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The Literacy Skills of Secondary Teaching Undergraduates: Results of Diagnostic Testing and a Discussion of Findings

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Abstract: The capacity of secondary school teachers to support general literacy and to teach discipline-specific literacy skills depends upon their personal literacy competence. Diagnostic testing of 203 secondary teaching undergraduates at one Australian university revealed deficiencies in personal literacy competence that could affect their future teaching effectiveness. The sample of undergraduates was tested in spelling, vocabulary, and punctuation. Analysis of the results showed high rates of error on general spelling and vocabulary tasks. The degree of error in many cases was severe. For some undergraduates, the prospect of successful remediation so late in their academic career appeared poor. It is suggested that universities need to monitor admission standards and continue to invest in ongoing remediation.

Introduction

The literacy standard of teaching graduates is a perennial subject for debate and inquiry in Australia, and periodic controversies about pre-service teacher literacy are nothing new. The Australian Government's current focus on admission standards for teaching degrees in Australian universities, and on the literacy proficiency of teaching graduates, will therefore evoke a strong sense of *déjà vu* for anyone who has been involved in teacher education for even a short time.

That such controversies are often provoked by, or harnessed to, political agendas can invite cynicism. But political interests alone should not be taken as proof that concerns about teacher literacy are mere fabrications or distractions. Teacher quality does indeed affect student outcomes (see, for example, Hattie, Clinton, Thompson, & Schmidt-Davies, 1995; Hattie, 2003, 2009; Ramsey, 2000; Rowe, 2003, 2004). Inquiries into teacher quality are therefore legitimate. With respect to teacher literacy, there is evidence that at least some new graduates in Australia do not meet the standard expected of professionals working in the field of education.

This paper presents findings on the literacy skills of prospective secondary teachers in their final years of study before graduation. The findings suggest that the number of graduates who fall below the expected standard may be significant, and that in some cases their personal literacy competence falls far short of expectations. The reasons why inadequate teacher literacy ought to concern us, and what measures might be needed to address the problem, are discussed.

Literacy Standards for Teachers

As part of its suite of initiatives on teacher training, the Commonwealth Department of Education has proposed that students entering teacher education courses should demonstrate literacy achievement in the top 30 per cent of the population. This is a laudable goal, though perhaps difficult to achieve in the light of evidence that teacher education courses are increasingly drawing from the lower quartiles of university entrants (Department of Employment, Science and Training, 2003; Leigh & Ryan, 2008).

In pursuit of the government's target, the Australian Institute for Teaching and School Leadership (AITSL) has been tasked with developing standards and measures to ensure the literacy objective is met. Currently, scores in designated Year 12 subjects are being used as proxy measures of literacy for admission to teaching education courses. In Western Australia, for example, Satisfactory Achievement (SA) in Stage 3 English is deemed to indicate literacy performance in the top 30 per cent of the population (AITSL, 2013, p.13). For 2015, purpose-designed literacy tests are being developed, to be rolled out nationally for teacher education students. This move follows the lead of the United Kingdom's National College for Teaching and Leadership, which has already developed and implemented a battery of online literacy tests for trainee teachers (Department for Education, 2014). Simultaneously, education faculties in many Australian universities are developing and implementing their own protocols for measuring and remediating the literacy of teachers in training.

In its position statements, AITSL argues, quite reasonably, that a high level of literacy is essential for education students. Advanced literacy is required, it says, for coping with the academic program at university, and for subsequently "carrying out the intellectual demands of teaching" (AITSL, 2014). This position is informed not only by common sense but also by research on teacher preparation and teaching standards. Such research confirms that personal literacy competence is an important determinant of a teacher's capacity to support student learning and literacy development (see, for example, Louden et al., 2005; Louden & Rohl 2006). Indeed, there is some evidence that the teacher's own verbal competence is one of the few truly predictive indicators of successful teaching (Ehrenberg & Brewer, 1994; Mead & Leigh, 2005; Leigh, 2012).

Yet there is little analysis in the AITSL documentation of exactly *how* literacy figures in the intellectual work of teachers. For teachers working in early childhood and primary education, where instruction in literacy is central to the curriculum, the connection seems obvious. A teacher with poor personal literacy competence will be ill-equipped to provide the necessary instruction, guidance and modelling that is essential to the early literacy development of his or her students. But the situation in secondary schools is not as clear. Secondary teachers have not traditionally been charged with initial literacy instruction, and literacy has often been seen as incidental, rather than foundational, to the work that secondary teachers do. Secondary school teachers see themselves as subject specialists first, and they reflect upon their teaching practice through the lens of their subject specialisation. For this reason, discussion of the literacy competence of secondary teachers, and its professional relevance, requires some additional clarification.

Three Dimensions of Teacher Literacy

I suggest that there are at least three dimensions to teacher literacy in the secondary school, which we might designate *professional literacy*, *general pedagogical literacy*, and *discipline-based pedagogical literacy*. All three dimensions, I will argue, depend upon personal literacy competence; but each develops that competence in different ways. What follows is a brief sketch of the three dimensions.

Professional Literacy

Secondary teachers must be able to conduct themselves as professionals in a complex workplace. This means they must be able to access and present information in a variety of forms, comprehend what they read, communicate ideas clearly to colleagues and the community, maintain clear and accurate records, publish their work in the accepted professional forms, maintain collegial relationships without unintentionally offending or misleading others, and so on. These are basic literacy requirements for any professional. They stand alongside other expected markers of professionalism, such as competence in one's field, ethical conduct, and ongoing professional development. Professional workplace literacy is clearly important; but it is not what provokes most public discussion or academic research on the literacy standards of teachers. How teachers communicate with one another in the workplace is largely invisible to outsiders, except as a proxy indicator for attributes that do generate concern—such as general intelligence and teaching effectiveness. When a teacher or school sends to parents a note that contains grammatical errors, for instance, it is not the lapse in professional literacy *per se* that arouses concern, but the implied incapacity of the teacher or school to provide sound instruction.

General Pedagogical Literacy

The second dimension of literacy for secondary teachers is the capacity to model Standard Australian English to students, and to provide appropriate instruction and correction in the classroom. This dimension of literacy manifests itself in the teacher's ability to spell words correctly when writing on the board, to produce class notes that are clear and correct, to mark out errors and offer corrections when responding to student work, and to teach complex literacy skills, such as essay writing and bibliographic citation. This is literacy in the pedagogical context, literacy as it gets caught up in the act of teaching. It overlaps but is distinct from the workplace dimension sketched above. This pedagogical deployment of literacy is much more the focus of public concern and media attention, for it relates directly to the teacher's capacity to foster high standards of literacy in his or her students.

Yet even this dimension of literacy is only part of the picture for secondary teachers. Concerns about spelling and grammar in the secondary school classroom often construe literacy as an *adjunct* to the subject content – an almost ceremonial accompaniment to teaching and learning. A teacher of mathematics or physics who exhibits poor spelling or grammar is perhaps seen as a bad model for literacy, but is not necessarily seen as a bad teacher of mathematics or physics. This imagined separation between subject content and literacy has in the past allowed secondary teachers in some subject areas to disavow the importance of personal literacy competence. But, as we shall see, that separation cannot be sustained in practice. That is because language and literacy are not merely adjuncts to the

curriculum content: they are the media through which subject knowledge is codified and transmitted.

Discipline-based Pedagogical Literacy

The third dimension of teacher literacy in secondary schools is the capacity to link curricular content to the forms of language and literacy associated with a particular discipline. This means not only observing the everyday conventions of spelling, punctuation, and written expression, but also understanding intimately the way specialist knowledge is encoded in the language and literacy practices of a given learning area. Shanahan & Shanahan (2008) have labelled this the “disciplinary” dimension of literacy.

Discipline-based literacy is fundamental to teaching and learning in the secondary school, where teachers work in specialised fields such as ancient history, chemistry, economics, geography, literary studies, and physics. These specialised fields use language in distinctive ways to codify and communicate knowledge: they have vocabularies, sentence patterns, text forms, and participant relations that are distinct from one another. Teaching the specialised language of a subject, and the related forms of literacy, is integral to teaching the subject itself. There can be no separation of language and content, therefore. An effective secondary school teacher must have sufficient knowledge of language and literacy to recognise the unique challenges posed by the discourse of his or her chosen subject and must be able to teach the discourse while teaching the content.

This concept of *discourse* is central because subject disciplines are social endeavours. The specialised discourses used in academic disciplines make communication more efficient among practitioners by standardising key terms and procedures. This is fundamental to the demarcation of any field of inquiry. But such discourses also work to exclude outsiders who lack knowledge of the concepts, styles, and usages codified in the language. In secondary schools, where students are being inducted into new and unfamiliar fields of knowledge, such discursive exclusion can be a powerful impediment to learning. Secondary school teachers must therefore be sensitive to the challenges posed by unfamiliar terms, text forms, and styles. They must address these literacy challenges simultaneously with the content.

Because discourses differ so much from one subject to the next, the literacy skills required by secondary school students cannot all be taught in English lessons. Specialised vocabulary terms such as *isosceles*, *bicameral*, *quotient*, *homeostasis*, *perturbation*, or *diminuendo* will not arise in English. Such terms must be decoded and taught in the relevant content area lessons—which is why secondary teachers must be capable of analysing and teaching the language of their specialisation. As we shall see, that capacity must be underwritten by their own personal literacy competence.

Discipline-based Literacy: A Closer Look

The literature on discipline-based literacy (variously called *disciplinary literacy*, *content-area literacy*, and *cross-curriculum literacy*) is extensive and longstanding, and will not be summarised here. Useful overviews are provided by Alvermann & Phelps (1998), Heller & Greenleaf (2007), Ruddell (2001), Shanahan & Shanahan (2008), and Vacca & Vacca (1999).

Building on the research, departments of education across Australia, the United States, Canada, and the United Kingdom have developed their own professional support programs to improve teacher awareness and skill in literacy. In Western Australia, this took the form of two large scale initiatives during the 1980s and 1990s: *First Steps*, for primary teachers, and *Stepping Out*, for secondary teachers.

Two common themes have emerged from the research and development in curriculum literacy. The first is that improvements in student literacy and learning require a whole-of-school approach, which is to say that all teachers must see themselves as teachers of literacy. That idea is captured in the above description of general pedagogical literacy; and it was a strong emphasis in “literacy-across-the curriculum” initiatives of the 1980s and early 1990s. The second theme is that specialist teachers must give explicit attention to those specific features of language and text that are characteristic of their discipline areas. This is a more recent emphasis, associated with “content-area literacy” movements of the later 1990s and 2000s.

The new Australian Curriculum endorses both themes in its *General Capabilities* policy. It identifies general literacy as a cross-curriculum priority, and it places particular emphasis on the role of literacy in disciplines. The Curriculum states:

Success in any learning area depends upon being able to use the significant, identifiable, distinctive literacy that is important for that learning area. . . .

This means that:

- all teachers are responsible for teaching the subject-specific literacy of their learning area;
- all teachers need a clear understanding of the literacy demands of their learning area;
- literacy appropriate to each learning area must be embedded in the teaching of the content and processes of that learning area. (Australian Curriculum and Reporting Authority [ACARA] 2013, pp.9-10)

The implications of the Australian Curriculum statement can best be clarified through some concrete examples. Science teachers, for example, must teach explicitly the use of passive voice sentence constructions and precise measures in laboratory report writing:

The solution was heated rapidly to a temperature of 100 degrees Celsius.

History teachers must explicitly teach the use of chronological pointers, tense markers, and causal connectors in recounts of historical events:

The American withdrawal led to the fall of Saigon.

Following the Second World War, a period of international tension ensued that became known as the Cold War.

Home Economics teachers must teach explicitly the use of the imperative mood in cooking instructions, which requires starting each step with a verb:

Peel and chop the carrots. Sauté the vegetables in a pan.

The same imperative form can be found in procedural instructions used in Design and Technology and Digital Media subjects.

Teachers in subjects as diverse as art, economics, geography, music, and physical education will each have their own special text forms to contend with, requiring this same

degree of explicit treatment. Teaching such skills calls for modelling, explanation, and active instruction in the sentence forms and text structures of the learning area.

But such instruction requires that the teacher already knows, for example, what a verb is, where tenses must be indicated, and how passive and active sentences differ. Teachers with poor personal literacy competence will be ill-equipped to recognise such features in the language of their learning areas, or even to produce these grammatical forms reliably in their own work, let alone teach them to others.

Equally, teachers in all disciplines must help students break the code of new terminology, by teaching important word roots, prefixes, and suffixes. Doing so enables students to recognise the underlying patterns that link words to their meaning (Harmon & Wood, 2008). The Greek word *oeidos*, for example, combines as a suffix with many other words, to signify “form or likeness”:

and <u>roid</u> = man-like	(combining with <i>andros</i> , man)
aster <u>oid</u> = star-like	(combining with <i>aster</i> , star)
human <u>oid</u> = human-like	(combining with <i>human</i>)

Knowledge of the *~oid* suffix will enable secondary school students to anticipate the meaning of new words such as *anthropoid*, *cuboid*, *meteoroid*, *ovoid*, *planetoid*, and the like. Without such instruction, students must memorise words as random labels or attempt to deduce the code themselves, increasing cognitive load and risking misunderstanding. Latin and Greek number forms are another important building block in subject terminology. Words such as *binary*, *triathlete*, *quadrilateral*, *heptathlon*, *octagon*, and *decimal* make use of Latin and Greek prefixes that, for those in the know, cue the meaning of the word. Teachers who can teach or revise these simple codes efficiently in the context of a lesson will provide students with powerful connections to meaning.

The benefit of embedding language and literacy in content instruction should not be underestimated. Students studying human physiology in the Western Australian Certificate of Education (WACE) Physical Education course, for example, must learn many Latin-based names for organs, structures, and locations in the human body. Many students struggle to memorise the labels on anatomical drawings, never stumbling upon the underlying code that would simplify their task. Complex names for the muscles and tendons of the human hand, for example, can be reduced to a small number of terms, if one understands the code:

Terms	Code
flexor carpi ulnar	Movement: flexor = bend, extensor = straighten
flexor pollicis longus	Parts: pollicis = of the thumb, carpi = of the wrist digitorum = of the finger
flexor pollicis brevis	
extensor digitorum	Location: radialis = outer bone, ulnaris = inner bone
extensor carpi radialis	
flexor digitorum radialis	Length: brevis = short, longus = long
flexor carpi superficialis	

The code is based on a few Latin names for parts of the hand, and a series of simple binary descriptors (*bend/straighten*, *long/short*, *inner/outer*). Knowledge of the code enables students to progress from memorising labels passively to generating the terms themselves (“What would we call a long muscle that bends the thumb?”). I have been surprised by the number of university PE majors who have self-reported, in response to this example, that they

had relied on brute-force memorisation throughout their training, and now wish “someone had taught [them] this three years ago.”

As these brief examples make clear, secondary teachers do require high levels of literacy—both general and disciplinary—if they are to provide effective content instruction in the classroom. As a foundation for their own learning, and for embedding language and literacy in their teaching, they need strong personal competence in *spelling, vocabulary, word building, grammar, and punctuation*.

We can now see that knowledge about the general literacy skills of pre-service teachers is indeed important for predicting their future prospects as educators. That is the rationale for the testing program outlined below.

Literacy Testing: Participants and Context

General literacy testing was conducted on three cohorts of students enrolled in a Bachelor of Education course at an Australian multi-campus metropolitan university.

The three cohorts were made up as follows:¹

Cohort 1: 70 students in year 3 of their course at Campus A, 2013

Cohort 2: 68 students in year 4 of their course at Campus B, 2014

Cohort 3: 65 students in year 3 of their course at Campus A, 2014

Each cohort contained students from across the full range of learning area specialisations offered at the university. The range of subject majors included Art, Design and Technology, Drama, English, Computing/IT, Digital Media, Home Economics, Mathematics, Music, Physical Education, Science, and Social Science.

It was not possible to identify individual students by major, although this is planned for future testing rounds. No attempt was made to differentiate the participants by gender, socio-economic status, ethnicity, language background, or other demographic markers. They are identified here only as trainee secondary teachers in the final two years of their course.

The context of the testing was diagnostic and pedagogical. Participants were tested on entry into a course unit dealing with literacy in teaching and learning, which is required for all secondary teaching undergraduates. The unit begins with a round of anonymous diagnostic testing of the students' own literacy skills. Results from the tests are used by the teaching team to plan a remediation program that targets any weaknesses identified in the cohort. The remainder of the unit introduces students to understandings about the role of literacy in learning and to practical literacy-support strategies for use in secondary school teaching.

It will be clear from the context that this testing was not a disinterested research exercise. The nature and content of the test was determined by the requirements of the work students were to undertake in the unit. Further, the test instruments were neither independently standardised nor normed. Therefore, no representation is made here as to the general validity of the results in relation to students at other Australian universities. The data are offered as a prompt for research and policy development, not as the results of a definitive investigation. Nevertheless, the School of Education in which the testing took place is one of the largest in Australia, and the data were obtained from three separate undergraduate cohorts totalling 203 students. This made the sample worth analysing as a snapshot of actual performance by a large number of trainee teachers.

It is noteworthy that the students were not antagonistic to the testing, and most welcomed the focus on literacy and literacy support as part of their professional preparation. Anecdotally, they expressed anxiety about their literacy skills, and attributed their low levels of confidence to a perceived neglect of literacy in their own schooling.

Test Procedure and Content

Students were tested in a single sitting on three dimensions of general literacy: spelling; vocabulary and word building; punctuation, sentence construction and grammar. Forty minutes were officially allocated for the testing at the end of workshop sessions, but in practice no strict time limit was imposed. Students were not required to submit papers until they had finished the tasks to their satisfaction. The tests were administered in workshop groups, but test papers were collected up and marked centrally. This was done to preserve anonymity and to allay any fears among students that their performance on the diagnostic test might provoke judgement from their tutor. The diagnostic and pedagogical purpose of the testing was explained fully. Students were encouraged to see the testing as beneficial to their progress; and their best performance was solicited.

A description of the tasks and the method of testing follows.

Part 1: Spelling

Students were given a called spelling test of twenty items and directed to write each word correctly in their answer booklet. The words were chosen from a corpus assembled from three sources: reading materials in core education units taken by the students; dictionary lists of commonly misspelled words; and the UK teacher literacy sample tests. Specialty discipline words were excluded, as this was intended as a test of general spelling competence for students of all disciplines.

The set of twenty words chosen for each test contained a balanced mix of easier and more complex words. Examples from each set included the following:

Easier	Harder
argument	amateur
beginning	conscience
coronary	exaggerate
definite	hypocrisy
maintenance	miscellaneous
principal/principle	parallel
resistant	rhythm
sentence	supersede

Some more complex words were included to test students' strategies for spelling unfamiliar or difficult words. These included words such as *questionnaire*, *fluorescent*, and *iridescent*.

Each word was announced clearly, then presented in a sentence that clarified the meaning, then announced again. For example:

Principal. The chief administrator of a school is the principal. Principal.

Tutors conducting the test were all native English speakers with clear enunciation. They repeated the cues if requested to do so.

Part 2: Vocabulary and Word Building

The second task was a test of vocabulary and morphological knowledge, including the ability to state word meanings and to identify word elements such as roots and affixes. Students were given ten words to define. These were projected onto the whiteboard or screen in a large font, to ensure legibility. The words were chosen from core education course materials and textbooks. A mixture of incidental vocabulary and key content words was chosen. Examples from each set included the following.

General vocabulary	Professional vocabulary
agrarian	cognition
candid	draconian
hyperbole	heterogeneous
orthodox	homogeneous
peninsula	pedagogy
malign	profession
sanguine	variance

There were two parts to the task. For each word, students were asked to give a plain English definition and then indicate anything they knew about the derivation of the word. Definition and derivation were each worth one point, so that each item was worth two points.

Two examples were given to demonstrate the task, as follows.

Bicycle: a pedalled vehicle with two wheels (*bi* = two, *cycle* = circle/wheel)

Thermometer: a device for measuring temperature (*thermo* = heat)

The examples given were loose derivations, not strict etymologies. ‘Thermometer’ should more correctly be expanded as *thermos* + *metron*, but the point of the examples was to encourage best guesses, rather than to intimidate and inhibit students by requiring strict accuracy. Points were awarded for general correctness, not finely detailed parsing of the Greek and Latin components.

Part 3: Punctuation, Sentence Construction, and Grammar

Four simple punctuation skills were tested: use of the single comma; use of a comma pair to indicate subordinate content in a sentence; use of the semicolon; and use of the colon. These were tested by the simple technique of inviting students to write a sentence on any topic, demonstrating correct use of the relevant punctuation mark. For example:

Write a sentence on any topic showing correct use of a comma pair to insert information in a sentence.

Inviting students to generate their own sentences is arguably a more forgiving task than requiring them to correct sentences generated by others. It gives the student control of the subject matter and allows for more open-ended responses.

A final task tested the ability to design and punctuate sentences that expressed logical operations such as statement, contrast, cause/effect, and condition. The task also tested whether students produced sentence fragments. The instructions were as follows.

Write four complete sentences on any topic. Include the following sentence types.

- One sentence beginning with *The*
- One sentence beginning with *Although*
- One sentence beginning with *If*
- One sentence beginning with *Because*

Use correct punctuation and grammar in your sentences. The four sentences do not need to be on the same topic.

Each item in Part 3 was worth one point, giving a score out of eight.

Results

The results presented below are arranged by skill category (*spelling, vocabulary, punctuation*) with scores for each of the three cohorts presented in each category. This approach allows an appraisal of the whole test population in relation to each skill, as well as a comparison of cohorts. Each category is followed by a brief interpretation of the results. A general discussion of the findings follows in the final section.

Spelling

The spelling test produced a stark and consistent picture of student ability across the three cohorts. Results are shown below using a simple frequency plot of test scores (Table 1). Numerical tallies are given to assist reading of the data.

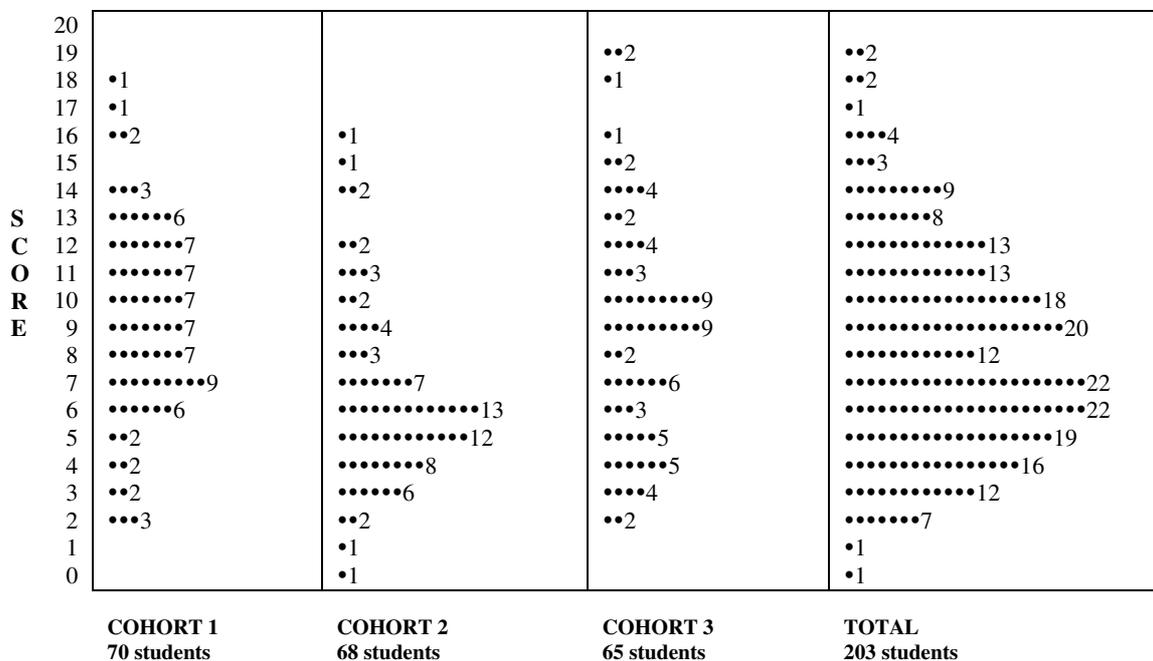


Table 1. Spelling scores /20 for three undergraduate cohorts.

A range of observations can be drawn directly from these data. No student was able to spell all twenty words correctly. The top score was 19/20 correct, the bottom score zero. Sixty-five per cent of students (132) across all three cohorts scored below ten correct spellings, while 95 per cent (193) scored below fifteen correct. Of the three groups, Cohort 2 had the lowest mean at 6.44, compared with 9.50 for Cohort 1 and 8.81 for Cohort 3. The combined mean was 8.25.

Without reference to a standard benchmark, it is difficult to say what constitutes a “pass” on the test, for this population. But there are good grounds for concluding that spelling performance across these three cohorts fell well short of the notional “top 30 per cent” of the population. A pass mark set at 50 per cent—arguably a generous target for a university cohort—would mean that the bulk of the students had failed.

More revealing than the raw scores, however, are the actual spelling attempts made by students. The raw test scores merely show whether attempts were right or wrong. They do not show the *degree* of error. Examination of the spelling attempts shows that many errors were not near misses, as one might hope, but substantial misspellings, some so severe that the intended word was almost unrecognisable to the markers.

The errors revealed a range of underlying deficiencies in personal literacy competence. These include apparent mispronunciation of common words (for example, *aquatense*, *defernent*, *parale*, *perfeSSIONal*); inability to derive the correct spelling from known roots (for example, *science* as the root for *conscience*, *conscientious*); and poor knowledge of some basic English spelling patterns (for example, the *ie* rule in *mischieF* and *mischievous*). These deficiencies clearly have implications for the ability of graduating teachers to model correct spelling in the classroom, to correct the written work of secondary students, or to tackle the more challenging task of teaching discipline-based literacy.

Examples of the spellings offered by the participants are set out in Table 2.

Word	Spelling attempts (More frequent errors listed first)
acquaintance:	aquantence, aquantens, aquatense, equaintence, eqaintens, equatense
amateur:	amature, amiture, ammatore, amenture, ameature
conscientious:	conconsious, conscieciious, conceincous, conciatious, coincideincous, consenshus
definite:	defanite, defernite, definent, deffanate, defernent, defernit
exaggerate:	exadgurate, exaduate, exaduarate, exhagurate, egsegerate, exahuat, eggagerate
miscellaneous:	miselanium, missalanium, miscilaneous, misalansious, misolonios, misoulances
mischievous:	mistevious, misgevious, misjeavous, mischivus, mistichevus, mistuphus, mystifous
parallel:	paralell, parralel, parralle, parrallele, parale
principal:	principle, prinspal, prinsipal, princaple, prinserpul
privilege:	privelage, prevelige, privellage, privarledge, priverledge
professional:	proffessional, proffessional, professional, peffessional, prufessional

Table 2. Examples of spelling errors for selected test items. Not all errors are represented.

Vocabulary and Word Building

Results for the vocabulary test revealed that students had effectively no knowledge of common word derivations, roots, and affixes. There were so few correct attempts that tabulation of the scores would serve no purpose other than to overshadow the scores for definition. For this reason, scores for word building and derivation have been separated from those for basic definitions. Scores out of ten for basic definitions are recorded below, in Table 3.

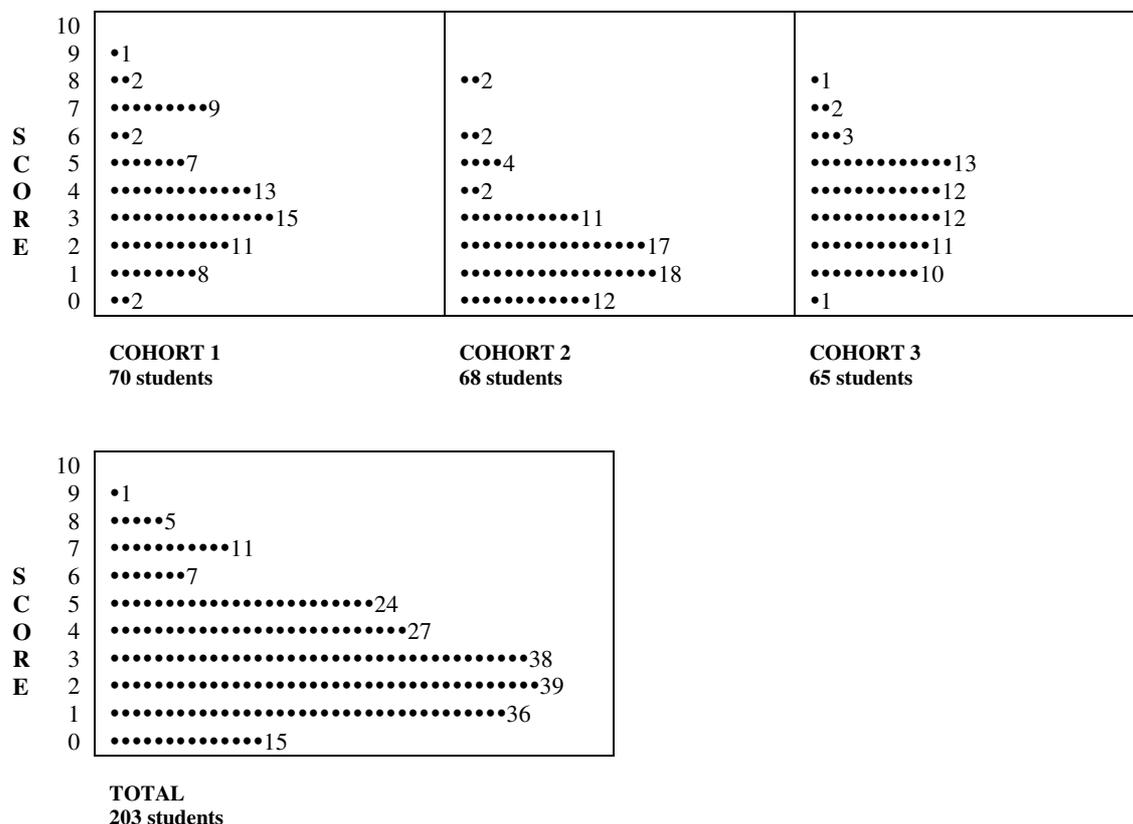


Table 3. Vocabulary scores /10 for three undergraduate cohorts.

The figures show definition scores only. Scores for word building have been omitted.

As was the case with the spelling scores, the raw data for vocabulary permitted a range of observations to be made. No student was able to define all ten of the words on the test. The top score was 9/10, obtained by one student. The bottom score was zero, obtained by 14 students. Seventy-six per cent of participants (154) scored below five correct items. Means of 3.74, 2.07 and 3.40, for Cohorts 1, 2, and 3 respectively, were achieved. The combined mean was 3.07. Once again, in the absence of a standardised benchmark it is difficult to interpret the results in terms of norms for this population; but a score of 50 per cent should not be beyond university students in their third or fourth year of study. A pass mark of 50 per cent would have meant that the great majority of participants had failed the vocabulary test.

The definitions and derivations offered by participants revealed that their knowledge of word meanings, roots and affixes was very limited in most cases, and close to zero for many. This is true not only for incidental vocabulary items, such as *hyperbole* and *orthodox*, but also for those terms that are part of their professional discourse, such as *pedagogy* and *homogeneous*. Very few students could accurately define pedagogy as the art or science of

teaching, and almost none could correctly relate the root *paedo* to “child” or “children.” (Strictly speaking, the word derives from the Greek *pais/paid* for “boy,” but the modern sense is “child.”) This is despite the word *pedagogy* being among the most prominent of the discipline-based terms used in teacher education courses. Examples of the definitions offered in this part of the test are given below in Table 4.

Word	Attempted definition
candid:	smug, contented, sure of yourself / a photo / something hidden / cooked in sugar
dextrous:	a food additive / intelligent / a chemical / the number ten / energy source
draconian:	to do with dragons / a medicine / ancient times
hyperbole:	a word used in English / a fruit (Jamaican) / to heat past the boiling point / a poem
kosher:	a sweet for dessert / a kind of weapon / a type of bean / a musical beat
malign:	cancer / no cancer / not in a line / misaligned / out of place
orthodox:	about the teeth or mouth / contaminated / old fashioned
pedagogy:	a word in education / your content knowledge / a personal view of teaching / knowledge of subject / beliefs of teaching / self knowledge
quadrilateral:	animal that walks on all fours / a shape with ten sides / a play ground
sanguine:	a type of pasta like linguine / a kind of sail / a salmon dish

Table 4. Selected vocabulary definitions from across three undergraduate cohorts.
Spelling has been corrected and punctuation removed.

The definitions offered by participants revealed a number of interesting limitations and confusions in vocabulary and word knowledge. While some erroneous definitions seemed to reveal a degree of awareness about roots and affixes, participants struggled to articulate this clearly. For example, the definition of *hyperbole* as “past the boiling point” implies knowledge of *hyper*, but the student who offered this definition could not isolate the root or give a formal account of it.

The same kind of error can be seen in a definition of *quadrilateral* as “an animal that walks on all fours.” Participants who did tease out number prefixes tended to get them wrong: thus *quad* was variously defined as “three,” or “four,” or “ten,” or “part of the leg.” Faced with such an array of responses, one has to conclude that the occasional correct definition may be nothing more than a lucky guess, rather than an awareness of the underlying etymological code.

Some of the responses seemed to show a tendency for subject specialists to make guesses that reflected their narrow knowledge base. Subject specialisations were not recorded on the test, but could in some cases be reasonably deduced from the responses. For example, many responses appeared to show Home Economics majors construing unknown words as cookery terms. *Candid* was apparently misread as *candied* by a number of participants, and defined as “cooked in sugar” or “burned sugar.” *Sanguine* was identified as a type of pasta, apparently based on its orthographic similarity to *linguine*. *Dextrous* was misidentified as *dextrose* by many of the same respondents.

Other participants, perhaps Physical Education majors, interpreted words, roots and affixes as parts of the body: thus *quad* (in *quadrilateral*) was identified not as the Latin number prefix for four, but as “part of the leg.” The definition was presumably based on *quadriceps*, the thigh muscle—so named because it has four insertion points (a naming

convention evidently unknown to the students who offered this particular decoding of the word).

The attempted definitions for *pedagogy*, and related educational terms, were also revealing. While a few participants correctly linked “peda” to “child,” and others made reasonable guesses for “student” or “pupil,” many more made connections that were simply nonsensical given the general usage of the term:

- “peta” = knowledge
- “peda” = personal experience
- “peda” = large, overarching
- “peda” = thought
- “peda” = many
- “peda” = books or instruction
- “peda” = the self

Doubtless the participants were attempting to make some logical connection to teaching; but in doing so they revealed a worrying ignorance of the actual meaning of this important term.

The findings from this section of the test are particularly troubling in terms of the participants’ capacity to assist their future students with the challenges of discipline-based literacy. As we have seen, breaking the code of specialist discourses calls for a sound knowledge of word morphology, including some common Greek and Latin roots and affixes.

Punctuation and Sentence Construction

Punctuation and sentence construction skills were tested by means of the short composition tasks described earlier. Participants wrote single sentences to demonstrate the use of a punctuation mark, or to show a statement, cause-effect connection, or conditional proposition. A combined score out of eight was generated from this section of the test. Results are set out below in Table 5.

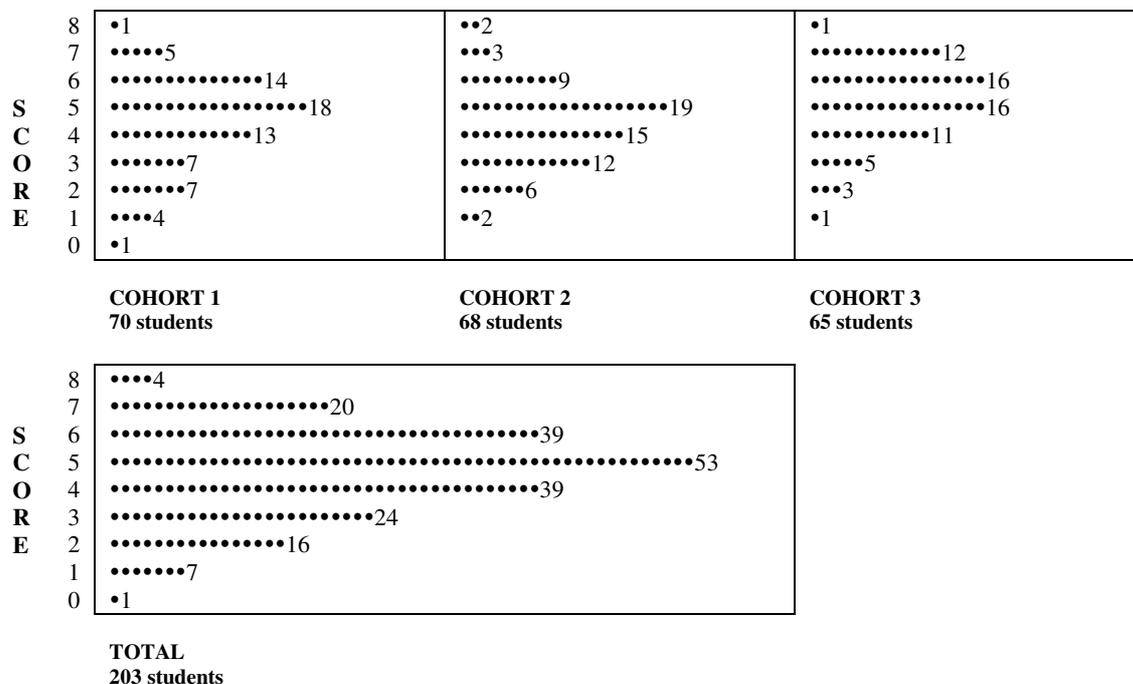


Table 5. Punctuation and sentence construction scores /8 for three undergraduate cohorts.

Scores were generally higher on this section of the test. Four students scored 8/8, while only one achieved a score of zero. Fifty-seven per cent of participants scored 5/10 or above, the combined mean score being 4.62. Means for the three cohorts, at 4.40, 4.35 and 5.13 respectively, were aligned more closely than for the other tasks. This was the only section of the test in which the mean score was above 50 per cent. That said, the tasks were very simple, and it should have been possible for most students in the final years of a Bachelor Degree to achieve very well.

The sentence writing tasks revealed that most students could use a single comma correctly to separate list items. Fewer, however, were able to correctly insert modifying information into a sentence using a comma pair. Use of the colon and semicolon was much less accurate, with knowledge of the colon being marginally better than that of the semicolon. Some students incorrectly took “comma pair” to mean quotation marks, while others confused comma with apostrophe. A few struggled with the very basic task of writing a simple sentence containing a comma.

In the sentence construction tasks, sentences begun with “Because...” and “Although...” were often incorrect. Many students produced sentence fragments, instead of recognising that these were conditional openings that needed to be followed by a main clause. Perhaps suspecting a trap, some students argued (incorrectly) that a sentence should never start with “Because.”

Such dogmatic insistence upon non-existent rules of grammar raises concerns about the rules that some graduates will promote in their own classrooms. This is further evidence that personal literacy competence is essential for effective classroom practice. Examples of sentence construction attempts are set out below in Table 6.

Simple Punctuation (Comma, comma pair, colon, semicolon)

I like the colour green but, blue is a close second.
I met a lady, her name was Jane, she helped me move some bricks.
The man said; “hello” to me.
At the zoo I saw an elephant, he has big ears.
Playing the electric guitar ; 12 bars are in the chorus.
I can’t, believe, she can’t hit a ball.
Fold in the flour ; gradually to avoid any lumps.
The red frog; the animal that is red.

Sentence logic, Punctuation, Grammar (Using *The, If, Although, Because*)

The game was too far away to attend. Although I would have enjoyed it.
The man did not eat the cake. Because he was on a diet.
The dog jumped the fence. Because the dog was chasing a cat. Although it got away.
Although the two object are different they similarity. [sic]
Although, I know what you are saying.
Because I said so. If you don’t mind. Although why would of you!
Although cats don’t like water.

Table 6. Examples of sentence construction and punctuation from across three undergraduate cohorts. Not all errors are represented.

Discussion

The diagnostic testing described in this report has a number of obvious limitations in test design and analysis, notably the lack of standardised performance benchmarks against which each participant's scores can be measured. No doubt this is an issue that AITSL will have to address in designing national tests to replace the proxy measures currently used to define the "top 30 per cent" literacy standard.

Objections might also be raised against the format of the tests, which treated language skills in isolation and out of context. Participants might score better on embedded skills tests—for example, where incorrect spellings must be identified in a passage of text, and punctuation errors corrected in existing sentences. (Embedded testing is now being used in the final assessment of the course unit, but it is too early to establish correlations between the existing diagnostic test and the new final assessment.)

Analysis of the results by degree major, by entry pathway, by gender, by language background, and other variables, could also contribute more to our understanding about the skill levels of the cohorts, and the factors that influence them. So, too, would an analysis of the correlations between skill sets (Are poor spellers also bad at punctuation? Does limited vocabulary correlate with poor spelling?).

Accepting these objections, the test results nevertheless provide some valuable insights into the language and literacy performance of some 200 teachers in training. Once in the classroom, these teachers will be required to provide spontaneous displays of literacy competence: writing on the board; answering unanticipated questions from students; responding to and correcting written work; translating textbook content into student notes; and so on. Such situations have much in common with the test activities reported here. The teacher must display wide vocabulary knowledge, perceive and explain connections between words, spell correctly without notice, and compose clear sentences. There is enough evidence in the test results to suggest that many undergraduates in this Bachelor of Education course lack the personal literacy competence to perform those tasks to a professional standard. This is a concern, given the evident importance of language and literacy competence in ensuring effective teaching.

It is noteworthy that on all tasks the means were lowest for Cohort 2. Students in this cohort included a greater proportion of mathematics, science, and physical education majors, while Cohorts 1 and 3 were made up largely of arts and humanities majors. While it is tempting to interpret this as evidence of differential capacities related to learning area specialisations, the picture is more complex. First, many students enrol in units across campuses, resulting in a greater mix of majors in each cohort than might be expected on the basis of campus location. Second, the range of scores within each cohort was not dramatically different from the overall range, indicating that there were equally strong and equally weak performers in each group. Without more precise knowledge of each participant's specialisation it would be unwise to draw firm conclusions about the relative strength or weakness of students in specific learning areas.

The overall picture presented by the results is concerning and yet familiar. It is consistent with the somewhat gloomy portrait of trends in teacher quality painted in a number of recent reviews and reports (Department of Education, Science and Training, 2003; Leigh & Ryan, 2008; Leigh, 2012; Loudon, 2007; Watson, 2005). It is also consistent with prior studies of teacher-education cohorts in Western Australia, including reports by Scriven (1987) and Watts (1991), both of whom assessed the literacy skills of earlier generations of student teachers. Scriven reported failure rates of 40 per cent in literacy testing of teacher education students at the University of Western Australia and the WA College of Advanced

Education (1987, p.110); while Watts noted that at Curtin University his spelling benchmarks were met by 43 per cent of secondary trainees, and his punctuation benchmark by 25 per cent (1991, p.23). Those earlier studies, triggered initially by the Beazley report on education in WA (Beazley, 1984), appear to have much in common with the findings presented here, more than two decades on.

Following the reports of Beazley, Scriven, Watts and others, and driven by an ongoing media focus on teacher literacy, new initiatives were implemented at training institutions in Western Australia in the late 1980s and early 1990s. This included systematic testing, formal remediation programs, and clear literacy benchmarks for students taking education degrees. Those benchmarks proved to be effective barriers to the academic progression and graduation of some students. The result was a wave of appeals and objections, and a drop in graduation rates that (briefly) affected the supply of teachers in some subject areas that were already experiencing shortfalls—such as mathematics.² Eventually, however, the barriers were dismantled. Bachelor of Education degrees were replaced (temporarily, it turned out) by double degree courses, and the literacy issue disappeared from public view.

It appears that not much has changed in the intervening decades. While the various testing regimes cannot be compared directly with one another without a common set of standards to align them, the raw evidence of student performance on spelling, vocabulary and writing tasks still suggests that some graduating teachers have literacy skills below the ability level of the students they will be hired to teach. It is true that these simple diagnostic tests reported here are narrow and partial measures, and that literacy is a larger and more complex set of skills and abilities than has been sampled here. But as we have seen, teachers are often called upon spontaneously to perform precisely this kind of task, such as when writing on the board for students, or when offering off-the-cuff definitions in response to a question. While the occasional near-miss is to be expected, many of the errors reported here point to significant—and probably long-standing—deficits in spelling, vocabulary, and punctuation.

The prospect of national testing by AITSL is a new development. If it comes to pass, it will be the first such large-scale initiative in the modern history of Australian teacher education. It could be a game changer. But the question that will inevitably arise is this: will training institutions, departments of education, and schools have the stomach to stick by the proposed standards if new literacy hurdles threaten teacher supply at a time of predicted shortage? Or will we discover that the tolerance for error increases as supply tightens?

In the meantime, there are some clear implications in these results for institutions that are preparing secondary teachers. One implication is that literacy must remain a focus in all course units across all specialisation areas. Specialist curriculum courses, in particular, must address the discipline-based literacies that are vital to student progress. This means integrating literacy into the study of subject content and methods, as recommended by the *Australian Curriculum* in relation to secondary schooling (ACARA 2013). The body of research and resource material needed to achieve this is already well established, and there can be little excuse for failing address the issue.

University academics must remember that they too are teachers of literacy. That means maintaining an explicit focus on teaching the vocabulary, usages, and text forms associated with general university subjects. This includes taking time to define and explain key terms such as *pedagogy*, and using appropriate metalanguage with students in such discussions (noun and verb, passive and active voice, root and affix, and the like). The practice of handing over pre-written PowerPoint summaries to students, rather than requiring them to write notes in class, might also need to be revised, if we hope to strengthen the spelling and composition skills of future teachers. Taking their own notes requires that

students use and spell key vocabulary in context, on a daily basis, instead of functioning as mere collators and organisers of course material prepared by tutors.

Under pressure from the Commonwealth, new literacy assessment measures and remediation programs are already being developed in many institutions. These range from post-entry tests to assessment schemas, from support services to supplementary remedial units. Such measures are entirely appropriate, but they must not take the place of daily attention to literacy in lectures and workshops. Literacy skills develop best when they are embedded meaningfully in the content and context of other activity.

If the findings presented here are representative of wider problems, then the measures outlined above will still not be enough to meet the objective of graduating teachers whose literacy skills are in the top 30 per cent of the population. Many undergraduate students appear to have literacy problems so fundamental that remediation in the late stages of their degree program cannot hope to overcome a lifetime of poor literacy performance. It seems that problem can only be addressed in future by setting and applying appropriate admission standards and intervening much sooner in the students' academic careers.

Notes

¹Students at Campus A enrol for curriculum literacy study in Semester 2 of their third year. Those at Campus B enrol in Semester 1 of their fourth year. Proportionally, there are more humanities courses at Campus A, and more science courses at Campus B, but many students enrol across campuses and out of step, so that in practice the groupings are mixed.

²The author was a literacy coordinator at one Western Australian tertiary institution from 1986 until 1989, and was involved in the testing and remediation programs established in response to Beazley and Scriven.

References

- Alvermann, D. & Phelps, S. (1998). *Content reading and literacy*. Boston, MA: Allyn & Bacon.
- Australian Curriculum and Reporting Authority (ACARA). (2102). *General Capabilities in the Australian Curriculum*. Canberra: ACARA. Retrieved August 12, 2014 from: <http://www.australiancurriculum.edu.au/GeneralCapabilities/Pdf/Literacy>
- Australian Institute for Teaching and School Leadership (AITSL). (2013). Year 12 study score results as proxy indicators of personal literacy and numeracy. Retrieved August 12, 2014 from: http://www.aitsl.edu.au/docs/default-source/initial-teacher-education-resources/aitsl_initial_teacher_education_standard_3_year_12_study_scores.pdf
- Australian Institute for Teaching and School Leadership (AITSL). (2014). Literacy and numeracy standards. Retrieved August 12, 2014: <http://www.aitsl.edu.au/initial-teacher-education/literacy-and-numeracy-standards>
- Beazley, K. E. (1984). *Education in Western Australia. Report of the Committee of Inquiry into Education in Western Australia*. Perth, Western Australia: Government Printer.
- Department of Education, Science and Training, Committee for the Review of Teaching and Teacher Education. (2003). *Australia's Teachers: Australia's Future – Background Data and Analysis*. Canberra: Department of Education, Science and Training.

- Department for Education (United Kingdom). (2014). Literacy test for trainee teachers. Retrieved August 12, 2014 from: <http://www.education.gov.uk/sta/professional/b00211208/literacy>
- Ehrenberg, R.G. & Brewer, D.J. (1994). Do school and teacher characteristics matter? Evidence from *High School and Beyond*. *Economics of Education Review*, 13, 1, 1-17. [http://dx.doi.org/10.1016/0272-7757\(94\)90019-1](http://dx.doi.org/10.1016/0272-7757(94)90019-1)
- Harmon, J.M. & Wood, K. D. (2008). Content-area vocabulary: a critical key to conceptual learning. *Adolescent Literacy in Perspective*, 2-6. Adlit.org. Retrieved September 29, 2013 from: <http://ohiorc.org/adlit/>
- Hattie, J.A., Clinton, J., Thompson, M., & Schmidt-Davies, H. (1995). *Identifying Highly Accomplished Teachers: A Validation Study*. Greensboro, NC: Center for Educational Research, University of North Carolina.
- Hattie, J.A. (2003). Teachers make a difference. Paper delivered to the Australian Council for Educational Research Conference, *Building Teacher Quality*. Melbourne, 19-21 October. Retrieved July 24, 2009 from: http://www.acer.edu.au/workshops/documents/Teachers_Make_a_Difference_Hattie.pdf.
- Hattie, J.A. (2009). *Visible Learning: A Synthesis of 800+ Meta-analyses on Achievement*. London: Routledge.
- Heller, R. & Greenleaf, C.L. (2007). *Literacy Instruction in Content Areas: Getting to the Core of Middle and High School Improvement*. Washington DC: Alliance for Excellence in Education.
- Leigh, A. (2012). Teacher pay and teacher aptitude. *Economics of Education Review*, 31, 41-53. <http://dx.doi.org/10.1016/j.econedurev.2012.02.001>
- Leigh, A. & Ryan, C. (2008). How and why has teacher quality changed in Australia? *Australian Economic Review*, 41, 141-159.
- Louden, W. (2005). *Prepared to Teach: An Investigation into the Preparation of Teachers to Teach Literacy and Numeracy*. Canberra: Department of Education, Science and Training.
- Louden, W. (2007). *Submission to the Senate Employment, Workplace Relations and Education Committee: Inquiry into the Academic Standards of School Education*. Retrieved October 6, 2014 from: http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Education_Employment_and_Workplace_Relations/Completed%20inquiries/2004-07/academic_standards/submissions/sub73.pdf.ashx
- Louden, W. & Rohl, M. (2006). 'Too many theories and not enough instruction': Perceptions of pre-service teacher preparation for literacy teaching in Australian schools. *Literacy*, 40, 2, 66-78. <http://dx.doi.org/10.1111/j.1467-9345.2006.00440.x>
- Mead, S. & Leigh, A. (2005). Lifting teacher performance. *PPI Policy Report (April)*, p.4. Retrieved August 24, 2014 from: <http://www.PPIOnline.org>
- Ramsey, G. (2000). *Quality Matters – Revitalising Teaching. Report of the Review of Teacher Education*. Sydney, New South Wales: Department of Education and Training.
- Rowe, K.J. (2003). The importance of teacher quality as a key determinant of students' experiences and outcomes of schooling. Paper delivered to the Australian Council for Educational Research Conference, *Building Teacher Quality*. Melbourne, 19-21 October.
- Rowe, K.J. (2004). In good hands? The importance of teacher quality. *Educare News*, 149, 4-14.
- Ruddell, M. (2001). *Teaching Content Reading and Writing*. Third ed. New York: John Wiley & Sons.

- Shanahan, T. & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents. *Harvard Education Review*, 78, 1, 40-59.
- Scriven, M. (1987). Critical thinking and the concept of literacy. *Informal Logic*, IX, 93-110.
- Vacca, R. T., & Vacca, J. L. (1999). *Content Area Reading: Learning Across the Curriculum*. Sixth ed. Glenview, IL: Scott, Foresman.
- Watson, L. (2005). *Quality Teaching and School Leadership: A Scan of Research Findings*. Canberra: National Institute for Quality Teaching and School Leadership.
- Watts, O. (1991). Who is teaching our children to spell? The literacy crisis in teacher education. *The Australian Journal of Teacher Education* 16, 1, 22-27.
<http://dx.doi.org/10.14221/ajte.1991v16n1.3>

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