

Literacy and numeracy support in vocational education: Perceptions from engineering apprentices in Victoria

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This research explored how engineering apprentices at an Australian TAFE institution perceive their supported acquisition of literacy and numeracy skills. Using a mixed methods approach, 56 apprentices completed questionnaires with nine participating in subsequent interviews. The study identified apprentices' perceived ability levels in reading, writing and numeracy, learning strategies they employed, and literacy and numeracy support they found most helpful. Findings provide insight into apprentices' approaches to learning, many of whom struggled to articulate how they acquired the literacy and numeracy skills for their studies and employment. Participants primarily focused on navigation of coursework and reading demands while reporting similar learning strategies. Literacy and numeracy support (LNS) teachers were considered helpful for others, with clear distinctions between the trade teacher/trainer and LNS teacher. Agitation with the self-paced nature of the classroom and a mismatch between study and workplace was also highlighted. This research suggests greater awareness of how apprentices learn would support literacy and numeracy skills development without reinforcing a deficit discourse. New approaches to develop apprentices' learning strategies within the wider dialogue of literacy and numeracy acquisition is recommended.

Introduction

The literacy and numeracy landscape in vocational education and training (VET)/technical and further education (TAFE, herein) is complex and contested. Each Australian state and territory has "a different mix and extent of provision, and different nomenclature to describe" literacy and numeracy support (Black & Yasukawa, 2011, p.3; see also Joyce, 2019). Stakeholders acknowledge that low literacy and numeracy abilities perpetuate social and economic disadvantages (Industry Skills Council, 2011; Macklin, 2020; see also UNESCO, 2020) even as Australian TAFE regulatory practices perpetuate student deficit approaches to the provision of literacy and numeracy support (Black & Yasukawa, 2011). Analysis of literacy and numeracy levels among adults suggest the demands of everyday home and work life are not being addressed by the increased regulation of TAFE institutions (Black & Yasukawa, 2011; Black, Yasukawa & Brown 2015; Townsend & Waterhouse, 2008). It has been claimed that rushed and under-researched literacy and numeracy TAFE support systems led to simplistic responses (Perkins, 2009; Black & Yasukawa, 2013).

The Australian Government provides funding for student literacy and numeracy support (LNS) in TAFE institutions and students receive parallel support from an LNS specialist teacher working along-side a trade teacher/trainer (Black & Yasukawa, 2013; Joyce, 2019; Yasukawa, 2011). These programs are largely considered successful (Industry Skills Council, 2011) and despite recent changes in government funding of TAFE and private

vocational education trainers there remains limited funding for support in trade classrooms (Burke, 2018; Noonan, 2016). Consequently, some Victorian institutions enrol students in additional units from a *General Education for Adults* certificate to help fund LNS provision.

Studies have found a large literacy and numeracy demand on vocational students, requiring many apprentices to adapt to a range of different and often complex literacy practices (Edwards et al., 2013, Parkinson & Mackay, 2016). Stressing the need for additional research in the area, Coxhead et al. (2019) argued for a relationship to be established between literacy and associated values, and that vocational learning, literacy and numeracy (LLN) practices are not easily transferable from secondary school. Given the funding challenges facing adult literacy and numeracy programs, additional research into the attitudes of learners and the nature of TAFE learning environments is required (Black & Yasukawa, 2011; Black & Yasukawa, 2013). This paper seeks to address this gap by reporting how engineering apprentices navigate and cope with the reading, writing and numeracy demands of their course and the learning strategies they employ.

Edwards et al. (2013) and Black et al. (2015) argued that many literacy elements are invisible in the vocational classroom, with literary practices not explicitly explained or discussed. Bednarz (2014) acknowledged the difficulties apprentices have in navigating classroom literacy and numeracy expectations. Additionally, some researchers contend that literacy and numeracy acquisition has been relatively un-researched in the Australian TAFE sector (Black & Yasukawa, 2013), and that there is a need to investigate effective support of apprentices (Black & Yasukawa, 2013; Moraitis et al., 2012; Nicholas et al., 2012). Berghella and Molenaar (2013) found a “mismatch” between the literacy and numeracy required for a course and the skill levels of the trade’s teachers/trainers and LNS teachers (p. 8). They reported more research would develop a stronger understanding of the gap between the support provided to apprentices and the expectations required of them (Berghella & Molenaar, 2013).

Griffin (2020), and Deloitte Access Economics (2016) acknowledged that engagement in education, whether training, technical or otherwise, is an important part of success for apprentices. O’Neil and Gish (2001) asserted the importance of learning how to learn and the creation of literacy, research and critical thinking skills. The focus on learning and appreciating the portability of skills assists in the apprenticeship/work transition by developing capabilities to adapt to workplace literacy and numeracy demands (Griffin, 2020; Macklin, 2020). Additionally, this study considers learning literacy to include an understanding and discussion of how a student *learns* and the discourse surrounding that learning. Examining the effectiveness of the learning approaches adopted by the apprentices in this study required examining the strategies and practices they found most helpful and the supports they considered most effective.

Identifying practices that assist students, including apprentices, to navigate new disciplinary contexts with unfamiliar discourses are central to success in studies (McKay & Devlin, 2014; Middendorf & Pace, 2004). At the TAFE institution where this study was undertaken, the 2016 LLN pre-testing data collected by pre-enrolment processes to meet

reporting requirements (Medlin, 2016), determined that 62% of apprentices required assistance in at least one area of reading, writing, and numeracy. It was anticipated that many would experience difficulties negotiating the literacy and numeracy expectations in their apprenticeship. This project explored the often-under-represented apprentice perspective (Angus et al., 2013; Medlin, 2016) of what constitutes effective literacy and numeracy support. Its findings can be used to inform pedagogical practices to improve apprentice retention and completion.

The context of this study is established through a review of literature examining the provision of LNS at Australian TAFE institutions. The study's methodology is followed by a brief discussion of four findings and their value for the ongoing provision of LNS followed by five recommendations and some concluding reflections.

Context of the study

This study engaged engineering apprentices in a Victorian regional TAFE institution. The Australian state of Victoria has the country's second largest population and over 74,000 apprentices and trainees (VRQA, 2019; see Joyce, 2019 for an overview of the Australian TAFE and VET landscape). Victorian apprentices earn a wage while studying a trade certificate and usually spend much of their time with their employer. Their certificate, as is the case with the apprentices in this study, is generally undertaken over three years. Adult literacy and numeracy education in Australia have historically received considerable political, economic, and social attention (Black & Yasukawa, 2011; Black et al., 2015; Mackenzie, 2020a; Mayer, 2016; Ryan et al., 2016). Associated debates have considered projected shortages in skilled workforces, training in skill-sets for future workplaces, and effective pathways to employment that support a diversity of students (Griffin, 2020; Mackenzie, 2020b; Yasukawa et al., 2020). This research offers the voice of the apprentices, providing an appreciation of students' perceived needs and how they might be addressed, as called for in the Australian context (Medlin, 2016).

Black and Bee (2018) and Balatti et al. (2006) examined the importance of relevant workplace literacy and numeracy skills, and the key roles of acquired confidence and self-esteem for the success of apprentices. While both employers and employees agreed similar skills required attention, each saw the issue differently. Apprentices saw literacy issues as unproblematic whereas employers spoke of the many problems that arose (O'Neil & Gish, 2001). Harris et al. (2001) indicated stakeholders agree that literacy and numeracy skills require development over the course of training and that persistence is important. Bednarz (2014) reported that the main problems in apprentice retention were "inflexible delivery options, poor feedback ... and literacy and numeracy difficulties" (p. 5). Joyce (2019) stressed "there remains an urgent need to address the language, literacy and numeracy needs of the Australian workforce" (p.103).

In Australia, the recognition of complex interwoven literacy and numeracy challenges confronted by apprentices replaced an "emphatic and singular" notion of literacy (Cope & Kalantzis, 2015, p. 1). Nonetheless, the Higher Education Skills Group (HESG) requires

consideration of each prospective students' literacy and numeracy skills, and this entrenches a deficit discourse. Challenging this regulatory discourse entails recognising the complexities of literacy and numeracy education and considering what this means for their acquisition (Medlin, 2016; Waterhouse & McHardy, 2011). Different beliefs are evident between the compliance and regulation practices that assure appropriate institutional governance, and researchers who deem this detrimental to the core business of vocational teachers (Medlin, 2016; Ryan et al., 2016).

Examining how engineering apprentices acquire literacy and numeracy requires consideration of how a presumed literacy crisis impacted TAFE institutions (Black & Yasukawa, 2013), and the view that adult Australians struggle to cope with the literacy demands of everyday work and life (Black & Yasukawa, 2011; Black, Yasukawa & Brown, 2015; Medlin, 2016). The extent of the impact of this crisis is debated (Black & Yasukawa, 2011; Black et al., 2015; Joyce, 2019; Waterhouse & McHardy, 2011). Nonetheless, a steadfast political belief emerged that a literacy crisis led to Australia falling behind other OECD countries with negative economic impacts (Agrifood Skills Australia, 2009; Black & Yasukawa, 2013; Industry Skills Council, 2011; Mayer, 2016; Perkins, 2009). Black and Yasukawa (2013) and Perkins (2009) reported that a reactive government response caused constructive conversations around the issue to become problematic (Black et al., 2015). Waterhouse and McHardy (2011) and Jones (2018) contended that engaging a crisis discourse and positioning the student as the primary issue through pre-testing requirements, does little to improve literacy and numeracy education.

Balatti et al. (2006) asserted that the development of literacy and numeracy skills to address economic concerns is only effective if they are fit for purpose, contextualised and relevant to the students' immediate educational needs (see also Black & Bee, 2018; McHugh, 2011; Rose, 2012). Griffin (2020), Yasukawa et al. (2020) and Mayer (2016) further stressed that literacy and numeracy skills are crucial for active and responsible citizenship, social capital, and ultimately self-esteem and self-efficacy. Deloitte Access Economics (2014) emphasised addressing the changing literacy and numeracy landscape to ensure apprentices can participate in advanced economies that demand an increasingly literate and numerate workforce. More recently it has been acknowledged that the core of vocational education internationally consists of "literacy, numeracy, and digital competency as well as occupationally relevant skills" (Mackenzie, 2020a, p.3). There have also been calls for the government to become more active in ensuring employees can transfer key skills in a dynamic literacy and numeracy environment (Deloitte Access Economics, 2016; Griffin, 2020; Macklin, 2020).

Previous critical examinations of LNS identified effective learning strategies that aid apprentices to navigate the skill demands of their courses. Bates (2004) and McHugh (2011) found that making LNS non-remarkable helped students to accept assistance. McHugh (2011) also recommended easy student access to their trade teachers/trainers (to ensure an inclusive environment), limiting the number of assessment tasks, and providing unscheduled opportunities to learn. Casey et al. (2006) emphasised the need for a partnership between trade teachers/trainers and LNS teachers and argued for a shared notion of values and beliefs as well as clear and strong institutional support. Additionally,

UK researchers Cooper and Baynham (2005) stressed the importance of marrying LLN with vocational skills, implying their separation was somewhat commonplace.

Literacy and numeracy skills have been quite hidden in TAFE curriculum and make the classroom and workplace expectations placed on apprentices difficult to determine (Townsend & Waterhouse, 2008; McHugh, 2011). Black and Bee (2018) endorsed contextualising literacy and numeracy skills to ensure relevance to the job, rather than teaching these in isolation. Most recently Joyce (2019) acknowledged the benefits of literacy and numeracy are most effectively taught within the workplace and thereby reduce the stigma associated with low literacy skills. Torii and O'Connell (2017) highlighted the literacy and numeracy challenges for apprentices and the paucity of research in this area. Often the experiences of apprentices in TAFE, collected via compliance or social inclusion measures, are lost and fail to accommodate the learners' voices as constructors of knowledge. These lost experiences provide evidence for the need to reform (Angus et al., 2013).

Although O'Neil and Gish (2001) questioned the extent to which LNS fosters the development of skills transferable to the workplace, programs such as *Skills for Education and Employment* are considered successful (Deloitte Access Economics, 2016; Industry Skills Council, 2011). This support can be further seen in Casey et al.'s (2006) work, with specific guidelines for values and beliefs considered an essential ingredient. Despite the diversity of LNS provision in Australian TAFE institutions, which makes generalised assessments of how they function and what they achieve difficult (Balatti et al., 2006), many reportedly lead to growth in student self-confidence and self-esteem (Sanguinetti et al., 2005). This growth occurred despite a shift in outcome reporting from self-confidence building origins to more economic rationalist purposes in which literacy and numeracy proficiency becomes a distinct measure of success. This development has further entrenched a learner deficit discourse and made the provision of LNS more difficult (Balatti et al., 2006).

Method

A mixed methods approach was adopted to overcome the limitations of using only qualitative or quantitative data (Creswell & Plano Clark, 2006) and to bring clarity to apprentice's voices reporting their navigation of literacy and numeracy issues. The quantitative (questionnaire, parts one and two) and qualitative elements (questionnaire part three and interview) of this study were used to provide "breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). A mixed methods approach also helped to expose the interrelationships between the demands, strategies, challenges, and effective supports identified by the participants. An explanatory sequential design with two stages (Creswell & Plano Clark, 2011) was used; the initial quantitative focus identified patterns within the population, the second stage explored the depth of these patterns through semi-structured interviews.

Following Human Research Ethics Committee approval, first, second, and third-year engineering apprentices who were at least 18 years of age, were invited by email to

complete a 30-minute questionnaire during classes. A staff member who had no relationship with the apprentices administered the invitation, consent forms and completion of the questionnaire. Part one of the questionnaire featured 15 five-point Likert scaled questions, and one ranking question between 'strongest' to 'weakest' for the skills: reading; writing and numeracy. This provided quantitative data to assess apprentice perceptions of their literacy and numeracy preparedness and the demands within their courses. Part two required participants to rank the effectiveness of 10 strategies and 10 support methods that address the literacy and numeracy demands of their courses on a three-point Likert scale. Part three contained five free-writing short response questions inviting identification of critical incidences in their acquisition of literacy and numeracy skills or the types of literacy and numeracy support they perceived to be effective. A critical incident (Cotton, Nash & Kneale, 2014) can be a positive or negative experience and is simply an event the apprentice considers significant. *Microsoft Excel* was used to collate, summarise and graph responses for part one and part two and these were examined to identify patterns among the respondents. Part three responses were examined against the above data to identify participants who could provide insights into the individual and collective responses.

Based on their responses to the questionnaire it was anticipated that up to ten participants would be invited to a recorded 30-minute, semi-structured interview at their campus of study. To ensure the anonymity of participants, each was provided a pseudonym prior to data circulation and analysis. The manually transcribed interviews were coded by each researcher against perceptions of preparedness, learning strategies, use of support, and identified experiences and themes of interest and analysed to identify patterns of consensus, contradiction, and critical incidences. After meeting to compare findings, the transcripts were re-examined and re-coded on the basis of agreed indicators. This approach provided insight into the range of apprentice's perceptions and what they considered effective literacy and numeracy learning and support strategies. The interviews provided the apprentices an opportunity to share their "learner voice" concerning the strategies they most valued and the practices they believe promoted engagement, academic resilience, retention, and pass rates (Angus et al., 2013, p. 567).

Findings

The findings of the project established that among the apprentices:

- Most of the apprentices saw their skills in at least one type of literacy as stable and fixed and felt confident in meeting the literacy and numeracy demands of their course;
- Some participants were able to discuss the literacy and numeracy strategies they use, but many struggled to explain how they acquired the learning strategies necessary for success in their studies;
- Participants primarily reported similar dependent learning strategies and focused on the navigation of engineering coursework, including disciplinary jargon;

- Many participants saw the LNS teachers as helpful for apprentices other than themselves, with clear distinctions between the roles of the trade teachers/trainers and the LNS teachers.

Questionnaire: Likert style items

The questionnaire was distributed to 83 apprentices and completed by 56. This sample included 14 first year, 13 second year, 11 third year apprentices, seven who indicated they have been in the course for longer than three years and 11 who provided no indication.

In rating their confidence levels in reading and writing, before and after they began their course, the differences were minute (4% and 2% respectively). Numeracy appeared to be the skill in which the apprentices perceived their greatest increase with 11% indicating their confidence levels had increased. Most saw their skills in at least one type of literacy as stable and unchanging.

The majority reported feeling 'confident' in dealing with the literacy and numeracy demands of their course with 86% able to 'read and understand most things' and 91% able to 'meet writing demands'. Reading was reported by the apprentices as their strongest skill and numeracy their weakest by 52% of participants. Overall, 75% reported they could understand numeracy tasks despite 52% rating numeracy as their weakest skill. A comprehensive majority reported confidence in their abilities to complete the required work (95%) and meet challenges that arose (88%).

The questionnaire indicated that the most prevalent learning strategies (above 95%) were: 'looking up previous information', 're-calculating equations', 'seeing if the answer is reasonable given the question', and 'leaving the question for later'. The least used strategy, albeit employed by over one quarter (29%), was 'cheating'. Two thirds of participants relied on repetition and focused upon 'finding the answer' and 96% identified dependence on the trade teacher/trainer as a dominant learning strategy. It was reported by 71% that they sought support when needed, 22% sought support on occasion and 7% rarely, or never, sought support. When students sought support, 96% approached the teacher/trainer and 45% approached the LNS teacher. This clear distinction between the role of the trade teacher/trainer and the LNS teacher was further confirmed in subsequent interviews. Literacy and numeracy support was considered useful by the majority (70%) and not, or rarely, useful by 18%. Most apprentices (75%) reported they did not require much support. The most widely utilised supports (88% and over) were:

- Ask the teacher (referring to the trade teacher/trainer);
- Have the teacher show me how to do it;
- Ask a teacher alternative ways to solve the problem; and
- Try a few times to figure it out myself, then ask the teacher.

The least utilised supports were:

- Have the LNS teacher show me how to do it (43%);
- Ask the LNS teacher (45%).

Questionnaire: Open-ended items, critical incidents

Participants were invited to write about critical incidents in their learning in five open-ended questions and 17 of the 56 respondents did so, albeit in a limited manner. Among the 17 responses one student indicated that support with reading helped them to understand information, no students reported requiring support with writing, and seven had sought LNS assistance with mathematics. Responses to question 4: experiences that changed how they saw the usefulness of literacy and numeracy support, included: “[LNS] in practical, real world scenarios [is] helpful to do things better in my workplace”; “When I learn different ways of doing problems it helps”; “I have always found literacy and numeracy [support] useful”; “I witnessed the support teacher aid another student when help was needed in maths”; and “I do see the need for it”. Responses to question 5: suggestions that would improve literacy and numeracy support, included: “testing the fundamentals to get a better understanding of the areas people may need work / help in” (the existing practice); “a class after school some days a week for the people that need it”; “will depend upon the person and how they learn”; and “the teacher should be able to explain things a few different ways before it actually helps an individual understand and improve their literacy and numeracy”. These responses support the finding that the apprentices struggled to: articulate learning strategies; identify and explain relevant learning situations; and demonstrate an awareness of their learning experiences. Eleven students provided responses that suggested further useful information could be obtained from participation in an interview.

Semi-structured interviews

Based on their responses, 11 apprentices were invited to participate in interviews and this was accepted by nine apprentices which included: one female; one with an acknowledged cognitive impairment; and one who had successfully completed another program at the same institution.

During their interviews many apprentices exhibited difficulty in explaining how they acquired the literacy and numeracy skills for success in their studies. Ray suggested ‘It’s just how my brain works. I dunno, it’s just weird how I work things out.’ The apprentices evidenced limited abilities to critically self-reflect or articulate the incidents where learning strategies were helpful. They also struggled to make connections between learning strategies, problem solving and learning tasks within their studies and workplaces. Jean reflected that ‘I’m not sure what I do actually... you’d probably see what I do, but I don’t actually know.’

With respect to developing literacy and numeracy learning strategies, Remy noted ‘everything’s in the book so as soon as you read over it ... if you don’t understand it, just keep reading over it and eventually you’ll get it anyway.’ Other apprentices struggled to identify this strategy as a tool for learning. Logan reflected that ‘[t]he only way I seem to learn is just going over and over stuff until it sinks in, and it eventually does sink in. It’s just repetition really. For me it’s always been repetition.’

In five of nine interviews dependence on the trade teacher/trainer was identified as a dominant learning strategy when challenged by coursework. Scott reported, ‘usually it ends up with me having to talk to the teacher.’ Jean said that, ‘if it doesn’t make sense then I usually just ask the teacher’ and for Logan, ‘95% of the time I go to the teacher’. Notably, apprentices such as Logan utilised the trade teacher/trainer as a principal strategy in the learning context, even though the importance of independent problem solving was acknowledged for both self-benefit and meeting workplace expectations. He observed: ‘I think it’s probably best if [you] step back and first identify it yourself rather than going to the teacher.’ Logan’s contradiction indicates a disconnection between classroom and workplace learning strategies. Some other apprentices demonstrated more independent approaches to navigating challenges and an appreciation of the learning context and course demands. When asked how she solved problems, Jean responded: ‘It just usually ... works itself out because the questions are in order. So, if you know the rest of the questions then you ... work it out in your head and you can go back to it.’

The apprentices recognised the need to be able to operate independently in the workplace and some could see the value in developing this capacity in their approach to learning. Logan raised the importance of persistence, in approaching difficult tasks and working out ‘what it is or how to do it ... because you learn it yourself.’ Kurt used this understanding as a motivator to develop his literacy skills and ability to learn and noted:

you’ve gotta be able to stand on your own two feet and be able to work something out. You can’t be always going to the boss saying, ‘can you just read this out’. The boss has other things to worry about and he’s paying you top dollar. You’ve gotta be able to work on your own.

Jean outlined the value of independent learning in terms that differentiated between knowledge and skills and demonstrating their application in practice. She noted:

It’s almost like doing something in pencil [theory] and you can just rub it out but doing it in pen [practical] you can’t. You’ve just got to erase the whole thing and re-do and re-do and you’re wasting stuff, so if you figure it out in theory you’re not wasting your time or wasting material.

Logan observed of his peers, however, that, ‘some students, if they don’t understand it, they just kind of throw in the towel.’

When apprentices spoke about support for achieving success, the examples were often the provision of a solution, or modelling a required formula, which ultimately enabled a passive and dependant role. Remy reported:

[the trade teacher/instructor] is really good at figuring stuff out in different ways that I didn't think would have been possible. Like sometimes ... when you're looking at something and there'll be a way to do it, but it won't quite work. There'll be a different way to do it that he's experienced ... having that knowledge and passing it on is quite good.

When asked to suggest better ways for LNS teachers to approach apprentices who were experiencing difficulties, most struggled to answer. Logan responded, 'I understand your question, but I don't know the answer!' Jean replied, 'usually they're too strong headed [to change things]' and Bobby was 'not quite sure in all honesty.'

During their interviews most apprentices (seven of nine) acknowledged difficulty with literacy elements of their course despite their confidence levels in the survey responses. A common concern was that the amount of text posed a barrier to learning and Scott recommended, 'reduce some of the books. I reckon you could almost get rid of 50 percent of what we do.' In five of the nine interviews the disciplinary language and phrasing of learning tasks was identified as a distraction from the concepts and content to be understood. Jean commented that, 'if you give me a formula, that's easier. If it's written like 'one apple plus two apples equals' [that's] harder for me to work out than ... the numerical equation... just $1 + 2 = 3$.' She continued to explain, 'a lot of the questions in the assessments, they're just the other way around. They're the exact same question, just written a different way. Then you get confused and think 'that's a different question and it can't be the same answer' which isn't really needed.'

Almost half of the apprentices interviewed (four of nine) identified disciplinary language as a challenge with observations by Kurt that, 'sometimes there is language I wouldn't understand' and by Jean, 'there [were] a lot of big words that I didn't know.' The strategy of identifying and clarifying key words was adopted by some apprentices. Logan explained that '[s]ometimes you've got big words and you don't know what it means [sic] ... first identify the words, okay I really don't know what that means, okay let's go ask the teacher.' The apprentices suggested the course work materials (referred to as 'workbooks' or 'books') could be simplified. Jean suggested, 'the books could be simpler' while Hank was of the view that 'there's heaps of writing for no apparent reason.'

An exploration of the visibility and perceived value of the current LNS model during the interviews led two apprentices to acknowledge they were unaware of the LNS teacher and their role. Bobby reported that, 'I don't really know what he was there for. I thought he was like an aide for someone,' and Jean asked, 'Is that the guy that comes around?' Most participants reported they felt able to speak to 'either teacher' (the trade teacher/trainer or the LNS teacher). Erik commented that he would approach, 'whoever's free really. They both know what they're doing' and Logan noted of his peers, 'I dare say they'd happily go to either person. Just whoever's available.'

Despite a willingness to utilise the LNS teacher, participants believed the dynamics in the classroom changed once they arrived. Kurt reported, 'I just don't feel comfortable having a one-on-one person there. It's sort of like singling you out a bit. It shows you they've got

a problem (sic)'. Scott was uncomfortable that, '[he] doesn't have a desk, so he just keeps going around the room. It can feel a little unnerving to have somebody looking over your shoulder all the time.' He went so far as to say the LNS teacher was, 'disruptive ... having somebody who doesn't have the experience in our industry can be frustrating because they're talking from an outsider's point of view rather than from our point of view.'

When challenged by the material, there was a clear consensus about the differences and value of support from the LNS teacher and the trade teacher/trainer. Erik claimed, 'I go to the literacy numeracy person more often if it's more towards that, but if it's more towards trade questions they'd [other apprentices] go to the trade teacher/trainer. You can't really go to the literacy numeracy person for a trade question.' Remy confirmed that, 'the support person is good for numeracy and stuff like that, but as for the criteria of what we're trying to learn he's pretty limited.' The value for 'other students' featured prominently (six of nine interviewees). Scott admitted, 'I haven't found him of much use, I can't speak for the other students. I just don't need that extra help.' Hank claimed, 'some of the other people in the class definitely use [the LNS teacher], but I don't.' While Remy conceded, 'It's good to have that support there, but for me, I don't need it.'

Many of the apprentices saw their skills in at least one type of literacy as stable and unchanging, as evident in Scott's self-assessment, 'I know most of my strengths and weaknesses and one of my biggest weaknesses is numeracy, always has been, always will be.' This was also true in their approaches toward learning and developing new learning strategies. As further acknowledged by Scott, 'it's no fault to [the school] it's solely on me, I just won't learn it.' Jean talked about the value of learning and what it meant for her confidence and skill level:

When I first started, I was getting the theory done really fast and then in the prac all the boys were doing it a lot faster than me. Now that I've realised they've been doing the prac but not understanding the theory, I'll go and look at their prac. It looks horrible because they haven't actually done it properly.

Ray recognised a workplace imperative to improve learning skills and reading, writing and numeracy. 'My supervisor loves it that I'm keen to learn he goes "you're the most willing person in my section." If you're not willing to learn you're not going to progress through the company.'

Less than half of the interviewed apprentices (four of nine) acknowledged the need to be motivated learners or recognised interest as central to learning and success. Remy observed that, 'you can only do so much. Everyone's trying to help people that don't want to be helped... There's not much you can really do.' A third of interviewees (three of nine) spoke of their interest in learning. Ray shared that, 'I'm always eager to learn. I did a one-and-a-half-year course in media when I was fifteen because I wanted to just learn the computer sides of a lot of things. I just enjoy learning, the more I learn the more I can experience.'

Discussion

While it has been widely circulated that apprentices are not currently meeting the literacy and numeracy requirements of industry (Joyce, 2019) this paper contends that equipping apprentices with a discourse around learning *how* to learn is an important contribution to the solution (Bernards, 2014; Harris et al., 2001). Such an approach provides the bridge between the apprentices' current abilities and those required by future employers (Gekara & Snell, 2018). The observation by Mayer (2016) and Edwards et al. (2013) that many literacy practices are invisible or hidden to vocational students aligns with the findings of this study in which many apprentices were unaware of the learning literacies required to complete their course. This study also found that apprentices who exhibited an awareness of their own learning approaches and strategies appeared more confident in navigating their course. This appreciation suggests that apprentices would benefit from the explicit teaching of learning skills as supported by O'Neil and Gish (2001). An increased focus on a learning discourse would also improve teaching quality, aid student retention, and help apprentices better navigate the changing literacy and numeracy demands of the workplace (Couldrey & Loveder, 2017; Macklin, 2020). An emphasis on the importance of learning *how* to learn and developing a greater engagement with education could further assist in the transition between school, training and the workplace and ultimately benefit the apprentice (Deloitte Access Economics, 2016; Griffin, 2020; O'Neil & Gish, 2001).

Contributing the often-missing learner voice highlighted a range of factors for consideration in both the local apprentice experience and the wider narrative of literacy and numeracy acquisition and support in the Australian TAFE sector. These apprentices attributed less significance to acquiring literacy and numeracy skills than employers and industry who have long considered them core competencies (Griffin, 2020; O'Neil & Gish, 2001). A limited willingness among these apprentices to utilise available learning support appeared to arise from a discomfort with the method of provision alongside an inability to identify and articulate their own difficulties, and a failure to view learning strategies as transferable and desirable workplace skills.

The insights provided by these apprentices support further examination of how to provide contextualised learning for literacy and numeracy (Black & Yasukawa, 2013; Rose, 2012; Yasukawa et al., 2020). Although apprentices are routinely subject to many surveys, very little of their representative voices are reported back to them or their institutions (Angus et al., 2013). This lack of reporting happens despite recognition of the benefits of apprentice agency as collaborators and contributors in their learning and the subsequent benefits to education (Morselli, 2015).

The importance of work-ready literacy and numeracy skills has been flagged by industry (Bernards, 2014; Griffin, 2020; Macklin, 2020). While there have been successes in addressing the literacy and numeracy needs of apprentices (Deloitte Access Economics, 2016; Industry Skills Council, 2011), regulatory compliance in the institution where this study was conducted has shaped the apprentices' view of the LNS teacher and LNS provision. Mandating pre-assessment and the shifted focus of LNS from building

confidence to literacy and numeracy proficiency as the sole measure of success (Balatti et al., 2006; Jones, 2018) has altered attitudes. Despite the best efforts of the LNS teachers to present their services as student centred, the regulatory compliance framework and delivery practices have failed to make their presence unremarkable. The apprentices perceive LNS as intended to address learner deficits and defensively attribute its need to their peers, effectively reinforcing the discourse. Consequently, acquiring literacy and numeracy skills for professional qualifications is perceived as a distraction rather than valued as further education (Angus et al., 2015). A move away from a compliance-based foci (Balatti et al., 2006), while retaining the underlying aims of being fit for purpose, contextualised and relevant to the apprentices' immediate educational needs would yield a better understanding of LNS practices (Balatti et al., 2006; Jones, 2018; McHugh, 2011). Ultimately, the expectations around compliance and student reading, writing and numeracy skills creates a singular discourse, making a pedagogical shift away from a learner deficit discourse difficult. Continued research reporting the learner voice in TAFE is required to better align literacy and numeracy support and learning skills with industry and training needs.

This research, coupled with the diversity of approaches previously acknowledged in TAFE institutions' delivery of LNS, suggests the need for developing a community of practice among LNS teachers to identify exemplars that are embedded and unremarkable (Bates, 2004; Rose, 2012). This community of practice would promote literacy and numeracy within learning and knowledge practices and move the pedagogical practice and culture of the sector, including employers, staff and apprentices (Sych, 2016). The current prevalence of VET terminology and vocational specific training as opposed to previous TAFE terminology is indicative of the underlying economic rationalist philosophy, priorities and culture of the sector. A returned focus on contextualised 'further education' skills with essential industry-relevant theory and knowledge (Mackenzie, 2020a; Mackenzie, 2020b) would require LNS teachers to address more than literacy and numeracy skills deficits. Such a renewed focus would assist apprentices to develop their learning capabilities and make strong connections to the demands of their workplace (Black & Yasukawa, 2013).

This exploration has indicated the need to examine LNS delivery within local institutional contexts to identify pedagogies that better meet the needs of apprentices and industry without reinforcing a learner deficit discourse. Based on the insight provided by the participants, the following recommendations are proposed.

1. A more inclusive and engaging format should be adopted to replace the current workbooks, similar to the web-based learning method suggested by Caruso et al. (2016). From the apprentices' perspective, further innovation is required to align education and workplace requirements and expectations to close a commonplace separation between literacy and numeracy and vocational skills (Cooper & Baynham, 2005; Griffin, 2020).
2. Revision of how apprentices receive LNS to allow for greater access, unremarkable delivery, and more effective use (Bates, 2004) with an emphasis on teacher-student talk

and interactions at the time of learning (McLaughlin & Parkinson, 2018). The adoption by apprentices of LNS is dependent upon the mutual positioning of the LNS teacher and the trade teacher/trainer utilising agreed “vocational literacies” (McLaughlin & Parkinson, 2018, p. 15). These would include mutually acknowledged learning strategies, specialised language, and professional competencies that avoid learner deficit discourses.

3. Greater focus on how apprentices’ approach and solve work related problems to develop a bank of transferable strategies that support transition into the workplace, reinforce the learning process, and minimise the desire to simply find the answer (Griffin, 2020).
4. In a literacy and numeracy context, greater alignment is required between training and workplace expectations, with increased engagement and input from industry (Griffin, 2020; Jones, 2018; Macklin, 2020) to ensure an emphasis on authentic workplace literacy and numeracy expectations.
5. Promoting a learning discourse alongside industry and discipline knowledge requires fostering engagement with a culture of learning and learning relationships led by the trades teachers/trainers (Medlin, 2016). This requires providing professional development opportunities to equip them with pedagogies and explicit learning vocabulary and practices that may be shared with their students (Guthrie & Jones, 2018; Macklin, 2020; Smith & Yasukawa, 2017)

Conclusion

The benefit of understanding how engineering apprentices perceive their own navigation of literacy and numeracy expectations and challenges, and the support they are provided, assists staff to adopt effective teaching, learning and support strategies. This understanding also provides insight into a wider discussion concerning apprentices’ meeting the literacy and numeracy demands of the workplace.

The authors acknowledge a limitation of this study arises from its conduct at a single institution and the small sample size of participants. There are a wide variety of LNS initiatives and extrapolating from a single discipline sample at a regional Victorian institution should be undertaken with caution. Further, student’s achievement in terms of grades were not examined, nor were observations by staff of student learning practices, as this project sought to examine and report how the students themselves understood their approaches to learning and effective LNS support (Angus et al., 2013). Nonetheless, the results of this project warrant further similar research in other disciplines to identify commonalities. A coordinated exploration of different LNS structures and methods of provision, with the aim of identifying effective practice models, is recommended. A stronger understanding of industry expectations concerning learning discourse and the role played by LNS would also be beneficial to ensure apprentices are equipped with learning skills to meet evolving workplace needs. The benefits of a user informed and

transparent focus on learning skills support have also been suggested by Gekara and Snell (2018).

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Appendix 1: Questionnaire

Questionnaire questions: Scaled questions 1-5

- 14 Likert scaled questions to determine these student's perceptions of their literacy and numeracy ability levels and learning strategies,
 - 6 Likert scaled questions to determine these student's perceptions of the literacy and numeracy support and literacy and numeracy strategies they find most helpful,
 - 3 free-writing short response questions in which students will be invited to identify a critical incident that significantly impacted their acquisition of literary and numerate skills or their perceptions of the types of LNS assistance and intervention they found most effective and why,
 - 2 free-writing short response questions providing students the opportunity to suggest how literacy and numeracy support could be better provided into the future.
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Section 1: Ability levels and own learning strategies

1.1 How many years have you been studying engineering?

1.2 How did you feel about your ability to READ when you first started your course?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.3 How did you feel about your ability to WRITE when you first started your course?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.4 How did you feel about your ability to do MATHS when you first started your course?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.5 How do you feel about your ability to READ in your course now?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.6 How do you feel about your ability to WRITE in your course now?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.7 How do you feel about your ability to MATHS in your course now?

Very confident (1)	Good/ positive (2)	OK/not worried (3)	Not very good/ unsure (4)	Negative/ worried/ nervous (5)
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1.8 Please rank your skills [Reading/Writing/Numeracy] from strongest (1) to weakest (3).

Strongest			Weakest
1.	2.	3.	

1.9 How do you feel when approaching reading tasks in your course?

I can read most things and can understand them easily (1)	I can usually work things out with some effort (2)	Sometimes I manage myself, sometimes I need help (3)	I have some difficulty in getting the answers, I need help or am unable to find the answer I need (4)	I often struggle to read and answer questions (5)
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1.10 How do you feel when approaching writing tasks in your course?

Very good, I can complete most things easily (1)	I can usually complete tasks with some effort (2)	Sometimes I can manage myself, sometimes I need help (3)	I have trouble completing some tasks and sometimes need help (4)	I often struggle to answer questions and complete tasks (5)
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1.11 How do you feel when working with maths tasks (numbers and equations) in your course?

Very good, I can complete most things easily (1)	I can usually complete tasks with some effort (2)	Sometimes I can manage myself, sometimes I need help (3)	I have trouble completing some tasks and sometimes need help (4)	I often struggle to answer questions and complete tasks (5)
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1.12 How do you feel when completing workbooks in your course?

Very good: Complete them easily (1)	Good: Can do it (2)	OK/unsure (3)	I have some trouble (4)	Don't complete them/ I struggle to complete them (5)
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1.13 How do you feel about *your ability to solve problems* and challenges during your course?

Very strong: I have lots of ways to figure out what to do (1)	Strong: I have some ideas and ways to figure things out OK (2)	Sometimes I can figure out a way to get things done (3)	At times I can't solve problems (4)	Often I am not sure how to figure things out myself (5)
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1.14 How do you feel about asking for literacy and numeracy support?

I don't need to ask for support (1)	I am happy to ask for support if I need it (2)	I sometimes seek support if I need to (3)	I don't often ask for support (4)	I don't ask for support even when I need it (5)
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1.15 How useful do you find literacy and numeracy support?

I don't know because I haven't needed to use the support (1)	I have found the support useful (2)	The support is sometimes useful (3)	The support is rarely useful (4)	I don't know because I haven't asked for it (5)
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1.16 How much support will you need to successfully complete your course?

None. I won't need it (1)	I may at times need support (2)	The amount of available support is enough (3)	I may need more than the available support at times (4)	Even with lots of support I worry about successfully completing my course (5)
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Section 2: Strategies and supports

<i>Please indicate how often you use the following strategies and supports</i>		Use a lot (1)	Use some-times (2)	Don't use (3)
Strategy	Ask the person next to me (peer)			
	Use another book to find the answer			
	Locate word phrases that relate to the question			
	Look up information I have seen or written in the past			
	Skim read			
	Re-calculate my equations			
	See if the answer is reasonable given the question			
	Cheating (copy someone's work / look up answers /			

	wait for answers)			
	Leave the question and come back to it later			
	Look up the information on the internet			
Support	Ask the teacher			
	Ask a teacher a second time if I still don't understand			
	Ask the LNS support teacher			
	Ask the teacher to define a word			
	Have the teacher show me how to do it			
	Have the LNS Support teacher show me how to do it			
	Ask a teacher alternative ways to solve the problem			
	Ask for a real life example of the problem			
	Wait for the teacher to explain it to somebody else and listen in			
	Try a few times to figure it out myself, then ask the teacher			

Section 3: Critical incidents

1. Do you have an example of when the Literacy and Numeracy Support teacher changed your approach to reading in your studies? Please describe (provide 5 lines of space)
2. Do you have an example of when the Literacy and Numeracy Support teacher changed your approach to writing in your studies? Please describe (provide 5 lines of space)
3. Do you have an example of when the Literacy and Numeracy Support teacher changed your approach to maths in your studies? Please describe (provide 5 lines of space)
4. Have you had an experience that changed how you see the usefulness of Literacy and Numeracy Support? Please describe (provide 5 lines of space)
5. Do you have a suggestion that would improve Literacy and Numeracy support? (This could be a strategy that all students should be taught)

Appendix 2: Semi-structured interview questions

Warm up questions

Nice to meet you and thank you for taking the time for this interview.

I'd like to remind you that all information you provide will be treated with the strictest confidence and data will be stored separately from any listing that includes your name. Only aggregated and de-identified results will be used for research purposes and reported in academic journals. You are free to withdraw from the study at any time and your participation in the research study will immediately cease and any information you have provided will not be used.

- 1.1 What year of your apprenticeship are you in? Are you enjoying it?
- 1.2 Did you think you'd be doing Engineering when you were younger?

Studying questions

- 2.1 What have you found to be the most difficult aspects of your course? Reading / writing or numeracy? What has made this difficult?
- 2.2 How did you find the reading, writing and numeracy expectations when you first entered the Engineering course?
- 2.3 Is the reading, writing and numeracy difficult even today?
- 2.4 What resources can you use in the classroom to help with the reading, writing and numeracy demands? Which ones do you find most beneficial?
- 2.5 Have you learned any strategies to cope with the reading, writing or numeracy requirements of your course? What do they look like?
- 2.6 What do you normally do if there are questions you don't understand?
- 2.7 How do you think you can be better supported in your course to meet the reading, writing and numeracy demands?

Conclusion

- 3.1 In conclusion, do you feel you have developed enough strategies to cope with your course?
- 3.2 Do you have anything else you'd like to add?

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