

2021

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Robert M. Vanderburg
Central Queensland University

Paul Trotter
Central Queensland University

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Recommended Citation

Vanderburg, R. M., & Trotter, P. (2021). How Constructivist Theories of Development can be used to Re-conceptualise NAPLAN as an Opportunity to Develop Student Resilience. *Australian Journal of Teacher Education*, 46(9).

Retrieved from <https://ro.ecu.edu.au/ajte/vol46/iss9/1>

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How Constructivist Theories of Development Can be Used to Re-Conceptualise NAPLAN as an Opportunity to Develop Student Resilience

Robert Vanderburg
Paul Trotter
Central Queensland University

Abstract: Teachers have come under increased pressure to improve educational outcomes as Australia has sought to meet the challenges of competing on an international level. This intensified pressure has been accompanied by improved levels of funding, a National Curriculum for all Australian states, and territories, along with assessments to measure these key outcomes. However, this increased level of scrutiny has affected the pedagogical choices of teachers. Traditional modes of instruction have been reinforced, with teachers moving away from effective constructivist approaches to learning. This article will propose that a reinterpretation of constructivist theories of development is needed to arrest this decline, so that increased accountability measures, like NAPLAN, can be perceived as constructivist opportunities to build both core subject knowledge and broader 21st Century skills, such as resilience.

Introduction

Fundamental economic transformations emerged in the early 1990s causing governments around the world to place increased value on education. The world underwent a profound paradigm shift. As Trilling and Fadel detail, the 1990s saw countries around the globe spend more on technology than on industrial era goods; the reality emerged whereby “manipulating, managing, and moving bits and bytes of information” became more important than “handling the material world’s atoms and molecules” (Trilling & Fadel, 2009, p. 3). Governments across the globe have recognised the critical role education must play within a digitised, globalised economy whose reliance on raw materials and mass-production lessens by the day.

In Australia, this imperative became clear with the establishment of the National Curriculum (National Curriculum Board, 2008). Higher levels of accountability were also implemented across the Australian states through introducing the National Assessment Program of Literacy and Numeracy, commonly known as NAPLAN tests (see Thompson, 2013). Then in 2015, the significance of education to the future prosperity of the nation was further underlined with all education ministers agreeing that from 1 July 2016 the Australian Government would initiate the Literacy and Numeracy Test for Teacher Education (LANTITE) (Australian Government, 2017). The LANTITE was designed to verify that all prospective teachers could demonstrate the required level of literacy and numeracy skills. Over this same period, educational outcomes have not eased the growing pressure on the Australian education system. Despite record numbers of students graduating from universities (Universities Australia, 2020), NAPLAN results have shown only a slight increase (Acara, 2019). In contrast, international measures, like Programme for International Student

Assessment (PISA), have seen Australia tumble down the world rankings (OECD, 2006, 2010, 2012, 2015, 2019), and researchers are reporting increased numbers of disengaged students (Goss et al., 2017), high youth unemployment, and increasing reports of poor mental health (Casner-Lotto & Barrington, 2006; Foundation of Young Australians, 2018; Locke, 2015).

The traditional model of education has seemingly been found lacking in its capacity to fulfil the demands of the digital age (Kivunja, 2014; Prensky, 2001; Trilling & Fadel, 2009; Zhao, 2015). Students undoubtedly need a firm understanding of core subject knowledge, but they also need a broad suite of 21st Century skills. A key component of these new, necessary skills is resilience. Whilst we understand that resilience is a skill utilized prior to the 21st century, today's students must develop the capability to cope in stressful situations and must be nurtured and aided in developing resilience in our schools if they are to be successful within a digital economy (Mishra & Kereluik, 2009; Zhao, 2015).

This article will provide a brief history of development of the Australian Curriculum. For contextualisation purposes, the introduction of NAPLAN tests will also be included in that review. The effect on our schools of these accountability measures will then be examined. This will clarify why, despite increased levels of funding and the sustained efforts of teachers, such initiatives have yielded disappointing outcomes. The article will then turn to remediation. It will re-examine the developmental theories of Jean Piaget and Lev Vygotsky and align them with Michael Ungar's (Ungar, 2004; Ungar & Liebenberg, 2011) social-ecological theories of resilience to show that cognitive challenge is inherent within the learning process. We will argue that it is through a pragmatic implementation of constructivist principles and the successful negotiation of the ensuing challenge that teachers can be empowered to both improve students' learning outcomes and develop their inner voice of resilience.

The Development of the National Curriculum & NAPLAN Testing

To appreciate how schools and teachers have been affected by increased accountability, some historical context around the political movements prompting the Australian Curriculum is needed. It is also essential that the introduction of the NAPLAN test is contextualised for the same underlying reason.

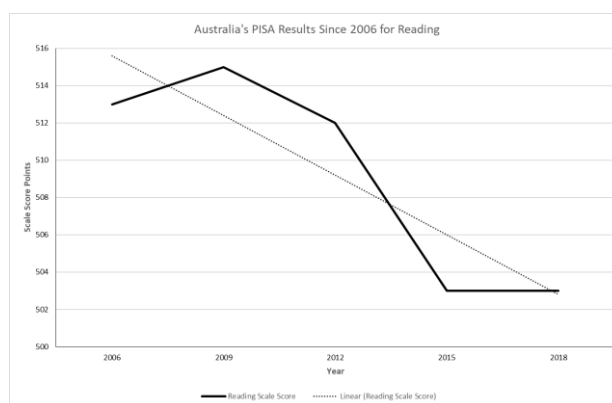
The Melbourne Declaration was released in 2008 and argued that high-quality education for Australian students was paramount to the future of Australia (MCEETYA, 2008). At the time, international test data showed that Australia was ranked in the top 10 countries for overall standards of educational outcomes (Brennan, 2011; OECD, 2006). Besides establishing curriculum revision, the Declaration also looked to improve the quality of Australian teachers. While the Melbourne Declaration was released, a study addressing the quality of teaching in Australia (Leigh & Ryan, 2008), commissioned by Julie Bishop, the previous Minister for Education Science and Training, was released revealing teacher aptitude had apparently been declining. Julia Gillard responded to this report and the Melbourne Declaration by establishing ACARA (the Australian Curriculum, Assessment and Reporting Authority), the group that would create a national curriculum and create associated assessment programmes (*Australian Curriculum Assessment and Reporting Authority Bill*, 2008). The express aim of the new curriculum was to develop a world-class curriculum for all, stating that "Most importantly, it will enable us to work collectively in defining what young Australians should learn and in creating and sustaining a world-class, and even a world-best, schooling system" (National Curriculum Board, 2008, p. 2).

Whilst it should be noted that each state retained responsibility for their specific implementation of the Australian Curriculum, ACARA had established a single curriculum for the whole of Australia, along with NAPLAN tests to measure student performance in literacy and numeracy (Brennan, 2011; OECD, 2006). The aim of these reforms may have been to raise the standards of educational outcomes for students and to ensure Australian teachers would become increasingly accountable to their communities for the outcomes achieved by their students. However, the effectiveness of these reforms in delivering their intended outcomes will now be considered.

Declining Standards and the Impotence of the Reform

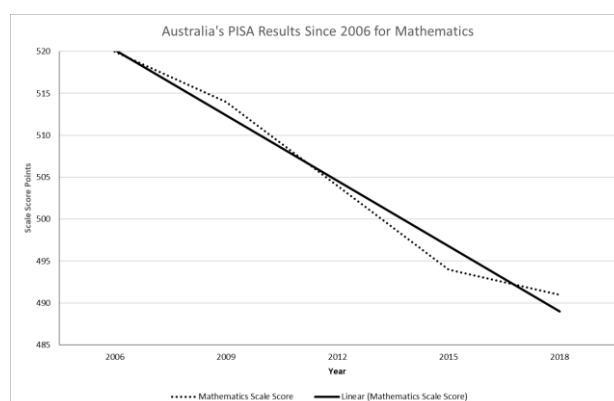
Australia's Declining Performance Indicators

The Programme for International Student Assessment, or PISA, is a worldwide study by OECD nations intended to evaluate educational systems. The tests measure 15-year-old school pupils' academic performance in mathematics, science, and reading. Upon their implementation and before implementing NAPLAN testing, Australia was ranked as 4th in the world for attainment in reading and in the top-ten nations for Mathematics and Science (OECD, 2003, 2006).



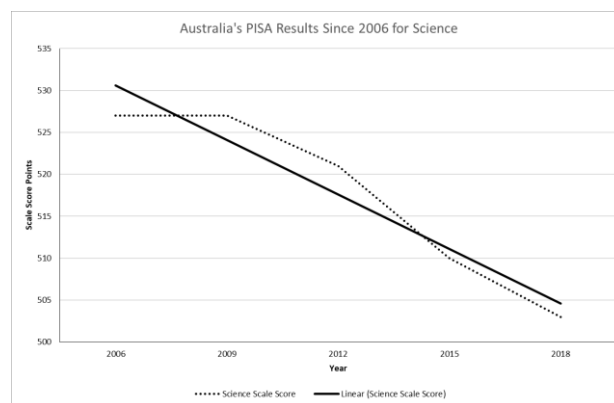
Note: Figure developed from data supplied by the OECD (OECD, 2006, 2010, 2012, 2015, 2019)

Figure 1: Australia's PISA Results Since 2006 for Reading



Note: Figure developed from data supplied by the OECD (OECD, 2006, 2010, 2012, 2015, 2019)

Figure 2: Australia's PISA Results Since 2006 for Mathematics



Note: Figure developed from data supplied by the OECD (OECD, 2006, 2010, 2012, 2015, 2019)

Figure 3: Australia's PISA Results Since 2006 for Science

Regrettably, Australia’s education reforms did not produce the intended improvements in educational standards. While NAPLAN results show some minor gains (Acara, 2019), TIMSS results remained far from impressive (Thomson et al., 2015), and Australia has suffered a dramatic fall in the PISA rankings in Reading (see Figure 1), Mathematics (see Figure 2), and Science (see Figure 3). As Australia’s recent PISA report states:

While Australia’s reading performance in PISA 2018 was similar to that observed in 2015, when considering a longer period, mean performance in reading has been steadily declining, from initially high levels, since the country first participated in PISA in 2000. Performance in mathematics has been declining too since 2003, and in science, since 2012. (OECD, 2019, p. 1).

These falling standards seem to coincide with the establishment of the Australian Curriculum and NAPLAN testing regimes. However, many of the most successful countries, as measured by the PISA rankings, are education systems that are also instilling testing regimes. For example, Singapore’s education system is highly accountable, with schools ranked against each other using national test data (Ng, 2010) and it also ranks highly on PISA.

Unintended Consequences of Reform

Successive Australian governments have viewed NAPLAN style tests as a cost-effective means to raise levels of attainment given that high performing countries such as Singapore and China exhibit such high levels of accountability (Miao & Reynolds, 2017; Ng, 2010; Zhao, 2009). However, in Australia, increased accountability has been shown to impact the pedagogical choices of teachers (Au, 2007; Rice et al., 2015; Thompson, 2014; Thompson & Harbaugh, 2013). Synthesising 49 studies on the effects of high stakes testing, Au (2007) found teachers’ altered their focus from assisting students in gaining a deep understanding of topics towards a shallower understanding of topics. These findings corroborated by various studies specific to Australian Curriculum and NAPLAN (see Rice et al., 2015; Roberts et al., 2019; Thompson, 2014; Thompson & Harbaugh, 2013). Such studies have also confirmed a shift of emphasis onto lower-order skills and shallow understanding as teachers feel pressured to cover the curriculum in time for the test. Both Au (2007) and Wiliam (2010) caution that under such pressure the curriculum is increasingly presented as discrete and disconnected. A narrowing of the curriculum, whereby less importance and time

is provided to those subjects that fall outside of the testing regime has also been evidenced (Au, 2007; Rice et al., 2015; Roberts et al., 2019; Thompson, 2013). A greater emphasis being placed on teacher-centred pedagogies is also noted in the literature. This shift reinforces the suggestion of a move away from constructivist modes of learning to a traditional model of instruction (Rice et al., 2015; Roberts et al., 2019; Windschitl, 2002). It would seem that principals and teachers have understandably reacted to the increased accountability brought about the introduction of the Australian Curriculum and NAPLAN by retreating from the student-centred, constructivist approaches that saw Australia rank so highly in international measures of student attainment (OECD, 2003, 2006) in favour of more socially acceptable models of knowledge transmission.

Whilst it is important to note that NAPLAN tests were not designed to be high stakes for the students; they were designed to measure collective student progress and provide an individual student diagnosis. It is argued (Mayes & Howell, 2018) that one of the broader implications of NAPLAN has been to unwittingly turn these tests into a potentially stressful event. Recently, Johanna Wynne (2014) of Melbourne University asserted in an article in the *Conversation* that “NAPLAN is plagued by negative impacts on student wellbeing and learning” and that “90% of teachers reported that students felt stressed before taking the test. There have also been reports of self-harm with one parent reporting that their child grew so stressed within the test that “he removed the blade from his sharpener and carved the word “f*k” into his left forearm” (Anonymous, 2019). A Perth paediatrician, Dr Elizabeth Green, warned of an “anxiety epidemic” in a 2016 interview for the ABC (Wynne, 2016). Despite any intention to design NAPLAN to be low-stakes, the evidence would seem clear that some students in some circumstances experience these tests as high-stakes and find them a cause of profound stress (Mayes & Howell, 2018; Rogers et al., 2016; Swain & Pendergast, 2018). The question remains as how best to support these students through these potentially stressful situations, equipping them with the skills to successfully negotiate life’s challenges and to limit any such negative consequences.

It would seem that NAPLAN tests have given rise to concerns regarding their potential to impact negatively on the well-being of students and teachers (Rogers et al., 2016). The prevailing view in the media and research literature would seem to affirm this assertion. However, a closer examination of the research evidence reveals a more nuanced reality. Rogers et al. (2016) synthesises research on the effect of NAPLAN on students and determined that the evidence across the field is inconclusive, stating that despite a negative tone to much of the commentary there was an “unclear evidence base” (p. 327). Undoubtedly, some students suffer negative consequences stemming from NAPLAN (Mayes & Howell, 2018; Rogers et al., 2016; Swain & Pendergast, 2018). However, negative experiences are not inevitable, nor are they universal. It would seem that students’ experiences of NAPLAN may differ considerably (Mayes & Howell, 2018; Rogers et al., 2016). Work by Swain & Pendergast (2018) investigating students’ reactions to NAPLAN found that students’ reactions to testing seemed dependent on the attitudes of the school; negative reactions by students were more common when the school applied greater pressure on their students to perform. Students developed predominantly negative perceptions of NAPLAN when the preparation and teaching experiences were driven by a need to optimise test scores. Contrastingly, students’ experiences were more positive when a less intensive, less pressured approach to preparation and implementation was taken. Implementation decisions made by teachers and schools are the key determining factor in the quality of experience for students.

Evidently, Australian educators have reacted to the increased accountability brought about by NAPLAN by retreating from constructive pedagogies (Rice et al., 2015; Roberts et al., 2019; Windschitl, 2002) and have seemingly impoverished attainment, impaired student well-being, reduced resilience, along with decreased standardised test results. Dylan Wiliam

(2010) cautions that any positive outcomes of tests must be worth the negative consequences that will inevitably follow. Critically, the specific impact on individual students of NAPLAN seems dependent on the pedagogical decisions of their teachers (Swain & Pendergast, 2018). As deep understanding and constructive approaches to learning are replaced with 'chalk and talk', the learning experiences of students suffer along with their academic progress and emotional well-being (Au, 2007). If Australia is to arrest its current declining standards, educators need to be supported in making courageous pedagogical decisions. Effective learning experiences that build on the individual student's current understanding need to be enacted, and the failed transmission model of instruction must lose its default status in Australian schools.

Resilience as a Key 21st Century Skill

Accepting the critical role education needs to play within a digitised, globalised economy, education has become vital to national economic prosperity (Trilling & Fadel, 2009; Zhao, 2015). This new economic reality requires an ever-expanding skillset from our students (Mishra & Kereluik, 2009; Zhao, 2014). These apparently new skills have been termed as 21st Century skills and the development these skills in our schools is accompanied by calls for pedagogical renewal from a host of popular writers (Gardner, 2008; Pink, 2005; Prensky, 2001, 2014; Robinson, 2011). However, it should be noted that these skills are not mere conceptions of the new millennium. The call for schools to promote the development of skills that sit outside of core curriculum content have been a recurrent topic of discussion similar to William T. Harris and his 1880's notion of "versatile intelligence" (Ravitch, 2000). A key component of these 21st Century skills is resilience (Truebridge & Benard, 2013).

In seeking to explicitly define 21st Century skills, Mishra & Kereluik (2009) provide a critical review of the literature on 21st Century Skills by conducting a comparative analysis of the differing frameworks that have been proposed. Their findings are organised into three overarching categories with three sub-categories, with one entire sub-category devoted to the critical importance of emotional awareness. Similarly, Gutman & Schoon (2013) examine the extent to which such skills matter in narrowing the gap in outcomes for pupils from disadvantaged backgrounds. Once again, resilience is prominent in their findings:

- Self-Perceptions
- Motivation
- Perseverance
- Self-Control
- Metacognitive Strategies
- Social Competencies
- Resilience and Coping
- Creativity

Whilst Mishra & Kereluik (2009, p. 3301) acknowledge that the whole idea of 21st Century skills remains in danger of becoming "an empty signifier, a term that we all think we understand and yet are hard-pressed to clearly define", the prevalence of resilience across definitions would seem to underline its relevance. In conjunction with a deep understanding of core subject matter, students need a range of non-cognitive skills in order to succeed in the new economic reality (Levin, 2012). Resilience and the ability to manage their emotions under pressured circumstances seems to be imperative:

But participation in education is not an end in itself; what matters for people and economies are the skills acquired through education. It is the competence and character qualities that are developed through schooling, rather than the

qualifications and credentials gained, that make people successful and resilient in their professional and personal lives. They are also key in determining individual well-being and the prosperity of societies. (OECD, 2017, p. 24)

Significantly, everyone has the capacity for resilience, and schools can play a pivotal role its development if they are able to provide students with the right amount of support and challenge (Truebridge & Benard, 2013). A detailed examination of resilience will be considered later in this work, but it seems clear that it remains an important skill for schools to develop and for students to acquire.

Essential Components of Constructivism

Whilst philosophical notions of constructivism have been around since Ancient Greece times (Boudourides, 2003; Murphy, 1997), the modern definition of constructivism as a developmental model that has been around for over 100 years (Gordon, 2009a, 2009b; Kivunja, 2014). It contends that knowledge is not inherently objective; knowledge emerges from the learners' struggle to comprehend. Constructivism has been defined as "a psychological and philosophical perspective contending that individuals form or construct much of what they learn and understand" (Schunk, 2012, p. 229). The key premise of constructivism is that learning lives in the thoughts and actions of the learner. As Gordon explains:

To assert that knowledge is constructed, rather than discovered, implies that it is neither independent of human knowing nor value free. Constructivists believe that what is deemed knowledge is always informed by a particular perspective and shaped by various implicit value judgments. (Gordon, 2009b, p. 39)

Baviskar et al. (2009) derive essential criteria for the characterisation of constructivist teaching:

Therefore, when a lesson is said to be constructivist, it does not necessarily follow a specific formula. Instead, a constructivist lesson is one that is designed and implemented in a way that creates the greatest opportunities for students to learn, regardless of the techniques used. Implementation of the theory is the crux of constructivism. Large lecture halls are often held up as the antithesis of constructivism. However, if an instructor needs to transmit a large amount of information to a large group of expert learners, and the lesson is properly implemented, a lecture is probably the most efficient constructivist tool possible. (Baviskar et al., 2009, p. 542)

Baviskar et al. (2009) argue that it is the learner who constructs meaning and that the teacher's role is to maximise their ability to do so. As shown in Table 1, Baviskar et al. (2009) establishes four critical elements for a lesson to be considered as constructivist:

Constructivist Criteria	Description
Eliciting prior knowledge	Prior knowledge can be elicited in different ways: formal pre-tests, informal questions, & activities such as concept-mapping.
Creating cognitive dissonance	Teacher selects tasks that have a high probability of being problematical for students—tasks which may cause students to find a problem'
Application of the knowledge with feedback	Application of the new construct could be in the form of quizzes, presentations, group discussions, or other activities. In addition to checking the validity of their constructs, application allows the student to further define the interconnectedness of the new knowledge.
Reflection on learning	The student needs to be made aware of the learning that has taken place.

Table 1: The Critical Elements of Constructivism

Although some techniques used by teachers will be strongly constructivist in nature, such as a scientific inquiry, it may not be necessary to utilise such a method for the lesson to be considered constructivist. Indeed, Baviskar et al. (2009) apply their criteria to several examples and show that it is not the inclusion of technology or that the inclusion of student activity which defines an approach as constructive in nature, but whether these four essential criteria are met.

The Importance of Cognitive Challenge and the More Knowledgeable Other

Two of the main figures associated with constructivism are Jean Piaget and Lev Vygotsky (Phillips, 1995). It should be noted that constructivism encompasses variant sub-theories with Piaget being viewed as more of a pure constructivist, whilst Vygotsky is viewed as more of a social constructivist.

The notion of stages of development inevitably arise when considering Jean Piaget's research (1927, 1950, 1970). Piaget introduced his famous stages of cognitive development with the sensorimotor stage that began at birth. Next came the pre-operational stage that typically lasted between the ages of 2 to 7. This was followed by the concrete operational and formal operational stages. The transition from one stage to the next being characterised by the construction of new psychological structures which did not previously exist. Whilst some researchers have called into question Piaget's conception of developmental stages (see Brainerd, 1978) and others have criticised him in methodological terms (see Braine, 1962), the central import of his work remains enduringly profound (Hopkins, 2011; Shayer, 2003). According to Piaget, learning is a product of evolutionary forces that strive for equilibrium between the twin forces of assimilation and accommodation:

Every response, whether it be an act directed towards the outside world or an act internalized as thought, takes the form of an adaptation or, better, of, a re-adaptation. The individual acts only if he experiences a need, i.e., if the equilibrium between the environment and the organism is momentarily upset, and action tends to re-establish the equilibrium. (Piaget, 1950, p. 3)

New psychological structures are developed in direct response to cognitive challenge. Piaget argued that students need to battle through cognitive disequilibrium to construct new meanings of phenomena. The learner, experiencing the struggle of dealing with their lack of understanding, is led to adopt new patterns of thinking so that equilibrium can be restored. Students develop in response to the strain of working through disequilibrium, resulting in learning becoming an active process of constructing meaning in response to cognitive challenge. Resultantly, despite the apparent naturalness of his stages, progression through

each of Piaget's stages remains contingent (Joyce, 1984). Arrestation is possible, should the individual's level of development be perfectly matched to their environment. If the environment is too comfortable, too reliable, then the learner will be content at the stage of concrete operation. In fact, neo-Piagetians (Case, 1978; Case et al., 1988) argued students may only develop through these stages more rapidly if their cultural experiences allowed them to contend with specific components of the next developmental stage at an earlier phase. The increased exposure to experiences of the next developmental stage created a state of disequilibrium which students would then struggle through to establish equilibrium. For Piaget, the challenge of new experience drove learning, opposed to natural maturation.

Lev Vygotsky was a contemporary of Piaget, but his work did not emerge into Western educational discourse until the 1960s (Vanderburg, 2006), as the Russian's work was suppressed for political reasons by the Soviet regime. Vygotsky arrived at similar conclusions to Piaget regarding the nature of learning and the presence of stages of development (see Vygotsky, 1934/1986, 1932/1978). However, they differed significantly in relation to the role of language and socialisation in cognitive development. For Vygotsky, speech provides humans with the ability to overcome impulsive action, to plan, and to bring tools to support problem-solving. Whilst a more knowledgeable other, in schools usually a teacher, provided a means of driving learning forwards. These ideas are encapsulated in Vygotsky's concept of inner speech and the zone of proximal development (Vygotsky, 1934/1986).

Vygotsky (1932/1978) proposed that the development of a child's inner speech remained critical to learning. Initially, children use speech to accompany action, but this process shifts and becomes internalised. This crucial shift occurs at a later stage of development when speech comes to precede action and functions to plan action that has not been realised in behaviour. Vygotsky explains that:

The greatest change in children's capacity to use language as a problem-solving tool takes place somewhat later in their development when socialised speech (which has previously been used to address an adult) is turned inward. Instead of appealing to the adult, children appeal to themselves; language thus takes on an intrapersonal function in addition to its interpersonal use. (Vygotsky, 1932/1978, p. 27)

Internal speech provides a cognitive mechanism for complex thought and problem-solving, with the result that for learning to occur effectively, it needs to be nurtured and moulded. For a student to think effectively, they must develop an effective inner voice (Vanderburg, 2006).

Coupled with Vygotsky's inner speech is his concept of the zone of proximal development (Vygotsky, 1932/1978). There is debate as to whether or not Vygotsky argued that the ZPD was a state in which a child needs a more knowledgeable other (Gredler & Shields, 2004). Some researchers argue that Vygotsky did not claim that the ZPD needed a more knowledgeable other, while others argue the contrary (Glassman, 2001). However, while the debate over Vygotsky's claims is evolving, we will use the more commonly accepted argument that a child needs a more knowledgeable other to guide them through the ZPD. Using the later argument, Vygotsky proposed that the learner exhibits two related levels of development. The first level represents the learner's actual level of development independent of assistance. Whilst a second level of development exists that is comprised of the level of attainment that was achievable via social interaction with more knowledgeable others. The zone of proximal development refers to the distance between these two levels. Vygotsky argued that children could be aided in their development with the assistance of a more knowledgeable person. The more knowledgeable person could guide, model, and scaffold the learning through the cognitive conflict they were experiencing. Vygotsky's

(1932/1978, 1934/1986) concept of the zone of proximal development is completely structured around the concept of a more experienced person watching and aiding a student through cognitive challenge so that they may construct meaning from such challenge and, upon equilibrium being restored, grow from the challenge.

Misconceptions Regarding a Social Constructivist Approach

Social constructivism has been credited with the development of discovery or inquiry approaches to learning. Regrettably, this too is often misguidedly equated to notions of relativism (Phillips, 1995). The accusation being that the constructivist teacher must accept almost any utterance or deduction by their students as being correct and that this constitutes a rejection of expertise and a devaluing of subject knowledge by the constructivist teacher (see Baines & Stanley, 2000). Phillips (1995, p.12) points to the simple “fact that nature exerts considerable constraint over our knowledge-constructing activities, and allows us to detect (and eject) our errors about it”. Vygotsky (1932/1978) provides the more knowledgeable other as a mechanism for the correction of erroneous thinking.

The notion of readiness for learning is also a point of confusion about constructivism. Misguidedly, some have used developmental stage theories to preclude learners from cognitive challenge, as some may argue the student must wait for the appropriate stage of development to arrive. Jerome Bruner (1960), another prominent constructivist, was categorical in his response to such criticisms. A central argument that emerges from his work is that the learner needs multiple exposures to abstract concepts and ideas, claiming that any subject could be taught to any age of learner in intellectually honest ways:

If one respects the ways of thought of the growing child, if one is courteous enough to translate material into his logical forms and challenging enough to tempt him to advance, then it is possible to introduce him at an early age to the ideas and styles that in later life make an educated man. (Bruner, 1960, p. 52)

This concept counters notions of impeding learning until stages of development have been achieved. A linear model of learning that espouses simple exposure to content is rendered a dangerous over-simplification. It also excludes the driving force of disequilibrium from the student’s experience, thus arresting developmental progress.

For some (see Dinham, 2017), a social constructivist approach equates to teachers ensuring that students are simply engaged in activity in the hope that they somehow stumble upon understanding. In this naive interpretation, the nature of the activity is seemingly unimportant, as is the presence or otherwise of a competent teacher. Undoubtedly, constructivist teaching should promote experiences that require students to be actively engaged, but activity without challenge or direction is not learning. Other criticisms stem from those (see Baines & Stanley, 2000) who have argued that the constructivist teacher performs little formal teaching and does not exhibit expertise in subject knowledge. The constructivist teacher merely sets up learning environments and investigations before they “get out of the way” (Baines & Stanley, 2000, p330). This ignores the entire premise of Vygotsky’s Zone of Proximal Development and the role of the teacher in the process of learning. The misconceptions that surround constructivism cause confusion for teachers. It may be pertinent for ITE programs to ensure that such pedagogical myths are dispelled and explicitly addressed within their programs.

The Potential Effectiveness of Social Constructivism

Despite challenges of implementation, social constructivism has proven to be a robust, enduring, and effective pedagogical approach to teaching. Recently, Finau et al. (2018) conducted a quasi-experimental study applying the Cognitive Acceleration through Mathematics Education (CAME) program and found positive effects on students' levels of self-regulation, motivation and mathematics achievement. This study built on the program developed by Philip Adey and Michael Shayer (2011). This program involved an intensive period of professional development for teachers that was explicitly built upon the work of Lev Vygotsky. Teachers developed their abilities to consider prior learning, engage learners socially, challenge student thinking and encourage collaborative reflection. These components remain compatible with Baviskar et al.'s (2009) criteria for constructive learning. However, these programs were in themselves founded on The Cognitive Acceleration through Science Education (CASE) program which was also found to achieve outstanding levels of student progress in every school involved in the project (Adey & Shayer, 1994; Shayer, 1999). Not only did the CASE study find evidence for significant learning gains, but remarkably, it also found that gains in learning were transferred across subject boundaries. This program was implemented in the subject area of science, but positive effects were also found in other subject areas. The CAME and CASE studies were founded on a social constructivist framework whose approach has a proven record of delivering significant gains in student attainment.

John Hattie (2012) in his seminal meta-analysis cited the CASE study as characterising the type of study that saw social constructivism programs ranked second with an effect size of 1.28. Many of the highest-ranking strategies may be considered social constructivist in nature such as self-reported grades (1.44), micro-teaching (0.90) and classroom discussion (0.88) amongst many others, or at least that they may be employed within a social constructivist framework. However, Hattie explicitly moves away from theoretical discussions of the learning process. His focus is on measuring pedagogical techniques in terms of a common scale of effectiveness. However, to prepare students for the reality of the information age, teachers need not only an array of effective pedagogical tools that have measurable effects on learning (Hattie, 2008, 2012), but also a theoretical framework by which to select and direct their use:

Teaching learners without a firm grasp of how they learn is like trying to erect a building on shifting sand. Another helpful analogy is that it is like embarking upon a long and detailed journey without a well-planned and articulated itinerary, some GPS device like a smart phone, or a roadmap. For without a well-planned itinerary or road map, how do we know where we are going? And if we don't know where we are going, what chance do we have of getting there? These simplistic analogies emphasise that an understanding of learning theories is crucial to effective teaching because theories help us understand how learners make sense of what they come in contact with, how they construct new knowledge, build on their current schema and apply what they have learnt to further their understanding of new ideas and concepts. (Kivunja, 2014b, p95)

Pragmatic techniques and tools to develop student learning allied to theoretical clarity will empower students not only perform well on standardised tests such as NAPLAN and PISA but also develop the array of 21st Century skills, such as resilience, required of them to thrive in the new socio-economic reality that confronts us. It would also seem appropriate for ITE programs to not only develop effective teaching techniques, but also a clarity of theoretical framework with which to adjudicate their implementation.

The Need for Adversity in the Construction of Resilience

The concept of resilience grew from a recognition that some children were subject to additional risk factors that increased the likelihood of a range of negative outcomes including school failure (Howard, et al. 1999). Important research by Norman Garmezy (1985, 1991) and Michael Rutter (1987) began to indicate that some students exhibited a suite of characteristics that empowered them to succeed, despite the presence of such risk factors as low income, large family size, parental criminality, low intelligence and poor child-rearing techniques. The work of Garmezy (1985, 1991) and Michael Rutter (1987) drove a shift away from the unsuccessful deficit model. Their research uncovered that some students succeeded despite a multitude of risk factors stacked against them. Instead of focusing on the apparent deficits of these at-risk students, the emphasis shifted towards exploring their strengths and talents.

The work of Michael Ungar would increase the depth of our understanding of resilience. Ungar (2004, 2008) refined our understanding of resilience initially by clarifying the varied ways in which the term has been utilised. The first way in which resilience was used was as a label for a broad range of characteristics that some children had despite being born or raised in disadvantaged circumstances. In a second sense, resilience was used to refer to someone's competence under stress. Whilst a third use of the term referred to someone functioning positively after a traumatic event that indicated a recovery from trauma. Ungar further explains:

Evidently, whether one understands resilience as a developmental outcome, set of competencies, or coping strategies, there is much overlap between these conceptualizations. What these definitions share in common is that they all argue that resilience occurs in the presence of adversity. (Ungar, 2008, p. 220)

Despite varied definitions of resilience, a common thread had emerged. Namely, that “risk and resilience are two sides of the same coin, with resilience present only when there is substantial exposure to risk” (Ungar, 2004, p. 351).

These resilient characteristics were seemingly not innate in the individual, nor were they fixed, but that they were dynamic in nature, and, therefore, they could be taught (Benard, 1991, 1993; Rutter, 2012). However, for resilience to be built, stress factors that caused cognitive disequilibrium needed to be present, so equilibrium could reassert itself in the form of resilient attributes. Gilligan states:

While resilience may previously have been seen as residing in the person as a fixed trait, it is now more usefully considered as a variable quality that derives from a process of repeated interactions between a person and favourable features of the surrounding context in a person's life. The degree of resilience displayed by a person in a certain context may be said to be related to the extent to which that context has elements that nurture this resilience. (Gilligan, 2004, p. 94)

Resilience, it would seem, remains a dynamic skill that is actively constructed in response to challenge and is not a collection of fixed attributes (Rutter, 2012). General agreement has been established, in the field, that resilience is an adaptive process brought about in response to exposure to adversity (see Masten, 2011; Rutter, 2012; Ungar, 2011, 2015).

However, Ungar (2004) realised while identifying varied definitional uses of the term resilience that differing philosophical perspectives were being brought to bear. Two were of particular interest. An ecological paradigm positioned resilience as “health despite adversity” (Ungar, 2004, p. 342), and a post-modern interpretation constructed resilience as the outcome of negotiations by individuals and their environment to remain

healthy despite adverse conditions. However, Ungar would bring these two perspectives together:

Given the multidimensionality of the processes associated with resilience, the likelihood of individual children withstanding the impact of cumulative stressors is not a measure of their personal invulnerability. Instead, resilience is predicted by both the capacity of individuals, and the capacity of their social and physical ecologies to facilitate their coping in culturally meaningful ways. (Ungar, 2015, p. 4)

Ungar's (2004, 2008, 2011, 2015) social-ecological theory of resilience combined these differing perspectives. This meant that resilience was an emergent trait brought about by challenge as the individual interacts with their social and physical ecologies. As Elliot et al. explain:

The explanation for any individual child being successful or unsuccessful depends on the combined influences of their neighbourhood, family, school, and peer group, together with their own personal attributes, characteristics, and personal choices. (Elliott et al., 2006, p. 276)

Whilst resilience would appear to be "the outcome of negotiations between individuals and their environments to maintain a self-definition as healthy" (Ungar, 2004, p. 351), the subsequent question remains regarding the nature of support the school should provide to students to cultivate resilience.

The Dangers of Reducing Resilience Development to Increase Self-esteem

It is thought that the impact of systemic factors such as a child's school has a greater effect on resilience than their individual traits (Abramson et al., 2010; Ungar, 2015). Therefore, schools are morally obligated to maximise their capacity to support the development of this skill and historically this has taken the forms of preventing adversity and the boosting self-esteem (Ungar, 2004).

Shean et al. (2015) chart the emergence of the self-esteem movement in the 1970's, explaining the belief that high self-esteem would lead to enhanced resilience, along with a host of positive corollaries such as high academic achievement, a reduction in violence, happiness, and healthy relationships. However, as Dweck explains (2008), by the 1990's this had led to parents and teachers enthroning self-esteem as "the most important thing in the world – that if a child had self-esteem everything else would follow" (2008, p. 55). Moreover, Katz (1993) suggests that a healthy preoccupation with self-esteem can actually lead to negative outcomes. Shean et al. explain:

Despite comprehensive effort to increase self-esteem through both formal and informal approaches, the associated benefits do not appear to have evolved, either in Australia or in the USA. In fact, statistics show that the mental health of Australian youth has not improved, and in some cases it has worsened. (Shean et al., 2015, p. 180)

The intention by teachers to pursue self-esteem as the primary goal may paradoxically lead to students experiencing the opposite. Shean et al. (2015) argue that by protecting students from the feelings of frustration, which naturally occur through mistakes and failures, that this can undermine development. Boosting self-esteem regardless of merit inhibits the ability to process the negative emotions which can accompany the struggle to learn. As a result, they become risk adverse and subsequently become resistant to learning new skills or adopting fresh challenges. Crocker & Knight (2005) liken such a pursuit to eating sugar, insofar that it may initially taste good, but

that it fails nutritionally. Seligman (2007) agrees with this proposition and states that depression can be the result of focusing on feeling good (see Forsyth et al., 2007). Rather than a blind focus on self-esteem, Shean et al. (2015) argue that the key protective process that leads to the healthy development of resilience is the development of self-worth.

The realisation that resilience could be developed in students was an important milestone, as this attribute is thought to be a key component of academic, economic, and emotional success (Levin, 2012). Benard (1991, 1993) noted that resilient students were responsive, active, and flexible. These adaptable learners also seemed to exhibit a sense of humour and an ability to establish positive relationships within their schools and communities. Resilient individuals have also been shown to have good problem-solving skills, an ability to think abstractly, to think reflectively, maintain a sense of purpose, work autonomously, and hold high expectations. These valuable traits would seem desirable for all students and not merely those deemed 'at risk'. Many of these characteristics are to be found in lists of essential qualities and skills synonymous with success in the new economic paradigm (Duckworth, 2016; Mishra & Kereluik, 2009; Trilling & Fadel, 2009; Zhao, 2009). Schools should not only strive for academic success but also seek to foster vital 21st Century skills such as resilience (see Gutman & Schoon, 2013).

Resilience would seem to be a skill that students actively construct (Shean et al., 2015; Ungar, 2004; Ungar & Liebenberg, 2011). This 21st century skill is seemingly developed in the same fashion to core content knowledge or skills and thus is subject to the processes of constructivism. For resilience to be developed, students have their prior understanding challenged and a state of disequilibrium established. They must then be supported by their teacher with appropriate scaffolding to practise these new skills along with feedback so that refinements can be instilled. Students then need to reflect on their learning; reflect on their increased resilience. Upon successfully negotiating these challenges, with the support of their community these students will develop the resilience skills and, once again, return to a state of cognitive equilibrium. The development of resilience undergoes the same four critical phases of development as previously outlined by Baviskar et al. (2009). Therefore, challenges such as NAPLAN should be framed in terms of a social constructivist opportunity to develop resilience. This is a challenge that students may find demanding; however, their teacher is compelled to support them in their struggle to construct meaning. As Joyce states:

Our nature as learners contains an interesting contradiction: Important growth requires change. We have to give up our comfortable ways of thinking and survive the buffets of taking on unfamiliar ideas, skills, and values. The need to grow is built into the fibre of our being. We are impelled upward in a developmental sense. Paradoxically, however, we have an ingrained tendency to conserve our beings as they are or were. (Joyce, 1984, p33)

Students need to be subjected to an environment that impels them to grow and develop. Conditions of too much comfort can lead to stagnation and arrestation of cognitive growth (Joyce, 1984; Shean et al., 2015). Significant growth requires a modicum of discomfort, and growth is the constructive process of meeting new challenges. Consequently, challenges such as NAPLAN tests should be perceived as constructivist opportunities to develop the resilience with which to ensure students fullest participation in today's globalised society. Resilience is a set of protective characteristics that emerge from adaptive changes brought about by successful exposure to stressors and adversity (Rutter, 1987; 2012). Whilst toxic levels of stress can be experienced by some students in some situations (Howell, 2017; Klenowski & Wyatt-Smith, 2012; Mayes & Howell, 2018), it is also evident that the choices

that educators implement in their classrooms has a profound influence on how students interpret the NAPLAN experience (Swain & Pendergast, 2018). Even though it is counter-intuitive, maybe protecting our children from stress and from exposure to the possibility of failure is in of itself damaging (Carolyn, 2007; Lemoyne & Buchanan, 2011). As Cassandra Wilkinson explains:

To raise our children without risk is to hobble them for life. At risk is the fundamental quality that guarantees a secure economic, social, and creative future... When we raise them on fear, it is kids paying the price today, but its society that will pay the price tomorrow if kids grow up afraid. (Wilkinson, 2004, p. 35).

Education needs to consider how students can be supported through such challenges and explore how NAPLAN may itself be utilised as a learning experience. Even in the unlikely event that NAPLAN tests be removed from our schools, students will undoubtedly face numerous subsequent challenges as they take up their roles in the new digital economy. Therefore, educators have an obligation to ensure their students are equipped with the tools and support necessary to successfully navigate such future travails.

Conclusion: Using Social Constructivism to Develop Resilience through NAPLAN

Resilience cannot develop without students experiencing a modicum of discomfort (Shean et al., 2015; Ungar, 2004), and standardised tests such as NAPLAN may provide an opportunity to drive the development of resilience. NAPLAN can provide the meaningful context in which productive resilience attitudes and strategies can be developed. The role of the school, according to resilience research (Elliott et al., 2006; Gilligan, 2006; Ungar, 2015), is to provide students with the cognitive challenges, the scaffolding and the support mechanisms from which they can construct resilience. The experience of successfully negotiating challenges associated with NAPLAN will enable students to grow their inner voice of resilience. After struggling through the preparation for the tests and dealing with the results, these experiences can empower cognitive and affective growth that will help students meet similar future challenges.

As has been evidenced through the work of Swain & Pendergast, (2018), the school's reaction to the pressure of NAPLAN can significantly impact on students' perceptions. How schools respond to the quest for improved NAPLAN results would seem to be pivotal. It seems that negative reactions by students were more common when the school applied greater pressure on their students to perform and when teaching experiences were driven by a need to boost test scores. Contrastingly, students' experiences have been found to be more positive when a less intensive, less pressured approach to preparation and implementation was taken. Given the focus on NAPLAN and their inherent accountability, it should come as little surprise that teachers have set their attention on a narrow measure of educational success. This shift in focus has forced teachers to retreat pedagogically to the "safe ground" of transmission modes of instruction that we know to be less effective.

This paper is challenging educators to implement social constructivist pedagogies to help students develop greater resilience skills while interacting with NAPLAN. This strategic initiative is paramount in helping Australia become one of the top 10 academic countries in the world (OECD, 2003, 2006). Undoubtedly, NAPLAN testing has caused a raft of negative consequences for Australian teachers and students (Mayes & Howell, 2018; Wynne, 2016). This is evidenced in the predominantly negative feedback this single measure of academic attainment generates (Thompson, 2013; Wyn, 2014; Wynne, 2016). It has certainly failed (Schleicher, 2019) in "creating and sustaining a world-class, and even a

world-best, schooling system” (National Curriculum Board, 2008, p2). However, all agents involved must foster the understanding that how the school chooses to react to the pressures of NAPLAN testing is a major factor in how the students perceive the tests (Swain & Pendergast, 2018). Presenting the NAPLAN tests as learning opportunities may help the students develop the skills needed to be successful on the test as well as potentially bolstering student resilience. It seems clear that further research in this area is imperative.

The Australian academic community has played a critical role in the 21st Century Skills movement in which resilience is a key component. Academics believe resilience is a key construct which students need to be successful in their educational and personal lives. Using NAPLAN and social constructivist pedagogies to develop resilience addresses many issues in students’ lives today. It helps students learn how to address the anxiety which comes from preparing for a challenging task, the anxiety which comes from completing a challenging task, and the anxiety which comes from the results of completing a challenging task. These skills develop anxiety resilience. Using NAPLAN and social constructivist pedagogies to develop resilience also helps students learn how life is filled with external stressors which they need to deal with. Everyone has had an external issue, problem, or task which they have had to work through. NAPLAN can be an experience teachers use to help prepare students for future life stressors.

Challenge is an essential component of a meaningful life, and we are powerless to isolate our children from it. Life comes with challenge, and it is imperative that parents support teachers, so students can construct the broad set of knowledge and skills needed to navigate the trials and tribulations of an uncertain future. NAPLAN may only represent one narrow measure of accountability, but it also affords an opportunity to build resilience. It is the role of the teacher to scaffold the inevitable challenges that students will face and to assist students to construct an inner resilient voice, with which future school challenges can be met to prepare students for living resilient lives.

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