Chapter 15
Resilience Building for Pre-service Teachers: BRiTE, Micro-Teaching and Augmented Reality/Simulation (BRiTE-AR)

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Abstract Initial teacher education predominately spends time preparing student teachers to plan, teach and assess the cognitive and social development of children within the classroom. Yet, the role of a teacher expands well beyond classroom experiences and at times includes conflict and stressful situations. How do ITE programs cater for these critical learning incidences? Augmented realities such as 'human in the loop' simulation and virtual learning environments provide current ITE programs a solution to this contemporary need and context. This paper is underpinned conceptually by Pedagogies of Practice: representation, decomposition and approximations actualised through new technologies, reflective practice strategies and challenging learning experiences. The interconnectivity between BRiTE modules (*representations*), Microteaching 2.0 (*decomposition*) and Simlab™ experiences (*approximation*) provides a unique approach that supports the development of resilience for our future teacher educators. The findings reveal an increased self-efficacy amongst the cohort and personal confidence in their own resilience capabilities. The reflective practice strategies embedded in the BRiTE-AR pedagogy of practices are offered as a possible solution to ITE educators interested in developing resilience in our future teachers.

15.1 Introduction

Resilience is a dynamic, multidimensional construct which develops over time when individuals are faced with adversity and difficult experiences in particular contexts (see Mansfield et al. 2016b; Masten 2014; Ungar 2011). A range of typologies exist that highlight different types of resilience, skills, domains and protective factors including but not limited to: Kenneth Ginsburg's (2011) 7 Cs-control, competence, coping, confidence, connection, character, contribution; Genie Joseph's (2017) 3

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types of resilience-natural, adaptive, restored: and Mansfield et al.'s (2012) dimensions of protective factors—professional, emotional, social and motivational. These typologies position resilience within an environmental context impacted by internal and external factors. Ungar's (2011) social ecological view of resilience outlines the importance of the interactions between personal characteristics and environmental protectors as triggers to help mitigate against stressors and challenges within given contexts. Many psychometric measures exist to assess resilience including the Resilience Scale for Adults (RSA), Connor-Davidson Resilience Scale (CDRis) and more recently the Teacher's Resilience Scale (Daniilidou and Platsidou 2018). In the context of the teaching profession, there has been a growing interest in resilience especially for teachers working in particularly challenging circumstances. Studies focused on practicing teachers' commitment, quality and effectiveness have also identified resilience as being a critical capability (Day and Gu 2014). Other studies have shown positive benefits for resilient teachers including teacher satisfaction, self-efficacy and intrinsic motivation (see Gu and Day 2007; Mansfield et al. 2016a). Many studies have examined the importance of teacher–student relationships and resilience (Spilt et al. 2011), explored the impact on resilience on the teacher profession (Hong 2012) and exposed the protective factors that affect the resilience levels in teachers (e.g. Froehlich-Gildhoff and Roennau-Boese 2012; Mansfield et al. 2012). Limited studies have explored ways that teacher resilience can be promoted through professional learning experience (Mansfield and Beltman 2019). Fewer studies have explored ways to develop resilience within initial teacher education. Although research on resilience continues to increase and provide a broader view and understanding of the need for resilience, the types of resilience, the environment to develop resilience and the skills required for resilience, there is still ambiguity about the definition of the term and how to teach it.

Resilience has been identified as a non-cognitive capability and desirable characteristic for potential teachers (Australian Institute for Teaching and School Leadership 2015). Yet, how is it defined and how can it be embedded in initial teacher education. Over time, resilience has been used in various disciplines and contexts to describe the adaptive capacities of individuals, communities and societies. More recently it has been conceptualised as positive adaptation after traumatic events (Day and Gu 2014). According to Daniilidou and Platsidou (2018), teachers' resilience refers to 'the extent to which teachers are capable to maintain positive attributes in face of a range of challenges, pressures and demands associated to their work' p. 17. They suggest that various protective and risk factors empower or disable teachers resilient behaviour. But how can we provide challenges, pressures and demands associated with building resilience within initial teacher education programs (ITE)?

This study acknowledges the need to build resilience into ITE programs. It builds on, and combines previous studies that focus on PST resilience, pedagogies of practices and simulation, to offer a unique approach to the development of resilience skills. It provides a scaffolded approach to developing resilience skills, experience and knowledge. Providing time and space for PSTs to be confronted with challenging and demanding incidences is unique in ITE programs. This study offers critical learning incidences and authentic simulated learning experiences as an approach to

develop the resilience and self-efficacy of PSTs for the changing and challenging contexts they face as graduates (Ledger and Fischetti 2020).

In Australia over 80% of teachers have experienced some form of student or parent bullying or harassment (Billet et al. 2019). Moreover, a recent increase in violence against teachers by parents adds to the adversity graduates may encounter. Yet, limited preparation and development of resilience to cater for these adversities are attended to within ITE programs. New technologies such as simulation and online learning modules may offer ITE programs with possible solutions and creative potentialities to address these graduate challenges.

Professions that engage in relational practices face many challenges. The difficult elements of teaching exist in the interactive dimension of practice in terms of relating to students, parents, teaching colleagues and principals (Grossman et al. 2009). This study draws on Grossman et al.'s (2009) pedagogies of practice: representations, decompositions, and approximations, to inform the structure involved in developing resilience in PSTs and utilises traditional practices (Micro-teaching), new technologies (BRiTE+ Augmented Reality) and reflective practice strategies (Critical Learning Incidences + Situation Action Outcome) to actualise practice.

Teaching is a complex practice and instructive failures are integral to the development of teachers (see Grossman et al. 2009). Yet teacher educators have few opportunities to engage in *approximations* of practice compared to other professions (Grossman et al. 2009). Micro-teaching and role-play strategies remain common approximation strategies embedded in ITE programs, PSTs plan, rehearse, revise and retry practice and over time, these processes become routinized (see Ericsson 2002). The combined pedagogies of reflective practice (BRiTE, micro-teaching, simulation) enable decomposition of complex practices and challenging scenarios and replicates these experiences within a controlled AR learning environment. This allows authentic approximations of practice, opportunity for instructive failure and professional feedback to occur.

This chapter explains how and why Murdoch University embeds resilience development within its ITE program. It explores the conceptualisation and conditions of combining a resilience program (BRiTE), a traditional teaching method (Micro-teaching 2.0), and augmented reality (simulation) within a 4 year ITE program and problematises it within a theory of practice and pedagogies of practice paradigm. This chapter notes the need for building resilience in PSTs and offers simulation as a pedagogical solution to address the need.

15.2 Teacher Education—Building Resilience of PSTs by Making It Visible, Immersive and Reflective

Pre-service teachers (PSTs) are faced with a range of rapidly changing school environments impacted by politically driven mandates, professional driven standards and community driven expectations. ITE programs remain under constant scrutiny and

criticism which lack evidence or substance (Louden 2008). Over time there has been a corresponding rise in issues relating to principal, teacher and student well-being and resilience (McCallum et al. 2017). Resilience to cope with these ongoing demands and associated changes within the profession is essential for teacher educators and ITE programs. Bahr and Mellor (2016) offer a strident call for

> teachers and teacher educators to reclaim their profession and build a future for this nation through the re-conceptualisation of schooling, teachers' work and teacher preparation. It is through action of this kind, not by regulation, that we will build and sustain excellent teacher preparation courses that enable quality teacher graduates who will guarantee that all students have access to meaningful learning experiences for now and in preparation for the future (p. iii).

In response to this call and desire to better prepare PSTs for the changing educational landscape and associated emerging educational ecologies, the professional and personal strength, resilience and courage of our graduates need addressing. Moreover, ongoing concerns about teacher attrition in the first five years, preparing teachers to better manage the challenges of the profession is important (see Weldon 2018). Not attending to this is costly both for a nation's budget and the social and academic outcomes of its citizens (Mason and Poyatos Matas 2015). For PSTs to successfully integrate within the ever-changing and considerably more demanding and diverse cultural contexts of schools they need to exit their programs with a suite of strategies that support resilience and enhance their confidence for managing challenges (see Mansfield et al. 2016b).

The growing need to attend to resilience and well-being of teachers is a global trend. Stress and burnout are psychological phenomena that develop over time within the profession. Teachers in Scotland experience tension between central government, local government and school (Forde and Torrance 2016). The prevalence of burnout in the Netherlands is higher in education than any other sector (Evers et al. 2002). UK stress levels of teachers are highest amongst the professions (Philips and Sen 2011). In Sweden, occupational stressors in combination with other variables account for teacher distress and burnout (López et al. 2008). A study of principals ($n = 3572$) in Australia found reasons for stress and burnout can be linked to lack of social support within the school environment (Beausaert et al. 2016). Riley's (2019) follow up study saw the rise in violence against principals and teachers add further to the volatile mix of stressors within schools. The rising number of students, teachers and principals showing increased levels of anxiety, frustration and stress (Abeles 2015) highlight the important role ITE needs to play to address resilience in PSTs. Particularly with regards to coping with the 'universally stressed' state of schooling systems around the globe.

The rising number of violence and abuse cases against teachers and principals within Australia (Billett et al. 2019) further add to the stressors impacting teacher well-being. Over 560 teachers were surveyed by Billett et al. (2019) in which 1540 incidences of 'teacher targeted bullying and harassment' (TTBH) occurred, 80 percent of teachers had experienced TTBH the previous 12 months and 85.2% of teachers felt there was a problem with parent and student TTBH in Australian schools. By shedding light on teacher's lived experiences the study revealed the

detrimental effect TTBH has on a teacher's self-efficacy and well-being. They even suggest it may contribute to elements of an unsafe work environment. They revealed a paucity of research in the field.

Bahr and Mellor's (2016) recent call for reconceptualising teacher education provides a fertile ground for the creation of new models, theories and practices that focus on the development of our graduates from a 'holistic' perspective. By paying attention to PSTs social and emotional well-being and mental health as well as developing their cognitive knowledge it is hoped that they become better role-models and can manage life challenges with more confidence.

Traditionally, the antecedents for successful PST graduates relate to developing the attributes of high expectation, kindness and care, positive attitude to teaching, and a sense of humour (Bahr and Mellor 2016). Other views of teaching have evolved from teacher characteristics to teachers behaviour, decision-makers and reflective practitioners, and more recently well-being and resilience. Are the antecedents different now that the ecological landscape of schools is changing? Grossman et al. (2009) argue that ITE programs should 'move away from a curriculum focused on what teachers need to know to a curriculum organized around core practices, in which knowledge, skill and professional identity are developed in the process of learning to practice' (p. 274). Furthermore, Wideen et al. (1998) suggests

> only when all players and landscapes that comprise the learning-to-teach environment are considered in concert will we gain a full appreciation of the inseparable web of relationships that constitutes the learning-to-teach ecosystem (p. 170)

A possible solution to addressing the interconnectivity of learning to teach approaches is offered by Grossman et al.'s (2009) Pedagogies of practice; *representations* of practice, *decompositions* of practice, and *approximations* of practice.

> *Representations* of practice are activities that illustrate one or more facets of practice in particular ways and allow novices to develop images of professional practice and ways of participating in it. *Decompositions* of practice are activities in which teaching is parsed into components that get named and explicated. *Approximations* of practice are activities in which novice teachers engage in experiences akin to real practice that reproduce some of the complexity of teaching (Ghousseini and Herbst 2016 p. 80)

Resources and approaches that address these practices include; BRiTE, Micro-teaching and Simulation. BRiTE, a research-driven online resilience modules (www.brite.edu.au) provides PSTs with a wide range of scenarios, authentic images, examples of professional practice and reflective practice tools that build resilience (see Chap. 3). BRiTE offers *representations* of practices for PSTs to view, make-meaning and reflect on their resilience practice. Micro-teaching practices, originating in the 1960s' at Stanford University, allow PSTs opportunity to decode and break the process of teaching into component parts and cycles—lesson plans, delivery, reflection and re-enacting. The micro-teaching approach allows *decomposition* of practice to occur. Simulation offers a virtual learning environment and digital platform that approximates real classroom contexts and challenging scenarios evident in and beyond the classroom. Simulation immerses students into a virtual world where they can practice, make errors and reflect on their practice. It is a tool that

has the affordances of addressing the pedagogies to develop resilience by producing *approximations* of practice. Although in its infancy in ITE programs, virtual worlds combined with authentic scenarios have the potential and capacity to develop PSTs resilience, self-efficacy and performance (Dieker et al. 2014; Ledger et al. 2019).

15.3 Building BRiTE-AR Resilience in Teacher Education: BRiTE, Micro-Teaching and Simulation

In order to be prepared for the ever-changing contexts of schooling, PSTs require attributes and conditions to develop their resilience and self-efficacy. These processes should be transparent and scaffolded. But how do current ITE programs address and develop resilience? Zeichner (1983) suggests that ITE programs are driven by four paradigms: behaviouristic, personalistic, traditional craft and inquiry orientated. A combination of these paradigms could transform current approaches and 'bring maturity to teacher education, recognising the complexity of the field and resisting the temptation to resort to simplistic competency development approaches' (see Bahr and Mellor 2016 p. 63). Grossman et al. (2009) argue that teacher educators should attend to clinical aspects of practice and experiment with how best to help novices develop skills by adding pedagogies of enactment to pedagogies of reflection and investigation. They also expressed concern that traditional approaches to teacher education emphasise knowledge and obscured the importance of instructional activities and relational work required in creating classroom community of practices and educational eco-systems.

Murdoch offers a solution to address and better prepare PSTs for the challenges they face as graduates. The BRiTE-AR model combines BRiTE modules (representation of practice), Micro-teaching (decomposition of practice) and AR simulation (approximations of practice). BRiTE-AR is embedded across ITE Bachelor of Education programs. BRiTE-AR addresses common identified graduate needs outlined in research (Bond 1951; Fry 2007; Goodwin 2012) and scaffolds them across the program duration. Four acknowledged areas of graduate need and concern include: effective lesson planning; appropriate feedback and assessment; classroom management; and working with parents/colleagues (Ledger and Fischetti 2020). Captured in the structure of BRiTE-AR are Grossman et al's (2009) three pedagogies of practice: representations, decompositions and approximations and Hammerness et al. (2005) proposed goals of teacher learning: A vision of practice, a knowledge of students and content, dispositions for using this knowledge and a repertoire of practices and tools.

Reflective practice strategies are embedded within each of the resources chosen to address the pedagogies of practice: BRiTE (representation of practice) includes a self-reflective resilience tool; micro-teaching (decomposition) requires reflective processes in the plan, teach, assess and replan, reteach cycle. This cyclic diagnostic

process promotes a continuous improvement model; and the augmented reality simulation (approximation of practice) uses video footage of the immersion interaction for in-depth reflective analysis including identification of a critical learning incident (CLI) and a process for attending to it (SAO+). Although these approaches and pedagogies of practice are introduced separately, they combine to form the Murdoch BRiTE-AR model. They are interlinked and underscore the connectivity and cohesion between theory, practice and pedagogical practices.

15.3.1 Components of BRiTE-AR Model: BRiTE, Micro-Teaching, Simulation

The *BRITE* resource for teacher educators was developed as a result of an Australian Office of Learning and Teaching Grant (Mansfield et al. 2016a) that builds on a previous project entitled Keeping Cool (Mansfield et al. 2012) (see Chaps. 2 and 3). Informed by an extensive review of literature in the field, the BRiTE program consists of five online interactive modules: Building resilience - what it is and why it is important; how to build and maintain Relationships; Well-being self-care, motivation; Taking initiative by building a resilient classroom, reflective practice and ongoing learning; Emotions- awareness, management and optimism. BRiTE includes self-reflection quizzes, information about skills and strategies, tips, videos, scenarios where skills can be applied, and a 'what to say' section. The online component personalises the experience for the PST by building an individualised toolkit and record of learning that can be downloaded for future reference and reflection.

Micro-teaching originated in the 1960s from Stanford University is described as a 'scaled down teaching encounter' (Allen and Eve 1968, p. 181). Although the complexities of the normal teaching encounter was reduced, the level of feedback increased. The process involves a short 5–15 min lesson with a small group of participants and a predetermined outcome that targets improving practice, diagnostic evaluation, experimentation or innovation. The ability to focus on an inordinate amount of elements within a micro-teaching context eliminates the time, cost and unpredictability of real classroom contexts. Over time the participants and the processes have changed. In 1960 participants were small groups of children after school hours and on weekends, but this became problematic due to limited and unreliable access to children. In the 1970s participants were students from within the ITE programs, but inherent problems such as familiarity, diversity and unrealistic encounters occurred. However, peer micro-teaching lesson studies in the UK helped mitigate against these issues (Griffith 2016). Technology has recently allowed 'observational rooms' in schools where classrooms have two-way mirrors and small groups or cohorts operate. More recently, technology has afforded significant changes in the use of virtual learning environments. Micro-teaching participants are presented as avatars and PSTs are immersed within a new virtual learning environment. Although

the participants and technologies have changed over the years, the original principals of micro-teaching have not.

Simlab™ is an augmented reality simulation technology originating from the University of Central Florida's *TeachlivE*™ program. It differs from other simulation platforms because it includes a *human in the loop* component (professional improvisation actors skilled in puppetry and sound morphing). This *human in the loop* functionality allows for synchronous responses of the animated avatars within a virtual classroom context. The virtual classroom can be accessed from anywhere, anytime. External students enrolled in ITE programs simply access their computer and activate a Zoom weblink after which the virtual class will appear and interactions begin. Avatars represent classroom students and real-time responses are exchanged between the PST and the avatars, feedback is provided by a clinical practitioner (Ledger and Fischetti 2020). PSTs are able to hone their craft within a controlled, authentic scenario-based virtual classroom where they receive real-time responses and feedback. These transactions are videoed for latter reflective practice tasks and feedback provided of performance by a clinical practitioner.

15.4 Methods

This exploratory study is largely a theoretical paper underpinned conceptually by Grossman et al's (2009) *Pedagogies of practice*: representations, decomposition and approximation, supported by new technologies and reflective practice strategies. The study builds on the known benefits of each of the component parts that make up the structure of BRiTE-AR: BRiTE (Mansfield et al. 2016b); Microteaching 2.0 (Ledger and Fischetti 2020), and Simulation (Dieker et al. 2014). Previous findings from each of the component parts, provide evidence of successful approaches implemented within ITE programs and justification as to why this exploratory study was conceptualised. The study highlights the connectivity between the three component parts as reflective practice strategies and technologies. The findings are discussed in terms of three pedagogies of practice (Grossman et al. 2009) and the wider discourse surrounding practice theory or theory of practice (Green 2009; Kemmis 2012) where practice is a social phenomenon, relational and embodied.

15.4.1 Site, Participants and Program

ITE four year undergraduate degree and PSTs ($n = 362$). The sequential structure of BRiTE-AR was designed vertically across the years to scaffold the skill and resilience development required of the PST using BRiTE modules aligned to the four areas of graduate need (see Table 15.1). It was also structured sequentially within the individual units so that each component built on the previous and allowed reflective practice thereafter. Micro-teaching elements of plan, teach, assess and

Table 15.1 Overview of BRiTE-AR: 5 BRiTE modules + Micro-teaching + Simlab = 4 year B.Ed

B. Ed	Graduate need	BRiTE module	Simlab teaching focus	Micro-teaching scenario
On-entry	Disposition		Disposition	Introduce self; engage; teach; reflect
Year 1	Effective lessons	Building resilience By being explicit	Presence and Effective lessons	Formal lesson of choice–elements
Year 2	Effective feedback	Relationships and offering feedback	Assessment and Effective feedback	Feedback on specific English lesson
Year 3	Catering for diversity	Taking initiative and improvising	Diversity Classroom Management	Catering for diversity in Math lesson
Year 4	Working with parents	Emotions when working with others	Responding to Parents and Others	Verbal abuse by irate parent
On-exit	Reflective practice	BRiTE toolkit	Eportfolio videos	

replan, reteach and reassess were inbuilt across all pre-placement units. A clinical practitioner provided external feedback and value-added to the reflective practice loop.

PSTs were already familiar with each of the three approaches—BRiTE (Mansfield et al. 2016b), micro-teaching (Allen and Eve 1968), and simulation (Ledger and Fischetti 2020). They were also well versed in using *Critical learning Incidents* (Tripp 1993) in various formats within their program as a reflective practice tool. BRiTE-AR attempted to combine these elements in a structured and reflective manner.

Critical Learning Incidences (CLI) were considered an appropriate reflective practice tool to connect the three approaches (BRiTE, micro-teaching, simulation). Figure 15.1 outlines how CLI is conducted after each practicum. Students are asked to identify a *situation* encountered within their practicum, the *action* they put in place to address the situation and the *outcome* of their action (SAO). SAO is the reflective strategy that responds to their identified CLI. It is also a strategy used to reflect on their practice when addressing BRiTE online modules, preparing for micro-teaching and simulation experiences and TPA interviews. The identified CLI and subsequent SAO reflective practice strategy provides PSTs an explicit structured approach to be reflective. It also provides valuable insight for academics of the range and scope of CLIs faced by their students. These inform the design of future simulated scenarios, interventions and feedback.

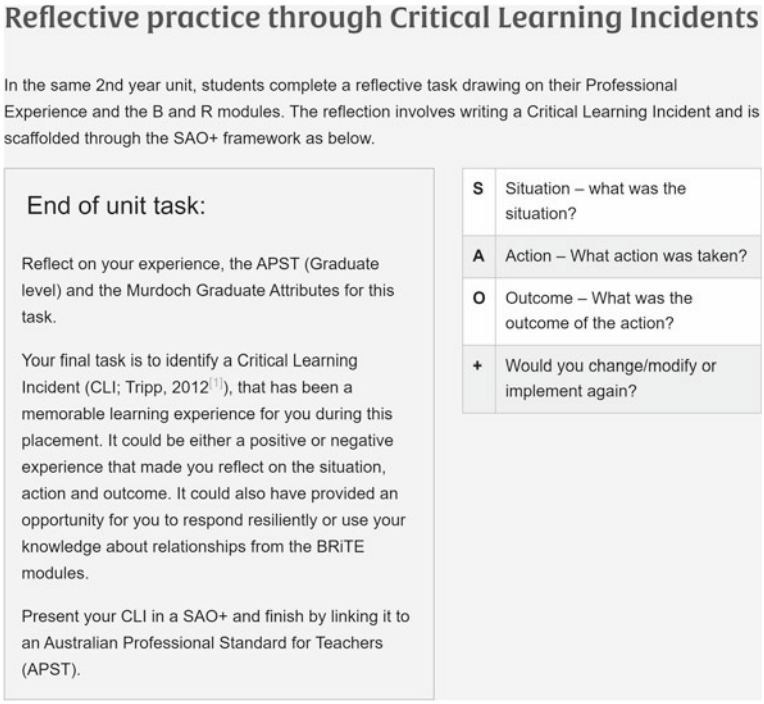

Fig. 15.1 Critical learning incidences using SAO+, with permissions granted by the Australian government department of education

15.4.2 Study Design

The design of the exploratory study aimed to capture and explore elements of BRiTE-AR from a student and academic perspective across the four year Bachelor of Education program using a range of data collection tools and reflective practice strategies. The pilot and exploratory study forms the first iteration of a longer-term research trajectory. It captured responses from the BRiTE modules, pre-post survey and simulation experience to check for suitability of the research design. It also explored and found variables important for analysis. This exploratory stage of a longer-term research trajectory was vital for developing suitable data collecting and analysis tools, identifying appropriate time points and selection of subjects for future implementation. Data from each of these elements were analysed and critiqued to see if each component was fit for purpose, had rigour, validity and transferability.

The first iteration of the exploratory study was conducted within the Bachelor of Education program. Students ($n = 362$) across all four years of the Bachelor ITE program were provided opportunity to opt into the BRiTE-AR study which linked to each of the four simulation touch points (see Table 15.1). Further studies will capture the development of PSTs over a period of time and will allow the cumulative

data sets to provide valuable information about the combined integration of BRiTE, Micro-teaching, and Simulation.

The first pilot of the program was used to trial a range of data collection tools. Participants in this first study completed a BRiTE module specific to their practicum unit, a pre-simulation survey to capture the focus of their micro-teaching session, a simulated experience specific to the needs of that unit, a two week practicum, and reflected on the combination of the three in their CLI (see Table 15.1). Samples of these responses were collected and analysed in terms of their role in linking the core elements of pedagogies of practice. Feedback collected from this range of reflective practice tools including the CLI and SAO+ method. The findings from these were back mapped against the theoretical framework underpinning pedagogies of practice.

15.4.3 Limitations

This study is primarily theoretical and draws on exploratory data findings and reflective practice strategies. Although each of the three programs has considerable research outcomes and shown their individual benefit within ITE programs, only BRiTE shows direct linkage to developing resilience in PSTs. The limitation in the findings is the lack of ability to dis-aggregate the findings from across all three elements—BRiTE, micro-teaching or simulation or the impact of the reflective practice strategies such as CLI as a pedagogical link between the programs that support transference of knowledge into practice. Therefore, we present the combination of the three programs and reflective practice strategies as being a collective approach to building resilience in PSTs rather than individual elements.

15.5 Findings and Discussion

A wide range of data was collected in the first iteration of the BRiTE-AR study from both students and academics employing the three programs and engaged in the structured reflective practice process. The data provides a snapshot of the resilience and reflective practice skills of the PSTs in terms of themes and issues. The following findings and feedback relate to the first iteration of BRiTE-AR in Semester 1, 2018. The reflective practice sample was collected after each PST undertook one BRiTE module, a micro-teaching process including simulation, and an assigned practicum placement. Reflections are extracted through the eyes of a PST and address issues impacting resilience, relationships, practicum, expectations and reflective practice. The findings and comments outline the interconnectivity of all component parts and are presented below to show the connectivity between programs, pedagogies and reflective practice.

After BRiTE, survey, and practicum experience, students were asked to choose a CLI explain it using the **SAO** method: **S**—Situation. Details for the context of the

experience, including the issues/barriers encountered. **A**—Actions. What did you or the mentor do in response to this situation that demonstrates your ability to be responsive? **O**—Outcome. What was the result that followed from your actions? How will you change it next time?

> Using BRiTE-AR allowed me to make the most of my practicum. *Situation*: Over my teaching placement I had 3 different teachers mentoring me over the three weeks due to one of them being sick. I had an overwhelming amount of contradicting feedback for my lessons and teaching styles due to the teachers mentoring me having different styles and methods of teaching. *Action*: I respectfully responded to each of the teachers and didn't raise issue of contradictions. *Outcome*: I took so much information away from the placement and learnt that you just have to take it all in, and then when you become a teacher you can select the strategies, styles and pedagogy that suits you best (Erica 2018).

Erica's reflection was similar to many PSTs. The majority of CLIs identified times of conflict whilst on placement with less than half of the comments referring to relationships with their mentor and the remaining issues related to working with students ($n = 160$). These critical learning incidences typically involved relational issues that required improvised and more often compromised solutions. Comments from PSTs highlighted their sense of powerlessness and need to be resilient within the context of placement. The PST responses also raised issues about the limited acceptance of error or making mistakes whilst on placement within their BRiTE personal plan. Many PSTs revealed that this was a common concern for them ($n = 289$).

15.5.1 BRiTE (Representation of Practice)

The online BRiTE modules and associated reflective practice plans attend to describing resilience and explaining its importance, building and maintaining relationships, self-care, motivation and managing work/life balance, building a resilient classroom, reflection, emotional awareness, management and optimism. The modules contain self-reflection quizzes, information about skills, videos, scenarios where they can be applied, words form the experts, and a toolkit to record their leaning and develop a personal plan. Many students chose to add their CLI to the toolkit and some sought solutions from the BRiTE modules to reflect on their CLIs. Language from the BRiTE modules was found in CLIs and vice versa. One student's CLI used the following quote drawn straight from BRiTE website—*what do the experts say* page,

> I think my teacher was distressed because she was irritated, impatient and withdrawn at times. I tried hard to support her but ended up speaking to my colleagues (Jo 2018)

Another showed the link between micro-teaching and BRiTE,

> Improved my confidence in presenting lessons as it was the first experience in writing a lesson plan and I was nervous. The micro-lesson and feedback were really useful, my BRiTE focus allowed me to learn from my mistakes without getting too upset (Jill 2018)

BRiTE offers scope for students and academics to map development and identify common areas of PST concern or strength across particular cohorts. BRiTE offers PSTs a wide range of *representations* of the teaching profession that are visual (videos), engaging (interactive responses with feedback, interactive responses based on scenarios), explicit orientations and reflections. BRiTE offers a range of *representations of practice* that comprise teacher resilience, the online resource makes teaching visible to novices (see Grossman et al. 2009).

15.5.2 Micro-Teaching (Decomposition of Practice)

Findings related to micro-teaching revealed clarity of the task and a better understanding of the art and science of teaching. Micro-teaching reduces teaching to a range of smaller interconnected sub-skills, knowledges and practices. This *decomposition* of practice enables teaching to be broken down into its constituent components to aid teaching and learning (Grossman et al. 2009). In this case, micro-teaching occurs prior to placement across all four year B. Ed programs. Students plan, teach, assess, replan a 10-min micro-teaching session aligned to the identified area of graduate weakness in that particular year. The micro-teaching session is viewed by a clinical practitioner who provides direct feedback on the micro-teaching performance in negotiation with the PST. Time-management, lesson plans, motivational hooks, engagement with students, lesson sequence and expected learning outcomes are made explicit prior to the micro-teaching session and reviewed after the interaction. Students use the SAO+ as a reflective tool following their Micro-teaching experience.

The findings from PST feedback reveal micro-teaching as a powerful strategy embedded in the ITE program and one that promotes the self-efficacy of PSTs across the identified areas of graduate weaknesses: lesson effectiveness, accepting and giving feedback, classroom management and working with parents/colleagues. PSTs commented on:

- Great to practice behaviour management and time management of lessons (Sally 2018)
- The main benefit was being able to view the video and reflect on my performance, it was invaluable (Alice 2018)
- I thought timing would be easy but I totally over-talked and ran over-time (Ann 2018)
- Feedback straight away was really beneficial (Ben 2018)
- Micro-teaching certainly tells me what I am good and not so good at (Bea 2018)
- Good to learn from mistakes and practice different teaching styles (Mary 2018).

The ability for PSTs to understand the art and science of teaching and break it down to specific and explicit tasks including reflective practice strategies, benefit PSTs. This decomposition of practice allows and embeds reflective practice behaviours for ongoing and continuous improvement.

15.5.3 Simulation (Approximation of Practice)

Simulation augmented realities afford PSTs *approximation* of classroom practices involving avatars, context-based scenarios, synchronous responses and clinical practice feedback. The feedback from PSTs on their simulation experience revealed common themes: a safe learning environment, opportunity to build confidence in front of class, a place where mistakes were accepted and actions repeated to improve, no impact on others, and use of reflective practice for self-improvement.

- The controlled learning environment mitigates against the variability of mentors and contexts on practicum (clinical practitioner)
- I think it is a great ice breaker and helps to calm you down when teaching. It enabled me to relax in a safe environment. (Bea 2018)
- Nothing beats a real class but the experience helps build confidence in how to speak in front of a class in terms of conversation and questioning. A regular feature would make it even more beneficial. (Tom 2018)
- It is great because if you make mistakes it is not detrimental to a child's education. I think there are challenges in making it less confronting for people like myself who are completely overwhelmed by the experience. (Claire 2018)
- Throwing me in the deep end and putting me outside of my comfort zone was important because it made me learn to cope and build my confidence. (Rich 2018)
- I can't believe how 'real' it felt – I made real connections to the avatars (Aggie 2018)

Comments related to simulation highlight its ability to *approximate* classroom scenarios and contexts and offer PSTs opportunity to make mistakes. Simulation as a pedagogical tool to improve practice was acknowledged by the PSTs who immersed themselves within the AR virtual learning environment. It offers an alternative learning platform to prepare future generation of teachers. Recent studies have found that PSTs exit with increased levels of self-efficacy when engaged in micro-teaching and simulation (Ledger et al. 2019).

The findings and feedback drawn from BRiTE personal plans, reflections on micro-teaching, simulation and critical learning incidents (CLI and SAO+) provided a wealth of useful data for analysis. The personalised BRiTE plans offered scope for students and academics to map development and identify common areas of concern or strength within ITE cohorts. The reflections provided opportunity to highlight connectivity between simulation experience and transferability of skill development into the aligned practicum. The data collection tools within this exploratory phase proved to be useful in gaining insight into the PSTs lived experiences and perspectives of themselves, including their ability to identify and cope with difficult situations. The findings offer scope for future research endeavours and more nuanced attention to how pedagogies of practices combine to impact measurable change in practice.

In addition to confirming the usefulness of the range of research tools within this study, the initial findings from the first iteration provide insight into the structure of the BRiTE-AR program, and the combined benefits of BRiTE, micro-teaching and

simulation. An action learning process will be used to refine future iterations and include the validation of survey tools. Future studies will analyse the actual practices that took place within each of these pedagogies of practice.

15.6 Conclusion

This study offers BRITE-AR: BRiTE resilience modules (see Chap. 3), micro-teaching (Allen and Eve 1968) and simulation (Dieker et al., 2016; Ledger and Fischetti 2020), as a unique combination of approaches that develop the resilience and self-efficacy of PSTs. These elements align to Grossman et al's. (2009) Pedagogies of practices: *representations of practice, decomposition of practice and assimilation of practice*. PSTs learn by doing, and to 'do' teaching PSTs currently complete a placement in a range of school contexts under the tutelage of mentors with varying experiences. This variance and diversity of experience impacts the preparation of future teachers particularly if critical or challenging. The combined BRiTE-AR approach prepares PSTs for the ever-changing and demanding roles and responsibilities of teachers by making the art and science of teaching visible and reflective using authentic scenarios, online modules and a controlled virtual learning environment.

Findings highlighted the need for pedagogical practices to be visible, immersive and reflective in order to build a better understanding of resilience or specifically target the attributes required to develop resilience in PSTs. The systematically embedded BRITE-AR within the B.Ed program addressed identified areas of graduate weakness and proved beneficial for PSTs. Reflective practice strategies underpinning the BRiTE-AR model involved critical learning incidences (Tripp 1993) and critique of these within a process of reviewing situation, action, outcome (SAO+) enhanced and improved practice.

Teaching is a complex profession that requires resilience, reflection and change of practice. The affordances of combining BRiTE, micro-teaching and simulation acknowledges teaching as a social phenomenon, relational and embodied theory of practice. BRiTE-AR offers a structured solution to preparing and developing resilience skills for PSTs that do not naturally develop on their own (see Grossman et al. 2009). It uses representation, decomposition and approximations of practice to make learning visible, immersive and reflective for our future teachers.

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