

The science behind the art of teaching: Evaluation as inspiration



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Abstract

Teachers across Australia inspire students to love learning. Our best teachers are constantly evaluating their impact on learning outcomes and adapting their practice – balancing the art and science of teaching. As we move rapidly towards the third decade of the 21st century, there is more pressure than ever for all teachers to deliver both deep discipline knowledge and the skills students need to survive and thrive in the workplace of the future. We need to use technology and data to support teachers to maximise learning outcomes for their students. This has to be done in a way that helps teachers, rather than placing an additional burden on them. Being able to more accurately identify where each student is at in their learning, and delivering the next challenging but achievable step, will maximise student engagement and inspire a love of learning.

Introduction

Teaching is an honourable profession, with communities according it a high status (Commonwealth Parliament of Australia, 2019). Teaching carries the primary responsibility for the learning outcomes of children and young people. It is a profession that must be adaptive and responsive – to the needs of each learning context, each student, the challenge of differentiation, emerging education developments, new curricula, and different measures of success. A profession with intrinsic rewards, it nonetheless requires personal and professional resilience and practitioners who draw strongly from a knowledge and creative base to pursue its unique and distinctive role. Using assessment and evaluation is where the pursuit of quality teaching begins.

There is much written about the challenges that face young people in a world shaped by automation, technological advances and the rise of artificial intelligence, globalisation, uncertainty and major social change. Far less is available on the professional challenges that face the teachers of these young people. Teachers who are vitally important in preparing these people for today's world and tomorrow's, and securing ongoing national prosperity.

As nascent citizens, students today need to acquire a combination of deep discipline knowledge, harness the ability to transfer and apply knowledge and skills to complex problems, and develop adaptive and resilient dispositions (Bialik & Fadel, 2018).

Improving educational outcomes delivers a range of positive impact, from individual benefits of ensuring students are able to succeed in the future workforce, through to the national economic level. Deloitte Access Economics (2016, p. iii) estimates that a 5 per cent increase in the Organisation for Economic Co-operation and Development's (OECD's) Programme for International Student Assessment (PISA) scores could lead to improved labour productivity and result in an increase to Australia's long-term gross domestic product by as much as \$12 to \$26 billion, once the benefits were fully realised.

In our increasingly complex world, one principle is generally agreed: it is no longer sufficient to 'teach to the middle'. Teachers have to draw on different pedagogical approaches to cater for the full spectrum of ability within a single classroom. Differentiation is widely considered the best way to maximise the learning potential of each individual, yet it is one of the greatest challenges for teachers.

Practicality may often dictate that instruction is pitched toward students achieving at the middle of the group (or the expected curriculum level), thereby not extending high-performing students or supporting low-performing students (Goss & Hunter, 2015). Australia's PISA

results reflect this. When compared to high-achieving countries, around 20 per cent of 15-year-old Australians fell short of PISA's minimum proficient standard in mathematics, and only 15 per cent reached the highest levels of mathematical proficiency, compared to 40 per cent of students in the five best performing systems (Goss & Hunter, 2015).

The ambition articulated in *Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools* is to achieve 'one year's growth in learning for every student every year' (Department of Education and Training, 2018, p. x). To deliver on this vision, teachers need professional knowledge of their discipline, effective and up-to-date pedagogical knowledge, knowledge about the way students learn, and knowledge of how to create effective learning environments. An understanding of the 'research–theory–practice nexus and the inquiry and research skills that allow teachers to become lifelong learners and grow in their profession' is also needed (Schleicher, 2018, p. 9).

Research has positively linked teaching performance to the ability to understand and effectively use three types of knowledge in the classroom – content knowledge, pedagogical knowledge and pedagogical content knowledge. While each of these types of knowledge is a critical element in delivering positive student outcomes, it is the depth of pedagogical content knowledge – the intersection of content knowledge and pedagogical knowledge – that elevates teachers to an expert level, allowing them to effectively differentiate teaching strategies in response to individual students (Teacher Education Ministerial Advisory Group, 2014).

As well as high professional expectations, the community calls for teachers to be passionate and compassionate individuals, able to respond effectively to students with a range of needs and backgrounds, able to promote tolerance and social cohesion and ensure that their students feel valued and engaged in their learning (Roy Morgan, 2017).

In a century characterised by striking, fast-paced advances in technology, good teaching is one endeavour that cannot be fully automated. Quality education will always require quality teaching and leadership. The rapport that teachers have with their students is the essence of teaching – it is the humanity, the interpersonal, the compassion, the relationships at the heart of the profession.

Every class or learning setting a teacher encounters will be different. Teaching *must* therefore be adaptive and responsive to the different needs of each setting and each student. The essential question is, how can teachers be encouraged and supported to achieve this goal? There is no single solution, however, there is a single place to start: *the belief that it is possible*.

The 'art' of teaching: teacher judgement and collective efficacy

What teachers do, and how they do it, are key to better educational outcomes.

Building on John Hattie's (2009) meta-analysis on student achievement, a recent report commissioned by the Department of Education and Training found that school and teacher factors contribute as much as 28 per cent of variation in student outcomes. Teaching practice, classroom organisation and environment, and school leadership are the most important drivers within this variation. Specifically, 'variations in teaching practice explain the largest variation in student scores, at 6.1 per cent for PISA maths scores, and 13.1 per cent for TIMSS Year 8 (and 3.9 per cent of TIMSS Year 4) maths scores' (Deloitte Access Economics, 2017, p. 45).

Teachers make multiple decisions daily about their practice: what they will do next, knowing what they know about individual students. Teachers continually use intuitive professional judgement, informed by their experience and knowledge, to gather information on what and how to teach. Recent research has confirmed that while intuitive judgement is an important part of teacher expertise, it is enhanced when complemented by a range of measures including achievement and attitudinal data from formative and summative measures. By incorporating such data collection into their repertoire, teachers are able to make sophisticated decisions that support enhanced student outcomes (Vanlommel, Van Gasse, Vanhoof, & Van Petegem, 2018). Teachers engage, motivate and stimulate students' love of learning by keeping themselves informed of the latest developments in their discipline to inspire and bring subjects to life. This is the art of teaching: combining deep discipline knowledge with rich contextual information about students to inform judgements about teaching that engages and inspires students.

Teachers develop professional judgement throughout their careers, as they progress from beginning to proficient to highly accomplished professionals. They do not develop this judgement in isolation of their peers. While a teacher may often stand solo in front of a class, teaching is a highly collaborative profession.

The concept of collective teacher efficacy – the collective belief of teachers in their ability to have a positive impact on student learning – has a longstanding evidence base (Bandura, 1993 & 1997; Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy, Sweetland, & Smith, 2002). And a strong correlation between collective efficacy and student achievement was recently highlighted by John Hattie.

Michael Fullan (2018) describes *collective efficacy* as encompassing 'a shared belief in [a] conjoint capacity to produce results, a culture of collaboration to implement high-yield strategies, evidence of impact as a primary input, with leadership participation in frequent, specific collaboration.'

Successful illustrations of collective teacher efficacy include the practice of Japanese lesson study, (Doig & Groves, 2011) and Gore and Bowes' Quality Teaching Rounds (Bowe & Gore, 2017). Each of these practices is characterised by a group of educators coming together in professional learning communities to observe, evaluate, discuss and collectively develop each other's professional knowledge and practice.

Collaborative professional development practices empower teachers to pursue more critical and deeper analytical work on their practice (Bowe & Gore, 2017), and allow participants to draw on the collective experience, creativity and insights of their peers, strengthening teaching as a collective endeavour and overcoming professional isolation.

An examination of the OECD Teaching and Learning International Survey (TALIS) and PISA results highlights the value that collaborative professional development can provide as part of regular teaching practice.

The 2013 TALIS results showed that while around 50 per cent of Australian teachers regularly exchange teaching materials and engage in discussions about student learning, richer collaborative practices such as engaging in team teaching (18.1 per cent), joint activities across classes (7.9 per cent) and teacher observation (4.9 per cent) were much less common (OECD, Table 6.15, 2014).

All professional engagement and exchange and coordination activities should be encouraged; however, deeper professional collaboration is more beneficial in enriching the profession and where Australian teachers could gain the greatest benefits (Clement & Vandenberghe, 2000).

Using data in the classroom: The 'science' of teaching

All effective teaching uses evaluation, and uses it consistently and often. Measurement is integral to the process of identifying children potentially at risk and charting change (Bruniges, 1999, p. 23). Teachers reflect on student responses to strategies used in the classroom through observations and classroom assessments and as professionals through communities of practice.

Like any measure, NAPLAN data, our national assessment, does not replace teacher judgement – it informs and augments it. NAPLAN assesses aspects of literacy and numeracy in Australian students at Years 3, 5, 7 and 9. It provides valuable diagnostic information about the strengths of individuals and areas for their further development. As such, it provides a valid and reliable source of evidence for teachers to use in their professional judgements.

Traditional assessment practices focus on comparing a student to the others within their cohort. While this can be effective to differentiate within a group, it has limited value for teachers seeking to understand what a student knows, can do, or understands (Bruniges, 1999, p. 11).

Well-considered and delivered assessment practices support teachers to monitor student progress and inform next steps, determine the effectiveness of chosen teaching strategies – both for learning and engagement – and to measure understanding of a unit of work (Stronge, 2002). By developing more effective and targeted assessments, teachers can assess with greater precision, and get richer information to inform and support their decisions on what and how to teach.

Neuroscience and psychometric education research have contributed important observations of student development. Student learning is not consistently linear, with learners experiencing periods of learning ‘growth spurts’ and plateaus (Bruniges, 1999). Assumptions about patterns of growth are important components in ensuring that descriptions of expectations are based on what should typically occur at particular ages, or stages, in the schooling continuum (Bruniges, 1999, p. 23). Yet, too great a reliance on the knowledge of the development of ‘typical’ students can disadvantage many students.

Early work on learning progressions by the Australian Council for Educational Research (ACER), Australian Curriculum, Assessment and Reporting Authority (ACARA) and others has the potential to provide powerful information for the profession. Learning progressions describe the common development pathway along which students typically progress in their learning, regardless of age or year level. They describe the skills, understanding and capabilities students acquire as their proficiency increases in a particular area. This helps teachers to identify the stage of learning reached, any gaps in skills and knowledge, and plan for the next challenging but achievable step to progress learning.

The development of learning progressions will assist teachers to more easily establish the current levels of achievement of their students, as well as any gaps in learning. When linked with on-demand resources and professional learning, they will support teachers to identify and plan the next teaching and learning

steps for each student (Cawsey, Hattie, & Masters, 2019). Technology must be harnessed to support teachers. The challenge is in knowing how to develop or access relevant and useful assessments, receiving data in accessible formats, and using the results to complement the rich contextual information held by the teacher – then deciding what to teach next based on the skills and knowledge of the students.

The benefits of the digital age in schools have been described by Andreas Schleicher (2018, p. 17) as:

In the past, schools were technological islands, with technology often limited to supporting existing practices, and students outpacing schools in their adoption and consumption of technology. We need to use the potential of technologies to liberate learning from past conventions and connect teachers and learners in new and powerful ways, with sources of knowledge, with innovative applications and with one another.

Adaptive teaching and learning: Evaluation as inspiration

Advances in adaptive teaching and learning require a collective effort, starting with professional collaboration between teachers, as embodied in the concept of collective teacher efficacy.

Opening up of the profession with a greater culture of classroom observation, coding of lessons, instructive teacher feedback loops and translation of important contributions of school leaders, researchers, and policymakers into the classroom requires action. Such a collective effort would allow teachers to access the valuable research insights. With support, incorporation of insights into daily practice would ensue.

There is a wealth of high-quality educational research taking place nationally and internationally that can assist in the identification of the most effective ways to achieve better educational outcomes and support teachers to make simple but meaningful changes to their practice with a resultant positive impact on student outcomes.

In the 2013 TALIS, for example, 94 per cent of teachers on average agreed that it was their role to facilitate inquiry in students. A majority of the teacher respondents also believed that students should be allowed to think of solutions themselves before teachers showed them (93 per cent) (Freeman, O’Malley, & Eveleigh, 2014). Research also indicated that while teacher-directed instruction and memorisation learning strategies assisted students in solving rudimentary mathematics problems, student-oriented instruction and elaboration strategies are more successful for more complex tasks (OECD, 2016).

Yet, when PISA 2012 asked students to report on the prevalence of different approaches found in the classroom, the data often varied from what teachers reported to be desirable learning strategies. While teachers in the United Kingdom reported a strongly constructivist view of teaching, England was among the countries where students reported the highest prevalence of memorisation strategies (Schleicher, 2018, p.17). The percentage of Australian students who reported using memorisation strategies was also significantly above the OECD average. This pattern was similar for many other English-speaking countries.

These PISA findings suggest a concerning disconnect between teacher-identified desirable pedagogies and classroom teaching practices. Translating such research could prompt teachers to understand their current practice, look at what the evidence says and provide the impetus to implement the findings in their day-to-day teaching.

The creation of a national education evidence institute will be an important first step in bridging the gap between research and the classroom; to use evaluation to help teachers adapt their practice and inspire their students.

Conclusion

Teachers have a valuable and powerful role. They guide students' development and influence their futures.

Teaching is a highly sophisticated profession with a clear dualism: it is grounded in evidence and pedagogy yet characterised by values of compassion, empathy and deep care for students. These are complementary.

Well-considered assessment will guide and enhance, not detract, from student learning. Educators must embrace the opportunities assessment and evaluation data provides to reflect on practice and to support them in delivering on intentions, goals and expectations for student learning. Assessment and evaluation information and analysis empowers educators to consider the impact of their teaching and to continually adapt and adjust their teaching to the needs of their students.

Policymakers and researchers need to work *with* the teaching profession to support further research and evaluation of what works and how to do it well – in a way that puts teachers in the driving seat and does not add to the demands placed on practitioners.

Quality teaching does not end with assessment and evaluation, it is where it begins.

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