school’s targeted professional learning needs. Research also highlights the importance of school leader use of data to inform management of pedagogy within the school (Sammons et al., 2014). Conway and Abawi (2013) emphasised the critical role of school leaders in making schools adopt a school-wide pedagogy to ensure school improvement efforts are successful and sustainable. To be impactful and context-appropriate, such a school-wide approach to pedagogy needs to be developed within schools. This requires a culture of mutual trust and support (Domain 3), where teachers feel free to share their pedagogical experiences. The development of school-wide expectations for pedagogy is inextricably linked to the school’s vision (Domain 1); it “is developed on the strength of verbal and visual articulation of shared values, beliefs and pedagogical practices within a school community in support of the school’s vision” (Conway & Abawi, 2013, p. 177). One strategy identified as particularly helpful in developing school-wide approach to pedagogy is the use of metaphoric language.

School leaders and teachers keep abreast of research on effective teaching practices

Various studies highlighted the importance of school leaders and teachers keeping abreast of research on effective teaching practices (Campbell et al., 2015; Dinham, 2016; Hattie et al., 2015; Masters, 2011, 2012). As noted, research highlights the importance of providing strategic direction to set expectations for effective school-wide evidence-informed pedagogical practice (Cole, 2012; Marshall & Zbar, 2013; Masters, 2011). This requires school leaders to keep abreast of the latest research. One study specifically highlighted the importance of encouraging teachers to use evidence-informed teaching strategies (Cole-Henderson, 2000). Further, teachers need to critically evaluate research evidence when implementing pedagogical practices to avoid falling into the trap of quick fixes or use of ineffective strategies (Dinham, 2016). This also means that they need to be wary of popular methods which: (1) lack a solid evidence base (2) have been demonstrated to be ineffective; or (3) are based on misinterpretations of research (Masters, 2011). Teachers may keep abreast of research evidence on effective pedagogical practices by actively engaging in self-initiated research projects or participating in external research (Campbell et al., 2015).

School leaders and teachers purposefully collaborate in discussing, modelling, observing, and providing constructive feedback on teaching practice

As noted in Domain 5, there is a substantial evidence base which highlights the importance of regular teaching observation and feedback to support teacher professional learning (e.g., Coe et al., 2014; Marshall & Zbar, 2013). Given the importance of effective instruction in improving student achievement, research highlights the need for school leaders to be instructional leaders. Although the exact definitions of instructional leadership varies, a key feature is supporting teachers in their day-to-day work (Louis & Wahlstrom, 2011b). Several studies specifically highlighted the importance of ongoing school leader feedback on teachers’ teaching practices (Hattie et al., 2015; Robinson, 2007). The school leadership team needs to ensure pedagogy is informed by current research and use this knowledge to frame feedback on classroom observations and follow-up conversations with teachers (Hattie et al., 2015). Ongoing teacher learning is best supported by systematic observation and evaluation against evidence-informed descriptors of effective teaching (Masters, 2016).

As discussed in Domain 5, fostering collaboration is vital to facilitating school-wide teacher expertise, which includes their pedagogical practices (e.g., Ronfeldt et al., 2015). Research shows that whilst teachers make in-the-moment decisions in their classrooms, high quality pedagogical practices require school-wide material and human resourcing support, including cross-teacher collaborations (Anthony & Walshaw, 2007) and collaborative teacher enquiry about classroom practices (Hopkins, 2013). School leaders therefore need to ensure they provide appropriate structures for “getting pockets of good practice spread across the school” (Cole, 2012, p. 12).

Research shows that teacher collaboration in determining teaching strategies is positively associated with student achievement and is perceived as helpful by teachers. These findings may be explained by the positive benefits that collaboration has on individual teachers' instructional practices (Ronfeldt et al., 2015). A large-scale quantitative empirical study (Ronfeldt et al., 2015) showed that students of teachers in schools with higher levels of collaboration made larger achievement gains compared to teachers in schools with lower levels of collaboration, regardless of teachers' individual levels of engagement in collaboration. These findings highlight the importance of creating strong school-level collaborative environments. In addition, research showed that the quality collaboration (as reported by individual teachers) matters, as demonstrated by higher levels of student achievement gains when teachers engaged in high quality collaborations. Findings from another study also highlighted the positive impact of teacher collaboration on the effectiveness of pedagogical practices (Anthony & Walshaw, 2007).

Teacher collaboration to inform pedagogical practices may extend beyond the bounds of the schools. One study highlighted the need for teachers to be creative and cross traditional boundaries in sourcing pedagogies to support 21st century learning, which may involve other schools or the wider community (Scott, 2015). Another study highlighted the importance of teacher sharing of pedagogical expertise with the wider community to enhance the quality of educational practices beyond their own classroom (Campbell et al., 2015).

Teachers use a range of evidence-informed teaching strategies

There has been much debate about which pedagogical approaches are most effective (Louis & Wahlstrom, 2011b). Early literature placed much emphasis on the effectiveness of highly structured approaches to teaching. For example, Sammons et al. (1995) cited Scheerens (1992) who claimed that structured teaching involves: (1) making learning goals explicit (2) offering to-be-learned material in logically sequenced manageable units (3) providing ample opportunity for student practice and (4) monitoring student progress and providing timely feedback. More recently, research has increasingly highlighted the importance of giving students a voice in their own learning (Hopkins, 2013). Contemporary approaches to pedagogy emphasise a need to draw on a range of student- and teacher-led strategies (also referred to as student-centred and teacher-directed), which need not be mutually exclusive (Dinham, 2016; Louis & Wahlstrom, 2011b; Mourshed et al., 2017; Scott, 2015). Play-based learning appears particularly powerful for younger students ($d = 0.50$) and has been linked with "improved performance outcomes both in cognitive-linguistic and affective-social domains" (Hattie, 2009, p. 154).

For example, teachers may effectively combine elements of direct instruction with inquiry-based instruction. Key elements of such an approach include teacher pacing of instructional materials and active student involvement in their own learning (Louis & Wahlstrom, 2011b). Importantly, pedagogical strategies need to be fit for purpose. For example, evidence suggests that student-led learning strategies are often applied as a means to an end, rather than in a way that meaningfully contributes to achieving curriculum goals (Dinham, 2016). Research suggests that giving students some control over their learning is important for their motivation, but the direct effects on achievement outcomes appear minimal (Hattie, 2009). For example, the more nuanced findings in relation to pedagogical practices in the Mourshed et al. (2017) study showed that the effects of inquiry-based instruction were negative when insufficient teacher-directed instruction was provided. Further, the results showed that the impact of inquiry-based instruction was often negative in developing countries. Overall, their results suggested that there is a need for inquiry-based instruction to be structured, rather than open-ended and student-led. Meta-analytic evidence pertaining to discovery-focused pedagogies supports these findings. Hattie (2009) identified inquiry-based teaching as moderately effective ($d = 0.31$). Further, he found a large effect size for problem-solving teaching ($d = 0.61$), yet the effect size for problem-based learning was much smaller ($d = 0.15$). Overall, these findings point to the importance of explicit instruction for establishing foundational knowledge before inquiry-based teaching can successfully be used, which may still require active teacher guidance.

The shift in curriculum outcomes to so-called 21st century skills has resulted in calls for updated pedagogies to ensure students get the opportunity to meaningfully acquire new knowledge, apply this knowledge in a range of contexts, and continuously adapt their knowledge and skills to ever-changing situations. Although there have been many calls for 21st century pedagogy to move beyond transmissive approaches, some degree of explicit teaching of skills remains essential, which can be embedded in disciplinary teaching. Research evidence suggests that 21st century pedagogies need to be highly personalised, be collaborative, and capitalise on opportunities for informal learning. It is now recognised that learning in the 21st century takes place within and outside of the school, often in interaction with technology, peers, or others in the community. The implication for practice is that not confining learning to something that is done individually, in a fixed setting, mode or timeframe, can benefit transfer to other situations. Further, research shows the importance of providing students with opportunity to produce something new as part of the learning process based on creativity (Scott, 2015).

Research also highlights the importance of school leaders encouraging teachers to try new pedagogical strategies (Zepeda, 2013). However, Fullan and Hargreaves (2016) warned that not all newly developed pedagogies are effective. They identify 3 features of effective new pedagogies:

- 1 They are student-driven, requiring students to actively engage in their learning
- 2 They are activist, aiming to fuel passion in students
- 3 They purposefully use digital technology to enhance the learning experience.

Research also highlights that effective pedagogical practice draws on a range of grouping structures, ranging from whole-class, to group-based, to individual activities (Anthony & Walshaw, 2007; Dinham, 2016; Hopkins, 2013). For example, in relation to early years mathematics learning, a best evidence synthesis (Anthony & Walshaw, 2007) identified that there is strong evidence for the effectiveness of a pedagogical approach which balances a variety of teacher-initiated group activities and student-led activities and play, connected to real-life experiences.

Research shows that small groupwork has substantial potential to enhance student social and academic outcomes. Groupwork is particularly beneficial in enabling students to build understandings in interactions with peers, without forcing them to expose their emerging understandings to the whole-class. As such, small group interactions can foster student self-efficacy (Anthony & Walshaw, 2007). Another study showed that collaborative pedagogies can be powerful as they demand students to draw on “content understanding, basic skills and applied twenty-first century skills” (Scott, 2015, p. 6). Interacting with different group members requires students to consider alternative perspectives and articulate and defend their own points of view, which can result in enriched or altered knowledge structures (Scott, 2015). Peers can provide powerful support for each other’s learning, and engaging in helping a peer also has powerful benefits for one’s own learning. For example, Hattie (2009) highlighted the power of peer tutoring ($d = 0.55$): “when students become teachers of others, they learn as much as those they are teaching” (p. 187). In addition, research suggests that cooperative learning ($d = 0.41$) is more effective than individual learning, heterogeneous classes, or competitive learning (Hattie, 2009). Although students can benefit from groupwork and social interactions, they also need to be given the opportunity to think and individually complete activities (Anthony & Walshaw, 2007).

Effective pedagogy capitalises on planned opportunities for teaching and learning as well as taking advantage of teaching and learning opportunities as they arise (Anthony & Walshaw, 2007; Masters, 2013). Overall, research highlights the need for teachers to use a range of evidence-informed teaching strategies, discussed next.

Setting high expectations for every student’s progress and ambitious goals for improvement

As previously discussed in Domains 1 and 7, research evidence overwhelmingly shows the importance of setting high expectations for all students (e.g., Yatsko et al., 2015). Hence, pedagogical practices need to reflect such high expectations. Specific to classroom-level evidence, there is overwhelming evidence supporting the impact of teacher expectations on student achievement (CESE, 2017; Coe et al., 2014; De Boer et al., 2018; Hattie, 2009, 2012; Hattie et al., 2015; McAleavy et al., 2018; Sammons et al., 1995; Yatsko et al., 2015). For example, Hattie (2009) concluded that teacher expectations play an important role in setting appropriate challenge for students and have a powerful effect on student achievement ($d = 0.43$).

Numerous studies highlighted that teachers need to set high expectations for their students in the classroom (CESE, 2017; De Boer et al., 2018; Hattie, 2009, 2012; Hattie et al., 2015; Masters, 2013; McAleavy et al., 2018; Sammons et al., 1995; Yatsko et al., 2015; Zepeda, 2013). Based on evidence from the science of learning, Masters (2012) emphasised the importance of teachers and students having “a deep belief ... that successful learning is possible” (p. 3). When teachers hold low expectations for students, this has a particularly detrimental impact on the outcomes of students from low SES backgrounds or minority groups (De Boer et al., 2018). Teachers who explicitly communicated high expectations for student success and encouraged them contributed to students’ engagement (Rodríguez, 2008).

Setting high expectations for student learning goes hand in hand with setting appropriately challenging and measurable goals, another powerful mechanism for enhancing student learning outcomes ($d = 0.56$) (Hattie, 2009). Importantly, teachers need to engage students in striving to achieve these goals and evaluating their own progress (Hattie, 2012). Self-assessment and self-monitoring require students to have a clear understanding of the learning goals, and what it means to achieve these (success criteria), how they are progressing in relation to these goals, and what the next steps are towards achieving these goals. Goals may be specified for a range of different time periods, which will depend on the level of complexity and depth of the learning outcomes (Hattie, 2009). Teachers and students both need a thorough understanding of what the pathway to success looks like. One effective way to ensure students understand criteria is to formulate these in discussion with the teacher or through co-construction. This is particularly important because assessment tools such as rubrics are often written in a language that is not

accessible to students. Involving students in the construction of these tools ensures they become meaningful to them. Another effective way to enhance student understanding of what quality work looks like is through the use of exemplars (Hattie et al., 2015).

A systematic review and meta-analysis of studies in primary and secondary schools (De Boer et al., 2018) found that interventions to raise teacher expectations of student learning were generally effective. These interventions often focused on a combination of approaches to change teacher's expectancy behaviours, awareness, and beliefs. The average effect of these interventions on teacher expectations was 0.38; the average effect on student achievement was 0.30. Although modest, these effect sizes highlight the importance of teacher expectancy levels for student success. Another study suggested that the following strategies may be employed by teachers to set high expectations (CESE, 2017): (1) clearly identifying expectations and follow up on these expectations (2) communicating that students must work hard to achieve success (3) continuously encouraging students to improve based on their individual learning trajectory (4) providing feedback that identifies next steps in learning and (5) expecting homework to be completed on time.

Supporting student understanding of learning goals and what it means to be successful

Effective teaching requires that teachers and students have a clear understanding of the learning goals (CESE, 2017; Zepeda, 2013). At a more fine-grained level, effective learning is facilitated when teachers ensure students understand task requirements and what it means to be successful in the task (Hattie et al., 2015). Success criteria need to be clear and specific and be understood by the teacher and students (Hattie, 2009). Providing worked examples which demonstrate the processes required to perform a task is an effective way to help students understand what success looks like ($d = 0.57$). For example, fostering student understanding of what they were learning and how to improve was identified as effective in high value-add NSW government schools (CESE, 2015). Many teachers in these schools used strategies such as modelling, including the use of exemplars and scaffolding to support student understanding of how to achieve the learning outcomes. Use of these strategies was accompanied by regular feedback.

Engaging in regular improvement-focused teacher-student and student-student feedback interactions

A substantial number of studies highlighted the importance of improvement-focused feedback to students as a key pedagogical strategy (AITSL, 2017; Anthony & Walshaw, 2007; Black & Wiliam, 1998; Coe et al., 2014; CESE, 2017; Dinham, 2016; Hattie, 2009, 2012; Hattie et al., 2015; OECD, 2008; Masters, 2011, 2013; Renshaw et al., 2013; Scott, 2015). There is strong evidence that feedback can substantially impact student learning, particularly for lower-achieving students (AITSL, 2017; Black & Wiliam, 1998). Feedback has been identified as "amongst the most powerful influences on achievement" ($d = 0.73$) (Hattie, 2009, p. 173), and is considered vital to student motivation and confidence (Dinham, 2016; Masters, 2011).

Traditionally, much research and classroom practice has focused on how feedback can effectively be provided by teachers. Such research has highlighted the importance of providing regular (Dinham, 2016; Hattie, 2012; Masters, 2011, 2013), timely (CESE, 2017; Masters, 2011, 2013; OECD, 2008), constructive (Anthony & Walshaw, 2007), and actionable (AITSL, 2017; CESE, 2017; Dinham, 2016; Masters, 2013) feedback to students on their learning. Research suggests that praise is the most common form of feedback in classroom practice. Although praise is an important motivational mechanism, feedback can only contribute to student learning if it addresses cognitive aspects (AITSL, 2017; Anthony & Walshaw, 2007). Overall, research shows that feedback needs to be "clear, purposeful, meaningful and compatible with students' prior knowledge" (Hattie, 2009, p. 177-178). Another important consideration is the learner's level of prerequisite knowledge; if students do not have sufficient foundational knowledge, it is better to provide instruction than feedback. Hence, effective feedback practices are reliant upon teacher and student understanding of how students are progressing in relation to learning goals (Hattie, 2012). Importantly, teachers need to find a balance between providing feedback and encouraging students to think independently and engage with the learning material before intervening (Anthony & Walshaw, 2007).

Although feedback has often been conceptualised as a one way transmission of information from teachers to students, research points to the need for a broader conceptualisation of feedback. Specifically, the effects of feedback can be maximised when there is a two-way flow of seeking, providing, and acting on feedback by both teachers and students to progress teaching and learning. Feedback has traditionally been associated with corrective information to students. However, its power lies in its instructional component, providing task- or process-related information that can enable students to "confirm, add to, overwrite, tune, or restructure information memory, whether that information is domain knowledge, metacognitive knowledge, beliefs about self and task, or cognitive tactics and strategies" (Winne & Butler, 1994, p. 5740, cited in Hattie & Timperley, 2007). As such, Hattie and Timperley (2007) identified that feedback needs to address 3 questions: 'how am I going', 'where am I going?' and 'where to next?'. Hence, research highlights the importance of a tight connection between learning goals, learning progress, and next

steps in learning (AITSL, 2017; Dinham, 2016; Hattie et al., 2015). Students are more likely to benefit from feedback when it is clearly linked to success criteria that they understand (AITSL, 2017; Hattie et al., 2015).

No matter how carefully crafted, feedback can only have a positive impact on student learning if teachers ensure that students recognise, understand, and can use feedback. Accordingly, research highlights the criticality of active student involvement in the feedback process (Anthony & Walshaw, 2007; Black & Wiliam, 1998; Hattie et al., 2015). Importantly, students need to receive, interpret, and act on feedback. For example, AITSL (2017) emphasised that feedback can only result in improved student learning if it leads to adaptations in teaching strategies or changed student behaviour or use of (meta-)cognitive strategies. Research shows that this is often not the case; much of the feedback teachers provide is not noticed or used by their students (Hattie, 2009). Students may differentially interpret feedback messages, and there may be multiple courses of action that they can take to improve their learning outcomes (Black & Wiliam, 1998). Evidence pertaining to differences in feedback provider and receiver perspectives therefore highlights the need to monitor students' actual use of feedback (Hattie, 2012).

In addition, research highlights the importance of acknowledging the different ways of using the power of feedback, including feedback from students to themselves, peer feedback and feedback from students to the teacher (AITSL, 2017; Hattie et al., 2015). Research shows that substantial learning benefits can be gained from peer and self-feedback, with an important disclaimer that students need to be trained before they can benefit from such processes (AITSL, 2017). Once again, research highlights the importance of student understanding of learning intentions and success criteria (Hattie et al., 2016).

School leaders play an important role in realising the potential of feedback within their school. They need to "provide resources for teachers including examples of implementation and examples of what effective feedback looks like in practice" (AITSL, 2017, p. 10) and collaborate with teachers and other schools in finding ways to provide, receive and use feedback effectively.

Fostering students' beliefs in their own capabilities to learn successfully and their understanding of the relationship between effort and success

Numerous studies highlight the importance of teachers helping students build belief in their capability to learn, also referred to as self-efficacy (Hattie, 2009, 2012; Hopkins, 2013; Masters, 2013; Mourshed et al., 2017; OECD, 2008). For example, findings from Mourshed et al. (2017) showed that students' mindsets (including motivation and self-belief) were amongst the strongest predictors of academic achievement. Celebrating small successes and providing regular feedback can help build student esteem in their capability to learn (Dinham, 2016).

Importantly, students need to believe that putting effort into their learning will result in improved learning outcomes (Coe et al., 2014; Masters, 2013). Teachers therefore need to help students understand the relationship between effort and success (CESE, 2017; Hattie, 2009; Hattie et al., 2015). More specifically, teachers need to foster student ownership of their learning and their understanding of the relationship between what they do and their success in learning (growth mindset). Moreover, teachers need to teach students strategies for persisting under challenging circumstances (Hattie et al., 2015). Fostering student's active role and responsibility in their learning can positively affect their self-esteem and academic outcomes (Zepeda, 2013).

Creating classroom and applied learning environments in which all students are engaged, challenged, feel safe to take risks, and are supported to learn

Student learning is best supported by use of a range of different learning activities, with differing purposes and formats (Anthony & Walshaw, 2007). Teachers need to use a range of pedagogical practices to ensure that students are challenged, engaged, feel safe to expose their understandings and misunderstandings, and receive the necessary support to achieve the best possible outcomes (Hattie, 2012). Teachers need to support all students to make progress in relation to their current achievement level (Masters, 2013). Teachers also need to ensure that they provide appropriate challenge for students (e.g., Coe et al., 2014), with research demonstrating the prevalence of teacher underestimation of student capability to learn in mathematics (Anthony & Walshaw, 2007).

Effective pedagogy includes creating an environment in which students are engaged and motivated (Masters, 2011). Teachers can foster student engagement in learning by using learning tasks that are challenging, interesting, authentic, and relevant to learners (Hattie, 2012), or by ensuring learning tasks are meaningful to students and provide realistic or real-life scenarios (Scott, 2015). Pedagogical practices that draw upon the potential powerful benefits of peer support, for example through peer feedback and providing motivational support, appear particularly beneficial for student engagement and achievement (Hattie, 2012). As previously noted, it is not time spent in class per se but rather how the time is spent that relates to student outcomes. CESE (2017) found that effective learning

time was the most important facilitator of student achievement. These effects are both indirect (resulting in more effective learning and hence better achievement; about 85%) and indirect (resulting in better engagement, which in turn positively relates to achievement; about 15%).

In discussing evidence for Domain 3, the importance of creating a school-wide orderly learning environment was emphasised. Creating productive classroom environments is vital to realising effective pedagogical practices (CESE, 2017; Coe et al., 2014; Hattie, 2009, 2012; Sammons et al., 1995), enabling teachers to focus on effective pedagogy as opposed to behaviour management (McAleavy et al., 2018). For example, the importance of an orderly classroom environment was highlighted by Hattie (2009), citing a meta-analysis by Marzano (2000) which found positive associations between an orderly classroom environment and student achievement ($d = 0.52$) as well as engagement ($d = 0.62$). Creation of such orderly classroom environments requires that teachers recognise positive student behaviour and enact agreed consequences for inappropriate behaviour. In relation to positive student behaviour, CESE (2017) emphasised the importance of good classroom management that promotes positive behaviour. Consistent use of classroom routines, clear expectations and rules, and responding appropriately to positive and undesirable behaviours can help foster a positive classroom environment. This is particularly important because research evidence has demonstrated that learning behaviours have a long-lasting impact on student achievement (Fredricks et al., 2004, cited in CESE, 2017). Good classroom management also contributes to students' feelings of connectedness in the school (CESE, 2015).

Specific to the classroom, various studies emphasised the importance of effective pedagogy as hinging on creating a safe classroom environment (Anthony & Walshaw, 2007; Hattie, 2012). For example, Anthony and Walshaw (2007) stated that effective pedagogy requires a safe classroom environment where teacher and student interactions foster "students' capacity to think, reason, communicate, reflect upon and critique what they do and say in class" (p. 54). Such an environment encourages students to take risks in their learning, ask questions and reveal their misunderstandings or confusion and helps them to become increasingly more capable and independent. This aligns with 21st century pedagogy, which advocates a shift in the role of the teacher from expert to guide and co-creator of knowledge, with learners taking on a more active role (Scott, 2015). Teachers play an important role in helping students develop metacognitive strategies, motivation, and confidence in learning (OECD, 2008), essential for them to become more independent learners. In addition, research evidence highlights the importance of creating a safe and orderly climate where students view mistakes as opportunities to learn and are encouraged to ask questions. This also requires fostering trusting peer relationships (Hattie, 2012). Moreover, students benefit most from feedback—one of the most powerful pedagogical strategies—in classrooms with "climates that foster peer and self-assessment, and allow for learning from mistakes" (Hattie, 2009, p. 178).

Related to creating a safe classroom environment, pedagogical strategies need to foster students' sense of self-efficacy (CESE, 2017). Offering opportunity for goal setting, practice, feedback, and revision help foster student interest and motivation. Pedagogical approaches that foster student autonomy have also been associated with increased interest and motivation. For example, teachers can engage in dialogues with students and use problem-based teaching strategies. Research highlights the importance of respectful teacher-student interactions, in which teachers value all student contributions (Anthony & Walshaw, 2007; Coe et al., 2014) and are respectful of different cultural perspectives (Anthony & Walshaw, 2007).

Explicit and guided instruction

Numerous studies highlighted the importance of explicit teaching, also referred to as explicit instruction, or direct instruction (Anthony & Walshaw, 2007; CESE, 2015; Dinham, 2016; Hattie, 2009; Hattie, 2012; Zepeda, 2013). Direct instruction involves a structured approach to conducting a lesson based on identifying learning intentions, fostering student engagement, presenting content, modelling and demonstration, checking for understanding, guided practice, closure and subsequent opportunity for practice in a different context, which is essential to support transfer of learning (Hattie, 2009). Research evidence suggests that more structured and guided pedagogical practices are generally more effective than loosely structured and unguided practices, particularly for novice learners (Dinham, 2016). Specifically, research evidence suggests that direct instruction is one of the most effective pedagogical strategies ($ES = 0.59$), although it is often erroneously confused with transmissive and superficial teaching (Hattie, 2012). For example, in learning to read, substantial meta-analytic evidence (50 meta-analyses) suggested that explicit teaching was more effective than holistic approaches which rely on incidental learning of essential vocabulary. Evidence from 5 meta-analyses in writing similarly showed benefits of explicit teaching of strategies to accomplish a specific goal, particularly for lower-achieving students (Hattie, 2009). Explicit instruction was an important aspect of teacher practices in high value-add schools (CESE, 2015).

Questioning to gauge and stimulate students' thinking

Recognising that what is taught does not necessarily equate to what is learned, various studies highlighted the importance of questioning to assess student learning (CESE, 2017; Hattie, 2009; Masters, 2011). The effects of questioning as part of instruction are positive overall ($d = 0.46$), yet highly variable. This likely relates to the different nature of questions teachers may ask. Importantly, the nature of the questions needs to align to intended learning outcomes (Hattie, 2009). Other than informing teachers about student progress, questioning also has important pedagogical purposes. For example, meaningful use of questioning can stimulate learning by eliciting student conceptions and ideas and foster peer discussions to challenge ideas and encourage creative thinking (Scott, 2015). Others have highlighted the importance of using higher-order questions to facilitate deep learning (Hopkins, 2013), providing opportunity for students to ask questions (CESE, 2017), or providing opportunity for interactions to extend student knowledge when they stimulate exploration and modification of key ideas (Anthony & Walshaw, 2007). Research also highlights the value of metacognitive strategies such as self-questioning for student learning ($d = 0.64$) (Hattie, 2009).

Promoting deep learning by emphasising underlying principles, concepts, and big ideas

Various studies highlight the importance of teachers drawing connections between key principles, concepts or big ideas to promote deep and meaningful learning (Anthony & Walshaw, 2007; CESE, 2017; Dinham, 2016; Hattie, 2012; Masters, 2011). Effective pedagogical practices require a focus on in-depth as well as surface features of learning. This includes a key focus on student understanding of underlying concepts, which may be developed over an extended period (Hattie, 2012). Teachers thus need to draw on their content knowledge to make connections between different key concepts explicit to students (Anthony & Walshaw, 2007). Concept mapping appears effective for learning by helping students to identify main ideas and how different concepts relate ($d = 0.57$) (Hattie, 2009). Deep learning can be further facilitated by supporting students to apply their learning across multiple contexts over extended periods of time (Masters, 2013).

Deliberately building on previous learning and assisting students to see the continuity in their learning over time

Various studies highlighted the importance of connecting new material to students' existing mental models—knowledge and skills structures—to facilitate learning (Hattie, 2012; Masters, 2011, 2013; Subban, 2006) and foster student motivation (Masters, 2013). For example, Masters (2013) emphasised that teachers need to ensure that new learning material builds on what students have already learned. Helping students see the connections between what they need to learn and how they have progressed over time can be highly motivating. Similarly, such an approach can help promote deeper levels of learning. Helping students connect new ideas to existing knowledge can “produce a new insight or enable the learner to make sense of information in a new way” (p. 17). Further, empirical evidence shows the importance of student development of meta-cognition and reflection on their learning, which can help them connect new information to existing knowledge and skills and see the big picture of what they are learning. Pedagogical approaches that draw on problem-based learning and peer collaboration are particularly suitable for fostering such metacognitive skills, which need to be explicitly taught (Scott, 2015). Further, research suggests that the use of tools such as advanced organisers can be beneficial in helping students connect new knowledge to their pre-existing knowledge ($d = 0.41$) (Hattie, 2009).

School leaders and teachers draw on a range of evidence to regularly evaluate the effectiveness of teaching and make enhancements to practice

As discussed in Domain 7, research evidence shows that evaluating the effectiveness of teaching to inform adjustments to practice is vital (e.g., McAleavy & Elwick, 2016). Not only is this vital to ensure that individual student needs are met; such evaluations can also improve teachers' overall pedagogical practices (Goss & Hunter, 2015; Hattie, 2012; OECD, 2008; Marshall & Zbar, 2013; Masters, 2013). Teachers may draw on informal and formal sources of evidence in evaluating the effectiveness of their pedagogical practices. Frequent feedback from multiple sources is key to improving teaching practices and maximising effectiveness on student learning (Marshall & Zbar, 2013). For example, Anthony and Walshaw (2007) highlighted that teachers continuously evaluate student contributions and make decisions on the spot about how to modify their pedagogy in light of these evaluations. Others highlighted that teachers need to use feedback from interactions with students to adjust their teaching (AITSL, 2017; Hattie, 2012; Marshall & Zbar, 2013; OECD, 2008). Teachers can also gather valuable information to inform pedagogy from students by requesting feedback on their teaching (Hattie et al., 2015; Marshall & Zbar, 2013), for example from school leaders. In relation to more formal evaluations based on evidence, Masters (2013) emphasised that monitoring and evaluating the effectiveness of teaching strategies by drawing on reliable outcome measures is pivotal to the heart of effective pedagogical practices. Collaborative discussion amongst teachers about the impact of their teaching on student learning can inform decisions on how to modify pedagogical practices to advance student learning (Hattie, 2012).

Building school-community partnerships

Overall evidence for Domain 9

The importance of relationships between schools and their wider communities was highlighted in numerous studies (Anthony & Walshaw, 2007; CESE, 2015; Epstein & Sheldon, 2002; Garza et al., 2014; Harris et al., 2013; Hattie et al., 2015; Jensen & Sonnemann, 2014; Leithwood et al., 2004; Lonsdale & Anderson, 2012; Louis et al., 2016; Miles & Ferris, 2015; Milgate, 2016; Scott, 2015; Zepeda, 2013). Recent research evidence shows that “support from those beyond the school gates is an essential part of preparing learners for the twenty-first century” (Lonsdale & Anderson, 2012, p. 1). Benefits associated with school-community partnerships include improved school cultures (CESE, 2015; Milgate, 2016), improved student engagement (Milgate, 2016; Otero, 2016; Scott, 2015), improved student wellbeing (CESE, 2015; Epstein & Sheldon, 2002; Lonsdale & Anderson, 2012; Moore et al., 2017) and improved student achievement outcomes (Anthony & Walshaw, 2007; Gordon & Louis, 2009; Leithwood et al., 2004; Lonsdale & Anderson, 2012; Milgate, 2016; Moore et al., 2017). These outcomes are all interrelated; for example, wellbeing-related benefits indirectly contribute to student achievement outcomes. Further examples of positive impact include:

“improved relationships with peers and family; increased confidence and self-esteem; higher aspirations for the future; taking the initiative through improved goal setting and time management, teamwork and conflict resolution; leadership skills; greater ability to learn independently; healthier lifestyle habits; a more positive outlook on life and increased awareness of the work of community groups” (Lonsdale & Anderson, 2012, p. 3).

Lonsdale and Anderson (2012) had observed a prominent shift in relationships between schools and community over the past decades. Where these were often viewed as separate and independent in the past, schools are now often regarded as ‘hubs’ of the community. Given the amount of time students spend outside of school, it has been argued that partnerships between school, families, and community can help realise students’ learning potential (Otero, 2016). However, the contribution of school-community partnerships to student outcomes will ultimately depend on the nature of the partnership (Lonsdale & Anderson, 2012).

The school builds physical and/or virtual partnerships with families, community stakeholders and organisations, local businesses, and service providers including allied health and social support to improve opportunities and outcomes for all students

As noted, numerous studies emphasised the importance of school-community relationships and partnerships for improving opportunities and outcomes for students (e.g., Leithwood et al., 2004; Louis et al., 2016; Milgate, 2016). These findings highlight the importance of building such relationships and partnerships, in which school leaders play a critical role (Garza et al., 2014; Leithwood, 2011; Leithwood et al., 2004; Moore et al., 2017; Zepeda, 2013). In the study by Moore et al. (2017), school-community partnerships were identified as an area in need of improvement in many schools. Researchers identified that school leaders typically are not trained in this aspect of leadership. Gordon and Louis (2009) suggested that district-level leaders may need to play a role in promoting school-community partnerships.

Schools may engage in partnerships with a range of individuals, groups or organisations. Most of the research in this domain focused on partnerships of schools with families and/or community leader(s)/organisation(s) (Anthony & Walshaw, 2007; CESE, 2015; Hattie et al. 2015; Jensen & Sonnemann, 2014; Louis et al., 2016; Milgate, 2016; Otero, 2016). For example, Milgate (2016) described how a school in rural New South Wales developed partnerships with Aboriginal and Torres Strait Islander peoples and communities, which were beneficial to members of the school as well as community members. This school had “developed the capacity to open and access a wealth of information by working alongside our community in a meaningful and respectful way” (p. 195). The community partnership was identified as bringing many benefits to the school, including: an enhanced school vision; enhanced sharing of cultural knowledge; stronger community partnerships in learning; decision making founded upon community voice; different perspectives on curriculum; and broader recognition of student success. As a result, this school reported the following benefits: improved student engagement; improved student attendance and fewer absences or partial absences; improved literacy outcomes; a core focus on learning as a community in classrooms; incorporation of traditional language and culture in the curriculum; and increased student confidence.

These benefits of school-community partnerships have been reported by many Australian schools, and include a range of different strategies for building such partnerships. Such schools are “recognising that indigenous parents, carers and organisations are integral in supporting schools to increase achievement, extend learners’ potential, nurture culture, celebrate success and create positive learning communities” (Milgate, 2016, p. 200). Similar findings have been reported in other contexts internationally. For example, the New Zealand best evidence synthesis on pedagogy in mathematics (Anthony & Walshaw, 2007) highlighted the value of school-family-community partnerships to facilitate student learning by helping students draw meaningful connections between different learning experiences. Further, such partnerships enabled teachers to better understand their student needs, encouraging them to make learning experiences more meaningful to their students. Involving families and the community in the school’s change journey can help foster desirable student behaviours and study habits. Community members or groups may also play an important part as role models and in resolving conflicts (Jensen & Sonnemann, 2014). In addition, school-community partnerships can help families understand how they can support their child’s education (Milgate, 2016), which has been linked to improved student achievement outcomes (see Domain 1).

Research also highlights the benefits of establishing partnerships with other schools (Levin & Schrum, 2014), as well as partnerships with community organisations, businesses, or service providers (CESE, 2015; Levin & Schrum, 2014; Lonsdale & Anderson, 2012; Louis et al., 2016; Moore et al., 2017; Otero, 2016; Zepeda, 2013). For example, schools may establish community partnerships with local organisations or businesses, such as organisations that assist with housing, afterschool care, or (mental) health care (Moore et al., 2017).

The school identifies community partners based on their potential to contribute to improved student learning, engagement, and/or wellbeing

As noted, school-community partnerships can have substantial benefits to students, including improved engagement, wellbeing and/or achievement. Lonsdale and Anderson (2012) emphasised that although school-community partnerships may take different shapes and forms, “the primary motivation for school-community collaborations should be about improving outcomes for students” (p. 2). Schools should therefore identify potential community partners based on their capacity to contribute to improved student outcomes. Establishing a community partnerships database can be a helpful resource in identifying potential school partners (Moore et al., 2017).

The school and identified partner(s) are committed to the purpose and objectives of the partnership and collaborate to plan joint activities

Having clarity about the type of relationship between schools and their community partners is pivotal to making these relationships come to fruition (Lonsdale & Anderson, 2012). Although various initiatives have mandated parent and community involvement in schools, fidelity of implementation seems problematic (Gordon & Louis, 2009). There appears to be much variability in the extent to which school leaders have succeeded in establishing and maintaining meaningful school-community partnerships (Moore et al., 2017). Hence, there needs to be clarity around the purposes and objectives of the partnership and roles and responsibilities.

As previously mentioned, the main purpose of these partnerships should be to improve student outcomes (Hopkins, 2013; Lonsdale & Anderson, 2012). However, school-community partnerships can have many benefits to either or both parties, depending on the purpose and nature of the partnership. Benefits may relate to “social, intellectual, financial, psychological and performance” aspects (Lonsdale & Anderson, 2012, p. 2). As such, school-community partnerships provide an opportunity to strive towards shared goals (Miles & Ferris, 2015).

For example, social benefits include stronger support networks, better understanding of student community contexts, and improved connections between students and their families, community groups, and the school. An example of intellectual benefit is improved knowledge of stakeholders through sharing of expertise. In both these examples, students are likely to gain indirect benefits from the partnership, for example, through greater cultural awareness and modification of curricula and pedagogical approaches to be responsive to student needs or fostering parental support for students (Lonsdale & Anderson, 2012).

Several other studies noted the potential financial and intellectual benefits of school-community partnerships (Dinham, 2016; Levin & Schrum, 2014; Miles & Ferris, 2015; Zepeda, 2013). For example, partnerships may also help schools obtain financial and/or in-kind support, which can assist them in realising their vision (Dinham, 2016). Partnerships with local business or community members can provide cost-efficient resources, including access to external expertise (Zepeda, 2013). Yet, it is important to note that partnerships need to go beyond sponsorships. To genuinely contribute to supporting student needs, such partnerships need to be “intensive, sustained, and purposeful” (Moore et al., 2017, p. 74).

Levin and Schrum (2014) highlighted the importance of community engagement in facilitating changes within the school. For example, in the context of technology integration, successful leaders actively established partnerships with business and industry, including university and technology company partnerships. Partnerships helped schools (1) acquire funding through donations or grants (2) access external expertise and (3) generate opportunities for students to apply their learning in a real-world context, including internships.

Other studies also highlighted the benefits of school-community partnerships in facilitating meaningful learning by providing an out-of-school learning context (Moore et al., 2017; Otero, 2016). As noted, partnerships may be mutually beneficial. For example, one school partnered with an emergency food provider. Students volunteered at this provider, which in return provided food to students in need (Moore et al., 2017).

In recognising the important role of schools in supporting student wellbeing more broadly, integrated student support initiatives have recently gained popularity. These support services collaborate with students and their families to ensure the necessary prerequisites for successful learning are in place. Community partnerships are one of the key elements of successful student support services. Emerging evidence highlights the potential for integrated student support initiatives to foster student academic outcomes. School-community partnerships can ensure students are provided with the necessary resources and supports (Moore et al., 2017).

Research also highlights important social and intellectual benefits linked to improved student engagement and learning (Hattie et al., 2015; Jensen & Sonnemann, 2014; Levin & Schrum, 2014; Otero, 2016). For example, a study by Cole-Henderson (2000) amongst principals of high-performing schools serving disadvantaged student populations in the US highlighted the value of site-based management teams to meaningfully connect schools with their communities. These groups, consisting of “parents, community representatives, and administrators as well as instructional and noninstructional staff, both professional and nonprofessional” (p. 85) were typically involved in making a range of school policy decisions, including the creation of special programs or promotion of parental involvement. Involving families and the community in the school’s change journey can help foster desirable student behaviours and study habits. Community members or groups may also play an important part as role models and in resolving conflicts (Jensen & Sonnemann, 2014). There are various models through which schools can foster genuine community partnerships. One key condition for successful school-community partnerships is the cultural competence within schools to effectively “integrate resources within the community” (Moore et al., 2017, p. 74) they serve.

In addition to benefits to the school, school-community partnerships also have important benefits to the community. For example, Milgate (2016) reported that schools can contribute to the social capital of the community, which may become “a more nurturing and thriving place to live” (p. 200). Schools may also provide opportunities for capability building in the community, for example by offering opportunities for leadership and employment. Contributing to teaching and learning can also provide meaningful opportunities for empowerment of communities (Milgate, 2016).

Appropriate resources are committed to ensure the effectiveness and success of partnerships

Research also highlights the importance of allocating adequate resources to ensure the effectiveness and success of partnerships (Dinham, 2016; Hattie et al., 2015; Milgate, 2016; Moore et al., 2017). This may relate to physical resources. For example, schools may engage in community partnerships based on a shared project, such as a community garden, as illustrated in the Sadadeen Primary School case study described by Hattie and colleagues (2016). As noted, cultural competence is critical to successful school-community partnerships (Moore et al., 2017). Employment of specific people may be needed to help connect teachers, students, and their families and community

members or organisations (Dinham, 2016; Hattie et al., 2015; Milgate, 2016; Moore et al., 2017). For example, in building community partnerships, schools may need to involve interpreters or community liaison officers. Respectful communication uses language and signage in an inclusive way (Dinham, 2016).

For example, the case study by Milgate (2016) outlined how a school in rural New South Wales developed partnerships with Aboriginal and Torres Strait Islander peoples and communities. The process of establishing the community partnership involved the establishment of an advisory Local Community Reference Group, which included community members such as Elders and school staff, and several other staffing positions in the school. In addition, the school organised weekly assemblies and involved community members in celebrating students' achievements. Another important strategy involved the allocation of an out-of-school space for discussion, to provide a comfortable and relaxed environment for community members and staff to get together.

Partners have clarity about roles and responsibilities and are involved in ongoing collaborative decision making and regular evaluation of joint initiatives

As previously mentioned, there needs to be clarity around the purposes and objectives of the partnership, and roles and responsibilities of those involved. As noted, the key focus of school-community partnerships needs to be on improving outcomes for students. The effectiveness of partnership activities needs to be monitored to ensure these are consistent with the shared goals and vision (Lonsdale & Anderson, 2012). Further, research highlights the value of collaborative decision making. Research evidence suggests that “teachers and principals can play a role in increasing student learning by creating a culture of shared leadership and responsibility, not just among school staff but also with the wider community” (Gordon & Louis, 2009, p. 23). For example, the benefits of school-community partnerships have been reported by many Australian schools, through a range of different strategies for building such partnerships (Milgate, 2016). Research also highlights the potential benefit of school leaders seeking feedback from families and the wider school community to inform school improvement (Handa, 2013).

Goals, progress, and achievements are systematically and regularly monitored and refined as required

The importance of goal setting, and regular and systematic monitoring of progress towards goals and achievements is recognised in the broader literature, and equally applies to school-community partnerships (e.g., Lonsdale & Anderson, 2012).

Partnerships have become embedded in the culture of the school community and partner organisations

As noted, school-community partnerships need to be “intensive, sustained, and purposeful” (Moore et al., 2017, p. 74). Research highlights the importance of a trusting school culture for fostering and sustaining school-community partnerships (Gordon & Louis, 2009; Leithwood et al., 2004). Research also highlights the important role of school principals in managing relationships with community stakeholders (Garza et al., 2014; Leithwood et al., 2004). For example, successful principals who managed to sustain school improvement were engaged in some form of school-community partnerships and were able to establish and maintain relationships amongst various school-community stakeholders.

Conclusion, limitations, and view forward

Overall, the literature reviewed confirms the robustness of the nine-domain framework for school improvement. Whilst the NSIT was based on literature published prior to 2011, 82% of publications reviewed to inform the SIT were published from 2011 onwards. Notably, the research included in this review is largely consistent with the NSIT's original evidence base, with no distinguishable differences based on publication year. At a more detailed level, suggestions for modification were made based on changes in common terminology, extension of the evidence base, or new developments in the field. Results of this literature review underpinned revision of the domain descriptors and characteristics. The performance levels for each domain were revised based on their alignment to the updated domain characteristics as well as feedback gathered from over 10 years of school reviews, and were refined through numerous rounds of revision following expert consultations. Refinement of performance levels further informed refinement to the SIT characteristics.

This review provides an indicative summary of what is known in relation to the 9 domains. However, we do not claim to have reviewed all relevant research. Nevertheless, the application of principles of saturation (Saunders et al., 2018) gives us confidence that the review provides a robust picture of the relevant research base.

As noted, an effort was made to include literature from around the world. Yet, there were inevitable geographical biases in the retrieved studies, which may be explained by the domination of the school improvement literature by a small number of authors (e.g., Leithwood, Fullan, Louis, Hopkins) and by publications from North America ($n = 32$) and, to a lesser extent, Australia ($n = 28$). Studies based on evidence from a range of international contexts ($n = 57$) assist in redressing some of the geographical imbalance. However, there are inevitably important perspectives to be gleaned from better understanding school improvement in other parts of the world. As evidenced in the review, there may be particularly important differences between critical factors to school improvement in developing and more developed economies (Hong, 2012). Notably, more recent publications tended to be more geographically diverse. It is hoped that researchers will continue to focus on an increasing range of contexts to drive evidence-informed school improvement globally.

Although the school improvement field appears relatively stable, ACER is committed to continuously monitor the evidence base underpinning its tools. Just under half of publications under review ($n = 56$; 48%) are from the most recent period, 2015-2020. A Zotero library has been established for the SIT and will be maintained by members of the Centre for School and System Improvement team. This library will be periodically updated to capture the emerging evidence and to inform professional learning and future reviews of the tool's evidence base.

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Appendix A.

Literature under review

Table A.1 Empirically-based studies

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
1 Al Mekhlafi & Osman, 2019	Journal article	Oman	Quantitative study The study examined the impact of an intervention using a quasi-experimental design. Participants included teachers, students and school leaders in 16 classes across 8 secondary schools; 4 schools were in the control group, another 4 were in the experimental group. Composite student assessments scores across 5 subjects were compared between groups and over time.	The study aimed to examine the impact of a four-year holistic school improvement intervention underpinned by a purposefully designed school improvement model.	1, 4, 5
2 Campbell et al., 2015	Journal article	Canada	Qualitative study The article is based on data collected through Ontario's TLLP. This initiative involved a one-year and five-year research study; the article reports on evidence of the first project and the first 2 years of the second project. Data analysis in the one-year study involved examination of TLLP team initial and final documents (totalling 302 TLLP projects), TLLP provincial-level training evaluations, interviews with teacher leaders, teacher union leaders and government staff. Subsequently, the five-year project involved examination of TLLP team initial and final documents, observations and analysis of feedback for the annual conference, surveys completed at different stages of the project, knowledge sharing logs, teacher vignettes of reflections on impact of the project, case studies, social media content analysis, and focus group interviews with policy makers.	The article discusses 3 evidence-informed claims about teacher leadership: "First, teachers can be the developers of their own and their peers' leadership rather than only the recipients of externally provided or directed leadership development. Second, teachers can be the leaders of professional knowledge and practices for educational improvement within and beyond their schools. Third, teachers can lead through collaboration and networks rather than only through formal hierarchies." (p. 91). The underpinning research examined the value of TLLP for teachers, to what extent its goals had been realised, and what lessons can be learned. A follow-up large-scale study examined the impact of the TLLP projects more broadly.	5, 8

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
3 CESE, 2015	Report	Australia	Mixed-methods study The study analysed evidence from 37 sampled high value-add schools. These schools all demonstrated above to be expected growth in student NAPLAN achievement across a two-year period but varied in their performance levels. A mixed-methods design was used to enable comprehensive examination of evidence. The study examined qualitative interview data obtained from a sub-sample of 14 schools, as well as quantitative school and student data (such as student attendance rates), as well as student and teacher survey data. In the quantitative analyses, data from high value-add schools were compared to similar schools for comparison purposes.	This study aimed to contribute to evidence on what works in school effectiveness, by examining which factors were associated with strong growth in student achievement in high value-add NSW government schools. The study specifically focused on (1) school-level factors which contributed to improved student achievement; and (2) classroom practices which contributed to improved student achievement.	1, 2, 3, 4, 5, 6, 7, 8
4 CESE, 2017	Report	Australia	Quantitative study Reports the results of structural equation modelling analyses based on a longitudinal dataset, consisting of student Year 7 and Year 9 NAPLAN reading achievement data and survey data from the <i>Tell Them From Me</i> student survey.	To examine the relation between: <ul style="list-style-type: none"> • Students' self-reported engagement and their NAPLAN reading performance • Self-reported classroom practices and performance and indirect impact of classroom practices on performance; and • Students' self-reported engagement and performance, and vice versa. 	1, 3, 4, 7, 8
5 Chen et al., 2015	Journal article	Singapore	Qualitative study The paper reports on the results of a cross-case analysis in 6 Singapore primary and secondary schools. A grounded theory approach was used to retrospectively examine evidence. The sample was selected to be representative of schools in Singapore. The analysis drew on data from 31 focus group discussions with teachers, principals and other key personnel.	To examine the context, processes and outcomes of school-based curriculum development in 6 schools.	3, 4, 6
6 Cole-Henderson, 2000	Journal article	US	Quantitative study Reports quantitative evidence from surveys administered amongst principals. The survey included 48 questions across 12 categories, ranging from parental involvement to curriculum. Given the small sample, the study reports percentages of responses within each category.	To explore common organisational characteristics in high-achieving schools in urban low SES communities.	1, 3, 4, 5, 8, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
7 Conway & Abawi, 2013	Journal article	Australia	Qualitative study Reports qualitative evidence from a case study involving one school that participated in the Innovative Designs for Enhancing Achievements in Schools (IDEAS) project. In this project, the school developed its own school-wide pedagogy.	Illustrate findings from the IDEAS project by focusing on a case study school (implicit).	1, 3, 5, 8
8 Darling-Hammond, 2000	Journal article	US	Mixed-methods study Analysis of literature, large-scale survey of policy, policy case studies and assessment evidence to examine how different teacher factors are related to improved student outcomes.	To examine how teacher qualifications and other school input factors are related to student achievement across different US states.	5
9 Datnow & Park, 2018	Journal article	US and international	Qualitative study Data were collected over the course of 2 years. The study involved 4 primary schools. The study analysed data from 82 teacher interviews, 17 school leader interviews, 180 hours of teacher team meeting observations, 117 hours of classroom observations, and a document review. In addition, the study drew on findings from 2 previous studies in primary and secondary education and the data use literature.	To examine the relationship between data use and equity, and to examine how data use may open or close doors for students. The paper aims to promote an equity agenda for data use research.	2, 7
10 Day et al., 2016	Journal article	UK	Mixed-methods study Mixed-methods study (IMPACT research project) underpinned by a literature review. The study was conducted over a three-year period. The authors integrated quantitative evidence from school performance data and 2 surveys with qualitative data from interviews and documents and 20 case studies. The study involved primary and secondary schools that had made significant improvements in student attainment over the past years, under the same principal's leadership.	To illustrate the nature of successful school leadership as a combination of transformational and instructional leadership across different phases of school improvement.	1, 2, 3, 4, 5, 8, 9
11 Epstein & Sheldon, 2002	Journal article	US	Quantitative study Quantitative study that examined the impact of various interventions on improving student attendance rates. The study used a combination of surveys and student attendance data over a period of 3 years. It involved 12 primary schools.	To empirically examine the relation between certain interventions and levels of student attendance at school.	1, 3, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
12 Garza et al., 2014	Journal article	Australia and US	Qualitative study Multiple case study involving 4 principals who were considered successful in long-term school improvement (at least 5 years). All principals had been part of the International Successful School Principalship Project. The study involved 2 principals in Australia and 2 principals in the US, who experienced a broad range of context-specific challenges during their times as school leaders. One of the schools was a special school, serving a group of students with a physical and/or intellectual disability. A range of qualitative data were collected using multiple methods several years apart. Data were gathered through interviews with all key stakeholders (including parents and students) and examination of key documents. Data analysis was inductive and focused on establishing individual as well as cross-case findings.	To identify lessons that can be learned from effective school leaders about sustainable school improvement.	1, 3, 5, 6, 9
13 Gordon & Louis, 2009	Journal article	US	Quantitative study The study used linear regression analysis to analyse self-report survey data from 157 principals and 4,491 teachers across primary, middle and secondary schools. In addition, student mathematics achievement data were obtained from students in the participating schools. Student achievement data were aggregated to the school building level ($n = 157$).	The study examined (1) the relation between principals' self-reported leadership style and their openness to community involvement; (2) the relationship between principals' openness to community involvement and student achievement, and (3) the relationship between school leadership structures and student achievement.	3, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
14 Griffin et al., 2012	Conference paper	Australia	Quantitative study Quantitative study that first examined the impact of teacher professional learning in use of assessment evidence for providing differentiated instruction on student achievement in years 3 to 10. Findings were further explored by quantitatively examining evidence of teaching strategy repertoires gathered through teacher workshops. The study was underpinned by a conceptual model that aimed to explain the variance in student learning outcomes by examining facets of school leadership, structured professional learning teams, teacher knowledge, attitude and skills and student outcomes.	To examine how teachers used data to inform teaching literacy and numeracy and examine the implications of shifting from a deficit model of data use to a developmental approach using learning progressions and scaffolding of learning. Specifically, this paper examined the relationship between teachings strategies for reading comprehension and mathematics achievement and the developed levels of skills in students.	2, 5, 7
15 Hairon et al., 2018	Journal article	Singapore	Qualitative study Case study in a Singapore primary school. Data were collected across one year through observations of lessons and staff curriculum meetings and focus group discussions ($n = 18$) with students, teachers and school leaders. Inductive thematic analysis was used to uncover key themes in the data.	The paper aimed to explore how the Singaporean education context shaped the way in which schools engage in school-based curriculum development.	6
16 Hattie et al., 2015	Book	International	Qualitative study The book includes a collection of case studies from schools in Australia, Hong Kong, New Zealand, Sweden, the UK, Norway and the USA. For each of the cases, key information pertaining to the context, background, leaders, the school's story and actions, the impact of the actions, and next steps in improvement are described.	The book presents case studies of schools that have participated in the Visible Learning ^{plus} professional learning program.	1, 2, 3, 4, 5, 6, 7, 8, 9
17 Hollingworth et al., 2018	Journal article	US	Qualitative study Multiple case study involving 4 successful principals in US schools. Data were collected by observing various meetings at each school, document analysis and interviews with key stakeholders. Data were systematically coded and analysed on a case-by-case basis prior to undertaking cross-case analyses to identify overall themes.	The study investigated how principals promote school culture to enable school improvement. The researchers aimed to identify common strategies used by the different school leaders to inform professional learning for school leaders.	1, 3, 4, 5

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
18 Hong, 2012	Journal article	International	Quantitative study Secondary analysis of TIMMS data. The study examined evidence on the relationship between teaching quality and instructional time and student achievement in advanced and developing economies based on data from TIMSS across 1995-2007 (from up to 59 countries).	The study examined (1) the relation between student mathematics and science achievement over time across countries, and the relation between GDP per capital (2) the relation between school-level factors and student achievement, and changes of these effects over time.	4, 5
19 Hoy et al., 2006	Journal article	US	Quantitative study The study examined teacher surveys data and student demographic and achievement data gathered from participants within 96 high schools. All survey measures had been previously validated and were reliable measures of academic emphasis, collective emphasis, and trust. Data were analysed using structural equation modelling and hierarchical linear modelling.	Demonstrate that academic optimism is a latent concept which predicts student achievement. The study tested 2 hypotheses (1) the construct of academic optimism consists of academic emphasis, collective emphasis, and trust (2) student achievement is positively associated with academic optimism, after controlling for student demographic variables and prior achievement.	1, 3
20 Leithwood, 2011	Book chapter	US	Qualitative study The chapter draws upon evidence from a sample of schools involved in the larger project to identify the most influential leadership practices.	To describe practices and behaviours that are associated with successful school leadership.	1, 3, 4, 5, 6, 9
21 Leithwood & Jantzi, 2011	Book chapter	US	Qualitative study The chapter draws upon evidence from a larger study. The chapter draws upon survey data from 2,570 teachers and student achievement data across 3 years gathered across 90 schools.	To examine (1) the impact of collective leadership on teacher variables and student outcomes (2) the relative influence of specific individuals and groups in collective leadership (3) the relationship between student achievement outcomes and levels of collective leadership influence.	1, 3
22 Leithwood & Patrician, 2015	Journal article	Canada	Mixed-methods study The article reports on the results of a quasi-experimental investigation involving an experimental and control group. The project involved 7 districts in Ontario. Description of the sample is not entirely clear, but the study appears to draw on data from 36 teacher-student dyads. Data obtained from student surveys, student achievement and skills as reported on their report card and interviews with parents, students and school staff. Various quantitative and qualitative analysis methods were employed, but these are not explicitly reported.	To examine which aspects of parental interventions are related to student school outcomes. Specifically, the study examined the effects of parent engagement strategies on student achievement and engagement, as mediated by family educational cultures and school/classroom conditions.	3, 6

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
23 Leithwood et al., 2020	Journal article	US	Quantitative study The article reports on research in primary schools which aimed to empirically validate the theoretical model which suggests that school leaders influence student achievement by exerting influence across 4 paths. Teacher survey data ($n = 1779$) representing the nature and quality of school leadership practices (aggregated to the school-level; $n = 81$) were analysed in conjunction with student achievement data (representing aggregated achievement across all subjects and year levels). The study used descriptive statistics, factor analysis, multivariate regression analyses and structural equation modelling. Student SES was used as a control variable.	To examine the mediating influence of school leadership through 4 paths which impact on student achievement, using quantitative methods which enable examination of the model as integrated. The study aimed to identify to what extent variables in the model contribute to student achievement, how variables on each path relate to student achievement, and which school leadership practices are likely to result in the greatest student achievement gains.	3, 4, 5, 8
24 Levin & Schrum, 2014	Journal article	US	Qualitative study Case studies in 8 secondary schools that demonstrated exemplary use of technology for school improvement. The study used a cross-case analysis to identify key features of successful leadership. Selected schools were diverse in nature. Data collection involved interviews, focus groups, classroom/meeting observations, and data from documents, including school improvement plans, meeting notes, student achievement data and information on schools' websites. Lessons learned were organised according to 7 key themes that were evident in all cases.	To examine the nature of school leaders' roles in facilitating use of technology for school improvement. Two research questions were central to the study: "What role (or roles) does technology play in school improvement in exemplary award-winning secondary schools? What lessons can be learned about exemplary school and district leaders who have used technology successfully as a lever for school improvement?" (p. 641).	1, 2, 3, 5, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
25 Loeb et al., 2012	Journal article	US	Quantitative study The study examined the relationship between school effectiveness and teacher careers. Student reading and mathematics assessment data (Florida Comprehensive Assessment Test) as well as background characteristics collected across 7 years from students in Miami-Dade public schools were used to compute value-add measures for teachers and schools. The dataset included data from over 350,000 students in over 350 schools and 10,000 teachers. Fixed effects value-added models were used to identify quantitative differences in staffing characteristics between more effective and less effective schools.	The study examined “the extent to which more effective schools are better able to recruit, assign, develop, and retain effective teachers and remove less effective teachers” (p. 270).	4, 5
26 Louis & Lee, 2016	Journal article	US	Quantitative study The study investigated how different elements of school culture relate to organisational learning, and how this relates to school context. The authors conducted a secondary analysis of survey data collected in 2008 from 3,579 teachers in 117 schools. Multilevel analyses were conducted to examine the relation between dimensions of school culture as perceived by teachers (Level 1) and school contexts (Level 2) and teacher self-reported organisational learning.	“(1) How does the culture of a school, as reflected in organized patterns of teacher beliefs, assumptions, and behaviours, contribute to their capacity for organizational learning? (2) How does a school's context affect organizational learning and also moderate the association between internal culture and organizational learning?” (p. 535).	3
27 Louis et al., 2016	Journal article	International and US	Conceptual and quantitative study This study: Reviewed the literature on caring and caring leadership Conducted exploratory quantitative analyses (structural equation models) of survey data gathered from teachers in 134 schools and student achievement data.	This study aimed to propose a new conceptual framework for caring school leadership examine how caring principal leadership was associated with academic and personal support in schools. The second part of the paper focused specifically on the following questions: “1. Are teachers' perceptions of their principals' caring behaviour associated with their perceptions of the school's provision of a supportive (caring) environment for students, particularly the most vulnerable students? 2. Are teachers' perceptions of principal and supportive school caring for students associated with student learning?” (p. 322).	3, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
28 Louis & Wahlstrom, 2011b	Book chapter	US	Quantitative study Draws upon survey data and student achievement data from a larger study.	To examine (1) the extent to which specific leadership behaviours affect teachers' work (2) the relationship of these leadership behaviours and student achievement (3) the potential of leadership behaviours to close the achievement gap for students from disadvantaged backgrounds.	3, 6, 8
29 Macneil et al., 2009	Journal article	US	Quantitative study The study analysed evidence from teacher surveys ($n = 1727$) about school culture in conjunction with student achievement data ($n = 24,684$). Based on student achievement data and student dropout rates, schools were categorised as 'acceptable', 'recognised', or 'exemplary'. Results were quantitatively analysed at the school-level for 29 schools, using MANOVA and ANOVA.	This study examined the relation between school quality and school climate.	3
30 McAleavy & Elwick, 2016	Report	UK	Mixed-methods study Secondary analysis of qualitative and quantitative data collected for evaluating school reform in London schools post 2000, who had made a remarkable transformation in their effectiveness over a 10 year period. This report provides an internationally-relevant synthesis based on the in-depth findings reported by Baars et al. (2014).	The report formulates key lessons learned from the transformation of London schools post 2000, by focusing on findings that are relevant to an international audience.	1, 2, 5, 7
31 McAleavy et al., 2018	Report	UK	Mixed-methods study The report draws on examination of student assessment evidence and school evaluation reports, as well as expert interviews ($n = 11$).	The report extends findings from the 2014 study (as reported in 2016) by examining to what extent London schools had managed to maintain success post 2013, when funding of specific improvement interventions ended and substantial changes occurred at the policy level. It draws on examination of student assessment evidence and school evaluation reports, as well as expert interviews to identify possible reasons for the findings.	1, 3, 4, 5, 8

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
32 Moss et al., 2019	Journal article	Australia	Qualitative study The qualitative case study was conducted in one primary and one secondary school in Victoria, which were regarded successful in realising integrated curriculum approaches. Data were collected over 2 school terms through classroom observations (some of which were video-recorded), interviews with teachers, focus groups with students, and field notes. A combination of open coding and analytical coding was used to identify themes in the data.	The study explored how teachers planned and implemented an integrated curriculum and used pedagogical strategies as appropriate to the local context and student needs within this curriculum to support student learning.	6
33 Mourshed et al., 2017	Report	International	Quantitative study Secondary analysis of PISA science achievement and survey data from students across 72 countries. The study used machine learning and advanced data analytics to identify key factors that contribute to student learning outcomes.	The study examined which factors contribute most to student achievement.	8
34 Moyle & Erfurt, 2016	Report	Australia	Qualitative study Draws on evidence from semi-structured interviews with 12 principals of Northern Territory schools, conducted twice a year over the 2 project years.	The report provides a guide for coaching and mentoring based on a joint project between the Northern Territory Principals' Association and ACER. The project involved 12 principals, with experienced principals playing a coaching and mentoring role for less experienced principals (6 pairs). All principals actively participated in coaching and mentoring between schools as well as within their own school.	2, 3, 4, 5
35 Murillo & Román, 2011	Journal article	Latin America (16 countries)	Quantitative study The study draws on data from a sub-sample of schools, teachers and students who participated in the Second Regional Comparative and Explanatory Study (SERCE) in Latin America. Using a four-level multilevel model, this study examined evidence from 4,271 schools, including nearly 4000 third-grade and nearly 4000 sixth-grade classrooms and over 90,000 students in each grade in 16 countries.	The aim of the study was to determine the extent to which available basic infrastructure and didactic resources predicted student achievement outcomes in literacy and numeracy across Latin American primary schools.	4
36 OECD, 2008	Conference paper	International	Qualitative study Case studies in secondary schools in 8 education systems.	Provide evidence of exemplary formative assessment practice in secondary schools in 8 education systems.	2, 8

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
37 OECD, 2020	Report	International	Mixed-methods study The report draws on evidence from curriculum documents and large-scale international assessments and surveys, as well as earlier OECD publications and empirical literature.	The report summarises international trends in curriculum innovation and reform. It synthesises evidence for different forms of time lag for achieving curriculum innovation and provides evidence-informed recommendations for curriculum reformat different levels of the education system.	3, 6, 7
38 O'Connor et al., 2019	Journal article	Australia	Quantitative study Analysis of data from 3,790 8–9-year-old children. Data from the Longitudinal Study of Australian Children (LSAC), NAPLAN and the Australian Early Development Census (AEDC) were linked for this study.	The study examined the association between positive mental health and academic achievement.	1
39 Park et al., 2019	Journal article	US	Quantitative study The study analysed data from a large-scale nationally-representative teacher survey sample ($n = 4,578$) in 767 public secondary schools and student mathematics assessment data ($n = 15,200$) at 2 data collection points. The study used multilevel structural equation modelling (MSEM) as an unbiased way to estimate indirect school-level effects.	The study examined how principal support is indirectly associated with students' mathematics achievement in high schools. The study examined the mediating influence of professional learning communities, school collective responsibilities, and group-level teacher expectations.	1, 3
40 Reeves et al., 2017	Journal article	Japan and US	Quantitative study Secondary analysis of TIMSS 2011 data, drawing on survey data and student achievement data. The study used linear regression and OLS linear regression models, using cluster-robust estimates to account for the nested data structure.	The study examined the impact of different teacher collaborative activities on student achievement and teacher job satisfaction.	3
41 Reis et al., 2011	Journal article	US	Quantitative study The study examined the effects of a reading intervention for primary school, the SEM-R. 6 teachers and 1,192 students in 5 schools were randomly assigned to the intervention or control group. Differences in pre-and post-reading achievement (fluency and comprehension) were analysed using multilevel analysis. Qualitative data were also gathered through interviews and observations, which were used for triangulation purposes.	To examine the impact of changing the way reading is taught by replacing traditional instruction with the SEM-R program, which focuses on students' interest and differentiated instruction. The study also examined the extent to which use of the SEM-R impacted student engagement in reading.	7

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
42 Renshaw et al., 2013	Report	Australia	<p>Qualitative study and literature review</p> <p>Inductive literature review about how to effectively use data for school improvement purposes. Reviewed empirical literature and public documents, along with collection of qualitative data from:</p> <ul style="list-style-type: none"> • Stakeholder consultations with senior staff in various organizational groups such as educational authorities and sector groups • Key informant interviews with principals, heads of departments and teachers in all 3 school sectors. 	To investigate the practices associated with Standard 5 of the Australian Professional Standards for Teachers.	2, 6, 8
43 Robinson et al., 2017	Journal article	New Zealand	<p>Multiple methods study</p> <p>The study examined the relation between different domains of activity and improvements in student performance prior to and following a two-year data use intervention in 5 underperforming secondary schools. The 5 schools all served low or medium SES communities. Data were collected through interviews, email interactions and phone conversations with school personnel, and key school documentation such as school improvement plans were examined. Cross-case analyses were examined in conjunction with quantitative analyses of student performance to systematically identify aspects that differed across schools that maintained and schools that significantly improved student pass rates on school leaving certificates (the National Certificate of Educational Achievement).</p>	To examine the relation between the extent of school improvement (as measured by student pass rates on national qualifications) and coordination and coherence examined under a new theoretical framework. Specifically, the study examined the extent and nature of coordination across various domains, as well as the relationship between overall coherence across domains and improvements in student achievement outcomes.	1, 2, 3, 5
44 Rodríguez, 2008	Journal article	US	<p>Qualitative study</p> <p>This multiple case study analysed interview data (3 interviews with each student) and observational data (both in and outside of the classroom) from 20 Black and Latina or Latino students from a range of achievement levels in 2 low-income urban high schools. Data were systematically analysed using a grounded theory approach.</p>	To examine the school culture of 2 low SES urban high schools from students' perspectives. Specifically, the study examined (1) the ways in which students in small schools experienced personalised relationships with adults (2) the influence of school culture on students' dispositions towards school.	3, 8

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
45 Ronfeldt et al., 2015	Journal article	US	Quantitative study The study drew on teacher survey data from a large district-wide sample (over 9000 teachers across 366 schools) collected over a two-year period. These data were analysed in conjunction with student mathematics and reading assessment data and school administrative data. Given the multifaceted aims of the study, data were analysed using various statistical methods, including OLS regression, multilevel regression, and fixed effects regression.	The study examined the relation between teacher collaboration as it naturally occurs in schools and student achievement. It focused on 4 aspects (1) the frequency and helpfulness of teacher self-reported collaborations (2) the association between different types of collaboration and student achievement outcomes (3) which mechanisms explain associations between individual and collective collaboration and student achievement (4) the association between collaboration and achievement whilst controlling for other possible explanatory variables.	2, 3, 4, 5, 6, 7, 8
46 Sammons et al., 2014	Journal article	UK	Mixed-methods study The study used an integrated mixed-methods approach, giving equal weight to the qualitative and quantitative components of the study, each informing the next phase of data collection. The extensive three-year research project examined quantitative survey data from school leaders and other school staff as well as case study data and interviews. The sample included 3 different types of improving schools; each had showed substantial improvements but had different starting points. Data analysis involved factor analysis, structural equation modelling, thematic analysis and coding and analysis to construct representations of case studies. Qualitative and quantitative findings were integrated by constructing a cross-case matrix.	The paper aimed to discuss the use of mixed-methods to examine processes and outcomes of school improvement. It illustrates the value of using mixed-methods by drawing on data from a longitudinal study in the UK. The purpose of the broader project on which the paper is based was to examine the relation between different leadership, teacher and school variables and student outcomes.	1, 2, 5, 6, 8

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
47 Shen et al., 2016	Journal article	US	Quantitative study The study drew on data collected using 42 item-survey about principals' data-informed decision making for school improvement. Data were obtained from principals and teachers; teacher data were aggregated to the school-level. The sample used for the study involved 98 principals and 107 of their teachers. In addition, school performance and background data and student achievement data in reading and mathematics were analysed. The researchers used structural equation modelling to examine the relations between various variables.	The study aimed examine (1) how data-informed decision making by principals impacted various school processes, and subsequently student achievement (2) the predictive validity of a survey instrument (3) how results of path analyses differed between teacher-reported versus principal-reported use of data to inform school-level decisions.	2, 3
48 Taylor et al., 2001	Journal article	US	Qualitative study The study was underpinned by a conceptual model of school improvement as an integrated use of embedded mechanisms. Based on the literature, a rubric was developed to evaluate school improvement plans. This rubric was used to evaluate school improvement plans of 88 schools.	To present results of using a newly developed rubric to assess school improvement planning and a related survey. The paper reports on results of using these tools, identified issues in implementing school improvement plans, and recommend actions based on this evidence.	1
49 Timperley, 2005	Journal article	New Zealand	Qualitative study Case study in one primary school with a large proportion of indigenous students. The case study involved observation and recording of staff meetings and interviews with the assistant principals and teachers over 9 months, and a follow-up with a sub-sample of participants one year later.	To describe the leadership challenges experienced by a school leader in facilitating school-wide use of achievement data for instructional improvement.	2, 5
50 Timperley, 2012	Conference paper	New Zealand and international	Qualitative study The study draws together evidence about various aspects of professional capability and school improvement, based on various large-scale research projects which showed substantial significant improvements in student outcomes.	Discuss answers to various school improvement questions, such as "Who should be making the decision about what to do when?" (p. 1).	1, 2, 5

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
51 Van Der Voort & Wood, 2014	Journal article	South Africa	Qualitative study The study reports on an action research project involving 4 underperforming high schools in South Africa. The study used an action research approach, which included a five-step cycle, including a workshop. Researchers gathered interview and focus group data from 4 principals, 8 deputy principals and 23 heads of department. Data were also gathered from Circuit Team members (who were external to the schools and played a supporting role).	The study examined how researchers may assist school management teams to develop and implement a school improvement plan. This study was the first in a larger project, and focused on fostering school leader understandings of the nature and importance of school improvement plans and how to develop them.	1
52 Van Geel et al., 2019	Journal article	The Netherlands	Qualitative study The study used evidence from a literature review, 8 classroom observations and consultations with 9 practitioners and 10 experts in differentiation to conduct a cognitive task analysis of the skill 'differentiation'.	To generate an empirically-based skills hierarchy for differentiation. Such an explicit operationalisation of what it means for teachers to differentiate can help inform future research.	7
53 Wahlstrom, 2011	Book chapter	US	Multiple methods study Examined qualitative and quantitative evidence from schools which were rated as having a highly effective principal. The chapter focuses on the nature of instructional leadership, and how this relates to student learning. The chapter draws on 20 principal interviews, 86 teacher interviews and teacher surveys in highest-rated and lowest-rated schools. The study also examined student achievement data in relation to these principal data.	The analysis investigated (1) how teachers perceived instructional leadership (2) the extent to which teacher perceptions of instructional leadership align with principals' perspectives (3) whether the nature of instructional leadership differs across primary and secondary school contexts.	1, 5
54 Yatsko et al., 2015	Journal article	US	Qualitative study The study involved school visits to 18 under-achieving schools who had received substantial funding to boost their performance. Data were collected through interviews with staff in the state education department, teacher unions, and the district and schools.	To examine what dramatic changes in schools as a result of increased funding looked like.	1, 2, 3, 4, 5, 7, 9

Author(s), year	Type	Geographical focus	Research method	Research question(s)/aim	Domain(s) as documented in Zotero tag
55 Yoon, 2016	Journal article	US	Quantitative study The study used hierarchical linear modelling to analyse longitudinal data gathered from teacher and principal surveys and student assessment of reading skills. The data were collected as part of a three-year project; the Study of Instructional Improvement. This study focused on a sub-sample of 38 primary schools serving low SES communities.	The study had 3 aims. It examined (1) the variation in principal's self-reported data-driven practices and how these varied based on principal and school background characteristics and time (2) the relation between principal's self-reported data-driven practices and teachers' self-reported levels of buy-in (3) the relation between principal's self-reported data-driven practices and teachers' self-reported levels of buy-in and student reading achievement.	1, 2, 3

Table A.2 Literature reviews/syntheses

Author(s), year	Type	Geographical focus	Review/synthesis method and aim	Domain(s) as documented in Zotero tag
56 Adie et al., 2020	Journal article	International	Systematic review to examine the impact of data walls on teaching and learning. The review examined how implementations of data walls in schools relate to phases of data use, and the impact of data wall use on teaching and learning.	2
57 Alton-Lee, 2011	Journal article	New Zealand	To provide an overview of evidence about teacher professional learning from 2 large-scale syntheses of research and identify how such evidence may inform educational improvement.	4, 5
58 Anthony & Walshaw, 2007	Report	International, main focus on New Zealand	The best evidence synthesis aimed to (1) identify and explain effective pedagogical approaches in mathematics and (2) identify pedagogical approaches that are particularly valuable for diverse learners in early years.	3, 4, 5, 6, 7, 8, 9
59 AITSL, 2017	Report	International, main focus on Australia	Synthesis of research evidence on effective feedback for teaching and learning. The synthesis draws on various reviews of literature and draws out key findings in relation to the Australian Professional Standards for Teachers.	3, 4, 7, 8
60 Black & Wiliam, 1998	Journal article	International	Review evidence about the effectiveness of formative assessment in classrooms.	2, 7, 8
61 CESE, 2015	Report	International, main focus on Australia	Review evidence in relation to student wellbeing. Specifically, the report focused on the relation between wellbeing, academic outcomes and school factors that contribute to student wellbeing, and the wellbeing policies for Australian students.	1, 3, 6, 7, 9
62 Coe et al., 2014	Report	International	To review evidence in relation to the following questions (p. 8): <ul style="list-style-type: none"> • What is good pedagogy? • What kinds of frameworks or tools could help us to capture it? • How could this promote better learning? The report synthesises findings from over 200 publications to identify aspects of teaching that have the strongest association with improved student learning outcomes. The review only included studies that examined the link between a well-specified intervention and student learning outcomes.	2, 3, 4, 5, 7, 8
63 Cole, 2012	Report	International, main focus on Australia	The paper aims to show how schools can improve their performance by aligning professional learning, performance management and classroom teaching practices. The paper synthesises evidence on these topics to addresses 6 research questions.	2, 3, 4, 5, 6, 8
64 De Boer et al., 2018	Journal article	International	To systematically review the effects of teacher expectation interventions, focused on changing teachers' behaviour, increasing awareness of expectancy effects and teacher expectation-related beliefs. The review examined the effects of such interventions on teacher expectations and student academic achievement.	8
65 Deunk et al., 2015	Report	International	Best evidence synthesis (a meta-analysis with an additional qualitative explanatory component) of the effects of differentiation on student cognitive outcomes. The review analysed empirical evidence on differentiation published after 1995. The study analysed evidence for kindergarten, primary education and lower secondary education separately.	7
66 Dinham, 2016	Book	International, main focus on Australia	The book synthesises research findings from the international literature and the author's own research within Australia on school effectiveness and school improvement.	1, 2, 3, 4, 5, 6, 7, 8, 9
67 Forsyth et al., 2011	Book	International	The book synthesises research findings from nearly 3 decades of research at 4 US-based universities. It provides a theoretical framework of collective trust, cumulates empirical evidence on collective trust in schools, and makes recommendations for practitioners.	1, 3
68 Goss & Hunter, 2015	Report	Australia	To provide evidence-informed recommendations for effective data use in Australian schools (implicit).	1, 2, 8

Author(s), year	Type	Geographical focus	Review/synthesis method and aim	Domain(s) as documented in Zotero tag
69 Hallinger & Heck, 2002	Book chapter	International	Conceptual and theoretical review of literature on mission and vision in school and business contexts. The review also examined empirical evidence in relation to these concepts.	1
70 Handa, 2013	Professional Journal article	International	Review of evidence for differentiation at the school and classroom level, which provides practical recommendations.	1, 2, 3, 5, 7, 9
71 Hanushek, 2013	Book chapter	International	Review of evidence in relation to financing schools and student achievement. Summarises key findings based on international quantitative evidence.	4
72 Hanushek & Woessmann, 2017	Book chapter	International	Review of quantitative evidence in relation to expenditure and class size on student achievement outcomes. The main focus is on evidence from large-scale international assessments.	4
73 Harris et al., 2013	Report	International	Review that sought to find evidence in relation to the hypothesis that within schools, 'a culture of trust enhances performance' (p. 2).	3, 9
74 Hattie, 2009	Book	International	Synthesis of meta-analyses which analysed evidence from 800 meta-analyses based on over 50,000 studies. The aim was to explain key influences on student achievement based on a large body of research across a range of educational topics. The meta-analyses under review were based on evidence from highly developed English-speaking countries, mainly the US.	1, 3, 4, 5, 6, 7, 8
75 Hattie, 2012	Book	International	The book is based on the synthesis of meta-analyses reported in a previous book (Hattie, 2009). This book provides an updated analysis of meta-analyses, adding evidence from over 100 further meta-analyses.	1, 2, 3, 4, 5, 6, 7, 8
76 Hopkins, 2013	Journal article	International, main focus on UK	Reviewed evidence from the past three decades in relation to 10 myths on school and system improvement.	1, 2, 3, 4, 5, 6, 7, 8, 9
77 Jackson, 2019	Report	International, main focus on Australia	The rapid review synthesised evidence in relation to curriculum flexibility at the system, school and class levels.	4, 6
78 Korpershoek et al., 2016	Journal article	International	Meta-analysis of the effect of classroom management strategies and programs on primary students' academic, behavioural, social-emotional and motivational outcomes. The meta-analysis reviewed evidence from intervention studies published between 2003 and 2013.	3
79 Lai & Schildkamp, 2013	Book chapter	International	Introductory chapter to edited book that draws on a broad range of international studies on data use.	2
80 Leithwood et al., 2004	Report	International	The literature review reviewed evidence in relation to 5 questions (p. 4): 1 What effects does successful leadership have on student learning? 2 How should the competing forms of leadership visible in the literature be reconciled? 3 Is there a common set of "basic" leadership practices used by successful leaders in most circumstances? 4 What else, beyond the basics, is required for successful leadership? 5 How does successful leadership exercise its influence on the learning of students?	1, 3, 4, 5, 6, 9
81 Lindahl, 2006	Journal article	International	The article discusses different definitions of school culture and school climate. It aims to provide evidence of how school leaders can assess these constructs, and how they relate to the process of school improvement. Further, the review seeks to address how school leaders can shape the culture in a way that is productive for school improvement.	3

Author(s), year	Type	Geographical focus	Review/synthesis method and aim	Domain(s) as documented in Zotero tag
82 Lomos et al., 2011	Journal article	International	Meta-analysis which reviewed evidence in relation to the relation between professional community and student achievement in secondary schools.	3
83 Lonsdale & Anderson, 2012	Essay	International, main focus on Australia	The essay synthesises evidence about school-community collaborations within Australia and internationally.	9
84 Masters, 2013	Report	International, main focus on Australia	Review of international literature on the role of assessment in education.	2, 8
85 Masters, 2016	Report	International, main focus on Australia	Review of evidence on continuous school improvement as aligned at various levels.	1, 2, 3, 4, 5, 6, 7, 8
86 Moore et al., 2017	Report	US	The study updated an earlier study by providing an analysis of more recent studies examining the effects of different integrated student support programs. The report also provides a detailed analysis of factors explaining differences in outcomes of various aspects of initiatives.	9
87 Robinson, 2007	Report	International	Review of empirical literature on the impact of different types of leadership on student outcomes. The study aimed to identify leadership dimensions which have the greatest impact on student outcomes, and why such practices make a difference to students. The review used meta-analytical techniques, supplemented by a qualitative review of the literature to explain the findings.	1, 2, 3, 4, 5, 6, 7, 8
88 Sammons et al., 1995	Report	International, main focus on the UK	Aim was to provide "an analysis of the key determinants of school effectiveness in secondary and primary schools" (p. 5).	1, 3, 4, 5, 6, 8
89 Schildkamp, 2019	Journal article	International	To discuss recent literature in relation to data-based decision making for school improvement and make recommendations for further research. The paper is informed by 5 recent literature reviews.	2
90 Schildkamp & Lai, 2013	Book chapter	International	To bring together key findings from the chapters in the edited book.	2
91 Stoll et al., 2012	Report	International	To review the literature on teacher professional development and pedagogy.	3, 5
92 Subban, 2006	Journal article	International	To synthesise research evidence about differentiated instruction.	6, 7, 8
93 Sun & Leithwood, 2015	Journal article	International	To examine the evidence about school leadership practices related to direction-setting. The review drew on meta-analytic as well as narrative analysis based on 110 studies.	1, 2, 3
94 Timperley et al., 2007	Report	New Zealand and International	Best evidence synthesis of international literature. "The purpose of the synthesis is to consolidate the international and New Zealand evidence around the emerging knowledge base about how to promote teacher learning in ways that impact on outcomes for the diversity of students in our classrooms." (p. xxii).	4, 5
95 Voogt et al., 2018a	Report	International	Literature review on the relation between curriculum innovations and equitable opportunities for student learning.	6, 7
96 Voogt et al., 2018b	Report	International	Literature review on curriculum flexibility and autonomy. The review sought to identify the extent to which different forms of curriculum flexibility and autonomy related to the curriculum as implemented and realised in classrooms and schools.	6
97 Zepeda, 2013	Book	International	Provides an overview of the literature on instructional leadership for school improvement. The book includes practical illustrations from different schools.	1, 2, 3, 4, 5, 6, 7, 8, 9

Table A.3 Conceptual or descriptive works

Author(s), year	Type	Geographical focus	Purpose	Domain(s) as documented in Zotero tag
Descriptive or theoretical work – other sources				
98 Bruniges, 2012	Conference paper	Australia	To propose 3 systemic actions to improve decision making and practice for school improvement: 1 Support teacher capacity to analyse and use data in a supportive and collaborative environment 2 Ensure teacher access to cutting-edge evidence about effective teaching, including professional learning 3 Foster a culture of collaborative professionalism amongst teachers.	2, 4, 5
99 Clarke, 2017	Conference paper	Australia and international	To illustrate the interrelationship between school leadership and learning and the implications of this interrelationship for classroom practice.	1, 3, 5
100 Earl & Katz 2002	Book chapter	International	“To describe the ascendancy of data in educational reform, discuss the nature of data, and offer some suggestions for leaders about transforming data into knowledge and blending it with wisdom for use in planning and decision making in schools” (p. 1004).	2
101 Farrar, 2015	Report	England and Australia	To outline findings from working with clusters of schools in school improvement.	1, 2, 3, 5
102 Fink, 2013	Professional journal article	Australia	To describe the importance of trust in school improvement.	3
103 Fullan & Hargreaves, 2016	Report	Canada and international	To put forward an argument and call for action for teacher professional development and learning in Canada.	1, 3, 4, 5, 8
104 Glover & Levačić, 2020	Book (digital)	International	The book outlines key insights about resourcing in education from an international perspective. The book draws on research evidence and provides practical guidance through case studies and reflective commentary.	4
105 Gouëdard et al., 2020	Report	International	The review synthesised evidence on curriculum reform using a policy implementation framework, taking account of all levels within an educational system. The review provides illustrative international examples and provides a framework for coherent system-wide curriculum implementation.	3, 4, 5, 6, 7, 8
106 Harris et al., 2014	Toolkit for teachers	US	To offer a toolkit which teachers can use to gather and analyse data from students about topics related to school improvement.	2
107 Hopkins & Craig, 2015	Manual for school leaders	Australia and international	To provide practical evidence-informed guidance to help school leaders create and maintain excellent schools in which every student is supported to realise their potential.	1, 3, 5
108 Jensen & Sonnemann, 2014	Report	Australia and international	To outline steps and illustrations from practice for school improvement.	1, 2, 3, 5, 9
109 Jones & Vetere, 2017	Conference paper	Australia	The conference paper describes the Science of Learning Research Centre approach to school partnerships and professional learning communities. This approach is illustrated by describing a case study of one of the project schools.	3, 5, 7
110 Louis & Wahlstrom, 2011a	Professional journal article	US	Highlight key evidence-informed aspects of principals' roles in shaping school culture to improve student learning outcomes.	3
111 Marshall & Zbar, 2013	Report	Australia	The report draws on evidence from case studies from 5 schools, commissioned by AITSL. It describes lessons learned from schools that have used processes of teacher and school development to improve teaching practice.	1, 5, 8

Author(s), year	Type	Geographical focus	Purpose	Domain(s) as documented in Zotero tag
112 Masters, 2011	Essay	International	Describes key evidence in relation to the work of school improvement.	1, 2, 4, 5, 6, 7, 8
113 Miles & Ferris, 2015	Report	International, primary focus on US	The report synthesises evidence on strategic use of resources to achieve school improvement based on the authors' observations in working with schools.	1, 2, 3, 4, 5, 6, 7, 9
114 Milgate, 2016	Book chapter	Australia	Describes the benefits of schools-community partnerships and how schools can build such partnerships. This is illustrated by one case study from a rural school in New South Wales.	9
115 New Leaders, 2015	Report	US	The report draws on the authors' experiences and the literature on teacher leadership to provide recommendations for advancing opportunities for teacher leadership. Findings are illustrated using a Case study of school leaders in one school.	3, 4, 5
116 Otero, 2016	Report	International, primary focus on Australia	Descriptive work and based on own experiences and various school-community initiatives. International, with a primary focus on Australia. The paper discusses "evidence, principles and practices that schools can use to build positive and productive relationships across the school and community" (p. 2).	1, 3, 9
117 Scott, 2015	Report	International	The paper "explores pedagogies and learning environments that may contribute to the development and mastery of twenty-first century competencies and skills, and advance the quality of learning" (p. 1).	3, 4, 5, 6, 7, 8, 9
118 Thessin, 2015	Professional journal article	US	To provide evidence-informed recommendations for data use for school improvement.	1, 2

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