NURTURING WONDER AND IGNITING PASSION

Designs for a future school curriculum

NSW CURRICULUM REVIEW
Interim Report
October 2019

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Interim Report

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Disclaimer

As this is an independent review, the report does not necessarily reflect the views of the New South Wales Government.

This document when attributed must be titled as *Nurturing Wonder and Igniting Passion, designs for a future school curriculum: NSW Curriculum Review Interim Report.*

PREFACE

In May 2018 the NSW Government announced a comprehensive review of the New South Wales (NSW) school curriculum from Kindergarten to Year 12 to 'ensure that the NSW education system is properly preparing students for the challenges and opportunities of the 21st century'. The announced Review was described as the first major review of the entire school curriculum since 1989 and would 'take into account and expand on' the findings of the 2018 Gonski *Review to Achieve Educational Excellence in Australian Schools*.[1]

This report is an interim report of the Review. It has been produced as a progress report and a basis for consultation on the broad directions it identifies. Following these consultations a final report will be prepared, including recommendations, and delivered to the Minister for Education and Early Childhood Learning in the first half of 2020.

Through public consultations across NSW, meetings with several dozen stakeholder groups, and more than 2000 short- and long-form online submissions, the Review has sought and received views on the current curriculum and, in particular, on desirable features of the future school curriculum. People have been generous with their time and deeply thoughtful in providing advice. They have welcomed the opportunity and challenge to envision a curriculum appropriate to school education well into the future.

A strong and consistent message received by the Review is that change is required. The current curriculum arrangements are not the arrangements that will best serve children and young people of NSW in the future. The crowded nature of the curriculum, including the amount of content that some syllabuses expect teachers to cover, is not conducive to teaching in depth or helping students see the relevance of what they are learning. The lock-step nature of the curriculum, including the specification of what should be taught, when it should be taught, and how long should be spent teaching it, does not provide the flexibility teachers require to ensure every student is appropriately challenged and making excellent progress. Teaching and learning in the senior secondary school are perceived to be overly focused on examination preparation, maximising the Australian Tertiary Admission Rank (ATAR), and university entrance, and insufficiently focused on equipping every student with the knowledge, skills and attributes they will require for further learning, life and work.

Many people encouraged the Review to be bold in its recommendations, reflecting the belief that substantial change is required. This Interim Report attempts to do this by providing broad directions for reform. Beyond identifying desirable adjustments to the existing curriculum, it proposes general design concepts for a possible future curriculum. The Review envisages syllabuses that are leaner in content and more focused on developing deep understandings of disciplinary concepts and principles; a curriculum structure that better recognises and accommodates the wide variability in students' levels of attainment; the closer integration of theory and application and an increased focus on building students' skills in applying knowledge; and a more integrated and broader approach to the senior secondary curriculum than syllabuses focused primarily on knowledge or primarily on skills.

A consequence of focusing on broad design concepts is that questions relating to practical implementation are not yet answered. The proposed curriculum reforms are seen as a long-term agenda, possibly requiring a decade of planning, trialling, revising and then implementing. A first question is whether these are appropriate directions for reform. That is the purpose of the next stage of consultations. For each proposed reform direction, a set of questions has been posed to prompt discussion and debate.

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[1] Department of Education and Training, *Through growth to achievement: report of the review to achieve educational excellence in Australian schools*, Australian Government, Canberra, 2018, viewed 25 July 2019, <https://docs.education.gov.au/documents/through-growth-achievement-report-review-achieve-educational-excellence-australian-0>.

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TERMS OF REFERENCE

The NSW Education Standards Authority (NESA) has been tasked with 'a review of the NSW curriculum to ensure it equips students to contribute to Australian society in the 21st century' (the Review).

The Review is conducted in a context of a high performing NSW Education system, which strives to meet the needs of a wide range of students, including those who are Aboriginal, or from culturally and linguistically diverse backgrounds, or living with disabilities.

The Review will undertake a comprehensive community engagement process to seek the diversity of views in the community, including the views of young people, parents, employers and those involved in the delivery of school education. These Terms of Reference have been developed following targeted stakeholder engagement.

The aim of the Review is to enhance the effectiveness of school education in NSW to:

- provide an education that engages and challenges every child and young person in learning, rewards them for effort and promotes high standards, and
- prepare each student with strong foundations of knowledge, capabilities and values to be lifelong learners, and to flourish in a world in which rapid technological advances are contributing to unprecedented economic and social change in unpredictable ways.

The Review will consider the strengths and weaknesses of the current NSW curriculum, its relationship to the Australian Curriculum and its accessibility to the diverse learners of the NSW community.

The Review, in developing its recommendations, should:

1. articulate the purposes of the school curriculum, including underpinning philosophies and principles
2. identify essential knowledge, skills and attributes as the common entitlement for all learners, ensuring parity of access to learning that is necessary for success, taking account of:
   a. the evidence on how skills and attributes are acquired through knowledge-based disciplines
   b. the extent of overcrowding in the curriculum
   c. the appropriate scope for school community choices about content
3. explain how the curriculum could be redesigned and presented to better support teaching, learning, assessment and reporting, including by considering:
   a. the desirability of identifying priorities for learning at different stages of schooling
   b. the appropriate level of detail in curriculum documents
   c. the breadth and depth of study
   d. ways of improving every learner's transition into school and across the years of schooling
   e. ways of enhancing the options and pathways for all students to further education and work
4. identify the implications of any new approach to curriculum design for:
   a. assessment and reporting (including NAPLAN, the Record of School Achievement and the Higher School Certificate)
   b. pedagogical practices and teacher workload
   c. teacher preparation and ongoing professional learning
   d. school organisation and regulation
   e. relevant legislation
   f. measuring the quality and impact of schooling.

The Review will have regard to:

- National policy developments and reports, including:
  - the *National Aboriginal and Torres Strait Islander Education Strategy 2015*[2] , and the national *Closing the Gap* strategy
  - *Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools*.[3] The Review will contribute appropriately to any related national processes
  - *Lifting Our Game: Report of the Review to Achieve Educational Excellence in Australian Schools through Early Childhood Interventions*[4]
  - Australia's Chief Scientist, Dr Alan Finkel's report *Optimising STEM industry-school partnerships: inspiring Australia's next generation*[5]
  - the *Independent Review into Regional, Rural and Remote Education* conducted by Emeritus Professor John Halsey[6]
  - the *Review of the Australian Curriculum: Final Report.*[7]
  - Obligations under the Disability Discrimination Act 1992[8] and the Disability Standards for Education 2015[9]
  - The 2016 BOSTES Review[10] (particularly in relation to the crowded curriculum) and the Stronger HSC Reforms[11] introduced from 2017
  - Any significant lessons to be drawn from other Australian jurisdictions including in their implementation of the Australian Curriculum, as well as perspectives from international jurisdictions where there have been recent reviews and curriculum revisions
  - Corresponding work of the Australian Curriculum, Assessment and Reporting Authority (ACARA) to review and refine the Australian Curriculum, including international research.

[2]   Education Council, *National Aboriginal and Torres Strait Islander: Education Strategy 2015*, 2015, viewed 6 August 2019, <http://www.educationcouncil.edu.au/site/DefaultSite/filesystem/documents/ATSI%20documents/NATSI_EducationStrategy_v3.pdf>.

[3]   Department of Education and Training, *Through growth to achievement.*

[4]   S Pascoe & D Brennan, *Lifting our game: report of the review to achieve educational excellence in Australian schools through early childhood interventions*, Victorian Government, Melbourne, December 2017, viewed 6 August 2019, <https://education.nsw.gov.au/early-childhood-education/whats-happening-in-the-early-childhood-education-sector/lifting-our-game-report/Lifting-Our-Game-Final-Report.pdf>.

[5]   Education Services Australia, *Optimising STEM industry-school partnerships: inspiring Australia's next generation: final report April 2018*, 12 April 2018, viewed 6 August 2019, <https://www.chiefscientist.gov.au/2018/05/optimising-stem-industry-school-partnerships-report-released/>.

[6]   J Halsey, *Independent review into regional, rural and remote education: final report*, Department of Education and Training, January 2018, viewed 6 August 2019, <https://docs.education.gov.au/documents/independent-review-regional-rural-and-remote-education-final-report>.

[7]   Review of the Australian Curriculum, *Review of the Australian Curriculum: final report*, Australian Government Department of Education, 2014, viewed 6 August 2019, <https://docs.education.gov.au/documents/review-australian-curriculum-final-report>.

[8]   Cwlth, *Disability Discrimination Act 1992*, 1992, viewed 6 August 2019, <https://www.legislation.gov.au/Series/C2004A04426>.

[9]   Department of Education and Training, *Disability Standards for Education 2005 plus guidance notes*, 2005, viewed 6 August 2019, <https://docs.education.gov.au/documents/disability-standards-education-2005>.

[10] W Louden, L Paul & P Lambert, *Review of the Board of Studies, Teaching and Educational Standards: report of the independent panel*, NSW Government, 2016, viewed 6 August 2019, <https://educationstandards.nsw.edu.au/wps/portal/nesa/about/news/news-stories/news-stories-detail/reviewing-the-board-of-studies-teaching-and-educational-standards>.

[11] Board of Studies Teaching & Educational Standards NSW (BOSTES), *Stronger HSC standards: blueprint*, n.d., viewed 6 August 2019, <https://educationstandards.nsw.edu.au/wps/wcm/connect/d210fd41-8c61-4754-aa45-7476b9305b1d/stronger-hsc-standards-bostes-blueprint.pdf?MOD=AJPERES&CVID=>.

EXECUTIVE SUMMARY

This Review of the New South Wales (NSW) school curriculum has concluded that change is required. The changes proposed by the Review are significant. They relate to the amount and nature of syllabus content, the overall structure of the curriculum, and the focus of learning in the senior years of school. Given the depth of the proposed changes, detailed planning, trialling, testing and implementation will be required over an extended period of time – possibly a decade – although work on some changes should begin immediately. The long-term vision is for a future school curriculum that supports teachers to nurture wonder, ignite passion and provide every young person with knowledge, skills and attributes that will help prepare them for a lifetime of learning, meaningful adult employment and effective future citizenship.

Although the school curriculum has served students well and continues to provide the foundations for a quality education, the Review was presented with strong evidence of the need for change. Broader changes in society, and particularly increasing globalisation and advances in technologies, have changed forever the world in which students live, including future employment possibilities. With a rapidly expanding range of activities now being performed by machines or outsourced to low-wage economies, occupations of the future will require levels of knowledge and skill beyond the capabilities of current and emerging technologies, including those based on artificial intelligence. The new and urgent challenge for schools and the school curriculum is to ensure that all students reach levels of attainment currently achieved by only some. This challenge is being taken seriously by some school systems internationally that recognise the risk of growing numbers of students being left unemployable and economically disadvantaged throughout their lives, with likely implications for increasing social inequalities and tensions.

However, by some indicators, current trends in student attainment in this state appear to be in the opposite direction. Although there is evidence of improvement in reading levels in primary schools (based on NAPLAN tests conducted between 2008 and 2018), the proportion of NSW 15 year olds meeting minimally acceptable standards of reading, mathematical and scientific literacy has been in steady decline (based on PISA assessments conducted between 2000 and 2015). NSW students slipped from being among the highest performers in the world in 2000 to being near the OECD average in 2015.[12] In other words, while low-level skills are in declining demand in workplaces, the proportion of NSW 15 year olds with only low-level skills has been growing. Reforms to the content and structure of the curriculum, although only part of the solution, are essential in addressing this challenge.

Teachers who spoke with the Review made strong calls for change. They described many current syllabuses as overcrowded with content, impacting their ability to teach effectively. They commonly described being under time pressure to cover large numbers of syllabus 'dot-points'. As a result, they experience difficulty in slowing down teaching and re-teaching to ensure students have learnt; they have limited time to teach core ideas in depth, including by providing opportunities for students to apply their learning in a range of contexts; and they often have insufficient time to build skills in knowledge application through student projects and problem-based activities. The crowded nature of many syllabuses, particularly in primary schools, but throughout the years of school, was described as encouraging superficial coverage of material rather than teaching for understanding, exploring relevance and meaning, and providing opportunities for students to transfer and apply their learning.

Teachers described most (but not all) existing syllabuses as specifying what they are to teach, when they are to teach, and how long they are to spend teaching it. This often constrains their ability to make

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[12]   Some submissions to the Review questioned the continuing usefulness of measures such as NAPLAN and PISA. It was claimed that some schools now train students for NAPLAN (possibly inflating current results) and that there are now other important outcomes of schooling not measured by these assessments. Although these claims may be valid, literacy and numeracy skills remain among the most important outcomes of schooling, and NAPLAN and PISA provide the best available data on recent state and national trends.

professional judgements about what individual students are ready to learn and to adapt their teaching accordingly. Teaching becomes a process of delivering the specified year-level syllabus, ensuring it is fully covered, and then assessing and grading each student on how well they have learnt what has been taught. The inflexibility arising from the expectation that teachers will deliver the same content to all students within mandated (or recommended) hours means that some students are taught content for which they are not yet ready or require more time. As a result, these students struggle, tend to achieve low grades year after year, and sometimes fall further behind the longer they are in school. On the other hand, the most advanced students – who typically begin each school year five or six years ahead of the least advanced students in the year level – often are not adequately challenged by the content of year-level syllabuses. There was concern that many of these students are not being stretched to the levels of which they are capable. The strong call from many teachers was not only for a less crowded curriculum, but also for a more flexible curriculum that allows teachers to identify and better address individual learning needs.

There were also calls for change in the senior years of school. Although the Higher School Certificate is widely described as a world-class credential, submissions to the Review pointed out that learning in these years currently is driven by the needs of post-school destinations and is bifurcated into 'academic' (mainly knowledge-based) learning, usually to maximise the Australian Tertiary Admission Rank (ATAR) for selection into universities, and 'vocational' (mainly skills-based) learning for specific occupations. Current arrangements were described as promoting artificial and unhelpful distinctions between academic and vocational learning, theory and application, and knowledge and skills. There was particular concern about the undervaluing of forms of learning that would better prepare all young people for future employment. Vocational courses were described as marginalised in current senior secondary arrangements and sometimes focused on low-level qualifications and skills for particular occupations that may or may not exist in the future.

There were also concerns about the 'academic' stream in the senior years. It was observed that, when the school leaving age was raised to 17, rather than reconsidering the kind of senior years curriculum that would be appropriate for the entire age cohort, it was assumed that most students would now follow the academic pathway through ATAR to university, and those who did not could undertake vocational studies. However, teachers questioned whether this assumption met the needs of every student. Teachers also expressed concerns about the limited forms of learning promoted by current external examinations. Some were concerned about cramming, the pre-preparation of answers, and the influence examinations have on learning priorities and approaches throughout the secondary school. Others expressed concerns about ATAR now being the dominant measure of 13 years of schooling and students attempting to 'game' ATAR through their choices of subjects.

This bifurcation of learning in the senior years parallels early 20th century attempts to cater for the growing number of 'non-academic' students entering lower secondary schooling. The 'academic' and 'non-academic' streams established at that time, with their separate courses and certificates, were eventually abolished in favour of common curriculum arrangements (core plus options) for all students. A long-term reform agenda for the senior years of school will be to develop a curriculum less focused on meeting the sometimes narrow needs of particular post-school destinations and more focused on providing every student with the broad knowledge, skills and attributes they will require for further learning, life and work.

Based on consultations and submissions to the Review, three broad areas of curriculum reform have been identified. These relate to the content of the curriculum, the structure of the curriculum and the senior school curriculum. Although these areas are inter-related, they also represent distinct areas of reform. Within each area, a number of 'reform directions' have been identified.

Reforming the content of the curriculum

The Review's first set of proposals address the content of the curriculum, including concerns that many syllabuses are currently overcrowded. They propose a reduction in the content of most syllabuses by prioritising what is central to each subject. The intention is to promote deep learning of core disciplinary knowledge. Although depth and breadth of learning are both important, the proposed changes preference deeper conceptual understanding over shallower coverage of extensive factual and procedural detail. The intended outcome is not quantitatively less teaching or learning, but teaching and learning refocused to develop deeper understandings and higher levels of skill.

The reduction of syllabus content should begin with the identification of what is essential to a subject – the core knowledge, concepts and principles at the heart of the discipline. These include disciplinary ways of thinking and working and the 'big ideas' around which less central detail can be organised and understood. In some subjects there may be relatively few of these. An indicator of the centrality of a concept or principle is likely to be its sustained relevance across the years of school and the fact that students develop deeper understandings of that concept or principle as they revisit it in different contexts.

Deep understanding includes being able to recognise how learning is relevant to, and can be applied in, different contexts. The mere acquisition of knowledge and skills is insufficient; opportunities to transfer and apply learning to new contexts should be an integral part of every subject throughout the years of school. Applications of learning, including to meaningful challenges and problems and through projects that students undertake, also provide opportunities to build students' skills in knowledge application – such as critical and creative thinking, using technologies, interpreting information/data, collaborating and communicating.

Teachers require time for teaching of this kind. The Review was told that the school curriculum had become more crowded in recent years because of additional topics schools have been asked to address. These topics often relate to specific health, safety or social concerns not being addressed elsewhere in society. Recent additions of this kind should be revisited to determine whether all are still required, and protocols developed to determine how topics could be added or deleted in the future.

There were other concerns that time for teaching was being eroded by increasing compliance requirements. Numerous references were made to 'box ticking' and paperwork now required of teachers. The New South Wales Education Standards Authority (NESA) should investigate options for reducing the time teachers and school leaders currently spend on compliance activities.

Reference was made to other factors that have impinged on teachers' time for teaching, including a reported downward drift of curriculum content into earlier years of school and teaching aimed at preparing students for NAPLAN tests.

The Review also considered the role of the curriculum in specifying a common entitlement for learning. In the early years of school, every student should receive the support they require to establish solid foundations in literacy, numeracy and social and emotional development. These areas of learning and development should be prioritised over other areas of the curriculum and resourced to ensure that every student is on track in their learning from early childhood.

In the middle years of school, the common entitlement should include the study of a specified range of subjects and, for the vast majority of students, the achievement of at least minimally acceptable standards in those subjects. As part of this entitlement, every student should develop at least basic knowledge about, and appreciation of, Aboriginal and Torres Strait Islander languages, cultures and histories, and study a language other than English from primary school.

In the senior years of school, every student should be provided with rigorous, high quality learning in areas of personal strength and interest. The curriculum in these years should provide opportunities to develop deeper understanding of content, including through problem-based and project-based applications of learning in real-world contexts.

Reforming the structure of the curriculum

The Review's second set of proposals address the structure of the curriculum, including concerns about its lack of flexibility to meet individual learning needs. They address directly the fact that students in the same year of school currently differ widely in the points they have reached in their learning, meaning that some students are not yet ready for, and others are not sufficiently challenged by, common year-level syllabus expectations. The intention of these proposals is to support teachers in establishing where individuals are in their long-term progress so that every student can be provided with well-targeted and appropriately challenging teaching.

Given that some students are two to three years behind year-level expectations and others are two to three years ahead, the process of establishing where individuals are in their learning requires a larger frame of reference than a year-level syllabus. It requires a map of long-term progress in an area of learning across the years of school.

The Review is proposing the construction of a map of long-term progress in the form of a sequence of 'attainment levels' in each area of learning. These attainment levels will describe and illustrate increasing levels of knowledge, understanding and skill, independent of student age or year level. Teachers will use these levels to establish where individuals are in their learning, with the possibility of students in the same class being at different levels. For each attainment level, a syllabus will specify the knowledge, skills and understandings required to 'achieve' that level, and also indicate the kinds of teaching likely to be most appropriate for students working at that level.

The result will be a very different curriculum structure. Students will progress through a sequence of attainment levels, possibly at different times and rates, rather than all moving in a lock-step fashion from one year-level syllabus to the next. Importantly, this proposal relates to the structure of the curriculum, not the structure of schooling; it is assumed that most students will continue to be grouped by age. The objective is to assist teachers to better identify and address the widely varying levels of readiness and learning needs within each year group, recognising that well-targeted teaching will benefit every student.

The Review's proposals will set higher expectations for every student's learning. The sequence of attainment levels will provide a frame of reference for monitoring the progress individuals make. Every student should be expected to make excellent progress every year, regardless of their starting point. The Review is also proposing the introduction of a standard (a specified level of attainment) in each learning area that every student should be expected to reach – and ideally surpass – by the completion of their schooling. Some students will reach this standard earlier than others. The sequence of attainment levels will provide a basis for monitoring throughout a student's schooling whether they are on track to achieve this standard.

These proposals also have implications for the assessment and reporting of student learning. Rather than grading each student's performance (A to E or equivalent) against the same year-level syllabus expectations, information will be provided about the highest attainment level a student has achieved in each subject at any given time and the progress they are making toward the achievement of the next level, as assessed by their teacher. In this way, parents/carers and students themselves will be provided with information about how a student is progressing and whether they are on track with learning expectations.

Reforming the senior school curriculum

The Review's third set of proposals address the senior secondary curriculum, including concerns about the bifurcated nature of 'academic' and 'vocational' learning, and concerns that learning in these years often is narrowed by the particular needs of post-school destinations.

A more integrated approach to learning is proposed based on a limited set of rigorous, high-quality, advanced courses. The intention is to ensure that every student is well prepared for further learning, life and work through learning that integrates knowledge, skills and attributes and prioritises both theory and application.

Currently, a very large number of courses (more than 170) is offered in the senior years of school. These include courses developed by NESA and other courses developed by schools, universities and VET providers. Concerns were expressed to the Review about the proliferation of courses, the associated call on resources, and the variable demands of current courses, some of which result in low-level VET qualifications. The conclusion of the Review is that there needs to be a consolidation of learning in the senior years, achieved through the long-term development of a smaller number of demanding, high-quality, advanced courses.[13]

Over time, it is proposed that every advanced course incorporate a mix of theory and application. This mix is likely to vary from course to course, but no course should be focused only on the acquisition of theory/knowledge or only on application/skills. The implication for existing 'academic' subjects is that they will need to give greater attention to applications of learning and to developing skills in applying knowledge. The implication for existing 'vocational' courses is that they will need to give greater attention to theory and to developing students' understandings of important concepts and principles in each area of learning. The goal in both cases is more advanced learning through the integration of theory and application.

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[13]   This proposal recognises that there will continue to be a need for courses that are accessible to students with disability.

To provide additional contexts for developing and assessing students' skills in applying knowledge – such as gathering, analysing and evaluating information; working with others; communicating; thinking critically; creating and evaluating solutions; and using technologies – the Review is proposing the introduction of a single 'major project' as a standalone component of the senior certificate. Students will choose the principal learning area for their project, which will be assessed by teachers using centrally provided criteria.

The Review is also proposing a common structure of progress and attainment in advanced courses, consistent with the curriculum structure in the earlier years of school. In each course, students will progress through a sequence of several attainment levels. In this sense, each advanced course will be 'modularised' with the possibility of recognising the achievement of individual modules in the form of 'micro-credentials' based on teachers' assessments of student achievement. In some existing subjects, these attainment levels will replace current performance 'bands'. Teachers' assessments against the attainment levels will provide the school-based component of course assessments.

In addition, it is proposed that, for every course, there will be an external assessment. In some courses, this may take the form of a written examination, as at present. In other courses, external assessments may take other forms such as independent evaluations of students' performances or work and supervised, online assessments of the content of individual modules/attainment levels.

Finally, the Review is proposing that advanced subjects be grouped into a new set of learning areas such as 'business, economics and financial services' and 'visual and performing arts and entertainment'. The aim is to reduce the academic/vocational distinction and to provide new focal points for partnerships with universities, vocational education providers and industries, and for improved career advice and guidance on post-school courses and pathways.

1. THE CONTEXT

Although there have been several major reviews of schooling arrangements and the school curriculum in NSW over recent decades, many aspects of current arrangements have their origins in the recommendations of the Wyndham Committee report of 1957. The Wyndham recommendations included the automatic transition of all students from primary to secondary school; the provision of a 'core' curriculum with increasing electives across the first four years of secondary school; the possibility of students undertaking courses leading to a Higher School Certificate (HSC) examination, the type and content of which 'should be such as to make it acceptable as a test for university matriculation'; and the establishment of an independent board with authority for the development of HSC courses, the conduct of HSC examinations, and the issuing of certificates.

The world in which schools now operate would be largely unrecognisable to members of the Wyndham Committee. It would barely be recognisable to members of the Carrick Committee who reported on their review of NSW schooling in 1989. Advances in globalisation, communication, and access to information, and fundamental changes in Australian society and many of its institutions have changed forever the contexts in which schools work, the challenges and opportunities they face, and the students who attend them. This Review commences with a brief look at some aspects of the environment in which NSW schools now operate and possible implications for the school curriculum.

The evolution of schooling

The Review has adopted a long-term perspective. From the outset, the task has been interpreted not so much as reviewing and suggesting changes to current syllabuses or making recommendations about operational matters for which NESA already has well-established decision-making processes, as developing possible design features for a future school curriculum. The focus of the Review has been on understanding perceived strengths and weaknesses of the current curriculum; exploring community aspirations for schooling in the future; and proposing broad-brush features of a curriculum that could well require a decade to plan and establish. This is not to say that immediate changes may not be required to existing syllabuses, but the primary goal of the Review has been to develop a long-term vision for the curriculum in NSW.

In adopting this approach, the Review has recognised that existing curriculum arrangements are the result of decisions made over many decades. An attempt has been made to look forward, but also backward to understand the intentions and motivations that produced the current curriculum. This has been instructive in revealing recurring themes and issues and in understanding past curriculum reform efforts, both successful and unsuccessful.[14]

Examples of recurring themes can be found in the ways in which the various phases of schooling have evolved in NSW. Throughout the history of the state, there has been steadily growing demand for higher levels of education as more of the population has sought access first to primary schooling, then lower secondary schooling, then senior secondary schooling, then tertiary education. The expansion of these educational phases has followed broadly similar patterns.

At first, only a small percentage of the age cohort has participated in any given phase. These students are drawn mainly from a social and/or academic elite, with entry being restricted either to families who can afford it or to students who meet entry requirements, usually through an entrance examination.

[14] For a review of the history of school reform efforts in New South Wales see J Hughes & P Brock, *Reform and resistance in NSW public education: six attempts at major reform, 1905-1995*, NSW Department of Education and Training, Sydney, 2008.

This select group of students forms a core of individuals being prepared for professional and leadership positions in society, typically through a university education. A relatively small number of schools deliver a curriculum to these students which is strongly academic in focus.

Then, as student demand for the phase grows, the government becomes increasingly involved in meeting this growing demand. This includes attempting to cater for the 'non-academic' students now wishing to participate in the phase, possibly by introducing separate institutions, courses or qualifications for students not expected to continue beyond the phase. Government fees, if they existed, are abolished and the entrance examination to the phase is used not so much to control entry as to allocate students to institutions and courses. An exit qualification from the phase is introduced by government, possibly replacing an earlier university-provided qualification.

Finally, as almost the entire age cohort participates in the phase, student participation is made compulsory. If an entrance examination to the phase existed (possibly an exit examination from the prior phase), its significance is now greatly reduced and it eventually is abolished. With near-universal participation, earlier differentiation is replaced by attempts to identify a common core of learning for the entire student cohort, and separate qualifications are merged into a common qualification for all students. And, as an increasing percentage of students proceed to the next educational phase, the exit credential decreases in significance as a selection mechanism and it too eventually may be removed.

These broadly similar steps in the evolution of schooling in NSW can be seen in the brief summary provided in the following table. An advantage of a long-term perspective of this kind is that it is a reminder that today's schooling arrangements, syllabuses, examinations and qualifications exist at a point in history and are part of an evolutionary process. Schools of the past were not organised as they are today. For hundreds of years, in much of the world, children were educated in one-teacher village schools. One-teacher schools also were common across NSW during the nineteenth century. Today's model of schooling, based on classes of children of the same age all being taught the same curriculum, became predominant during the twentieth century. And it is unlikely that schools of the future will be organised as they are today, particularly as technologies play an increasing role in individualising learning.

A long-term perspective also allows current arrangements in particular phases of schooling to be seen in the light of changes that occurred in earlier phases. For example, current concerns about the best ways to cater for 'non-academic' students in the senior school have their parallel in early twentieth century concerns in the junior secondary school. The response at that time was to introduce different curricula, sometimes leading to different qualifications. At one time there was a 'Commercial' certificate for 'non-academic' junior secondary students that sat alongside, and was eventually merged with, the mainstream 'Intermediate' certificate. As most of the age cohort has participated in a phase of school and progressed to the next, the trend has been to abandon attempts to provide differentiated arrangements and to provide all students with a largely common curriculum.

With a long-term perspective it also becomes clear that current differences in curriculum, teaching and assessment arrangements in the different phases of school often have resulted from the progressive addition of new phases as they were required. Today's students, rather than experiencing learning as a continuous and seamless process, often negotiate transitions and cope with between-phase differences that exist largely for historical reasons.

Table 1 Brief summary of the evolution of schooling in NSW

Primary
A small percentage of NSW children attended primary school in the early years of the colony. Participation rates grew throughout the nineteenth century. The concept of 'secondary education' did not really exist until the twentieth century.

The Public Instruction Act of 1880 introduced compulsory, free education and made school education the responsibility of a government department. Primary schooling effectively became universal following the Act of 1880 when participation rates increased by 25 per cent. Examinations at the end of this phase, variously named the Qualifying Certificate Examination, High School Entrance Examination and Primary Final Examination, were eventually abolished. |

Junior secondary
A small percentage of students attended secondary schools in the early twentieth century. A Qualifying Certificate Examination for entry was introduced in 1911 (replaced by the High School Entrance Examination in 1923). By 1920, of the 46 000 students who completed primary school, 4000 began secondary school.

A review was initiated in 1933 into how junior secondary education could meet the needs of all students. By 1935, 60 per cent of students began secondary school, with the majority being considered 'non-academic'. The Intermediate Certificate at the end of this phase was broadened and a 'General Activities' curriculum was introduced in 1939 for less academic students. With almost all students progressing from primary to secondary school, the High School Entrance Examination was abolished in 1943.

By 1945, 97 per cent of students participated in junior secondary education. An 'Alternative Curriculum' was introduced for less academic students in 1946, but the Wyndham report of 1957 recommended a core of subjects for all junior secondary students, automatic transition from primary to secondary school, and the introduction of the School Certificate based on external examination. By 2011, with most students continuing to the senior secondary school, the School Certificate was discontinued. |

Senior secondary
A small but growing percentage of students participated in senior secondary schooling by the mid-twentieth century following completion of the Intermediate Certificate and in preparation for the Leaving Certificate. By 1956, of the 50 000 students who had commenced secondary school, 8000 were enrolled in Year 12. The Wyndham committee recommended the introduction of the Higher School Certificate in 1957.

By 1995, 66 per cent of the 76 000 students who had taken the Year 10 School Certificate undertook the Higher School Certificate in Year 12. In that year, a review was initiated into the HSC (the McGaw review). The review recommended more advanced courses for more able students, the introduction of Technical and Further Education (TAFE) subjects into the HSC, and the clearer separation of the HSC from university selection processes.

By 2018, the apparent retention rate from Year 7 to Year 12 had increased to 77 per cent and almost 77 000 students were studying one or more Higher School Certificate courses. A national goal was set to lift the Year 12 (or equivalent) participation rate to 90 per cent by 2020. Following the Bradley review of 2008, there was significant growth in the proportion of Year 12 students continuing to tertiary study, with the expectation that at least 40 per cent of Australian 25-34 year olds would hold at least a bachelor's degree by 2025. |

A changing world

The past three decades have seen substantial change in the contexts in which schools work. Developments in technology have given students entirely new ways of communicating and interacting, as well as ready access to vast amounts of globally-generated information. The nature of workplaces has changed irreversibly, along with the knowledge, skills and attributes most workplaces now require. And there have been profound changes in Australian society and its institutions. These and other developments have impacted the day-to-day work of schools and increased the challenges of engaging and supporting young people and preparing them for their futures.

For today's students, the world is less certain and less secure than it was for their parents' and grandparents' generations. They are living in a period of rapid, ongoing change and growing social fragmentation. Through the media, including social media, they are exposed directly to the details of global terrorism and violence. They are witnessing increasing public cynicism about traditional institutions, including religious and political institutions and their leaders; the erosion of traditional values; growing questioning of 'truth'; and the emergence of 'fake news'. Many are concerned about environmental sustainability, social inequalities and the future, and large numbers of today's students are exposed to the realities of substance abuse, easy access to age-inappropriate online content, and cyber-bullying. Parental anxiety and the addictive nature of technology have led many young people to become more isolated, more anxious and less social.

These developments present schools with enormous challenges. Dealing with mental health issues is now an essential part of the work of most schools. Building resilience in children and young people is a priority, as is promoting optimism, self-confidence and positive mindsets. With the decline of other institutions – sometimes including families – that once played a lead role in inculcating values and developing character, schools have found it increasingly necessary to give priority to students' social and emotional development, and often to their physical and mental safety, health and wellbeing.

This raises a question about the scope of the school curriculum. For many teachers, the 'curriculum' currently is defined by a set of syllabus documents and the associated outcomes they are expected to teach and students are expected to learn. This syllabus-driven conception of curriculum has been adopted at the senior secondary level and extended through the years of school. Schools' efforts to address mental health issues, build student resilience, inculcate values and develop character often are described as outside and additional to this formal school curriculum, and sometimes are considered to impinge on the time available for delivering the curriculum. But in the twenty-first century, should the curriculum of schools explicitly include and give greater priority to the social, ethical, emotional and physical development and health of every student, and recognise these as school-wide and school-long priorities? And if so, what role, if any, should a curriculum development authority play in supporting schools in these aspects of their work?

Rapid changes are also are occurring in workplaces and to occupations that once provided destinations for school leavers. A growing proportion of routine, low-skill jobs are being replaced by machines or lost to low-wage economies. This is likely to accelerate with ongoing advances in robotics, artificial intelligence and machine learning. By some estimates, up to 40 per cent of existing occupations will be automated over the next two decades. These developments have profound implications for students and schools. In particular, it is becoming increasingly unacceptable for significant proportions of students to leave school with low levels of academic attainment. The OECD's Programme for International Student Assessment revealed steady growth in the proportion of NSW 15 year olds with unacceptably low levels of reading literacy, mathematical literacy and scientific literacy between 2000 and 2015. But even minimally acceptable levels of attainment in these areas are likely to be inadequate for meaningful employment in the knowledge economies of the future. There is an urgent need to lift the bar for every student.

Students with low levels of school attainment will be particularly vulnerable in an environment in which youth unemployment and underemployment remain serious issues. Nearly a third of Australian young people are currently unemployed or underemployed and many struggle to find employment in the fields in which they were trained. In 2016, only a third of graduates of vocational education and training (VET) programs were employed in their field of training. Students with low levels of school attainment are likely to be disproportionately disadvantaged in a more casualised workforce with lower levels of job security, increased part-time and freelance work, and multiple job and career changes. Already, 30 per cent of Australian workers are participating in flexible working arrangements involving multiple jobs or employers.

At the same time, there are growing shortages in the areas of science, technology, engineering and mathematics (STEM). The number of professional, scientific and technical jobs is predicted to increase substantially over the next decade, together with jobs in health care. And with continuing advances in digital technologies, skills in the use of information and communication technologies will be important for all students, with advanced skills becoming increasingly in demand. Despite this growing demand, average levels of school attainment in mathematics and science have been in steady decline over recent decades, as have the proportions of NSW students choosing to study more challenging STEM subjects in the senior years of school.

Changes in workplaces and the knowledge and skills they require have clear implications for schools and the school curriculum. Higher levels of attainment will be required across the board if most students are to be engaged productively in the knowledge- and service-based workforces of the future. This will include higher average levels of attainment in reading literacy, mathematical literacy and scientific literacy. Students also will require skills to work in modern workplaces and changing and uncertain environments, including transferable skills in communicating, collaborating, critical thinking, problem solving, digital literacy, project management, creativity and innovation. And, in an increasingly globalised world, students will require knowledge and skills to participate as active citizens and to work across national borders, including high levels of inter-cultural understanding.

The changing student population

The student population in NSW schools continues to grow in size and complexity. Today, approximately 1.2 million students in Kindergarten to Year 12 attend 3100 schools and are taught by more than 100 000 in-school teaching staff. These numbers are predicted to grow over coming decades in line with anticipated population growth. In Greater Sydney alone, the population is forecast to grow from 5.6 million to 8.4 million over the next three decades.

About 75 per cent of students currently attend schools in major cities. Most others attend schools in regional NSW, and a small percentage (less than half of one per cent) attend schools in remote and very remote parts of the state. Population projections anticipate a growing proportion of future students attending schools in metropolitan areas, including in Western Sydney, where the population is expected to grow by 70 per cent by 2041.

About 65 per cent of students currently attend government schools, 20 per cent attend Catholic schools, and 15 per cent attend independent schools. Over the past thirty years, the percentage of students in independent schools has increased significantly, with a decline in the percentage attending government schools. There is also a very diverse range of schools within each sector, including in size and wealth.

In recent years, a growing proportion of Aboriginal and Torres Strait Islander students have successfully progressed through the school system and into tertiary education.

The student population also has become more diverse as a result of immigration. Western Sydney is now the most diverse large urban area in Australia, with 35 per cent of its residents born outside Australia. In 2016, one third of students in NSW government schools were from homes in which a language other than English was spoken. In some regions of Sydney, languages other than English are spoken in more than 40 per cent of homes, and in Parramatta, South West, and Inner South West regions, the percentages increase to more than 60 per cent.

Students with disability make up approximately 20 per cent of the NSW school student population, with education providers being required under the *Disability Discrimination Act 1992* and the *Disability Standards for Education 2005* to ensure students with disability are able to access and participate in education on the same basis as all other students.

In summary, the size and diversity of today's student population mean that students come to school with very different backgrounds, starting points and learning needs. The principles of equity and inclusivity require that every student be given access to the same curriculum and the support they require to progress and succeed. But this depends on the school curriculum providing the flexibility teachers require to respond to the increasing diversity of student needs.

Evolving understandings of learning

In parallel with these historical, contextual and demographic changes have been advances in understandings of human learning and the conditions that promote successful learning. These evolving understandings have been built from experience and confirmed and refined by research into learning.

Among the many things now known about learning is the crucial importance of emotional engagement. People are capable of remarkable levels of knowledge, expertise and accomplishment in areas of personal interest. Learning comes easily when it is driven by curiosity and passion. When motivated by personal goals, a search for answers, or something or someone they love, people are prepared to devote thousands of hours over many years to focused, purposeful learning. This is true across a wide range of endeavours, including careers, sporting activities, hobbies, personal growth and relationships.

We also know from research that becoming an expert in a field involves more than acquiring a body of knowledge or developing finely honed skills. Experts have deep understandings of their areas of expertise developed over extended periods of time. They understand the principles and concepts that underpin their field and around which facts and skills can be organised and understood. They not only know 'what', they also understand 'why'. Deep understandings give experts the ability to transfer and apply what they know to new situations and an understanding of the contexts to which their knowledge can be generalised.

For these reasons, what is learnt must have meaning for learners. People can learn meaningless information, but the intrinsic motivation for doing this is low, and such information is easily forgotten. Successful learning and effective recall are more likely when what is being learnt has personal meaning and when learners can see its relevance and potential applications. Learners also develop deeper understandings and are better able to recall facts and procedures when they have opportunities to apply these in practical, real-world contexts.

Successful learning depends on a learner's readiness to learn. People do not learn effectively when placed in unsupportive or unwelcoming learning environments. Unfamiliar cultural contexts and norms can be significant impediments to learning. People also do not learn effectively when presented with things they already know or when they lack assumed knowledge or skills. Learners benefit most from challenges that are beyond their comfort zones but within their reach – stretch challenges that require effort and possibly somebody else's support. Teaching, coaching, mentoring and counselling are in large measure processes of ensuring individuals are presented with well-targeted, appropriate and challenging learning opportunities.

Studies of neuroplasticity have demonstrated the remarkable human capacity for learning and raised expectations of what can be learnt given motivation, effort and the right kinds and levels of support. As educators, we are much less inclined than we once were to place limits on what individuals can learn given appropriately supportive conditions.

At the same time, research reveals individual learners to be at very different points in their learning. It might be imagined, for example, that the practice of grouping school students by age and teaching every student the same age-based curriculum year after year would result in students of the same age becoming increasingly similar in what they know and can do. In fact, there is no current evidence of this. In each year of school, the most advanced ten per cent of students are at least five to six years ahead of the least advanced ten per cent of students, and this appears to be unchanged across the years of school. And there is some evidence that, in mathematics, students become more varied in their levels of knowledge and skill the longer they are in school.

We also better understand the life-long nature of learning. Research in neuroscience has shown the capacity of the brain to form new neurons well into the ninth decade of life. Learning is an ongoing, long-term process, meaning that the points individuals reach in their learning by particular ages often are less important than the fact that they are continuing to make good progress in their learning. It is important for learners to understand this. One of the most effective ways to promote learners' confidence in their ability to learn, to encourage a degree of self-control over learning, and to build an appreciation of the relationship between effort and success, is to enable learners to see the personal progress they are making – regardless of how they are performing relative to age peers or beliefs about where they should be by particular ages.

These are just a few things now known about learning, but they have profound implications for the construction of effective learning environments, the kinds of learning the curriculum prioritises and promotes, the way that learning opportunities are structured and provided, and the assessments required to guide teaching and drive successful learning.

Current policy priorities

Over the past two decades there have been important changes in the policy contexts in which NSW schools and school systems work. One feature of these changes has been increased national collaboration around identified policy priorities. The Commonwealth government has played a more prominent role in working with the States and Territories to set policy directions for school education. During this period, agreed national objectives have included improving overall levels of student performance; increasing the participation and attainment levels of priority equity groups; improving school completion rates and better preparing young people for post-school destinations; reforming school funding arrangements; and enhancing the effectiveness of teaching and school leadership.

To deliver these reforms, three national agencies have been established: the Australian Curriculum, Assessment and Reporting Authority (ACARA), the Australian Institute for Teaching and School Leadership (AITSL) and Education Services Australia (ESA). The work of these agencies has resulted in the development of an Australian Curriculum which has now been implemented fully or in part in all states and territories (in all learning areas from Kindergarten to Year 10 and in English, mathematics, science, history and geography in Years 11 and 12); the introduction of a National Assessment Program to assess, report and monitor student performance in priority curriculum areas including literacy and numeracy (accompanied by a national website to report publicly every school's performance); and the development and introduction of national standards for teaching, school leadership and initial teacher education.

Levels of student performance

A first priority for governments has been to lift levels of student performance nationally, particularly in literacy and numeracy. Concerns about students who were not mastering basic literacy and numeracy skills during their primary years led the NSW Government to introduce Basic Skills Tests in 1989.[15] All other states and territories introduced similar tests during the 1990s. The National School English Literacy Survey of 1996 confirmed that a significant proportion of Australian primary children were failing to achieve minimally acceptable standards of reading and writing.[16]

From the 1990s, the improvement of literacy and numeracy levels became a key educational priority for all governments and school systems. A range of initiatives were taken to address this priority, including the establishment of national partnerships focused on raising literacy and numeracy levels; the promotion of evidence-based approaches to the teaching of reading; the introduction of National Assessment Program-Literacy and Numeracy (NAPLAN) tests annually for all students in Years 3, 5, 7 and 9, replacing the earlier state- and territory-based tests; the development of targeted literacy and numeracy programs and funding; the introduction of literacy coaches into many schools; and the development of the national My School reporting website.

Although NAPLAN tests conducted between 2008 and 2018 showed no significant improvement in reading levels in NSW secondary schools over this ten year period, there were significant improvements in the reading levels of Year 3 and Year 5 students.[17] Similar observations were made nationally. The Progress in International Reading Literacy Study (PIRLS) also recorded significant improvements in national Year 4 reading levels in the five years between 2011 and 2016, due mainly to improvements in Western Australia, Queensland and Victoria. The small improvement at Year 4 in NSW over these five years was not statistically significant.[18]

In numeracy, there was no significant improvement in the performance of NSW students at any year level between 2008 and 2018. Nationally, NAPLAN reported an improvement in the performances of Year 5 and Year 9 students, especially in Queensland and Western Australia. The Trends in International Mathematics and Science Study (TIMSS) found no significant change in Year 4 or Year 8 mathematics

[15] G Masters, J Lokan, B Doig, S-T Khoo, J Lindsey, L Robinson & S Zammit, *Profiles of learning: the basic skills testing program in New South Wales: 1989*, Australian Council for Educational Research, Hawthorn Vic, 1990, viewed 24 July 2019, <https://eric.ed.gov/?id=ED327276>.

[16] G Masters & M Forster, *Mapping literacy achievement: results of the 1996 National School English Literacy Survey*, Department of Employment, Education Training and Youth Affairs, Canberra, 1997, viewed 25 July 2019, <https://research.acer.edu.au/monitoring_learning/1>.

[17] Australian Curriculum, Assessment and Reporting Authority, *National Assessment Program—literacy and numeracy achievement in reading, writing, language conventions and numeracy: national report for 2018*, Australian Curriculum, Assessment and Reporting Authority (ACARA), Sydney, 2018, viewed 24 July 2019, <https://nap.edu.au/docs/default-source/resources/2018-naplan-national-report.pdf?sfvrsn=2>.

[18] S Thomson, K Hillman, M Schmid, S Rodrigues & J Fullarton, *PIRLS 2016: reporting Australia's results, Australian Council for Educational Research*, Camberwell, Victoria, 2017, viewed 25 July 2019, <https://research.acer.edu.au/pirls/1>.

achievement levels either in NSW or nationally between 2007 and 2015 (although there had been a significant decline in Year 8 mathematics and science levels in NSW between 2003 and 2007).[19]

From 2000, Australia participated in the OECD's Programme for International Student Assessment (PISA) – an assessment of reading literacy, mathematical literacy and scientific literacy at 15 years of age. Rather than testing basic skills, PISA assessed students' abilities to apply their knowledge and skills in reading, mathematics and science to a range of real-world problems. In this sense, it assessed higher-order academic skills.

Australian students' performances on PISA declined significantly between 2000 and 2015, both in an absolute sense and relative to average performance in all OECD countries. This was also the case in NSW, as shown in Figure 1. In 2000, when reading literacy was introduced as the major domain, NSW students performed well above the OECD average and among the highest performing countries in the world. The same was true when mathematical literacy was introduced as a major domain in 2003 and scientific literacy, in 2006. By 2015, this was no longer the case; NSW students performed just above the OECD mean.[20]

Figure 1 Average performance of 15 year olds in NSW and all OECD countries, PISA, 2000-2015

So although NAPLAN indicated no change in NSW secondary students' basic literacy and numeracy skills from 2008, and TIMSS indicated no change in Year 8 mathematics levels from 2007, PISA indicated a significant longer-term and continuing decline in 15 year olds' understandings of how to apply basic reading, mathematical and scientific knowledge and skills in practical situations.

In light of this evidence, the *Australian Education Act 2013* included a national target 'for Australia to be placed, by 2025, in the top five highest performing countries based on the performance of school students in reading, mathematics and science'.

The *National School Reform Agreement 2018* committed the Commonwealth and all states and territories to the joint pursuit of a national goal to improve the performance of all students, including priority equity cohorts. It was agreed that progress in achieving this goal would be tracked by monitoring the proportions of students in the bottom two and top two proficiency bands/levels of NAPLAN and PISA.

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[19]   S Thomson, N Wernert, EJ O'Grady & S Rodrigues, *TIMSS 2015: reporting Australia's results*, Australian Council for Educational Research, Camberwell, Victoria, 2017, viewed 25 July 2019, <https://research.acer.edu.au/timss_2015/2/>.

[20]   S Thomson, L De Bortoli & C Underwood, *PISA 2015: a first look at Australia's results*, Australian Council for Educational Research, Camberwell, Victoria, 2016, viewed 25 July 2019, <https://research.acer.edu.au/ozpisa/21>.

Performance of equity groups

A second major priority for Commonwealth, state and territory governments over recent decades has been to improve provision for specific equity groups, including Aboriginal and Torres Strait Islander students; students living in regional, rural and remote locations; students with disability; and students from educationally disadvantaged backgrounds. There has been continuing evidence of lower levels of participation, retention and academic attainment for these groups, resulting in government commitments to improve outcomes and reduce existing gaps.

Some progress has been made, particularly in improving participation rates. For example, in 2017, NSW achieved near-universal enrolment of four-year-old Aboriginal children in early childhood education. However, despite these high levels of enrolment, attendance rates remained low, particularly in regional and remote areas of the state. At the same time, the apparent retention rate from Year 10 to Year 12 for Aboriginal students remained unchanged at about 50 per cent between 2010 and 2018, compared to about 75 per cent for non-Aboriginal students.

The evidence from surveys of student attainment in literacy, numeracy, science, civics and citizenship and ICT literacy shows no consistent closing of the gap for any equity group. The graphs in Figure 2 are based on longitudinal data for the earliest cohort of NAPLAN students in NSW. Growth in reading and numeracy from Year 3 to Year 9 occurred on essentially parallel trajectories for Aboriginal and non-Aboriginal students, meaning that there was no closing of the gap for this cohort over these six years of their schooling. This has continued to be the case for subsequent cohorts of students, despite small but significant increases for both Aboriginal and non-Aboriginal students in reading in primary school.
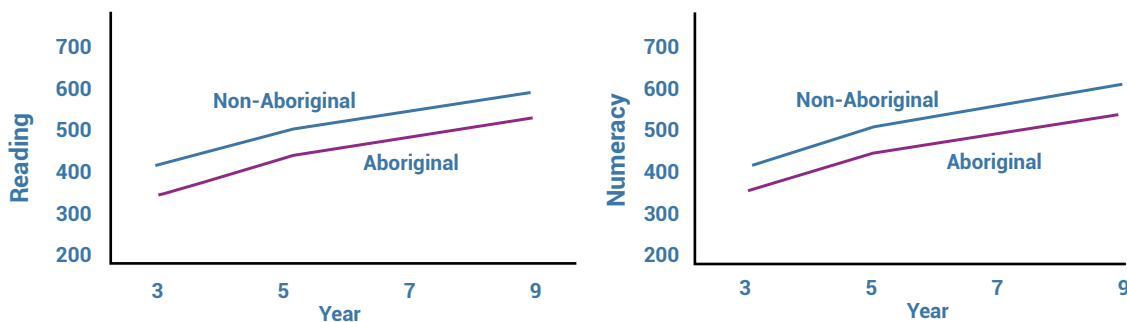
Figure 2 Average performance of NSW Aboriginal and Non-Aboriginal students on NAPLAN

Similar conclusions have been reached from Australia's participation in international achievement studies. The OECD's Programme for International Student Assessment (PISA) concluded that, for Australia as a whole, the decline in reading literacy, mathematical literacy and scientific literacy occurred for all major equity groups equally. There was no evidence of gaps closing for Indigenous students, rural and remote students, or low socioeconomic background students in reading literacy between 2000 and 2015, in mathematical literacy between 2003 and 2015, or in scientific literacy between 2006 and 2015.[21]

The IEA's Trends in International Mathematics and Science Study (TIMSS) concluded that the gaps for Australian Indigenous students in mathematics and science in Year 4 had 'changed little' over the 20 years between 1995 and 2015. For students in Year 8, the corresponding gaps for Indigenous students had 'not decreased measurably' over those same 20 years.[22]

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[21]   Thomson et al., PIRLS 2016.
[22]   Thomson et al., TIMSS 2015.

In summary, based on the National Assessment Program between 2008 and 2018, the PISA surveys between 2000 and 2015, and the TIMSS surveys between 1995 and 2015, a number of conclusions can be reached about recent trends in the performances of NSW students:

- there has been a statistically significant improvement in reading levels in primary schools since 2008, but not in numeracy (NAPLAN);
- there was an improvement in Year 4 students' mathematics levels between 1995 and 2007, but no improvement since then (TIMSS);
- there has been no significant improvement in either reading or numeracy levels in secondary schools since 2008 (NAPLAN);
- there has been a significant decline in 15 year olds' abilities to apply knowledge and skills in reading, mathematics and science to practical situations and problems since 2000 (PISA);
- there has been a significant decline in Year 8 students' levels of achievement in mathematics and science since 2003 (TIMSS);
- there is no evidence that gaps in literacy and numeracy levels have closed for any major equity group since 2008 (NAPLAN); and
- based on national (rather than state) evidence, it seems likely that achievement gaps between Aboriginal and non-Aboriginal students in mathematics and science in Years 4 and 8 have been unchanged since 1995 (TIMSS).

These are confronting observations, especially given that the improvement of literacy and numeracy levels and the closing of gaps for Indigenous and socioeconomically disadvantaged students have been among the highest educational policy priorities of Commonwealth, state and territory governments for at least three decades.

Current strategies

The overarching policy priority in school education currently is to ensure that Australia has a high quality, high equity school system. *The National School Reform Agreement of 2018* committed the Commonwealth and all state and territory governments to the pursuit of this objective through three common national goals:

- to improve academic achievement for all students, including priority equity cohorts;
- to ensure all students are engaged in schooling; and
- to ensure students gain the skills they need to transition to further study and/or work and life success.

One strategy has been to set targets and timelines to improve national performance (e.g. Australia to perform in the top five highest performing countries by 2025); close gaps for equity groups (e.g. halve the Aboriginal and Torres Strait Islander gap in Year 12 participation rates between 2006 and 2020); and improve Year 12 completion rates (e.g. lift the Year 12 or Certificate III completion rate to 90 per cent by 2020).

A high priority has been given to building the professional capacity of teachers and school leaders to deliver improved teaching and learning and thus improved outcomes. At a national level, this priority has been pursued largely through the work of the Australian Institute for Teaching and School Leadership. In NSW, it has been pursued since 2004 through the NSW Institute of Teachers (now incorporated into NESA) and through the development of the 2013 *Great Teaching, Inspired Learning* blueprint.[23]

A further strategy has been to provide NSW government schools with greater autonomy to make decisions about the most effective ways to deploy available resources to meet student needs and improve outcomes. This followed the 2012 *Local Schools, Local Decisions* reforms.[24]

The reform of school funding arrangements also has been seen as an essential strategy for raising educational standards and achieving more equitable outcomes in Australian schools. A key development was the 2011 *Review of Funding for Schooling* and its recommendation that schools be funded on the basis of student need rather than school type or sector.[25]

[23] NSW Education Standards Authority, *Great teaching, inspired learning: blueprint for action*, New South Wales Government, Sydney, March 2013, viewed 25 July 2019, <https://educationstandards.nsw.edu.au/wps/portal/nesa/about/initiatives/great-teaching-inspired-learning>.

[24] NSW Department of Education & Communities, *Local schools local decisions: report on the consultation*, NSW Government, Sydney, 2012, viewed 25 July 2019, <https://schoolsequella.det.nsw.edu.au/file/3d9c0df5-e220-4e12-bc09-71a340d7126f/1/Local%20 Decisions%20Report%20on%20Consultation_.pdf>.

[25] Review of Funding for Schooling, *Review of funding for schooling: final report*, Department of Education, Employment and Workplace Relations, Canberra, 2011, viewed 25 July 2019, <https://docs.education.gov.au/documents/review-funding-schooling-final-report-december-2011>.

And the 2018 Review to Achieve Excellence in Australian Schools in its report *Through Growth to Achievement* included among its recommendations a call to governments to provide teachers and schools with greater assistance in monitoring individual student progress, diagnosing specific learning needs, and implementing evidence-based teaching strategies and interventions.[26]

Curriculum challenges

This brief look at the context in which schools now operate reveals a number of challenges for the school curriculum.

The history of schooling in NSW is a reminder that the different phases of school were introduced at different times in response to growing student demand. This has resulted in differences in curriculum, teaching and assessment arrangements in different phases, and somewhat artificial transitions between phases. A challenge is to provide greater continuity and seamlessness of learning from pre-school, through the school years, and into post-school destinations.

History also suggests that current arrangements will change. In particular, as universal participation in the senior secondary school is approached, it is likely that greater efforts will be made to remove academic/non-academic curriculum distinctions. It is also likely that the transition that currently looms large in the consciousness of students, schools and the wider community – at the end of secondary school – will assume a lower level of significance as more students continue their learning seamlessly across this transition. Selection at this point is likely to become less relevant. And it might be predicted that, as participation rates in tertiary education continue to grow, academic/non-academic distinctions in that sector also will be replaced by more integrated approaches to theoretical and applied learning. All these developments invite the reimagining of the curriculum in the final years of school.

Ongoing changes in Australian society are requiring schools to take on broader roles and responsibilities than the implementation of a set of syllabuses. Schools are increasingly focused on students' social and emotional development, physical and mental health and wellbeing, and a range of personal skills and attributes, including resilience, optimism, and the ability to communicate and collaborate with others. School-wide priorities of these kinds are not adequately addressed as syllabuses and 'outcomes', but nevertheless need to be recognised as part of the total curriculum of today's schools. A challenge is to provide the time and support in schools to address these broader priorities.

Advances in technology are changing not only what students learn at school, but also how and where they learn, with implications for curriculum, teaching, learning and assessment. These advances also are changing fundamentally the nature of work and the knowledge, skills and attributes required in the workplace. Developments in robotics and machine learning are eliminating many existing jobs and creating others, with the most significant impact being on low-skill occupations, most of which are likely to disappear. Rather than providing job-specific skills, the school curriculum increasingly will need to equip young people with deep understandings and general skills and attributes that provide a broad preparation for further learning, life and occupations yet to be created. The pressing curriculum challenge is to set higher expectations for every student's learning.

At the same time, the student population is becoming increasingly diverse. Students in schools today have more varied backgrounds, including language and cultural backgrounds, than students of the past. This trend is likely to continue. The curriculum of the future must be designed to be inclusive of all students, but it also must have the flexibility to allow teachers and schools to provide learning experiences appropriate to students' increasingly varied backgrounds, starting points and learning needs.

Research into human learning highlights the importance of emotional engagement in learning – of nurturing wonder and igniting passion. Emotional engagement is unlikely when students fail to see the relevance of what they are learning or when teaching fails to connect with individuals' backgrounds and readiness. A curriculum that expects teachers to deliver large amounts of content to all students in the same time period limits teachers' abilities to teach core content in depth, to explain relevance, and to tailor teaching to individual needs. The challenge is to design a curriculum that promotes deep learning and provides teachers with the flexibility they require.

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[26]   Department of Education and Training, Through growth to achievement.

Finally, the context for this Review includes current national concerns about stagnating or declining levels of student attainment in curriculum areas such as reading, mathematics and science. Although there have been recent improvements in reading levels in NSW primary schools, there is no evidence of improved performances in secondary schools and evidence exists of a long-term decline in 15 year olds' abilities to apply their knowledge and skills in real-world contexts. It might be assumed that improved student performance depends almost entirely on the efforts of schools, teachers and students. However, schools, teachers and students work within the constraints of a curriculum – particularly if the curriculum tightly specifies what should be taught, when it should be taught, and how long should be spent teaching it. High-performing school systems recognise that the content and structure of the curriculum are important determinants of the quality of student learning. They see the curriculum as one element of an integrated learning 'system', all elements of which are underpinned by a set of learning principles.[27] These other elements include, but are not limited to, assessment arrangements, professional learning for teachers, support for school leaders, and early interventions. A challenge is to ensure the future curriculum and the broader learning system of which it is a part are designed around common, well-established principles capable of improving levels of student performance.

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27   M Tucker, *Leading high performance school systems: lessons from the world's best*, Association for Supervision and Curriculum Development (ASCD), Alexandria, VA, 2019, viewed 25 July 2019, <http://www.ascd.org/Publications/Books/Overview/Leading-High-Performance-School-Systems.aspx>.

2. COMMUNITY ASPIRATIONS

Submissions to the Review and input to consultation meetings reflected widespread consensus on the purposes of schooling and the kinds of attributes, knowledge and skills that schools should be working to develop in young people. The NSW community has high aspirations for its schools and the school curriculum. The curriculum is seen as the principal guide to ensuring that every student masters foundational learning, is exposed to a breadth of disciplinary knowledge and skills and is challenged to deep learning through advanced studies in areas of personal interest and passion. A shared aspiration is to see every student engaged in meaningful, enjoyable learning that provides foundations for further learning, future work and citizenship.

Unlocking every student's learning

In identifying purposes of schooling, many submissions referred to the centrality of individual learners and their ongoing learning and development. They used a variety of terms to describe this purpose, such as supporting each student to 'reach their full potential', 'experience individual success', 'achieve their personal best', and 'achieve their aspirations'. Some emphasised that this purpose embraced more than academic success; it also included supporting students to achieve their social, physical, emotional, creative and spiritual potential. For many, the primary purpose of schooling and the school curriculum is to assist every student to grow and develop to be the best they can be. However, it was impressed on the Review that this objective should not imply a belief that students differ in their potential.

Ensuring that every student makes the best possible progress in their learning and development while at school was seen as essential to improving individuals' life chances and providing every student with access to a broad range of post-school opportunities. Schools were regularly described as having a responsibility to prepare every student to be a happy, lifelong learner and a valued, contributing member of society.

Some submissions pointed out that this aspiration is already well captured in the *Educational Goals for Young Australians*, (the Melbourne Declaration), the *Australian Education Act 2013*, the recommendations of *Through Growth to Achievement* (the Gonski report) and the propositions underpinning the Australian Curriculum. For example, it was pointed out that the Melbourne Declaration includes the goal that 'all young Australians become successful learners, confident and creative individuals and active and informed citizens' and that, under the *Australian Education Act 2013*, 'all students in all schools are entitled to an excellent education, allowing each student to reach his or her full potential so that he or she can succeed, achieve his or her aspirations, and contribute fully to his or her community, now and in the future'.

Some noted that this purpose of schooling had always been its primary purpose and was largely unchanged 'since the time of Plato and Aristotle'. At its heart, schooling is about developing attributes, knowledge and skills that will allow students to flourish as individuals and move into the adult world with, as one submission put it, 'agency, agility, inventiveness, flexibility and concern for and understanding of others'. There was near-universal agreement that the ultimate purpose of schooling and the school curriculum is to see every student become an effective, contributing member of society.

However, a large number of submissions noted that the world in which students now live and schools operate has changed markedly in recent decades, and continues to undergo rapid change. Schools now need to equip young people for an increasingly complex, dynamic, globalised and uncertain world. Technology is revolutionising how people live and work, including by removing earlier constraints of space and time. Entire categories of work, particularly low-skilled activities, are disappearing to automation and/or low-wage countries. At the same time, it is becoming increasingly urgent to find solutions to an array of complex social and environmental problems.

It was argued that basic levels of knowledge and skill will not be sufficient to negotiate and function in this more complex world and that, to prepare students for the knowledge-based occupations of the future, schools will need to 'lift educational standards across the board'. Unlocking every student's potential will mean working to develop new and higher levels of student knowledge and understanding, skills in applying that knowledge, and social and emotional competence to live and work in a complex, changing environment.

Many submissions stressed that, while the purpose of schooling must be much more than to prepare young people for work, it is essential that students are equipped with information to make wise choices about future vocations, as well as higher levels of attainment and competence to work in an increasingly globalised world using technologies yet to be invented.

Maximising social benefits of schooling

There was also widespread recognition of the social purposes of schooling in providing a highly skilled future workforce; transmitting cultural knowledge and values; and ameliorating disadvantage and promoting social cohesion and mobility.

In underlining the importance of a highly skilled future workforce, some submissions referenced the *Australian Education Act 2013* and its goal for schools to 'create a highly skilled, successful and inclusive workforce, strengthen the economy, and increase productivity, leading to greater prosperity for all'. One submission argued that a key purpose of schooling and the school curriculum must be to 'support young people into pathways that lead to positive and sustained work outcomes and to address some of the chronic skill shortages faced by NSW businesses'.

There was considerable agreement on the kinds of general attributes and skills likely to be required to create such a workforce. These included critical and creative thinking, the ability to collaborate, resilience and adaptability, communication skills and problem solving. Some described these as distinctively 'human' attributes and skills, beyond the capability of machines.

It was also recognised that an important purpose of the school curriculum is to pass accumulated knowledge, wisdom and values from one generation to another. As one submission observed, the curriculum is a 'mechanism to make sense of who we are and to pass on the values, ethos and traditions of our culture through an understanding of history, society and community'.

Schools were seen as having unique potential to contribute to a 'just and healthy society' by promoting more equitable outcomes, enhancing cultural understanding, reducing the impact of socioeconomic disadvantage, and promoting social cohesion and social mobility. A number of people mentioned the Melbourne Declaration goal to promote 'equity and excellence' through school education. And some drew attention to the alignment of this social purpose with their own statements of system and school priorities.

Promoting wellbeing and building character

A common theme in submissions and consultations was the vital role that schools now play in relation to student wellbeing, mental health and the development of personal and social capabilities. This was a particularly strong theme in conversations with people working in schools. Some observed that teachers increasingly have to identify and manage students with mental health concerns. For others, a focus on wellbeing, emotional intelligence and the building of character was driven by a vision of the kind of people they want students to be by the time they leave school, which in turn reflected their aspirations for the future of Australian society.

Some viewed the development of personal attributes – including students' mindsets, values, attitudes and dispositions – as among the most important outcomes of the schooling process, sometimes prioritising it above the development of knowledge and skills. Students' physical and mental health, wellbeing and social-emotional growth were identified in one submission as the 'new key priorities'.

Underlying these calls for increased attention to student wellbeing and the development of personal and social capabilities were explicit concerns about 'rising levels of stress and health problems among young people', a perceived lack of resilience and greater levels of 'emotional fragility' in many students, and the impact of social media and screen time on students' lifestyles, relationships and behaviours.

Submissions identified, and sometimes listed, the kinds of personal attributes that should now be prioritised in schools. These included positive mindsets such as a sense of optimism, a sense of hope, a sense of belonging and a sense of purpose. Schools and parents saw it as central to the work and mission of schools to promote every student's sense of self-worth, self-confidence, self-drive and self-management. And there were references to the importance of developing students' self-awareness, understandings of their place in the world, metacognitive skills and awareness and appreciation of their own beliefs, values and aspirations.

One aspect of character building identified in submissions was the development of moral and ethical understanding. It was considered important that every student learn to make judgements of value and worth, to know the difference between right and wrong, and to make ethical decisions for the common good. One submission identified a key purpose of schooling as the creation of 'moral and ethical contributors to society'. Another considered it important that students develop the confidence and desire to make changes in the world when they believe change is required.

There were numerous references to the need for schools to develop new levels of resilience in young people, enabling them to cope with future ambiguity and change and to recover quickly from failure and disappointment. Schools needed to support students to learn how to 'bounce back and get on with it when things don't go their way', persist, overcome challenges, struggle when required, and display 'grit and determination'. Coping with ambiguity and change would require courage, open-mindedness and a willingness to take risks. And with changes in the structure of work, young people would need flexibility and versatility to move fluidly between the multiple jobs they were likely to have.

There were also concerns about some students' abilities to socialise and to relate to others. It was reported that some students appear to have become increasingly socially isolated, with technology a possible contributing factor. Teachers were concerned about these students' abilities to form healthy relationships and stressed the importance of developing social competence, including the attributes of empathy, compassion, respect, tolerance, patience and 'kindness'. As well as being crucial to the creation of an inclusive, coherent and compassionate society, these personal attributes were seen as essential prerequisites for effective collaboration and teamwork and for leadership in inspiring and influencing others.

One submission proposed that a goal of schooling should be to see students become 'individuals with a heart'. For many, this included being committed to social justice and an inclusive, peaceful society. Another submission argued that, as a society, we 'need to be making our schools places where democracy flourishes', which in turn depended on developing the attitudes, values and cultural competencies required to live and participate in a culturally, linguistically and religiously diverse democracy. Some made particular reference to students valuing Aboriginal and Torres Strait Islander histories and cultures in this context.

> Teaching subject content is one thing in school, but parents and carers have also expressed to CCSP that values such as respect, diversity, compassion, empathy and emotional intelligence are underpinnings to a curriculum that caters to the needs of the individual learner. Resilience, social skills, good communication, teamwork – these are again examples of essential personal attributes that are developed within individual students and are valuable in life and in the workforce.
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> **Council of Catholic School Parents NSW/ACT**

Discussions of students' personal attributes also encompassed their attitudes and approaches to school, including their interest in and commitment to learning. Some observed that children in the pre-school years display high levels of curiosity and creativity, but that these attributes often diminish once they are in school. Maintaining a spirit of inquiry and an interest in learning was seen as a major challenge in relation to many students. One person observed that 'currently in the education system, for a majority of young people, you see a lot of eyes glazing over'.

The importance of intrinsic motivation for learning was occasionally mentioned. This was seen to be absent in much current school learning, with students being motivated instead by external influences such as tests, grades and examinations, sometimes resulting in unacceptable levels of performance anxiety. The satisfaction of personal discovery was often missing in schools, undermining students' desires to continue with formal education and learning. One person observed that 'schools need to be able to create curiosity in young people'. Another simply observed that 'the purpose of schooling is to create learners'.

There was also discussion of the importance of students developing positive beliefs about their own abilities to learn successfully. This was often referred to as a 'growth mindset' – a belief that the ability to learn successfully is not fixed and that everybody is capable of learning given the right conditions and the required effort. Again, this was identified as a current concern in schools, with many students internalising the belief that they are inherently poor learners or are 'not good at maths', sometimes reinforced by the messages that schools deliver them.

In summary, the promotion of student wellbeing and mental health, the development of desired personal attributes and the building of character were seen by school systems, teachers and parents as central and vital purposes of schooling – at the heart of the school mission and relevant to all aspects of school life at all times. For this reason, it was considered inappropriate to consign the development of these attributes to any particular learning area or any particular stage of school. Interestingly, however, this aspect of the work of schools was not always seen as part of the school curriculum, which sometimes was associated only with prescribed syllabuses for key learning areas. For example, teachers sometimes said they were unable to devote adequate time to issues of student wellbeing and the building of character because they were so busy delivering 'the curriculum'.

Developing knowledge and deep understanding

Another major theme in submissions to the Review concerned the importance and role of knowledge acquisition in the school curriculum. Some considered that an emphasis on factual and procedural knowledge was becoming less appropriate given significantly improved access to information through advances in technology. Others rejected this argument, occasionally interpreting it as an attack on standards and rigour, and expressed concerns about the possibility of school subjects not remaining the primary organiser of the curriculum.

Perhaps most commonly, subject knowledge was described as being of timeless relevance – alongside the development of a range of personal attributes and skills – with submissions emphasising the importance of focusing teaching and learning on core knowledge and deep understandings of disciplinary concepts, principles and 'big ideas'. A regular call was for 'depth not breadth' and some commented that, when it comes to curriculum content, 'less is more'.

A variety of reasons were advanced for maintaining a strong focus on traditional school subjects. For some, disciplines such as the arts, humanities and sciences provided a well-rounded education that introduced students to distinctively different ways of thinking, understanding and interpreting the world. One submission argued that 'every child in the state should have meaningful experiences of these'; another, that providing all students access to a knowledge-rich curriculum was a 'key plank of educational equity in NSW schools'.

For some, a solid grounding in traditional disciplines was the best way known to prepare young people to lead thoughtful and productive lives. It was also argued that 'employers need deep subject specific knowledge' and that students who lack such a grounding will not be well prepared to cope with future changes and job disruptions. Strong foundations of this kind would be 'more difficult and more costly' to develop later in life.

Still others drew attention to skill shortages in areas such as engineering and the need to encourage more students to undertake advanced study in science, technology, engineering and mathematics. Mastery of disciplinary knowledge was described as essential to higher-order thinking and

multidisciplinary problem solving, and it was observed that post-school courses presuppose high levels of content mastery in school subjects.

A common view was that all students should be exposed to a range of disciplines as a matter of 'common entitlement'. One submission recommended identifying 'threshold' learning outcomes that every student should be expected to achieve in each of these disciplines. However, there was much less consensus on what this range of disciplines should be. There were suggestions that, in secondary schools in particular, fewer mandated subjects taught in greater depth were desirable. One submission noted that, while music, art and languages are often considered part of this common entitlement, 'modern' disciplines such as technology and engineering, media, and entrepreneurship are now also being promoted for inclusion. Some called for a greater focus on science, technology, engineering and mathematics subjects. Others worried that this risked skewing the curriculum away from the study of humanities and social science subjects in ways that could disadvantage young people. The range and mix of subjects that students should study in secondary schools was considered a crucial topic for discussion and resolution, and inevitably would require 'a negotiated compromise'.

> Students need to develop the critical skills and knowledge that pertain to each discipline of study as the disciplines offer different ways of understanding and expressing the world and value various aspects of the world differently. In supporting what is distinctive in each subject, schooling should provide students with opportunities to identify and apply the particularities of the disciplines to address cross-disciplinary real-world problems. Equally, they need to experience ways that the disciplines are similar and overlap, and how knowledge, skills and processes from one may be used for creative effect in another.
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> **English Teachers Association NSW**

Many submissions emphasised the importance of focusing the curriculum in each school subject on deep, conceptual learning. Giving greater priority to core concepts, principles, big ideas and disciplinary ways of thinking and working was seen as an alternative to, and protection against, expecting students to learn large volumes of relatively superficial factual and procedural knowledge.

Such 'conceptually organised' subjects required a coherent framework that identified the 'key concepts, skills and processes central to understanding within each disciplinary area'. This approach would enable teachers to teach for greater depth of understanding and would provide time for in-depth explorations of concepts. An accompanying 'spiral curriculum' structure would allow for the consolidation of learning by revisiting concepts with 'increasing degrees of complexity'. The principle of designing around conceptual understandings that develop across the years of school also was seen as a way of achieving 'coherence over a K to 12 horizon'.

Examples were provided of what a more conceptually organised subject might look like. These included the *English Textual Concepts* resource, developed jointly by the Department of Education and the English Teachers Association in response to teachers' desires for more conceptually based programs. This resource was described as providing teachers with 'progressions of what students understand about each concept', syllabus content to develop deeper understandings, and descriptions of what students are able to do to demonstrate their levels of understanding. According to one submission, teachers using the English Textual Concepts resource have reported that it has 'helped them focus at the heart of the subject' and, for many primary teachers in particular, has been 'eye-opening, in defining what the subject is'.

Another example was Siemon's *Six Big Ideas* in mathematics, which was described as a framework teachers can organise around to 'declutter content'. In the area of 'multiplicative thinking', for example, Siemon's framework describes eight levels of increasing conceptual understanding, thinking and problem solving from initial understandings based on concrete materials to the confident use of a wide variety of multiplicative structures and symbolic forms. The framework is accompanied by assessment tasks and teaching advice to develop multiplicative thinking, and is relevant for most students in Years 4 to 9.

> Big ideas are the major concepts that anchor a coherent curriculum. Content that is based on big ideas and sequenced to provide the foundation for development of higher order skills and thinking shifts the curriculum focus from a multitude of discrete knowledge and skills to the meaningful connections among them. A good example of this is the English textual concepts project, in which the big ideas were drawn out through rigorous analysis to develop a form of progressions for the core learning concepts in English.
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> **NSW Department of Education**

Exposure to a range of school subjects in the primary and early secondary years, and successful learning in mandated subjects, were seen as part of the common entitlement that should be available to every student, as well as the foundations on which individuals can choose to build more advanced learning in the later years of school. The achievement of common disciplinary foundations 'opened up subject choice', enabling students to pursue personal interests and learning pathways through the senior years and beyond into post-school learning and work.

Submissions observed that students in secondary schools require access to viable options and pathways to identify and pursue their interests and passions. This was especially important following the raising of the school leaving age to seventeen and with the broader range of students now completing school. As one submission noted, 'by the end of secondary school education, each individual will be different, and each must have been supported to develop their capabilities to the maximum possible extent'.

Advanced study in the later years of school should assist students to appreciate how subject learning 'connects with the world of work'. Students should have 'opportunities to connect with, and experience, industries and post-school education and training as part of subject-based learning while still in secondary school' to build an appreciation of the relevance of school subjects to post-school learning and work. Some described this as important for all students, but especially for the one in four school leavers who move directly into full-time or part-time employment and discontinue formal study on completing school.

Another regularly expressed aspiration was to see greater equivalence (or 'parity of esteem') of advanced subjects and learning pathways in the later years of school. One submission commented that 'the current distinction between vocational and academic courses in the final years of schooling ought to be reviewed'.

And there were calls for greater continuity of learning and seamlessness of transitions between schools, tertiary institutions and workplaces. The end of schooling, one submission observed, should not be seen as the end of learning: 'connections (back and forth) between schools and tertiary institutions, TAFE and the workplace need to set up ongoing learning as an aspect of life'. Suggestions included strong industry partnerships to allow students to apply subject content in real-world contexts and to tap into and make use of industry expertise. Principals reported that they would welcome improved links with universities to challenge and meet the learning needs of more advanced students.

In summary, there was widespread support for providing every student with exposure to a range of traditional disciplines and core disciplinary knowledge, skills and thinking as part of the common entitlement of schooling. There was a strong view that learning in these subjects should be focused on the development of students' deep understandings of key disciplinary concepts, principles and ways of working, and that these should be prioritised over comprehensive coverage of factual and procedural content. The curriculum should enable and promote the development of such deep understandings through the progressive building and revisiting of key concepts and big ideas across the years of school. With foundations in the common entitlement of school subjects established, students should have opportunities to pursue advanced studies in areas of personal strength and interest. And efforts should be made to ensure advanced studies in different areas of learning are of equivalent rigour and esteem.

Building skills in applying knowledge

Many submissions emphasised the importance of providing students with meaningful opportunities to apply knowledge and understandings and of developing students' skills to do this.

Opportunities to put learning into practice were considered essential for the development of deeper understandings of subject matter; to provide greater appreciation of the uses and relevance of what is being learnt; to increase interest and engagement; and to build a range of relevant enabling skills. It was regularly pointed out that the ability to use knowledge – as opposed to merely reproducing it – is an essential requirement in post-school life, learning and work.

Submissions gave extensive consideration to skills that support the application of subject knowledge, including skills in using technologies, reading, writing, sourcing and evaluating information, working with others, communicating, analysing situations, investigating alternatives, reasoning numerically, clarifying and solving problems, and creating new approaches and solutions. A wide range of cognitive, creative and interpersonal skills were identified as essential to effective knowledge application.

There was very strong support for giving greater attention to enabling skills of these kinds. One submission commented that 'it's critical to future work and success that these skills be more explicitly developed and measured at school'. Many observed that the ability to apply knowledge through analytical reasoning and problem solving is essential in modern workplaces and is becoming more important. Some argued that content knowledge alone is no longer sufficient and 'too narrow for most students'; the school curriculum needed to be 'refocused' to give more attention to skills of application, and more time in schools needed to be made available to allow this to happen. A few argued that these enabling skills are becoming more important than – and 'should take precedence over' – factual knowledge, because facts are now readily available on students' devices.

Comments of this kind often reflected the fact that skills in applying knowledge tend to have taken on a life of their own by being separated out and labelled (for example, '21st century skills', 'soft skills', 'competencies', 'capabilities'). For some, this labelling had had the effect of making them seem separate, secondary or even 'optional'. The term 'soft skills' made them sound 'frivolous'. It also had led to perceived 'tensions' between knowledge and skills that now needed resolution. Continuing this theme of separateness, some submissions argued that skills for application now needed to be 'embedded' into the curriculum; others observed that they were already there.

A number of submissions expressed the view that opportunities and the capacity to apply knowledge – and the development of skills to do this – should be seen as essential and integral aspects of school subjects throughout the years of school. As one submission noted, 'such skills cannot be learned in isolation from a knowledge base and must not be thought separate from it'. Critical thinking, for example, was described as a 'dimension' of students' developing competence in an area of learning. Another submission observed that it was 'impossible to be creative or imaginative with any authenticity without deep knowledge of any subject'. Knowing and doing needed to be as 'intertwined' in school learning as they are in much post-school learning (for example, in automotive engineering or dentistry). The fact that they are not was seen by some as an indicator of how rarefied 'academic learning' sometimes has become in schools.

> Strongly linked to the development of knowledge basics, and not separate to it or isolated from it, is the development of skills and the capacity to apply knowledge. Problem based learning has widely been used to motivate students and support the development of other skills. These other skills include the ability to create and communicate an idea or argument, operate effectively as an individual and as part of a team, draw more widely on sources of information across a range of discipline areas, apply technology to problem solving and solution finding and build an ethical and social framework. Such skills cannot be learned in isolation of a knowledge base and must not be thought separate from it.
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> **University of Technology Sydney**

The skills most commonly mentioned in submissions were consistent with those identified in the Australian Curriculum and a range of recent international reports and commentaries. They included:

- **Literacy and Numeracy.** These were almost universally identified as essential enabling skills. Adequate levels of literacy and numeracy were seen as fundamental prerequisites for deep understanding, the application of subject knowledge and the development of higher-order skills such as problem solving, data analysis and critical thinking. They were described in one submission as 'the foundations for all learners'. A number of secondary teachers, TAFE teachers, parents and employers referred to the concerning numbers of students leaving school with significantly inadequate levels of literacy and numeracy, and one submission saw the improvement of these skills as a current 'priority for the school curriculum'.

- **Digital Literacy.** Students' abilities to apply technology in subject-based learning and problem solving were regularly described as increasingly important skills. These skills included being able to 'decipher and navigate digital content from a variety of sources' and keeping abreast of, and being able to use, new and emerging technologies. There were a number of references to the importance of developing students' skills in coding and computational thinking, particularly but not exclusively in discussions of problem solving in science, technology, engineering and mathematics.

- **Problem Solving.** The use of subject knowledge, including subject knowledge from a number of areas of learning, to solve real-world, complex problems was seen as a key form of knowledge application. The team-based solution of meaningful, practical, real-world problems also was viewed as an important motivator of student learning. Submissions referred to the importance of students having opportunities to engage in all aspects of the problem solving process, including problem identification, planning and organising, systems thinking, design thinking, project management, model-making, and solution testing and evaluation.

- **Teamwork.** Many references were made to the importance of teamwork in modern workplaces, with individuals having to work both alone and collaboratively to find solutions to problems, to create new products, services and solutions, and to deliver complex, multi-faceted projects. It was considered important that, throughout their schooling, students have opportunities to develop skills in working productively with others on personally meaningful challenges.

- **Critical Thinking.** Students' abilities to analyse and evaluate situations to make rational, dispassionate judgements about appropriate courses of action are key skills in all problem solving and most knowledge application. Critical thinking typically requires students to draw on their knowledge and understandings of important concepts and principles in one or more areas of learning and to apply those understandings thoughtfully to 'specific information and challenges'. At least one submission noted that high-level thinking of this kind in turn supports deep learning of subject content.

- **Research Skills.** There were also frequent references to the need for students to develop inquiry skills. Even children in the early years of school, it was argued, need 'skills to be able to find out information about the world'. These skills included 'experimenting, hypothesising, critique and reflection'. As they progress through school, students should become increasingly proficient in identifying issues, formulating questions and hypotheses, designing investigations, gathering and analysing relevant information, and evaluating, critiquing and reflecting on the results of investigations and experiments.

- **Creative Thinking.** The ability to create new ideas and solutions was identified as important for applying knowledge and contributing in future workplaces. There were regular references to the desirability and benefits of promoting innovative and lateral thinking, imagination and student initiative and enterprise. In this context, some called for greater attention to entrepreneurial thinking and skills, and schools described programs they had introduced to promote these.

- **Interpreting Information/Data.** Skills in sourcing data or information relevant to an issue or problem and processing, analysing, interpreting and evaluating information also were seen as essential enabling skills. One submission observed that 'young people need to be able to locate, discern and filter information', especially now that so much information of variable quality is readily available to them. Students' willingness to question and their abilities to make judgements about the quality of data and information was mentioned a number of times in submissions.

- **Communication Skills**. Beyond basic literacy skills in reading and writing, students require higher-order skills in communicating ideas, arguments and proposals – verbally, graphically and in writing. This includes the ability to participate effectively in team meetings, to pitch ideas and make presentations.

In summary, there was strong support for a much greater focus on knowledge application in the learning of school subjects and for the development of skills that enable students to apply their learning to meaningful challenges and problems. However, as observed in relation to the promotion of student wellbeing, mental health and personal attributes, the provision of meaningful opportunities to apply knowledge, and the development of skills for knowledge application, were not always seen as part of the current school curriculum. For example, one submission warned against focusing 'only on the curriculum rather than on creating powerful learning experiences that support the development of the capabilities, skills, dispositions and character traits we want students to develop'.

A curriculum that meets every student's needs

The most strongly expressed aspiration in submissions to the Review was to see each and every student's learning needs being identified, addressed and met. There was also widespread agreement on the kinds of teaching required to realise this aspiration and the role the curriculum plays in enabling such teaching.

Implicit in many submissions – and explicit in some – was an underpinning belief in every student's ability to learn successfully given appropriate learning conditions, student effort and teacher support. A common belief was that every student should be expected to achieve ambitious personal learning goals.

A number of submissions observed that students are at very different points in their learning and so have different teaching and learning needs. Despite this, it was argued, all students should be expected 'to make good progress from whatever their starting points are', recognising that for some students with disability, good progress 'may occur in much smaller increments than for other students'. Some interpreted this expectation as aspiring to maximum individual learning growth for every student every year, and several submissions included the Gonski call to make this the primary focus of efforts in schools.

A key to maximising every student's learning was considered to be quality teaching appropriate to the points individuals have reached in their learning. Teaching that is targeted on students' current levels of attainment and learning needs was seen as a way of ensuring that every student is challenged by material at an appropriate level of difficulty and content. To do this, teachers needed to be able to 'differentiate and personalise learning to their students' needs and developmental progress'.

It was recognised that there are significant challenges for teachers in providing every student with appropriately targeted learning opportunities given students' widely varying levels of attainment. (More than one submission referred to the variability in students' literacy and numeracy levels in each year of school being the equivalent of five or six years of learning.) However, the consequences of not meeting the needs of the full range of students were seen to be less-advanced students falling further behind in their learning and more-advanced students not being adequately challenged and extended and falling short of their potential.

Submissions noted that the ability to target teaching on individuals' learning needs depended on teachers having a good understanding of where students are in their learning. One person described this as starting from the ground up – understanding what individuals need and then designing teaching to address those needs. The ability to establish and understand where individuals are in their learning was seen as an essential skill of all teachers that required 'an understanding of the diversity and complexity of learner needs'.

Related to the observation that students are at different points in their progress was the observation that students learn at different rates. Some stressed the importance of students being able to achieve curriculum outcomes 'at their own pace' and of the school curriculum being sufficiently flexible to allow this and to cater for different rates of learning. This comment often was linked to the observation that additional time is required to consolidate some students' learning and to ensure mastery of content before moving to more advanced content. For example, one submission saw it as essential that students can 'progress at their own pace in learning areas such as mathematics and English where step-wise learning and mastery are critical'. For more advanced students and those making faster progress, 'teachers should have the flexibility to start work earlier and accelerate students'.

Maximising each student's learning also depended on engaging students' interests and passions. A number of submissions commented that all students can learn successfully if they are interested in what they are learning. For some, the implication was to 'make school more interesting'. For others, including those involved in a number of innovative programs described to the Review, the implication

was to adopt more personalised and 'student-centred' approaches that empower individuals to discover and explore their interests. For example, it was explained that in 'Big Picture' schools, 'the first priority is for students to explore their personal passions and increasingly build their learning around these'.

Engaging and building on students' interests was described as another example of meeting individual learners where they are – not only in terms of academic attainment, but also in terms of personal interests and aspirations. Schools needed flexibility and time to respond to students' diverse interests, to 'let kids study what they enjoy' and to 'teach the things they're interested in'. It was argued by some that this became especially important in secondary schools where subject choices needed to be driven by an understanding of personal strengths and interests, and students needed to be able to pursue in-depth learning and future pathways matched to their individual passions.

Students not only differ in the points they have reached in their learning and in their varying interests and aspirations, but in many other ways as well. As one submission noted, 'there is now significant diversity within a cohort, with additional factors such as backgrounds, cultures and languages making the diversity among students greater than it has ever been before'. To meet every student's needs, the curriculum must provide flexibility to allow schools and teachers to respond to this diversity.

This includes room for schools to implement the curriculum flexibly in ways that suit their local contexts. Schools need to be able to adjust what they teach to 'take into account individual students' family, cultural and community backgrounds', as well as contextualising learning to help students appreciate its local relevance. This may be facilitated by closer engagement with the broader local community.

It also includes meeting individual learning needs through culturally inclusive and culturally responsive teaching practices. Submissions pointed out that many Aboriginal and Torres Strait Islander students and families experience 'a significant cultural gap' which directly impacts educational outcomes. But for many other students as well, attending school is a significant cross-cultural experience. The challenge of meeting every student's needs sometimes requires teachers to appreciate and build on the cultural knowledge and experiences that individuals bring to the classroom.

It was strongly impressed on the Review that the appropriate response to this great diversity of student needs was not to create separate curricula for different groups of students. It was essential that the mainstream curriculum was inclusive of all students, including students with special needs. Although the provision of something 'extra' and 'different' was often seen as appropriate and benevolent, separating some students out, streaming, and the lower expectations embodied in separate curricula and lower-level courses imposed 'artificial ceilings' on how far individuals could progress and often left them further behind. The clear preference was for a single curriculum that recognised students' differing levels of attainment and learning needs and that enabled 'appropriate adjustments to be made to teaching and learning' to ensure that every student was engaged, challenged at an appropriate level and made excellent progress towards high achievement.

> The content and outcomes of the curriculum should be flexible to enable teachers to make decisions about what is learnt, how it is learnt and the time required to learn. This will allow teachers to differentiate and personalise learning to their students' needs and developmental progress, as well as to the school environment… Knowing students and how they learn is an essential skill of all teachers and requires an understanding of the diversity and complexity of learner needs… There should be opportunities to challenge high achieving students, support those students with various learning needs, and devise curriculum and pedagogy to meet the full range of students in our schools.
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> **Association of Independent Schools of New South Wales/AHISA**

The implications for teachers of this aspiration to see every student's learning needs being met were not lost on those making submissions to the Review. Understanding students' varying backgrounds and learning needs, differentiating teaching to address those needs, and making adjustments to ensure that every student is engaged and making good progress in their learning were recognised as significant professional challenges, particularly in secondary schools. They require high levels of subject expertise, cultural competence and professional judgement.

Another strong message through the submissions was that meeting every student's needs cannot be treated simply as a matter of effective pedagogy, with teachers being delegated responsibility for working out how to do this. The curriculum itself has a crucial role to play in enabling and supporting the kinds of teaching necessary to achieve this, both through its design/structure and the nature and amount of curriculum content. The curriculum must provide time and flexibility for teachers to plan and make decisions about 'what is learnt, how it is learnt and the time required to learn'. This means giving teachers greater agency and trusting them to make decisions in the best interests of individual learners. A number of submissions believed that this, in turn, depended on a curriculum that provided broad guidelines and allowed teachers to decide on detail, make adjustments and contextualise content for students in their care. And there was widespread recognition of the need to back this up with high quality professional learning, resources and other forms of support so that teachers are able to work in this way.

In summary, submissions to the Review were motivated by a desire to see every student's learning needs being identified and met, and every student making excellent, ongoing progress towards high attainment. The curriculum, through both its organisation and content, was identified as having powerful capacity to promote this aspiration, but also to undermine it. A key to achieving this shared aspiration – identified repeatedly in consultations and submissions – was for the curriculum to provide sufficient flexibility, time and space for teachers to identify and understand individual learning needs and to tailor their teaching accordingly.

3. COMMUNITY CONCERNS

Just as there was widespread consensus on broad purposes and aspirations for schooling and the school curriculum, there also was significant agreement in consultation meetings and Review submissions on obstacles and features of the current curriculum limiting the full achievement of these aspirations. Concerns centred on the volume of content contained in many syllabuses; increased expectations and demands on schools by governments, school systems and NESA; a lack of flexibility in curriculum structures to address adequately the widely varying learning needs of students; the influence that external tests and examinations have on approaches to teaching and learning; the dominance of ATAR as the preeminent measure of school learning in the eyes of students and parents; and the undervaluing of a broad range of advanced courses and learning pathways other than those being pursued to gain admission to university. Inevitably, there were differences of opinion in relation to detail. However, there was overwhelming agreement that these six concerns must be addressed in any future redesign of the school curriculum.

Amount of curriculum content

The Review heard widespread concerns about the volume of content in most NSW syllabuses.

A consistent comment in consultation meetings and submissions was that syllabus documents expect teachers to cover an unreasonable amount of material. Syllabuses were regularly described as 'overcrowded', 'overly prescriptive', 'too content heavy', 'overly content driven', 'cluttered' and promoting a 'tick-box' approach to teaching.

In consultation meetings, one teacher commented, 'we need to get rid of masses and masses of content'; a second, that 'we need to remove 30 per cent of content from every syllabus – without exception'; and a third, that 'we could take half the dot points out of Human Society and its Environment syllabuses' with limited negative impact. Many teachers reported that they were struggling to teach the amount of mandated content in existing syllabuses.

Some believed the amount of syllabus content was a particular problem in primary schools. Others thought there was too much mandated content in the middle years of high school. Still others referred to the amount of content required for the Higher School Certificate. The Review also was given a variety of anecdotal accounts of reported consequences of 'overcrowded' syllabuses, such as a child being told to read as homework because there was 'no time to read at school' and a Kindergarten teacher claiming they 'didn't have time to teach nursery rhymes'.

A number of people referred to the role assessment processes play in driving this focus on detailed content coverage. Some spoke of needing to teach and assess all the dot points in syllabuses. Some referred to teachers' concerns that unaddressed dot points might later appear on HSC examinations. For example, one person said that teachers sometimes feel that 'if they miss a dot point in Year 7, they will be short-changing kids for success later in the HSC'. Some teachers believed that they had more freedom in the past and that teaching was 'now too linked to external assessment'.

The Review was told that many teachers, particularly in secondary schools, believe they are required to teach every syllabus dot point and so approach the syllabus as a 'checklist'; that early career teachers may be particularly reluctant to take risks by not covering all dot points; and that some teachers may believe everything in a syllabus must be covered to assign A to E grades accurately.

> Participants overwhelmingly stated that there are too many dot points in the Mathematics curriculum. Some responses included comments such as 'overloaded', 'overcrowded' 'too much content' and 'shallow learning due to density, very little time to explore'. Participants reported that the amount of content is detrimental to mastery of concepts, and rewards 'book-learners and test takers at the expense of critical and creative thinking and problem solving'.
>
> **Mathematical Association of New South Wales**

Some questioned whether teachers were over-interpreting what was expected of them. One submission referred to the distinction between real and perceived prescription. Another commented that, while teachers may believe syllabus content is mandatory, they often do not appreciate the flexibility available to them. Related to this was the observation that some teachers interpret examples intended only to illustrate outcomes as material that they are expected to teach. On the other hand, a number of submissions described ambiguity and a lack of clarity in syllabus documents that leaves teachers struggling to know what is mandatory and what is not. This was compounded by monitoring and inspection processes. One submission observed, 'The way the syllabus is presented, and teaching programs are monitored, makes teachers feel that they must cover all the dot points'. Another commented, 'There are numerous cases where areas of the curriculum are ostensibly optional, yet they are treated by NESA in its inspections of schools as mandatory'.

Teachers' attempts to cover the volume of prescribed content in subject syllabuses within the mandated hours were described as limiting their abilities to respond flexibly to the learning needs of students. The current level of detail and specificity 'hindered differentiation and personalisation' and the kinds of adjustments necessary to optimise the progress and achievements of individuals and groups of students. In consultation meetings, some teachers spoke of 'skimming content constantly' and 'bouncing from one thing to another' which led to students 'switching off' and left them without time to develop individuals' passions and strengths. It was argued that this level of prescription was 'not necessary to support qualified and accredited teachers' and undermined their professional judgements and expertise to make decisions in the best interests of students.

Another consequence of the current volume of content in syllabuses was the 'risk that content is taught only superficially', denying students opportunities to develop deep conceptual understandings of subjects. The current level of specificity was considered to stifle creativity and curiosity, student choice, teacher flexibility and the accommodation of local interests. Parents were concerned that the current approach does not allow for depth and consolidation of learning, especially in primary schools. One teacher said, 'There isn't the time and space for young people to get to higher level thinking like creating and applying, and evaluating, because of all the content that we need to cover'. And a parent organisation commented that students need time to explore and understand concepts, but 'the design of the current curriculum simply does not allow for this' because teachers 'are currently pressured to move from one outcome to the next too quickly'.

Various other consequences were identified, including the reduction of teachers' time to plan, refine and reflect on appropriate pedagogies; inadequate down-time in class for face-to-face conversations with students and to provide quality feedback; limited opportunities for professional discussions with colleagues; reduced time to monitor and see individual growth; and the 'blocking' of innovation in teaching. On teacher said, 'Ultimately, the issue is that we don't have time to do anything very well'.

A number of submissions referred to the impact current syllabuses are having on teachers. 'In trying to cover more and more content', it was claimed, 'we are overloading the students and the teachers and compromising the overall outcome'. Teachers were described as extremely time poor – a situation that had become worse in recent years. They were 'fatigued by trying to get the syllabus documents to work for students', burnt out, and in survival mode. 'Teacher and principal wellbeing is rock bottom because we have too much to do.' Teachers regularly called for more trust in their judgements and respect for their professionalism. One said that the curriculum reflected through its rigidity a lack of system trust in teachers. Another commented, 'Give us guidelines and allow us to be innovative'.

Some submissions suggested that concerns about the volume of syllabus content might also be addressed by minimising the duplication of material in different subjects. A degree of content 'cross-over' existed – for example, the teaching of plate tectonics in both geography and science – and that 'as much streamlining as possible' should be undertaken to minimise this. There were also concerns

about what was referred to as 'stage drift', with material that once was taught in one year level now being mandated in earlier year levels. This was described as resulting from recent syllabus reviews and it was speculated that this development was a response to concerns about declining/stagnating levels of student performance in national and international assessment programs.

More positively, some noted that a degree of prescription was likely to be helpful for beginning teachers, teachers in remote locations, and primary teachers who are required to teach across subjects and so may require additional support.

It was also reported that concerns about the volume of subject content were not relevant to all subjects. Some syllabuses, including newly developed syllabuses in primary history, geography and science, provided greater flexibility. Teachers also made positive comments about the level of content detail in current music, art and Stage 6 biology syllabuses.

> The curriculum is overcrowded. This affects everything from teacher workload to the ability of students to pursue their learning in depth. Any change must result in a less crowded and more flexible curriculum. There needs to be a balance between prescription and supporting teacher autonomy. We may have reached a point where teacher autonomy needs to be restored. We certainly do not need to go further down the track towards greater prescription and a compliance culture.
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> **The History Teachers' Association of NSW (HTA)**

In summary, there was near universal agreement that the amount of content in most current syllabuses needed to be reduced. As one school system's submission observed, 'the current suite of curriculum documents, including syllabuses, needs to be significantly redesigned'. This redesign needed to deliver more flexibility and appropriate oversight measures rather than the 'overwhelming and claustrophobic oversight' driven by current curriculum, assessment and credentialing requirements.

For some, this was a matter of changing the culture. NSW had chosen to develop syllabuses with a greater degree of detail than the Australian Curriculum by including additional learning outcomes, content descriptions and supporting information. But this syllabus approach to curriculum implementation continued 'a long tradition of prescription and control of schools and their activities for learning' and made it more difficult for teachers to create personalised learning opportunities. The Review was an opportune moment to reconsider this approach.

An aspect of any redesign must include 'paring back' the curriculum to focus on essential knowledge and deep understandings of core concepts, principles and big ideas in a discipline. These essentials must be 'defined unambiguously', clearly articulated and prioritised. It must be clear to teachers what is mandatory, and beyond this core, there must be 'opportunities for options and in-depth studies and projects', including opportunities for interdisciplinary/ multidisciplinary learning activities.

Central to this redesign, it was argued, must be greater teacher discretion and agency in deciding what to teach and how to teach it. Teachers needed 'a clear sense of the 'big picture' or overarching long term outcomes' but required time and autonomy to pursue 'pathways to achievement' that they deemed appropriate for their own students. As one parents' association submission put it, 'the curriculum should be a broad overarching guide for all schools which sets overall benchmarks, and the pathway to reach the benchmarks is in the hands of each school'.

Increased expectations of schools

The Review also heard widespread concerns about additional expectations and demands that have been placed on schools and that further reduce time for quality teaching and learning.

A number of submissions observed that schools are now fulfilling functions that once were responsibilities of families and other institutions in society. Some described this as 'filling a vacuum' created by broader societal changes – particularly in relation to student mental health, wellbeing and the development of personal qualities.

Numerous references were made to other pressures resulting from decisions to delegate to schools responsibility for addressing various social issues. One person observed that schools had become 'the solvers of all of society's ills', with new issues constantly being added to the curriculum. The Review

was told that a recent scan of political announcements had identified a diverse set of issues that schools were now being asked to address, including 'anxiety/depression, resiliency training, childhood obesity, road safety, water safety, Asian studies, healthy school canteens, bush fire safety awareness, languages, cyber safety and anti-bullying'. Others mentioned drug education, first aid, stranger danger, healthy eating and pet safety. Additional programs of these kinds consumed significant teaching time and detracted from other aspects of teaching and learning.

While all these social issues were recognised as important, they were seen as contributing to a 'chopping and changing of the curriculum' in response to topical political issues and pressures from 'non-school bodies' and special interest groups. These changes were 'often made hastily and without proper consideration of the impacts on time, resources, funding or even the benefits of such changes'. When such additions were made, consideration was never given to what might be removed from, or deemphasised in, the curriculum.

There was a view that it should be more difficult for governments to add social issues of these kinds to the school curriculum and workload of schools. Some suggested that schools and teachers should 'push back' on expectations that they address issues better addressed by parents, allied health professionals or other organisations.

Other factors impacting on schools were new levels of accountability and compliance. These diminished teachers' time to deliver the curriculum and impinged on school leaders' time to support and lead teaching and learning. Some submissions described a recent change of culture in schools with the introduction of more 'managerialist' approaches. These were reflected in top-down oversight of the work of schools and increased administrative duties of teachers and school leaders. A focus on management, accountability and compliance was described as having replaced an earlier focus on professional development and support for teachers – particular in interpreting and implementing the curriculum.

The implications of more devolved responsibilities and greater autonomy included a shift in principals' work away from teaching and learning to financial and other management issues. Increased requirements for school data analysis and reporting and other new accountabilities had seen an intensification of workloads and a reduction in principals' abilities to be 'instructional leaders'. Some reported becoming increasingly 'bogged down with governance and compliance'.

Increased administrative tasks also had impacted the work of teachers who reported having to comply with a growing amount of paperwork, 'red tape' and 'box ticking' and to 'attend more meetings and produce and comment upon more documents than ever before'. Excessive mandatory reporting, 'high stakes testing' and the 'burden of data entry' added to the time teachers spent on compliance and administrative activities. Requirements by NESA, such as those related to teacher accreditation, were described as onerous and added to a 'vastly increased workload' that eroded teachers' time for purposeful thinking, teaching and professional learning.

> Teacher workload is beyond the reasonable. Teachers were trained to deliver to students, but the existing paperwork processes are so time consuming that teachers spend more time focusing on making sure they look good on paper than whether they are being effective in the classroom. Being accountable is not a bad thing. However, this accountability has not improved student outcomes, but has created a huge 'other layer' on top of an already heavily-loaded curriculum.
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> **Careers Advisers Association of NSW and ACT**

There were frequent references to a compliance mentality that now exists in many schools, driven by school registration inspection processes and various other accountability mechanisms. Schools were described as working in a high stakes environment in which there are 'many pressures on teachers to make sure they're ticking the boxes'.

The Review was provided with an example. There had been significant changes in teachers' programming (lesson planning) in recent years, with much greater detail now being included in teachers' plans. In some cases, it was reported, the writing up of a lesson plan 'would take longer than teaching the lesson itself', representing a huge drain on teachers' time. This practice did not appear to be required by NESA, but instead reflected the detail that some principals and teachers believed was necessary for compliance and that would need to be produced if requested. One submission

explained that 'the inspection process has an impact on the expectations for this kind of programming documentation'. Several teachers told the Review that this documentation was 'put on file' in the school but sometimes bore very little resemblance to what they actually did in the classroom.

A consequence of increased accountability and compliance was that schools had become more risk averse. This sometimes led people to do more than was actually required of them – for example, making sure they taught all the dot and dash points in the syllabus. Some teachers said they felt this pressure: 'If I don't meet the hours on the timetable then we won't be a compliant school'. Such pressures were driven not only by NESA and its processes, but also by school systems and their various educational initiatives, which comprised 'another layer of complexity' for schools.

Working in an environment of accountability and compliance led some teachers to feel that their autonomy, expertise and professional judgement were not being respected or valued. As an indicator of this it was pointed out that content in the secondary curriculum was 'no longer a matter of guidance, but has become mandated'. One principal said that teachers described 'drowning under workload' and expressed concerns for their health and wellbeing. Another believed schools were losing many talented teachers to accountability fatigue.

In summary, submissions reported significant recent growth in expectations and demands on schools resulting from: the need to take on roles that once were responsibilities of parents and other institutions; directions from governments to develop and deliver school programs to address a variety of identified social issues; increased levels of accountability, including inspections linked to school registration; and a variety of administrative and compliance tasks, including assessment, data analysis and reporting. These additional expectations and demands on schools added to the challenges of overly content-laden syllabuses, increased pressure on already time-poor teachers, and detracted from the quality of teaching and learning.

An inflexible curriculum

Many submissions expressed concerns about a lack of curriculum *flexibility* to address students' very different learning needs.

The Review was told that, not only is there too much content in most syllabuses, but the school curriculum is often inflexible with respect to students' varying backgrounds and starting points. This inflexibility, which took a number of forms, was seen as hindering some students' abilities to learn successfully. For example, input to the Review from Indigenous groups described the school curriculum as providing learning opportunities 'targeted for children growing up in a Western culture'. This 'cultural/linguistic bias' made the curriculum inflexible in recognising and addressing Aboriginal children's different cultural and linguistic starting points and 'severely disadvantaged' many students.

> Universal educational theory tells us that knowledge development is best achieved through teaching that allows students to build on prior knowledge, such as that learnt from one's family and community, prior to and outside of formal schooling. Before starting their schooling and outside of their school hours Aboriginal children are learning their Aboriginal languages, they are learning Aboriginal English and they are being immersed in, engaging with and learning through the oldest continuous culture in humanity. But, when they step onto Australian school grounds, they are subjected to a significant cultural shift where all too often there is little or no value placed on speaking Aboriginal Languages, Aboriginal English and practising and learning through Aboriginal culture.
>
> **NSW Aboriginal Education Consultative Group Inc. (AECG)**

More generally, the Review was told that prescribed curriculum content often is not at an appropriate level for many of the students to whom teachers are expected to teach it. This lack of flexibility was attributed in part to the way in which the current curriculum is structured. Submissions pointed out that the curriculum is organised into year levels which are grouped into 2-year 'stages' of school. Syllabuses specify what teachers are to teach and students are to learn in each year, with teachers deciding how that syllabus content is taught. In each year of school, students are assessed and graded on how well they have learnt what teachers have taught and then move, more or less automatically, to the next year.

Although this was a common and traditional way of organising the school curriculum and student learning, some submissions argued that this approach took inadequate account of the 'greater range of learning abilities that are now acknowledged in the modern classroom'. A number of people described the extent of this variability, citing research evidence that the difference between the least and most advanced students in each year of school was the equivalent of about six years of school. It was also observed that children begin school with widely varying levels of learning and development. One submission noted, 'there is now significant diversity within a cohort, with additional factors such as backgrounds, cultures and languages making the diversity among students greater than it has ever been before'.

In this context, there was concern that the curriculum lacked the flexibility teachers required to respond to students' widely varying learning needs. One person commented that teachers are 'required to teach at a particular stage linked to year levels, regardless of where kids are at'. Several likened the school curriculum to a 'quasi-industrial model' or '19th century factory model' that treats all students in the same way and 'batches them through by age', one year at a time. One person in a consultation meeting commented, 'we push students up a year level whether they are ready or not, rather than saying they haven't met a standard and working with them'.

> Under the current curriculum, students are progressed from year to year regardless of how adequately they have met the outcomes or achieved the required learning foundations, or even if they have not achieved the outcomes or foundations at all. This does not acknowledge that individual students may vary dramatically in how they perform against the curriculum… As cohorts in schools are based purely on age, there can be enormous gaps in a single cohort in terms of the most and least advanced students. As these students are essentially required to progress at the same rate, there is little scope for teachers to adapt to these differences in one class.
>
> **Federation of Parents and Citizens Associations of NSW**

This way of organising learning in schools was considered to have a number of consequences for students. These consequences included less advanced students often being expected to learn year-level content for which they were not yet ready – sometimes year after year. Examples were given of a little boy beginning school speaking at the level of a two year old but being put into guided reading and phonics instruction because it was part of the Kindergarten curriculum; students in stage 4 who were performing at stage 2 in literacy and numeracy but still had to be assessed on stage 4 outcomes; and students who were required to study mandatory content in English and mathematics for which they lacked the foundations because 'their work in the previous year was also introduced too early and little or no revision was possible'. Expecting students to learn content in the absence of the necessary prerequisites resulted in 'entirely unsurprising' failure on standardised tests such as NAPLAN. One teacher simply said, 'many kids are not ready for what we are trying to teach them'.

When students are inadequately prepared for what they are taught, many perform poorly on year-level expectations year after year and fall increasingly far behind in their learning. Under the current curriculum structure, one person observed, 'if you fall behind early on in schooling, there is no opportunity to catch up'. Another person described some students as 'always having a feeling of being left behind, and all the negative perceptions that go with that', and added, 'we need to be able to meet kids where they are'.

Another identified consequence of this way of organising teaching and learning was failure to challenge and extend more advanced students. One teacher said, 'we have kids in Kindergarten who can easily do Year 3 maths', but asked, 'are we giving them that opportunity?' Parents expressed concerns about 'teaching to the middle' and called for greater curriculum flexibility to allow teachers to extend student learning rather than 'mark time' for more able students. And another person commented that the most advanced students sometimes 'learn nothing from year to year because they learnt it three years ago'.

> Members expressed a desire for flexibility around the content they should teach in each year. Currently teachers feel tied into teaching content to particular year levels regardless of the background knowledge of their students. If, for example, a teacher felt that there was a need to spend time reviewing content from previous years to better prepare their students for new learning then they should not feel under pressure to keep moving on. If they want to pause and consolidate students' prior learning, they should have the flexibility in the curriculum to do this.
>
> **Mathematical Association of New South Wales**

There was a common belief that the 'current structure and specificity of the curriculum' does not cater for the diversity of students in each year of school. One submission described the existing curriculum as 'excessively rigid' and 'inflexible', making it difficult for teachers to tailor their teaching to individual student needs. A 'one-size-fits-all' curriculum encouraged a teacher-centred focus on delivering the same specified content to all students rather than engaging individuals with personally relevant learning. And one principals' association commented that organising the curriculum according to 'chronological age' raised 'all kinds of issues, frustrations and dilemmas for students, teachers and parents/carers', such as: What should teachers do if a student fails to achieve the stage outcomes? What if a student has already achieved the outcomes expected for their stage?

For some who made submissions to the Review, greater curriculum flexibility depended first on shifting the focus from every student's mastery of a common, specified body of year-level syllabus content to establishing the points individual students had reached in their long-term progress in an area of learning. This, in turn, depended on an appreciation of the continuity and course of student learning in a subject across the years of school. One subject association's submission commented that 'all curricula need to be able to show a clear progression through different stages of schooling, especially in linking the primary with the secondary... A clearly articulated framework of concurrent development of concepts, processes and skills would strengthen our curriculum'. One teacher told the Review, 'we should really be looking to change to a perspective of growth – delink from age level and meet students where the learning need is'.

A focus on continuity and progress in an area of learning was described as providing a 'K-12 perspective' on learning and development. In fact, it invited a view of learning that extended beyond the school years: 'A curriculum that reflects a continuum of learning recognises and leverages the fact that learning occurs both before and after a child's formal years of schooling. It is structured as a continuum across levels of learning achievement not years of schooling and provides for seamless transitions.' One teacher also observed that 'many of the skills we are developing are lifelong and not easily linked to a stage'.

Many people commented on the negative impact that transitions between stages and phases of school have on student learning. It was recognised that existing phases (pre-school, primary, lower secondary, senior secondary, tertiary education), along with the transitions between them, are 'artificial constructs' resulting from historical responses to growth in demand for additional education. They commonly involve different curricular and pedagogical approaches, and transitions between them often produce serious disjunctures in the progress of individual learners. Frequent references were made to discontinuities between pre-school and Kindergarten, primary and secondary school, and senior secondary and post-school learning. One submission from a principals' association described phases of school as 'working against a successful transition from one setting to the other, breaking the continuum of learning'. Another submission asked, 'Would an effective school system that has the learner at the centre really be designed in such a way?' and argued that all learners would benefit from a 'seamless curriculum' from pre-school to post-school.

At least one submission acknowledged that the current curriculum already provides 'quite a lot of continuity in syllabuses from K-10', but described a significant discontinuity between the lower secondary and senior secondary years. The introduction of new syllabuses for specific, stand-alone stages rather than as a 'suite' across the years of school also was seen as contributing to reduced continuity of learning. Another submission observed that current problems with transitions are not just from one phase of school to the next: 'Many problems are from 'year to year' because the entire curriculum is organised around a 'stage based' or 'year based' progression'. A curriculum that genuinely reflected a continuum of learning from pre-school to post-school would provide an opportunity to

address current transition issues, as well as 'an opportunity for schools to think differently about how they structure themselves'.

Underpinning calls for a more flexible curriculum to meet the needs of all learners was an implied recognition that, at any given time, each student is at some point in their learning of a school subject and is capable of further learning progress if they can be engaged, motivated to make the required effort and provided with appropriate (well-targeted) learning challenges. This was considered to be true of every learner, from the least to the most advanced, including students with disabilities and learning difficulties. A curriculum based on a continuum of learning was described as an 'inclusive' curriculum because it recognised that every student was at some level of attainment on the same learning continuum and was designed to identify and meet each student's learning needs to enable them to make strong further progress in their learning.

Some submissions defined this as 'student-centred' teaching and learning. Central to this definition was a belief that what a student is taught should be determined by their current learning needs as established by their teacher, not by a central curriculum authority based on their age. The process of establishing a student's learning needs ideally would include the student's parents/carers and the student themselves. A principals' association commented, 'The ludicrous notion that all Kindergarten teachers deliver the same content and those same students are assessed in the same way is chronically outdated'. Another submission said, 'Learning must match the child's needs rather than the requirements of a school or a system, and teacher judgement is central to this process'. Those who advanced this proposition understood that it had far-reaching implications not only for the design of the school curriculum, but also for many other aspects of the work of schools.

One implication of this proposition was that it required teachers to establish where students are in their learning and to work to understand individual learning needs. This was recognised as a more difficult task for teachers than simply delivering the year-level curriculum to all students and then assessing to see how well they had achieved the same syllabus outcomes. It meant 'meeting students where they are' by identifying their current levels of attainment, interests, strengths and learning needs. A number of submissions referred to the value of classroom assessments in evaluating and diagnosing individuals' learning needs and deciding next steps in teaching. When assessments are used in this way, one submission noted, 'the teacher knows the entry behaviours of the child before they start teaching'.

Having established students' current levels of attainment, the challenge for teachers was to provide effective, well-targeted teaching and to work with students to set challenging goals for further learning. One submission observed that every student is entitled to know 'what they are going to learn, how they are going to learn it and how they will know they have learned it', adding, 'all good teachers know and understand this, but current structures mitigate against these practices'. In some cases, these practices require 'individual learning plans customised for each student'.

Another implication identified in submissions to the Review was that, as well as recognising that students are at different points in their long-term progress, there also needs to be recognition of – and curriculum flexibility to accommodate – students' varying rates of progress. Currently, there was considered to be 'little scope for students to meet the curriculum outcomes at their own pace or in ways that suit their own needs'. There needed to be flexibility to allow students who were capable of more rapid progress to move more quickly through the curriculum. At the same time, flexibility was required to provide extra time to students who needed it 'before having to move onto the next thing'. One submission observed that 'focusing on both hours and outcomes is a contradiction' and argued, 'Schools are best-placed to understand their student cohorts and make judgements about whether more or less time is required'.

It was also recognised that, for a variety of reasons – often beyond the school – students sometimes are not ready for the next steps in learning. Teachers occasionally find it necessary to address issues impeding a student's learning before they continue teaching. This also required curriculum flexibility. In addition, flexibility was required for students who were absent from school for significant periods. For example, Aboriginal and Torres Strait Islander students commonly engage in Sorry Business when there is a family or community death. 'This cultural practice requires students to be away from school for an extended period, sometimes up to three weeks.' A curriculum delivered on a fixed timeline to all students increased the likelihood of absent students falling behind in their learning.

The proposition that what a student is taught should be determined by their current learning needs as established by their teacher, rather than by their age or year of school, was recognised as having profound implications for the design of the school curriculum. A number of submissions addressed

these implications directly, including by sketching features of a possible alternative design. A parents' association urged the Review to consider how learning 'could be structured to ensure that the student is the focus in all classrooms and each student is working towards achieving their own personal learning goals and given every opportunity to reach their full potential'. Another submission observed that 'a serious commitment to personalising learning for every child means a disentangling from the current model'.

> The curriculum content and outcomes should be organised more flexibly to reflect different paces of learning, instead of fixed age-based stages, to allow students to make good progress from whatever their starting points are and to support continuity of learning as an ongoing process. NESA requirements around mandatory hours, permissible starting dates, fixed assessment requirements, fine-grained registration and inspection requirements should be removed or amended to allow schools the flexibility they need to deliver the best possible education for each of the students in their care.
>
> **Association of Independent Schools of New South Wales/AHISA**

A first, and key, step was to design the curriculum around increasing levels of absolute proficiency or attainment, rather than years of school. Various terms were used to describe this. Some submissions referred to increasing levels of 'competence' that are not tied to time: 'Competencies are competencies, like a driver's licence. It doesn't matter when you get it – it matters that you get it'. Some referred to redesigning the curriculum as 'learning progressions' and recommended that NSW 'move from a year-based curriculum to a curriculum expressed as learning progressions independent of year or age'. Others described these as 'proficiency levels' and called for 'progression through school based upon the attainment of successive proficiency levels in individual subjects or key learning areas'. Another person used the term 'capabilities' and considered that New Zealand was setting a good example through a 'capabilities framework' that was not linked to school years, but allowed students to demonstrate mastery of capabilities 'and then move on'.

Common to all these suggestions was a vision of a restructured school curriculum, organised into absolute levels of attainment, through which students could progress at their own rates. One person in a higher education institution wrote, 'When arbitrary deadlines for all students to demonstrate fixed learning outcomes are in place, some students are set up to fail. Learners should be able to develop and demonstrate understandings and outcomes at times that are appropriate for them… Flexibility is a key characteristic of this type of vertically structured curriculum'.

A submission from another parents' association described in some detail how the restructuring of the curriculum into 'proficiency levels' might work in practice, including the proposal that higher proficiency levels 'reinforce and build upon the core knowledge, skills and competencies of the lower proficiency levels without rehashing the material of previous levels'; that 'judgement about readiness for any particular proficiency level should rest primarily with the child's teacher'; 'differentiation in classes would be based on a child's proficiency level'; and 'students who are struggling to meet a proficiency level would be given additional time, support and funding within limits'.

The implications for assessing student learning also were discussed. With a sequence of increasing levels of proficiency defined for an area of learning, teachers' assessments would be undertaken to establish starting points for teaching, provide feedback to students, and to decide whether a proficiency level had been attained. In this way, the results of assessments would be 'cumulative throughout school' making transitions 'more continuous'. One submission noted that, upon leaving school (even if that occurs before the end of Year 12), each student could receive a report showing the 'actual proficiency levels for all subjects studied'. It was also felt that this could 'remove some of the stress on the HSC as a high-stakes exam'.

P&C Federation proposes the following proficiency-based progressions as a model for a future curriculum, which has the following characteristics:

- Progression through school based upon the attainment of successive proficiency levels in individual subjects or key learning areas
- Each proficiency level contains an essential core knowledge, skills and competencies component with students only being able to progress to the next proficiency level by having demonstrated they have mastered the core elements…
- Proficiency level trajectory based upon the minimum core competency trajectory that a student needs to reach at the end of schooling
- Students that master proficiencies early can traverse a steeper trajectory (within limits) by seeking to obtain higher proficiency levels
- Students remain in the age cohort to help promote normal emotional and social growth.

Federation of Parents and Citizens Associations of NSW

A number of submissions argued that, with the increased flexibility this approach would bring, assessments could be undertaken not at the same fixed time points, but when individuals were ready to be assessed and to demonstrate their achievement of a level of proficiency. One person said, 'There is a need to assess and report whenever it is timely, rather than in a 'lock step' way. So when students achieve outcomes, they should be able to demonstrate their achievement in a timely way and proceed to the next challenge that would be suitable for extending their capabilities'. It was considered that technology could be helpful in this process, with students undertaking online assessments at times of their choosing: 'Teachers must be given practical support by creating an online, formative assessment tool to help diagnose a student's current level of knowledge, skill and understanding, to identify the next steps in learning to achieve the next stage in growth, and to track student progress over time against a typical development trajectory.'

The construction of a sequence of levels of increasing proficiency in a subject, not tied to age or year level, also was seen as a way of building teachers' understandings of the nature of long-term progress in a learning area and their ability to support students who are at different points in their learning. A school system submission suggested that possible reasons for the decline in student engagement in the middle years of school included primary teachers' limited confidence in delivering the Stage 4 curriculum to students who have already mastered Stage 3 outcomes, and a perception by secondary teachers that 'uneven coverage' of the Stage 3 curriculum necessitated a 'recap' of that content. The submission observed that 'a shared understanding of all stages of the curriculum is needed for teachers to appropriately build on and extend their students' learning'. A submission from a principals' association also saw value in syllabus documents that could be used by both upper primary and lower secondary teachers: 'This would enable true learning progressions in the vital middle years where the learning outcomes could be properly tracked. There would also be greater scope for dialogue between the primary and secondary school settings, using a common language.'

Some submissions made the point that restructuring the curriculum did not imply restructuring schools (for example, grouping students according to their levels of attainment rather than by age). There were good social reasons, some argued, for keeping most students with their age peers: 'For the majority of students, especially in their teenage years, they do not want to stand out from the crowd. They want to move through school with their peers and be able to experience the various social stages of development with them.' Rather, the challenge was to break the current nexus between the structure of the curriculum and the structure of schools, and to develop a curriculum structure that better supported teachers to address the widely varying attainments and learning needs of students within each year group.

In summary, calls for a more 'flexible' curriculum were among the most common requests presented to the Review. A reduction in the volume of syllabus content would increase curriculum flexibility and teachers' abilities to address individual learning needs. But for many people, greater flexibility also depended on changing the curriculum structure so that teachers were better able to target their teaching on individual learning needs and to set appropriately challenging goals for every student's learning. One way to restructure the curriculum would be to define a set of proficiency (or attainment) levels that are independent of age and year level. It was recognised that such a change would have implications for teaching, learning, assessment, reporting, and professional learning and support.

External tests and examinations

The Review also heard concerns about the negative influences of external tests and examinations on teaching and learning in schools, particularly Higher School Certificate (HSC) examinations and the National Assessment Program – Literacy and Numeracy (NAPLAN).

Concerns about HSC examinations were part of a set of interrelated concerns raised with the Review about curriculum and assessment arrangements in the final years of school, others being the dominance of ATAR as a measure of school achievement and the undervaluing of pathways other than those designed for entrance to university.

A number of submissions referred to the HSC as an 'internationally recognised credential'. There were relatively few concerns expressed to the Review about the content of particular HSC syllabuses, however there was a view that the HSC was 'too prescriptive'. More specifically, a number of submissions called for the relaxing of the current requirement that, to be eligible for the HSC, students must complete ten units of study. This requirement was described as being 'based on assumption, rather than valid justification'. Some submissions proposed that the requirement be reduced to eight units of study, enabling greater depth of learning. One called for 'increased flexibility in attaining the HSC through removing mandatory units and hours and allowing schools to have greater choice to accommodate their school community'. Beyond the concern about the mandatory number of units and hours of study and the desire for greater flexibility, most concerns about the HSC related to the examinations. One person advised the Review, 'Don't change the HSC, change the exams and ATAR'.

A frequently expressed concern was that written examinations, by their nature, are not capable of assessing the full range of learning valued in HSC subjects. This was described as having a distorting effect on teaching and learning, giving undue emphasis to 'content', 'knowledge', 'rote learning' and 'exam skills' at the expense of encouraging project-based and problem-based skills in applying knowledge. One subject association referred to this as a '19th century approach to assessing learning'; another subject association described it as 'a centralised assessment regime that, despite internal assessment, still focuses on a Wyndham era external HSC', and added, 'As we move further into the 21st century there will be increasing pressure to review this approach'.

Some described HSC examinations as constraining teachers' abilities to teach in more responsive ways and to incorporate 'real-world relevance'. One person said that schools work to develop creative, innovative thinkers until that effort has to be put on hold to prepare students for HSC examinations. Another observed that project-based learning and a focus on '21st century' skills was an emphasis in Year 7, but declined throughout the secondary years because students 'have to sit an exam which is largely content-based rote learning questions'. A third person said there was no point in teaching '21st century' skills and the use of technology and then, at the end of schooling, 'giving them a paper and pen exam for three hours'. And a fourth described the stronger inquiry and investigative approach in new science syllabuses as 'great', adding 'but we're still stuck with the HSC external exam. We can't get changes in senior subjects with the external exam still sitting there. Kids are reporting that they don't see the value in it'.

Reference was made to developments in Extension 2 courses where students 'have the agency to pursue an individually chosen aspect of study that is significant, conduct independent research, work with universities and industry experts and sit an examination that allows them to take their research material in with them'. These developments were viewed positively and seen as a possible way forward in the development of HSC examinations.

> For years now, NESA and its predecessors have acknowledged that external examinations do not reflect the breadth of each examined subject. Changes in technology and what is valued in life-long learning such as agency, collaboration, investigation, critical questioning, creativity are not adequately, if at all, assessed in an examination context. While much effort and money is being spent on trying to bring standardised testing into the 21st century, the HSC fails to do what assessment should: assess student learning of a particular subject. More externally moderated school-based assessment could be designed to value learning processes and dispositions.
>
> **English Teachers Association NSW**

Another concern was that HSC examinations were promoting an approach to learning as 'memorisation', 'rote learning' and 'regurgitation', which worked against deep learning. A number of submissions described an HSC examination 'culture' in which students were being 'coached' to pass examinations. One professional association reported that students entering university appeared to have 'an engrained exam-passing culture' and called for the removal of 'the current focus on teaching to pass examinations'. A teacher described how students can spend many months preparing and reworking a piece of creative writing on the basis of feedback from teachers so that it can then be memorised and reproduced under examination conditions. A principal described HSC examinations as 'plagued by gaming, plagiarism and academically shallow learning'. Others had suggestions of strategies for addressing these concerns, such as allowing students to take prepared notes into examinations 'to remove the need for memorisation and focus instead on problem solving and the application of knowledge and skills'.

There were also concerns about unhealthy and inappropriate levels of stress associated with HSC examinations. Teachers described over-anxious and overly stressed students who often saw the one-shot, end-of-school examinations as determining their futures. One said that 'students see themselves as their HSC result' and often wonder what all the pressure was about once they leave school. A parents' association submission commented, 'Apart from the questionable relevance of the HSC written tests to vocational or direct to work candidates, the heavy emphasis on the HSC leads to a great deal of anxiety and other mental health problems for many students'. A prominent businesswoman remarked, 'The curriculum needs to provide challenge but not unproductive pressure. The current HSC process is an example of unproductive pressure'. And a university submission added, 'Improved methods of assessment, particularly those that minimise stress on students and do not distort performance, would be desirable if they can be demonstrated to be a reliable indicator of attainment'.

> Parents and carers have expressed to CCSP on many occasions that NAPLAN and the HSC are assessments that raise serious health and welfare concerns for students, especially in relation to stress and anxiety. The HSC has been in existence for decades and thousands upon thousands of students have sat the HSC since it was first introduced in 1967. So why then are students struggling more than ever with mental health issues associated with the HSC? …
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> The time has come to have a look at the HSC and consider what needs to change so that final exams do not come at the expense of the mental health of our students.
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> **Council of Catholic School Parents NSW/ACT**

The Review was told that HSC examinations influence not only the final years of school, but also much of secondary schooling. Teachers described the HSC as impacting on teaching and learning throughout the secondary school and 'down into primary'. One said, 'We're teaching to the HSC exam from Year 7 upward'. Others described it as looming large in the consciousness of teachers and students, influencing students' choice of subjects and teachers' decisions about what to teach. This often impacted negatively on the breadth and depth of teaching and learning. One teacher explained, 'There's the idea that if I don't teach it in Year 7, they will miss out when you get to HSC'. As a result, one submission observed, 'in the context of the HSC, suggestions about treatment of content (e.g. content elaborations) can be treated as mandatory in effect'. Another teacher said that if students ask why they have to learn something in secondary schools, the answer is the HSC.

HSC examinations also had an influence on schools' approaches to assessment, with students regularly being administered tests similar to those they would encounter at the end of the schooling process. In the senior years of school, examinations exerted a particularly strong influence, impacting on schools' curriculum choices and students' experiences. Minor changes in examination content were reflected in immediate changes to how students were prepared for the HSC. One person observed that 'opportunities for collaboration and other ways of doing things are being missed because of an excessive focus on HSC examinations'. Others expressed concerns about the examinations promoting a competitive rather than collaborative learning culture, between schools as well as students.

On the other hand, the Teachers Federation submission described the current NSW model as providing 'high standards in the HSC examination, alignment between what is taught and what is tested and community ownership of these fundamental processes that blend excellence and equity'.

A number of submissions referred to the 'high stakes' now associated with NAPLAN results and the impact this is having on classroom teaching. One subject association commented that, just as external testing and the reporting of school results in the HSC restricts pedagogy and the richness of content, 'the external publishing of NAPLAN data with its simplistic rating of schools based only on standardised testing outcomes is counterproductive to learning'. The Review was told of pressure teachers felt to prepare students for NAPLAN. This included decisions to teach material that some students were not yet ready to learn because it would be covered on the test. There was a widely held view that the publishing and comparison of school results had changed schools' approaches and made NAPLAN performance a higher priority for systems, schools and teachers.[28] Some contrasted this with the earlier Basic Skills Tests. Others referred to the 'unnecessary stress' that NAPLAN now creates for families and students.

Some submissions argued that NAPLAN results should not be used for public comparisons and judgements about teacher and school performances, but should be used only for within-school and diagnostic purposes. For example, a subject association argued that 'publicised results create a type of league table that warps the ways that schools approach NAPLAN, including teaching to the test, rather than using the information as a way of seeing where students are in their academic journey every two years'. Another subject association believed that, if NAPLAN were not used for high stakes purposes, it had 'the potential to be a very effective tool in identifying students who need assistance to strengthen, or extend, their learning and level of knowledge'.

> Another major diversion from providing young people with the curriculum and breadth of human possibility they deserve comes in the form of the hugely negative impact testing and reporting processes such as NAPLAN, A-E reporting and My School have on the actual curriculum that is emphasised in the classroom. One cannot seek to reform the curriculum without regard for the distorting effects such mechanisms have on the actual time that remains for rich, student-centred learning.
>
> **The Australian Education Union NSW Teachers Federation Branch**

In summary, while external tests and examinations were sometimes described as 'transparent, consistent and arguably less open to socio-economic bias than other forms of assessment', and were sometimes seen as more 'equitable' than other forms of assessment because all students sat them under identical conditions, they were commonly described as narrowing the focus of teaching and learning to what is tested, causing unacceptable stress in some students, and potentially promoting unhealthy competition between students and schools.

Dominance of ATAR

The Review was presented with a range of concerns about the impact ATAR was having on teaching and learning in schools, including concerns about its distorting influence on students' subject choices, its creation of hierarchies of school subjects, its overshadowing of HSC results, and its impact on the perceived value of post-school pathways other than university entry.

Many people referred to the powerful and dominating role ATAR plays in the consciousness of students, parents and many teachers. It was observed that 'ATAR is still often seen as the ultimate goal for students and their families'; that learning at school is about 'getting results to get an ATAR'; that 'students feel intense pressure to get the highest ATAR possible'; and that, for many students, ATAR is closely tied to self-esteem. This was widely seen as a problem that needed to be addressed. In its submission to the Review, the Universities Admissions Centre (UAC) wrote, 'It seems beyond doubt that there is too much pressure on students to get a high ATAR, and the education sector and the community as a whole need to come together to reduce that pressure'. In consultations for the Review, people often referred to the pressures of 'HSC and ATAR' jointly, interpreting HSC examinations as the necessary prerequisites for the construction of ATAR.

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[28]   A NAPLAN Reporting review commissioned by the COAG Education Council, undertaken by Professor William Louden and released in June 2019, concluded that many school education stakeholders are concerned that publishing school-level NAPLAN data had made the tests 'high stakes'. (http://www.educationcouncil.edu.au/site/DefaultSite/filesystem/documents/Reports%20 and%20publications/NAPLAN%20Reporting%20Review/Final%20Report.pdf)

Submissions expressed concern about the influence ATAR was having on teaching and learning in secondary schools. As well as functioning as the ultimate measure of thirteen years of school, ATAR was described as a key influence on 'how teachers teach and how students learn'. It led students to choose subjects not on the basis of individual interest or aptitude, but on beliefs about how ATAR might be maximised – for example, by choosing 'easier' HSC subjects over 'harder' subjects. Although these beliefs were strongly refuted by UAC, there were numerous references to attempts by students, parents and teachers to 'game' ATAR in the hope of increasing students' ranks and thus chances of being admitted to their course of first choice. Decisions to avoid 'harder' STEM subjects in favour of 'easier' subjects were described by the Australian Chief Scientist as a 'malign influence' of the current ATAR system. And a university observed that students' post-school course options were sometimes being undermined by subject choices made at school in an effort to maximise ATAR.

A concern was expressed that ATAR also imposes a hierarchy on school subjects through its rules about which subjects can and cannot be included in its calculation. 'Courses related to Early Childhood Education and Care, plumbing, recreation and sport, and screen and media, can all be studied as part of a student's final two years of schooling, but are delegitimised through their exclusion from tertiary admission rankings.' The categorisation of these courses as 'Category B' or 'Board Endorsed Courses' was seen as implying that they were 'less important or worthy' and was considered to leave NSW at risk of an 'acute skills shortage' as students continued to move away from vocational studies in their final years of school.[29]

Other 'perverse impacts' of ATAR were identified. These included students' decisions to enrol in post-school courses not because they were aligned to students' strengths and interests, but because students and their parents were reluctant to 'waste' a high ATAR on a course that did not require it. In this sense, ATAR was also being treated as a measure of the quality of post-school courses. As a result, the quest for high ATARs was having 'the unfortunate consequence of negatively affecting students' school experience, pathway decisions and ultimately, career paths'. Beyond this was 'growing evidence that the perceived importance of the ATAR and academic achievement is having a negative effect on school engagement, overall wellbeing and mental health in the HSC years'.

Some submissions drew attention to the use of ATAR by schools as a marketing tool, its use by employers as evidence in employee recruitment, and by the media as a convenient basis for stories and headlines. It was noted that ATAR was not designed or intended for any of these extraneous purposes and that better explanation of its uses and misuses was required.

There were a number of calls to reconsider the relationship between the Higher School Certificate and ATAR. Underlying these calls was a desire to see the end-point of schooling 'not dictated by university entrance'. A principals' association commented that the HSC's 'nexus with the ATAR and University Entrance has become a problem' and believed that 'reinstating student pride in their HSC achievement would be a positive step'. A number of people commented on the fact that the end-game for many school students was university entrance and that students who received early offers – which sometimes occurred early in Year 12 – often disengaged at that point from their HSC studies. This was described as another current problem in some schools.

> Decouple the ATAR from the final years of schooling by revitalising and re-emphasising the HSC as a final credential that celebrates and recognises the attainment of skills and capabilities. Consistent feedback from both businesses and our engagement with young people suggests that the current emphasis on the Australian Tertiary Admission Rank (ATAR) over the final years of schooling is having a negative impact on student development and the alternative learning pathways. The focus on ATAR can substantially derail the 'education' component of the final years… While the ATAR was designed for universities to sort and select students, it has evolved to have a much broader reach with many students and parents seeing it as the key way of measuring success at the end of school.
>
> **NSW Business Chamber**

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29 Category B courses can be included in the ATAR calculation, but no more than two units in a total of ten. Board endorsed courses are not included because they do not have common examinations.

The Review was told that, despite the introduction of a more demand-driven system in higher education, with some universities now more focused on student recruitment than student selection, 'some courses and even some universities' had a continuing need to manage competitions for limited numbers of places. For these courses and universities, ATAR was a highly efficient 'sorting and ranking mechanism'. UAC produced ranks for 50 000 students every year.

But it was also noted – including by some universities and UAC itself – that 'ATAR as the only admission requirement is now in diminished use and is being supplemented by other indicators'. References were made to the 2018 Mitchell Institute report, *Crunching the Number*, and its observation that only one in four students entering Australian universities was admitted on the basis of their ATAR.[30] 'Early offers, aptitude tests, special entry schemes or VET award courses were all alternative options to enter university.' Many people referred to the fact that less than 30 per cent of all university admissions were based on ATAR and that there were now many other ways to gain entry. In a meeting with staff of one university the Review was told, 'If there was an opportunity to remove ATAR, as a faculty we'd encourage it, seeing that the correlation between achievement and what students bring has absolutely nothing to do with ATAR; it's about level of curiosity and willingness to commit to the process of learning'. A parents' association believed the challenge was to 'educate students, parents and the community about the many pathways to success, and also the many pathways to university beyond an ATAR'.

UAC pointed out that, although it was not widely understood, students are admitted to courses on the basis of their UAC Selection Rank, not their ATAR. The Selection Rank is calculated for university courses separately and, for many applicants, includes additional evidence such as interviews, portfolios, additional tests and school recommendations. The use of such additional evidence by universities had been growing and, together with the use of bonuses, meant that a student's Selection Rank could be different from their rank by ATAR. Looking to the future of the Selection Rank, UAC anticipated that 'performance in specific courses or disciplines could be used, or the ATAR could be calculated differently or broken up into a number of rankings for different fields of study'.

In summary, while it was recognised that there is a continuing need to select students for entry into some higher education courses and institutions, there were widespread concerns about the way in which ATAR dominates the efforts and attention of students, parents and teachers in the final years of school. This was seen as undermining the HSC credential, undervaluing particular school subjects and post-school pathways, and having a distorting effect on students' choices of school subjects and university courses. Although many students aspire to an ATAR, and UAC continues to produce a rank for 50 000 students each year, students now enter universities on an increasing range of evidence, with ATAR being one of a number of inputs (albeit a significant one) to the calculation of course-specific Selection Ranks.

Senior years curriculum

The Review was presented with a range of concerns about the curriculum in the final years of school, mostly related to its perceived over-emphasis on preparing students for university at the expense of providing all students with a broad preparation for post-school study, life and work.

A regular comment was that the increase in the school leaving age from 15 to 17 in 2010 was not accompanied by the necessary curriculum changes to cater for the full age cohort. Instead, the expectation was that the vast majority of students would now undertake the Higher School Certificate and pursue an academic pathway. One person commented that 'since we raised the school leaving age, the focus moved to ATAR for all students'. One submission observed that, although more than 60 per cent of the age cohort did not go to university, 'the curriculum places the attainment of an ATAR and university entry as the default indicator of success, irrespective of the needs and interests of individual students'. In this sense, the current senior curriculum was considered by some to be 'unintentionally elitist', with the HSC still being 'incredibly skewed as a tool for university entrance'. Another person argued that 'the HSC is overwhelmingly designed to meet the needs of students who plan to progress to higher education' and called for the senior curriculum to be redesigned to 'benefit all students in their final two years in a classroom regardless of their post school destination'.

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[30]   This figure applies to all admissions, not only Year 12 students. Approximately 80 per cent of Year 12 student admissions use ATAR, either on its own or in conjunction with other evidence.

A number of submissions commented that the prioritisation of university preparation in the final years of school meant that the learning needs of many students were not being met. This included not providing 'appropriate learning environments' for some students and requiring others to take subjects that did not 'suit their learning abilities or interests'. One submission believed it was 'time to acknowledge that students with a much broader range of abilities are completing their HSC and we are not undertaking best practice to prepare all students for further education and work'. Another commented that 'the changing needs of students undertaking senior schooling and opportunities in the workforce are not being reflected in many of the offerings provided by the school education system'. And a third submission noted that 'both the curriculum and wider school system are subsuming the needs of students in favour of pathways geared towards university'.

Many submissions referred to the continuing priority being given in schools to the 'traditional academic pathway' from HSC study to ATAR to university entry. Other pathways were commonly treated as 'alternative' or 'non-academic'. It was noted that not all schools had embraced the introduction of VET courses, and 'non-ATAR' patterns of study were 'struggling for acceptance' in many schools. This was exacerbated by the hierarchy currently imposed on school subjects by university rules concerning ATAR. A parents' association submission observed that 'there is sometimes a bias amongst teachers/ schools regarding VET, which is sometimes seen as inferior to ATAR/tertiary preparation'. In a public consultation meeting, one person commented that the 'stigma' often associated with vocational learning in schools needed to be addressed. And it was noted that, while VET subjects remained relatively popular, with almost one third of students including a VET subject in their pattern of study, the number of students taking VET subjects had decreased sharply from 60 775 in 2013 to 50 165 in 2017.

> Despite a large portion of Year 12 completers not entering university after school, there is an implicit assumption throughout the entire curriculum that all students aspire to go to university immediately upon finishing school. This assumption is apparent in the curriculum's disproportionate focus on academic achievement and on preparation for university study, while vocational options receive considerably less focus and are thus implicitly treated as inferior to academic pursuits. This essentially means that students who wish to enter university after school get considerably more support and preparation under the current curriculum than students who would prefer to undertake vocational study, start apprenticeships or enter into the workforce after school.
>
> **Federation of Parents and Citizens Associations of NSW**

There were numerous comments about current VET arrangements in schools. Although these arrangements were considered to work well for many students and were in general 'highly desirable' and 'highly valued', hands-on VET courses delivered by schools and external providers were described as more expensive for schools and for students than traditional academic offerings. VET delivery also was 'complex and cumbersome' and compliance requirements of the Australian Skills Quality Authority (ASQA), NESA and the Department of Education placed 'an undue burden on schools in terms of time, teacher training, resourcing, and administration, and on VET teachers who are being overburdened with requirements'. Industry requirements, including the requirement that teachers update their qualifications whenever ASQA approves an updated industry package, were seen to be adding to the burden on schools and 'burning teachers out'.

Concerns also were expressed about the variable quality of current VET offerings in schools, with one submission stating that 'as a part of the NSW curriculum, VET must meet the principles of rigour, coherence, depth and aspiration'. Another submission called for the prioritising of higher (Certificate III) VET courses and for 'eliminating' lower level (Certificate II) courses, especially in the final years of school. One submission told the Review that VET courses often provide insufficient work placement or on-the-job training when compared to standard post-school VET delivery, and that 'industry tends to hold a low view of school-delivered VET for producing students who are not job-ready compared to the training delivered by TAFE and other industry-based RTOs'.

A number of submissions commented on school-based apprenticeships and traineeships (SBATs). These were considered valuable for some students, but there were concerns that SBATs required significant time and effort to complete and, unless they were part of Board Developed courses, did not contribute to an ATAR. This was seen as one cause of the historically low levels of enrolment in SBATs. Another cause was a lack of flexibility to accommodate required workplace hours in school timetables, which made SBATs less attractive to employers, students and parents. The Review was also told of research showing 'systemic weakness with the current SBATs model' which, rather than preparing students for the 'high skill and high-earning roles our economy needs', often locked disadvantaged students into narrow and 'precarious' employment pathways.

> The IEU believes that VET education as it is currently structured and resourced in NSW is less than satisfactory. If ASQA cannot be removed from the equation NESA should be authorised to operate it on their behalf. VET in specialist schools works reasonably well. In a comprehensive high school, it is complex in terms of different assessments (competencies), work placement and credentialing. The pedagogy underpinning VET is at considerable variance to that of other HSC subjects. VET teachers are currently required to undertake industry currency retraining every two years. This is mandated at 30 hours per framework. This is burdensome and cumbersome and, in our view, ineffective and unnecessary.
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> **Independent Education Union of Australian - NSW/ACT Branch**

There were widespread concerns about the consequences of current senior secondary curriculum arrangements for some students. The Review was told that 26 per cent of young Australians do not attain either a Year 12 certificate or a Certificate III equivalent qualification by age 19. Among those from low socioeconomic backgrounds, the figure was 40 per cent, and among young Indigenous people, 56 per cent. Concerns frequently were expressed about the number of young people leaving school 'without the skills to sufficiently prepare them for success in future employment and life'.

Some of these students were described as 'drifting on to nothing'. This was a particular concern for parents in rural communities who called for better pathways for disengaged school leavers. The Review was told that more than 14 per cent of all young Australians aged 15 to 24 were not in full time education, employment or training – the highest level since 2010.

There were also concerns about the under-preparation of students who moved directly from school into work. In 2016, 22 per cent of NSW school leavers were either in full-time or part-time employment and not studying. It was argued that, for these students in particular, schooling must provide 'the skills they need to make the successful transition directly into the labour force'. A number of submissions questioned how well the current senior curriculum was doing this. For example, it was claimed that 30 per cent of 15 to 24 year olds want more work but are unable to find it because they lack the skills required for the workforce. This suggested 'a continued shortcoming in the ability of the education system to adequately prepare students for employment, particularly when considering the changing nature of work in Australia'.

Submissions also expressed concerns in regard to the 19 per cent of NSW school leavers who go from school to post-school VET studies (Certificates I to IV, apprenticeships or traineeships). Not only were these vocational pathways undervalued by schools, but the vocational education sector itself was described as 'in decline'. There were references to the 'erosion' of TAFE as the major provider of vocational education. Some called for the strengthening of TAFE and saw this as a key to ensuring 'Australia's workforce has the depth and breadth required for its future economic and social sustainability'.

There were also concerns about the quality of advice available to students about school pathways, post-school options and future career possibilities. Current careers education was described by one person as failing to 'inform, engage, advise or prepare students to enter the workplace'. Students needed to understand that university was not 'the only path to a rewarding career' and that there were pathways other than ATAR to enter university.

The Review was told that students in the senior years required better information about the expectations of employers and the ways in which they could work towards valued qualifications over time. (In this context, the Record of School Achievement (RoSA) was described by parents as a relatively meaningless credential that simply confirmed that a student had attended school and carried little weight with employers. Many students were said to be 'not printing the credential at all'.) One person commented that 'engagement can be improved if young people can see where their learning is taking them – into a well-articulated career pathway'. And a number of submissions reminded the Review that the ultimate purpose of the senior curriculum is not university entry or preparation for the workforce, 'but to produce well rounded students who are good people and active citizens'.

In summary, concerns about the senior years curriculum centred on its current bifurcation into a valued, dominant 'academic' curriculum and an under-valued, 'alternative' vocational curriculum. This dichotomy was described in various terms, including: academic versus vocational; abstract versus technical; and institutional versus real world. The Review was encouraged to explore ways of reducing or eliminating these distinctions and ensuring that every student in the final years of school received an excellent preparation for ongoing learning, life and work. One teacher said, 'If we just change the HSC, people will find ways to reinvent it. The change needs to be more fundamental'.

Submissions made a variety of suggestions for improving curriculum arrangements in the senior years. These included minimising possibilities for narrow, instrumental learning (for example, to maximise ATAR or to prepare students for specific jobs that may or may not exist in the future) and ensuring instead that every student engages with a broad, rigorous, high quality senior curriculum that prepares them for post-school study, life and work. This curriculum should provide the flexibility for every student to build on their strengths and pursue their passions and interests. Some suggested the curriculum could be 'modularised' to allow students to design more tailored learning programs leading to valued credentials, including possible 'micro-credentials' linked to individual modules of learning. High quality senior subjects should incorporate the possibility of students undertaking study with external providers, including TAFE and universities, and to accumulate credit while at school towards post-school qualifications. Where relevant, these should include workplace experiences.

Submissions also described a need for better links between the senior years curriculum and post-school destinations (workplaces, vocational education providers and universities). Improved partnerships with industries would assist in enhancing the relevance of learning, clarify learning pathways and career opportunities, and provide opportunities for increased industry engagement in the work of schools. As an example, the Review was briefed on initiatives and programs of Engineers Australia to support student learning and teacher professional development relevant to the engineering profession. Secondary principals also made favourable reference to 'distinction' courses provided in the past by universities, said that they would welcome links of this kind being re-established, and strongly advocated 'a more fluid connection between the final year of school and entry into the world of university'. A general point made in a number of submissions was that there was a need for greater continuity and seamlessness of learning across the transition from school to post-school destinations.

4. GUIDANCE FROM LEARNING RESEARCH

In recent decades, significant research has been undertaken into human learning and the conditions that promote successful learning. This research has spanned a range of disciplines, including neuroscience, cognitive science, educational psychology, educational research and sociology, and has resulted in a relatively new interdisciplinary field of inquiry commonly referred to as the 'science of learning' or the 'learning sciences'. Several major reviews have summarised the state of knowledge in this field. Many of the field's research findings have implications for learning in schools. A few of these findings are summarised here.[31]

> New developments in the science of learning raise important questions about the design of learning environments – questions that suggest the value of rethinking what is taught, how it is taught, and how it is assessed.[32]

Deep understanding

One group of research studies has explored the characteristics of 'experts' in various fields such as mathematics, chess, science, medicine and history in an effort to identify what develops as people become more expert in their fields and so to establish what distinguishes experts from novices.

A general conclusion from these studies is that experts have a great deal of knowledge in their fields. Their extensive factual and procedural knowledge is an important component of their expertise. However, importantly, this knowledge does not exist in the form of disconnected facts; expert knowledge is interrelated and organised around deep understandings of important concepts and principles of the field.

Experts' deep understandings of their field make their factual and procedural knowledge more 'usable' in the sense that it can be transferred and applied more readily to new and unseen situations. Experts are better able to make sense of new information, including by recognising features, patterns, relationships and discrepancies that are less obvious to novices. Research shows that novices in a field are more likely to represent newly encountered problems in terms of their surface features, while experts attend to deeper, more abstract concepts, principles and processes that underlie surface features. Other research has shown that novices tend to possess knowledge in smaller, disconnected pieces, while experts possess larger, more integrated 'chunks' of knowledge that assist them in identifying meaningful patterns in information.

Experts' deep understandings also provide them with better appreciation of the contexts to which knowledge can and cannot be applied (that is, their knowledge is 'conditionalised') and deep conceptual understanding enables them to retrieve facts more readily from memory, to learn related information more rapidly and to think about and solve novel problems in their field.

These expert/novice studies show that the simple accumulation of knowledge and the memorisation of facts and procedures are inadequate for analysing and solving significant new problems or tackling complex challenges. Activities of those kinds require deep understandings of a field developed over many years through exposure to a wide variety of related problems and challenges.

This research also has shown that expertise in one field does not transfer readily to expertise in another, even when fields appear closely related. For example, it might seem that 'problem solving' should

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[31]   This section draws on a paper prepared for the Curriculum Review by Ms Charlotte Waters titled *'Findings from the learning sciences: implications for curriculum, instruction and assessment',* Australian Council for Educational Research, 2019.

[32]   J Bransford, AL Brown, RR Cocking, MS Donovan & J Pellegrino (eds), *How people learn: brain, mind, experience, and school: expanded edition*, National Academies Press, Washington DC, 2000, p. 131.

transfer across fields of expertise. But research has found that experts behave much like novices when faced with problems outside their fields. Expert problem solving appears to depend on understandings that are largely field-specific.

These findings have obvious implications for the school curriculum. Students' abilities to transfer and apply their factual and procedural knowledge to new contexts and problems depend on their grasp of underpinning concepts and principles in an area of learning, opportunities to apply their learning to a wide range of contexts and problem types, and extended time frames in which to do this.

> The fact that experts' knowledge is organised around important ideas or concepts suggests that curricula should also be organised in ways that lead to conceptual understanding. Many approaches to curriculum design make it difficult for students to organise knowledge meaningfully. Often there is only superficial coverage of facts before moving on to the next topic; there is little time to develop important, organising ideas.[33]

Motivation

A second body of research has explored the role of motivation in learning. These studies have investigated different ways of motivating learning; learners' varying reasons for engaging in learning; beliefs about personal capacity to learn; and conditions and teaching practices that enhance motivation to learn. The findings of these studies demonstrate the powerful impact motivation has on student engagement, persistence and learning outcomes.

Studies of different ways of motivating learning show that praise, recognition, rewards and reprimands (often referred to as 'extrinsic' forms of motivation) are all capable of encouraging learning. However, external motivators of these kinds often are less powerful than internal ('intrinsic') motivators of learning such as the desire to learn something because it is interesting, enjoyable or inherently useful, or because it relates to personal long-term goals. Research suggests that intrinsic motivation often is related to the desire to be in control of one's own life, to become more competent or to be connected with or care for others.

In general, learners are more intrinsically motivated if they are pursuing a topic of personal interest, responding to a challenge that they believe is within their capabilities, and feel a sense of autonomy and control over their learning. There is some evidence that, if people are extrinsically rewarded for their performance or for things they would have done anyway, persistence and performance can decline – perhaps in response to a perceived diminution in control.

Closely related to these studies is research into reasons for learning. Researchers have described two broad motivations for learning: 'performance' and 'mastery'. Learners with a performance orientation often are focused on competition, satisfying others, achieving recognition and avoiding negative judgements. Learners with a mastery (or learning) orientation usually are motivated by a desire to develop their competence in an area of learning and to achieve personal learning goals.

These different motivations for learning are reflected in learner behaviours. Learners with a performance orientation tend to focus on learning isolated pieces of information to improve speed of learning and recall. They typically avoid challenging tasks or areas in which they may perform less well than other learners, and may perceive failure as a matter of personal shame. Learners with a mastery/learning orientation tend to enjoy challenging tasks, are more willing to persist and make an effort, and tend to have more positive attitudes to failure.

Other research has studied conceptions of learning ability. Some learners see the ability to learn as 'fixed'. They believe people differ in their ability to learn, meaning that there are better and worse learners. From their point of view, there is little that poor learners can do to change the hand they have been dealt; additional effort may be largely pointless. Others see learning as 'incremental' (also referred to as a 'growth mindset'). They believe that every learner is at some point in their learning and is capable of further progress with effort and appropriate support.

Learners' views of their own ability to learn have a direct impact on motivation. When learners believe they are capable of success, they are more inclined to make an effort and to persist with their learning,

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[33] eds Bransford et al., *How People Learn*, p. 42.

and so are generally more successful. The opposite is true of learners who doubt their ability to learn and have low expectations of success. This can be a particular issue if the learning environment is not seen as welcoming and a place where they belong – for example, if they sense that they are cultural outsiders.

Learning environments can be designed to encourage motivation. One way to do this is to provide learners with a sense of control over their learning, enabling them to pursue personal interests and strengths. Research suggests that even small meaningful choices can promote a sense of autonomy and control, enhance motivation and lead to improved outcomes. When learners have a degree of control over their own learning, they also are more likely to take on and persist with challenging problems.

Motivation is also enhanced when the learning environment sparks interest and curiosity, and arouses learners' interests to know more. Researchers refer to this as 'situational interest' or interest in specific situations or phenomena. Project-based and problem-based learning can be effective in building situational interest and encouraging perseverance. Motivation is also increased when learners see value and practical relevance in learning, and when it is aligned with their interests and long-term aspirations.

Teachers can promote motivation by connecting with learners' interests and passions; making clear how new learning builds on what learners already know; directing learners' attention; encouraging a focus on learning rather than performance; explaining the meaning and utility of what is being learnt; ensuring that challenges are at a manageable level of difficulty; and providing learners with the ability to monitor the progress they are making and to appreciate the relationship between effort and success.

> Educators may support learners' motivation by attending to their engagement, persistence, and performance by:
> - helping them to set desired learning goals and appropriately challenging goals for performance
> - creating learning experiences that they value
> - supporting their sense of control and autonomy
> - developing their sense of competency by helping them to recognise, monitor, and strategise about their learning progress
> - creating an emotionally supportive and nonthreatening learning environment where learners feel safe and valued. [34]

Progress in learning

A third body of research has explored the developmental nature of learning, addressing questions of how expertise typically unfolds in particular fields, including how new learning builds on prior learning and lays foundations for future learning; common sequences in the development of competence; the impacts of prerequisite knowledge, preconceptions and misconceptions on learning success; and the teaching implications of learners' pre-existing understandings, beliefs and backgrounds.

Underpinning this research is recognition that most human learning does not involve learning discrete, isolated and more or less equivalent facts and skills. Learning is the process through which increasingly interconnected and sophisticated knowledge, skills and understandings in an area of learning are developed over time. The development of expertise involves more than mastering a growing number of facts and skills; it also involves increasingly deep understandings of the principles, ideas and ways of working at the heart of the field.

Research has explored the nature of developing competence in fields as varied as language learning, medical specialisations, classroom teaching, mathematics and history. The general aim of this research has been to describe and understand what it means to be increasingly competent and to elucidate pathways to greater expertise – often to inform teaching programs or professional development.

Research into learning pathways has included studies of 'learning progressions', defined as descriptions and illustrations of increasing understanding or proficiency in an area of learning. Unlike sequences of proposed learning found in many curriculum frameworks, learning progressions are constructed from empirical evidence about how proficiency typically develops in practice. That is, rather

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34 National Academies of Sciences, Engineering, and Medicine, *How people learn II: learners, contexts, and cultures,* National Academies Press, Washington, D.C., 2018, p. 133.

than describing what 'should' occur, learning progressions attempt to describe how learning actually occurs. And because they are evidence-based, these descriptions can be tested and falsified.

Research studies have investigated progressions of developing understanding in areas such as science and mathematics. These studies sometimes have explored learners' increasing understandings of specific concepts such as buoyancy, atomic molecular theory and the flow of organic carbon through socio-ecological systems. The belief is that more explicit, evidence-based descriptions of how learning occurs in practice will provide an improved basis for structuring curricula and deciding appropriate instructional sequences, as well as better frames of reference for establishing where learners are in their learning and monitoring improvements over time.

Other research has highlighted the importance of identifying appropriate starting points for learners' next steps in learning. It is now well established that successful learning depends on connecting with learners' current knowledge, understandings and beliefs. In general, learning is most effective when it builds on, challenges and extends prior learning. Teachers need to be able to establish where students are in their learning, including by diagnosing preconceptions, incomplete understandings and false beliefs. This, in turn, requires a frame of reference against which learning progress can be monitored. Teachers also need to be able to connect with, and build on, the cultural knowledge and starting points of individual learners.

Research suggests that by establishing where learners are in their long-term progress in an area of learning, teachers are better able to provide guidance on appropriately challenging learning goals, provide feedback to inform next steps in learning, and assist learners to see and monitor the progress they make over time.

> There is a good deal of evidence that learning is enhanced when teachers pay attention to the knowledge and beliefs that learners bring to a learning task, use this knowledge as a starting point for new instruction, and monitor students' changing conceptions as instruction proceeds… Learner-centred teachers present students with 'just manageable difficulties' – that is, challenging enough to maintain engagement, but not so difficult as to lead to discouragement. They must therefore have an understanding of their students' knowledge, skill levels, and interests.[35]

Learning environments

A fourth body of research has explored the role of learning environments in successful learning. These studies have highlighted the importance of inclusive, supportive environments in which all learners' backgrounds, strengths and starting points are recognised and welcomed, strong relationships are built, and collaborative learning (including project-based and problem-based learning) is encouraged.

Meaningful engagement and successful learning are strongly influenced by learners' attitudes and expectations. Research clearly demonstrates the importance of learning environments that are welcoming and that provide learners with a sense of belonging and personal meaning, as well as a sense of autonomy and control over their learning. Learning is maximised in environments in which learners believe they are capable of learning successfully, receive supportive and helpful feedback to make decisions about their learning, and are able to monitor and reflect on the progress they are making.

Teachers play a vital role in creating such environments. Research has illuminated how they do this. To be most effective, the environments teachers create and the learning opportunities they provide build connections with learners' backgrounds, starting points and individual learning needs. Teachers promote healthy, productive relationships within the learning environment and motivate learning by stimulating interest and curiosity. They provide appropriate balances of direction, guidance and autonomy. They build learners' confidence in their ability to learn and encourage an ongoing focus on learning and mastery rather than performance. And they provide feedback that guides next steps in learning and assists learners to appreciate and monitor their progress.

Many studies have investigated learning environments as social contexts in which learners and their teachers continually interact. These studies have included research into the role and importance of interpersonal relationships in learning success and the role that culture plays in the learning

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35   eds Bransford et al., *How People Learn*, pp. 11–24.

process. Learners bring a wide variety of background knowledge and starting points to their learning, including varied cultural and linguistic backgrounds. For some learners, mismatches between cultural background and the culture of the learning environment can make the learning environment unfamiliar and unwelcoming, making it more difficult for learners to engage productively in learning. These mismatches can include differences in understandings about rules, behaviours and appropriate uses of language. This research is revealing that cultural considerations are key determinants of learning success and critical factors in all learning.

A number of research studies have considered the role of collaborative/cooperative learning environments and have demonstrated how the quality of collaboration among learners and between learners and teachers influences learning outcomes. Learning often is promoted by focused, cohesive learning communities in which learners work together to support each other's learning. This research has included studies in which learners collaborate on a problem or project that members of a team undertake jointly. Some studies have explored collaboration of this kind in online environments. In 'collaborative learning', there is a need for learners to work together to set goals, make decisions about roles and responsibilities, share tasks, communicate, and address issues as they arise. Some studies have examined the benefits of cooperative learning of this kind in cross-disciplinary problem-solving contexts. Benefits appear to include greater social acceptance of group members, increased task orientation and improved self-esteem.

> For some students the culture and practices of school are not markedly different from those they experience outside of school, while for others going to school is a cross-cultural experience that can bring challenges.[36]

Metacognition

A fifth body of research has explored the importance of metacognition to learning. This research includes studies of learners' conceptions of, and knowledge about, learning itself; awareness of personal strengths and weaknesses in relation to the demands of tasks and challenges; and 'self-regulation' skills in planning, monitoring, revising and reflecting on learning progress.

Researchers define metacognition as awareness and understanding of one's own thinking and learning processes. This includes a learner's knowledge about themselves – their current levels of attainment, strengths, weaknesses and ways of learning. Learners with higher levels of metacognition have greater control over their learning. They are better able to monitor comprehension of what they are learning, recognise when they do not understand or when there are gaps in their knowledge or skills, identify the need for additional information and proactively seek that information, and recognise inconsistencies between new information and what they already know. Metacognitive skills also enable learners to recognise and reflect on what has worked and not worked in their learning, what does not make sense, and what needs further investigation. In short, higher levels of metacognition provide higher levels of self-awareness and self-monitoring.

Research shows that learners are more likely to learn successfully if they have an understanding of where they are in their learning (their current levels of knowledge, skill and understanding), if they are able to plan ahead and direct their learning to achieve challenging but realistic learning goals, and if they are able to monitor progress in achieving those goals. Metacognition also involves the ability to reflect on and evaluate the success of efforts to improve. Evidence suggests that some of these behaviours are more difficult for younger children, but that learners can be assisted over time to build skills in self-regulation.

Research findings in areas including physics, writing and mathematics indicate that metacognitive strategies are best developed in the context of individual subjects rather than as generic skills taught separately. Attempts to develop metacognitive skills in isolation from subject matter generally have resulted in failure to transfer to specific learning contexts. A general conclusion from research is that the teaching of metacognitive strategies should be a priority in all school subjects.

> A 'metacognitive' approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them.[37]

36   National Academies of Sciences, Engineering, and Medicine, *How people learn II*, p. 136.
37   eds Bransford et al., How People Learn, p. 18.

5. GUIDANCE FROM REFORM INITIATIVES

Another source of input and guidance to the Review is international experience in reviewing and reforming school curricula. Most countries routinely review the curriculum to ensure it reflects their current intentions for student learning and contemporary beliefs about best practices in relation to the school curriculum. There also has been growing international interest in what can be learnt from other school systems, especially those that perform at unusually high levels in surveys of student achievement. This section briefly reviews international experience and thinking on some issues raised in public consultations and submissions to the Review.

Flexibility and teacher autonomy

There has been an international trend over the past decade towards greater local decision making in relation to the school curriculum. This trend has given schools and teachers increased autonomy to decide what they teach and when they teach it. The trend has been evident in a range of school systems, including Singapore, Canada's British Columbia, Scotland, China, Japan, Hong Kong and South Korea. In many countries, this trend follows an earlier emphasis on central prescription, standardisation and accountability as system-driven strategies for raising performances in schools.[38]

Fluctuations between specificity/uniformity and flexibility/local decision making have been a feature of school curricula as governments have attempted both to ensure commonality and consistency in curriculum offerings and to free schools to respond effectively to student and community needs. All school systems recognise the importance of ensuring that every student has access to a core of common and essential learning, but in light of evidence that attempts to drive improvement through increased specification and accountability have been largely ineffective, and with growing recognition of the need to develop a broader range of student capabilities and attributes, most systems are now shifting the balance toward flexibility and autonomy.

> If the pendulum swings too far towards uniformity, then the curriculum risks becoming too inflexible and difficult to tailor to local needs; whereas if the curriculum swings too far towards diversity, it risks becoming so fragmented that it loses its 'core' and becomes meaningless.[39]

There is some international evidence that increased local decision making in relation to the curriculum is associated with higher levels of student performance. A 2013 study by the National Foundation for Educational Research in England identified curriculum flexibility as a feature of high-performing school systems. Although studies of this kind have not established a causal relationship between curriculum flexibility and student performance, flexible curriculum arrangements and greater local autonomy clearly are not impediments to high national performance.

Canada's British Columbia is an example of a system that has recently reduced the level of prescriptiveness in its school curriculum. This was done in response to a review that found strong support for greater flexibility. The revised curriculum is described as 'concept-driven' with a greater focus on core concepts and an emphasis on 'depth over breadth'. The redesigned curriculum shifts responsibility to teachers to decide what to teach and when to teach it, including the amount of time to be allocated to individual subjects. It also provides greater flexibility for students to pursue personal interests. The British Columbia reforms are described as placing 'high confidence and trust in the

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[38] This discussion draws on a paper prepared for the Curriculum Review by Dr Jen Jackson titled 'Balancing prescriptiveness and flexibility in the school curriculum', Australian Council for Educational Research, 2019.

[39] GC Savage, 'A national curriculum in a federal system? Historical tensions in the light of the Australian curriculum', in A Reid & D Price (eds), The Australian Curriculum: Promises, Problems and Possibilities, Australian Curriculum Studies Association, Deakin, 2018, pp. 241–252, p. 248.

capacity of its teachers' and are accompanied by a substantial program of professional development to support teachers to adopt greater levels of responsibility and control.

A number of East Asian countries, including China, Singapore, Japan, Hong Kong and South Korea also are in the process of providing greater flexibility in their curricula. These countries have performed at high levels in international surveys of student achievement – a fact often attributed to their high levels of centralised control. However, these countries are now rapidly reforming their curricula to place greater emphasis on creativity and entrepreneurialism and are providing teachers with increased flexibility to do this. For example, Singapore has reduced the content of its school curriculum by up to 20 per cent to allow for 'a wider range of teaching approaches'. The Singapore reforms are described as giving greater respect to teacher autonomy and professionalism, and are accompanied by resources to support less experienced teachers who require them. In China, the school curriculum has historically been prescribed by the central government, with local governments and schools being responsible for implementation. Under recent reforms, the central government now provides an overall vision and framework within which local governments and schools develop more detailed implementation plans, including locally developed courses tailored to student needs.

In the United Kingdom, all school systems have made recent changes to give teachers and students more control over the content, design and pace of student learning. A review of Scotland's 'Curriculum for Excellence' by the Organisation for Economic Cooperation and Development observed that it had 'deliberately moved away from prescription towards a curriculum that has to be built in the different learning settings all over Scotland'. The curriculum is described as abandoning a 'one-size-fits-all' national syllabus to encourage schools to develop courses tailored to their students and local circumstances. Similarly, a new curriculum in Wales, being trialled in 2019, has been introduced in response to a finding that the curriculum had become 'unwieldy, overcrowded and atomistic' and was inhibiting teachers' and students' abilities to apply learning to real-life situations and to integrate learning across subject boundaries. According to the Welsh Government, 'teachers will have more freedom to teach in ways they feel will have the best outcomes for their learners'.

Reduced specification of curriculum detail and increased flexibility are considered to deliver a number of benefits. These include the possibility of teaching important material in greater depth because teachers are not required to cover large amounts of prescribed content. Flexible curricula typically provide a broad framework within which teachers and schools work – usually built around core knowledge, concepts and principles in each subject. Greater flexibility also provides opportunities for more student-directed learning, particularly in undertaking projects in areas of interest, addressing real-world problems, engaging in creative and entrepreneurial activities, and building skills in the application of knowledge. With greater flexibility, students have more control over their learning, including by setting goals and monitoring progress in achieving them – factors often associated with higher levels of motivation and student engagement.

From the perspective of teachers, increased flexibility offers improved opportunities to tailor teaching to the backgrounds, interests and attainment levels of students. When syllabuses specify what teachers are to teach to all students, when they are to teach it, and how long they are to spend teaching it, there are often limited opportunities to adapt the content and timing of teaching to students' learning needs. Greater flexibility promotes differentiation and the adjustment of teaching to student backgrounds and local circumstances. It also promotes recognition of teachers as professionals. Professional work involves more than the delivery of 'one-size-fits-all' solutions; it usually involves evaluating presenting circumstances and drawing on professional knowledge to develop personalised interventions and bespoke solutions. The education literature refers to this as 'informed professionalism', with educators applying their professional expertise within broad guiding frameworks. Greater flexibility and trust also have the potential to build teachers' skills in curriculum planning and delivery; to promote greater collaboration and innovation, including with local communities; and to reduce externally imposed compliance requirements.

Structuring the curriculum

Every school curriculum has both content and structure. The content of the curriculum specifies what teachers are to teach and students are to learn, and is reflected in decisions about learning areas, subjects, units/topics and learning outcomes (specific knowledge, skills and understandings). The structure of the curriculum specifies how this content is to be organised, including the sequence in which it is to be introduced.

Historically, the structure of the school curriculum has mirrored the structure of schooling itself. Schooling has been organised into time periods such as phases, stages, school years, semesters and terms, and the curriculum has been structured to align with these periods.

Recent reviews of school curricula have recognised that this traditional structuring of the curriculum is only loosely related to how students actually progress in their learning. One indicator of the mismatch is that, despite students being grouped by age and taught the same curriculum in each year of school, the most advanced students in any year level are at least five to six years ahead of the least advanced students. This raises an important question about the appropriateness of common year-level curriculum expectations for the wide range of student attainment levels in each year of school.

> Almost a decade ago, I wrote that 'the greatest challenge facing America's schools today isn't the budget crisis, or standardized testing, or teacher quality. It's the enormous variation in the academic level of students coming into any given classroom.' All these years later, I still believe that's true.[40]

Added to this, curricula developed for different stages of school often are based on different pedagogical approaches. These differences sometimes reflect different student needs at different ages, but more often reflect historical decisions unrelated to student needs. A consequence is that, rather than providing students with a smooth continuum of learning across the years of school, most curricula present discontinuities and changes of approach that can impact negatively on learning – particularly across arbitrary transition points, including between the years of school.

A consequence of structuring the curriculum to mirror the structure of schooling is that, when students move to the next year of school, they simultaneously move to the next stage of the curriculum – whether they are ready for it or not. This is sometimes referred to as the 'lock-step' nature of schooling, where students are required to progress in the curriculum based on their age rather than on the basis of what they are ready to learn. This can disadvantage students who lack the prerequisites for the next stage of the curriculum and also students who are ready for learning challenges well beyond that stage.

> The McComb, Mississippi, school district had a reading problem. Students in the primary grades might be the same age, but their reading levels could be years apart. Giving all the students in the same grade the same instruction was a surefire way to leave some of them far behind. So the district… instead provided instruction based on students' reading level. Students might be in a classroom with their agemates, but because one might be two grade levels ahead, and another might be two grade levels behind, they receive very different instruction. *It's an equity initiative.* The aim is to make sure that all students leave elementary school reading well and ready for the middle school program [emphasis added].[41]

These issues were addressed in a recent review of the Welsh curriculum[42]. That review noted that the Welsh curriculum, in common with school curricula around the world, was structured to correspond to chronological 'stages' of school. These stages tended to have distinct philosophies and approaches, resulting in potential discontinuities at transition points. The review noted that 'shifts in philosophy or approach at transition points can hinder progression and there was evidence that this could contribute to disengagement as young people progress through school'. This structure of the Welsh curriculum had other unintended consequences, including 'placing ceilings on expectations or causing teachers to distort teaching to avoid addressing things that may follow in the next stage', resulting in 'a confused context for smooth progression'.

[40] MJ Pertrilli, *What schools can learn from OrangeTheory about differentiating instruction*, The Thomas B. Fordham Institute, 2019, viewed 25 July 2019, <http://fordhaminstitute.org/national/commentary/what-schools-can-learn-orangetheory-about-differentiating-instruction>.

[41] Tucker, *Leading high performance school systems: lessons from the world's best*, p. 140.

[42] G Donaldson, *Successful futures: independent review of curriculum and assessment arrangements in Wales = Dyfodol Llwyddiannus, adolygiad annibynnol o'r cwricwlwm a'r trefniadau asesu yng Nghymru*, 2015, viewed 26 July 2019, <https://gweddill.gov.wales/docs/dcells/publications/150225-successful-futures-en.pdf>.

To address these issues, the Welsh review proposed a 'revised approach to progression' based not on automatic age-related curriculum progression, but on recognition that 'children and young people will progress at different rates and that there should be an emphasis on ensuring solid foundations in learning as the best basis for progression'. In particular, the review proposed that the curriculum not be structured to correspond to phases and stages of school, but instead be 'based on a well-grounded, nationally described continuum of learning that flows from when a child enters education through to the end of statutory schooling at 16 and beyond'.

It was proposed that this continuum of learning be divided into a number of 'Progression Steps' which together would 'provide a roadmap for each individual child and young person's progress in learning'. Five progression steps would correspond broadly to expectations at ages 5, 8, 11, 14 and 16, but would recognise that some students 'may move between progression steps more slowly or quickly than others'. In the context of these broad expectations, there would be 'a duty on schools to provide a curriculum that enables most children and young people to reach, or go beyond, each progression step'.

> The new [Welsh] national curriculum should be organised as a continuum of learning from 3 to 16 without phases and key stages. Progression should be described in relation to a continuum of learning in each Area of Learning and Experience from when a child enters education to the end of statutory schooling… Progression Steps should be reference points, providing a 'roadmap' for each individual child and young person's progress in their learning and not universal expectations of the performance of all children and young people at fixed points.[43]

Importantly, this proposed structure would be inclusive, 'with all children and young people making progress along the same continuum, regardless of any additional learning needs they may have, although they may move between progression steps more slowly or quickly than others'.

Each progression step would identify and consist of a range of achievement outcomes, including 'embedded' skills such as digital competences, literacy and numeracy. The review considered it 'essential that these are based upon sound understanding of how children progress in different kinds of learning and what they need to know and be able to do in order to move to the next stage securely'.

Progression through the five steps would in general reflect 'a capacity to engage with ideas and issues in greater depth, success in tackling more complex problems and being able to grasp more abstract concepts, and becoming more accomplished in performance'. The review provided further detail of what progression in learning might involve in particular learning areas.

The progression steps proposed by the Welsh review were seen as 'reference points' for schools, teachers, parents and carers to determine whether children and young people make appropriate progress in their learning. The review also noted that, at the national level, the Welsh Government needed to be satisfied that the system as a whole was meeting expectations of both progress and attainment.

In Australia, the 1989 *Committee of Review of New South Wales Schools* (the Carrick Committee) recommended the structuring of the school curriculum 'not so much upon years and hours of study', but to allow students to progress at their own rate and to challenge and extend every student to achieve the highest possible goals. In particular, the Committee encouraged a 'greater emphasis on learning as a continuous individual process'.

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43   Donaldson, *Successful futures*, p. 56.

The Committee recommends that:
1. Schools and school systems encourage an emphasis upon school structures and patterns of progression which provide sufficient flexibility in, and across, the 'years' of schooling to allow students to progress on the basis of individual capacity, readiness, needs, interests, and degree of achievement in relation to a program of work, provided that due allowance is made for social growth and peer interaction.
2. Teacher education institutions place greater emphasis in their courses upon giving teachers the skills to plan and provide, within appropriate group contexts, the facilitation of individual learning.
3. Syllabuses be structured, not so much upon years and hours of study, but upon the content, skills and attitudes to be learnt and the experiences to be achieved by each student.
4. Student progression through curriculum structures be based upon successful achievement of syllabus objectives and experiences.
5. 'Time' should be regarded in all schooling as a flexible factor in learning rather than as a determining factor.
6. Schools and school systems ensure that all students are challenged and extended to reach the highest possible goals.
7. Schools and school systems encourage structures which are alternatives to the traditional divisions between 'primary' and 'secondary' education such that there can be a greater emphasis upon learning as a continuous individual process.[44]

More recently, the *Review to Achieve Educational Excellence in Australian Schools*[45] proposed separating the structure of the school curriculum – at least in some key areas of learning – from the structure of schooling itself. That review noted that the current Australian Curriculum specifies a 'diet of knowledge, skill and understanding' for every student in each year of school. However, given the wide variability in student attainment in each year level, 'it is impractical to expect that the same curriculum content can adequately cater to students' different learning needs'. The review noted that some students are not yet ready to be taught the curriculum specified for their year level, while others need to be 'stretched well beyond the year-level standard', and that a curriculum that holds all students to the same expectations 'restricts the ability to maximise the learning growth of every student every year'.

The review recommended the gradual phasing in of 'learning progressions' that would see 'key parts of the curriculum presented as levels of increasing proficiency through which students progress in their school years, independent of year level or age'. This recommendation would 'change the presentation of the curriculum from one organised around year-level packages of content and achievement standards to a structured roadmap of long-term learning progress'. As in the Welsh proposal, a limited number of levels of increasing proficiency would be defined by 'criteria that describe what a child knows, understands and can do' at each level. Students would advance incrementally through these levels by demonstrating mastery of the content of each level. Teachers would establish the level reached by each student at any given time and would tailor their teaching to 'challenge the student to reach the next level'. The review argued that presenting every student with targeted, appropriately challenging learning opportunities in this way was a key to raising the quality of Australian education.

To accelerate individual student learning growth and attainment, we need to shift from presenting the Australian Curriculum as a prescriptive set of yearly targets, and instead use the curriculum as a roadmap of long-term learning progress. Learning progressions that enable teachers to focus on the learning readiness and individual progress of students need to become the new benchmark for monitoring success.[46]

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44 New South Wales Government Committee of Review of New South Wales, Report of the Committee of Review of New South Wales Schools: a summary of conclusions and recommendations (Carrick Report), New South Wales Government, 1989, viewed 26 July 2019, <http://minerva-access.unimelb.edu.au/handle/11343/191174>, p. 12.
45 Department of Education and Training, Through growth to achievement.
46 Department of Education and Training, Through growth to achievement, p. 27.

Learning progressions

Over the past decade, a large number of studies have explored the development of 'learning progressions' in a range of school subjects, but particularly in science and mathematics. Although definitions of learning progressions vary, there is general agreement that their objective is to describe how students' understandings of, and abilities to apply, core disciplinary concepts, principles and ways of thinking and working grow and become more sophisticated across the years of school.[47] Importantly, learning progressions are empirically based; they are constructed not only to reflect the logical structure of a discipline, but also to reflect how students' knowledge, skills and understandings typically develop in an area of learning over time.

> Learning progressions focus the science education community on how ideas gradually become more sophisticated over time based on coherent unfolding of ideas, instruction, and prior experiences… Learning progressions provide curriculum designers with the tools needed to purposefully build upon students' current understandings in order that they will form richer and more connected ideas over time. Curriculum materials must not only build from the nature of the discipline but also from what is known about how students learn and reason.[48]

International interest in learning progressions has been motivated in part by the observation that curricula in countries that perform unusually well in international surveys such as the Trends in International Mathematics and Science Study (TIMSS) are structured to develop increasingly sophisticated understandings of core disciplinary ideas across the years of school. In these countries, sequencing in mathematics and science curricula 'does not treat topics as interchangeable parts placed arbitrarily on a grade-level grid. Instead, the topics appear to be sequenced to reflect the hierarchical and logical structures of the disciplines'.[49]

In the United States, the *Framework for K-12 Science Education* was designed to address concerns that science curricula in that country were overly focused on covering and continually revisiting science topics and content rather than progressively building deeper scientific understandings. The *Framework for K-12 Science Education* incorporates learning progressions based on 13 core science concepts. These progressions 'illustrate how ideas build upon one another to create new levels of understanding'.[50]

When used in this way, learning progressions provide an underpinning structure for curriculum design. They focus attention on core knowledge, skills and ideas in a subject, and describe how these typically develop over extended periods of time. In so doing, they map potential pathways of learning and provide structures around which less central factual and procedural detail can be sequenced and organised.

General capabilities

Recent international reforms of the school curriculum have placed greater priority on the development of general skills required for life and work.[51] Various terms have been used to refer to these skills, including '21st century skills', 'key competencies' and 'general capabilities'. Often these skills have been defined to incorporate 'soft skills', such as personal attributes and values.

The call for increased attention to such skills had its origins in concerns about how well young people were being prepared for the workforce. There was recognition that narrow, vocation-specific knowledge and skills were likely to become increasingly redundant with growing automation, advances

47 T Corcoran, F Mosher & A Rogat, *Learning progressions in science: an evidence-based approach to reform*, CPRE Research Report # RR-63, CPRE, Philadelphia PA, 1 May 2009, viewed 24 July 2019, <https://repository.upenn.edu/cpre_researchreports/53>.

48 JS Krajcik, 'The importance, cautions and future of learning progression research', in AC Alonzo & AW Gotwals (eds), Learning Progressions in *Science: Current Challenges and Future Directions,* Sense Publishers, Rotterdam, 2012, pp. 27–36, viewed 25 July 2019, <https://doi.org/10.1007/978-94-6091-824-7_3>, pp. 28–29.

49 WH Schmidt, HC Wang & CC McKnight, 'Curriculum coherence: an examination of US mathematics and science content standards from an international perspective', *Journal of Curriculum Studies*, vol. 37, no. 5, 2005, pp. 525–559, viewed 25 July 2019, <https://doi.org/10.1080/0022027042000294682>, p. 555.

50 SY Stevens, N Shin & D Peek-Brown, 'Learning progressions as a guide for developing meaningful science learning: a new framework for old ideas', *Educación Química*, vol. 24, no. 4, 2013, pp. 381–390, viewed 25 July 2019, <https://www.sciencedirect.com/science/article/pii/S0187893X13724911>.

51 P Weldon, *'Changing priorities? The role of general capabilities in the curriculum'*, Australian Council for Educational Research, 2019.

in technology and the increasing complexity of modern workplaces. In this context, employers sought general capabilities such as the ability to learn on the job, work in teams, solve problems, and to think critically and creatively about workplace challenges. More recently, there has been a focus on general skills and attributes essential to life in increasingly globalised and multicultural societies confronting complex social, economic and environmental challenges. This has led to capabilities such as global competence, intercultural understanding, social competence and ethical behaviour also being prioritised in the school curriculum.

In Australia, these developments were driven in part by the 1992 Mayer committee which drew attention to the growing importance of initiative, creativity, critical thinking and entrepreneurial skills in workplaces. The Mayer 'key competencies' were proposed as skills to be developed across the school curriculum and also in vocational and higher education institutions. The key competencies identified by the Mayer committee were: collecting, analysing and organising information; using mathematical ideas and techniques; communicating ideas and information; solving problems; planning and organising activities; using technology; and working with others and in teams.

In 2002, the Australian Chamber of Commerce and Industry and the Business Council of Australia coined the term 'employability skills'. The resulting employability skills framework included skills in: communication; teamwork; problem solving; initiative and enterprise; planning and organising; self-management; learning; and technology.

The Australian Curriculum took a broader approach to general capabilities, not limiting them to skills required for work. The 'general capabilities' in the Australian Curriculum are: literacy; numeracy; ICT competence; critical and creative thinking; ethical behaviour; personal and social competence; and intercultural understanding. Teachers are expected to teach and assess these capabilities 'to the extent that they are incorporated within learning area content' and students are expected to develop these capabilities through the application of subject knowledge and skills. The 2018 Gonski review called for increased attention to the teaching, assessment and reporting of these general capabilities.

> Strengthen the development of the general capabilities, and raise their status within curriculum delivery, by using learning progressions to support clear and structured approaches to their teaching, assessment, reporting and integration with learning areas.[52]

Most countries now prioritise general skills and capabilities in their school curricula. In 2017, the Brookings Institution reported 117 countries (76 per cent) referring to general capabilities in their curricula, with the most commonly identified skills being creativity, communication, problem solving and critical thinking. There also have been international efforts to promote the assessment and teaching of these skills – for example, through the Assessment and Teaching of 21st Century Skills project – and the Organisation for Economic Cooperation and Development has conducted international surveys of student achievement of skills such as creative problem solving, collaborative problem solving, global competence and creative thinking.

Despite strong international agreement on the importance of prioritising general capabilities in the school curriculum, many questions remain. These include the question of which skills and attributes should be prioritised in schools. A large number of general capabilities have been identified in the international literature and in curriculum reform initiatives. Efforts to identify priorities commonly produce different lists of capabilities and often use different terminology, sometimes implying differences in intention. The Australian Curriculum's general capabilities provide one answer, but do not explicitly list other commonly identified capabilities such as entrepreneurial skills and problem solving. The Gonski review expressed the view that the adequacy of the current list should be considered 'in light of contemporary thinking'. At the same time, schools often identify their own priorities, such as resilience, research skills and mindfulness. A challenge in giving greater priority to general skills and attributes is the wide range of possibilities.

Another question relates to how capabilities are defined. Although much international effort has gone into developing lists and taxonomies of skills and attributes, much less effort has been made to define what is meant by the skills and attributes contained in these lists. Even commonly prioritised capabilities such as creativity (which may be different from creative thinking) are not always well

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[52]   Department of Education and Training, *Through growth to achievement*, p. xiii.

conceptualised. Teaching and assessing a capability requires clarity about what higher levels of that capability look like. Some attempts have been made to do this, including through the learning continua developed for the general capabilities in the Australian Curriculum, but these often are based on top-down beliefs rather than being built from theory and/or empirical evidence about how a capability develops in practice. There are exceptions, including work undertaken by the OECD and as part of the Assessment and Teaching of 21st Century Skills project, but in general, the nature of general capabilities and, particularly, the nature of their development tend to be inadequately defined.

There is also a question about how discrete some capabilities are. If they occur as part of complex behaviours, can they be isolated for the purposes of teaching and assessment? For example, can skills in collecting, analysing and organising information be taught and assessed separately or are they best developed and assessed as an integral part of solving a problem or undertaking a project? Is 'personal and social competence' a capability that can be taught and assessed or is it better taught and assessed as several skills/attributes? Questions remain about how broadly or narrowly some capabilities can and should be defined for the purposes of teaching and assessment.

A much-debated question concerns the generalisability of capabilities. The terms 'generic' and 'general' often are used to imply that capabilities – especially skills such as self-management and communication – exist independently of context. Although a capability must have some range of application to be meaningful, how broad is this range? For example, are critical and creative thinking skills generalisable across school subjects in the sense that students who demonstrate higher levels of these skills in one subject tend to demonstrate higher levels of these skills in all subjects? To what extent can these skills be taught and assessed independently of particular subject knowledge? Or are they strictly domain-specific and 'general' only in the sense that they are relevant to a range of learning areas? These questions can be answered only by investigating the range of contexts to which a capability can be generalised. And the answer is unlikely to be the same for all capabilities.

Finally, there are questions about how capabilities are best incorporated into the school curriculum, how they are best taught or developed, and how they are best assessed. Capabilities sometimes are described as an alternative to traditional school subjects as a basis for structuring the curriculum. In other contexts, they are seen as standing alongside and being equivalent in priority to school subjects. The challenge is sometimes described as 'embedding' general capabilities in subjects as appropriate. An unfortunate development has been the emergence of a knowledge-skills tension, with some advocating the prioritisation of general capabilities over subject knowledge, and others rejecting the 'skills movement' in favour of traditional disciplinary knowledge.

The task of working out how to teach general capabilities is often left to teachers. Many school systems have reduced the content of their syllabuses to create space for teachers to give greater attention to general capabilities. Singapore and Japan have reduced their formal curriculum by about 30 per cent. Hong Kong has reduced its formal curriculum to four key learning areas. However, evidence from East Asian and other school systems and from vocational education suggests that teachers see themselves first as subject specialists and often experience difficulty in incorporating general capabilities into their teaching. They require time and professional development to do this.

In some school systems, projects and experiential learning are seen as contexts for the development of general capabilities. In Hong Kong, these include school partnerships with the business sector and other non-education bodies to provide students with practical, real-world experience and problem solving. Singapore has included 'project learning' as a compulsory element of its university entrance examinations. And in Japan and Hong Kong, efforts are being made to blur disciplinary boundaries by presenting students with issues and problems that require the application and integration of knowledge across disciplines.

The assessment of general capabilities presents a particular challenge. It is sometimes argued that general capabilities will not be accorded the priority they require in the school curriculum until they can be assessed and reported with the same rigour and credibility as subject knowledge. In practice, quality assessments of general capabilities are rare. Rubrics developed for general capabilities tend to be open to interpretation and of questionable reliability, and in some school systems are used only as a basis for student self-assessments. In most countries, formal assessment processes continue to be based on disciplinary knowledge or, in vocational education, job-specific skills.

> A real assessment of the students' ability to use their knowledge, as in the science of learning, should be the students' ability to apply what they have learned to real-life situations and in collaborative groups. Hence, the ideal assessment should be creative, integrative, practical, and collaborative. This is rare.[53]

Vocational learning

Vocational education re-emerged in Australian secondary schools in the 1990s with vocational learning being integrated into senior secondary subjects and recognised through vocational education and training (VET) qualifications. This coincided with growing student participation rates in senior secondary schools following a decline in youth labour markets, a growing focus on general capabilities required for work and life, and the clearer articulation of industry needs. VET in Schools enrolments trebled between the mid-1990s and mid-2000s in Australia. The desirability of alternative pathways and forms of learning further increased with the raising of the school leaving age to 17 in NSW in 2010.[54]

The introduction of VET in Schools programs was seen as providing a range of benefits to students and schools, including a practical alternative to the traditional academic curriculum; a school learning environment that better catered for the needs of all students; opportunities for part-time work and career exploration; increased retention and student engagement; a pathway to further education and training; dual certification based on the senior school certificate and VET qualifications; and a foundation for entry to apprenticeships, traineeships and post-school VET. A perceived benefit was improved transitions between school and work or further study and opportunities to make progress towards an industry-recognised vocational qualification while also achieving the senior certificate.

Although these benefits have been realised for many students and schools, there are ongoing concerns and challenges in relation to VET in Schools. These include the difficulties of integrating VET programs with their competency-based approaches to teaching and assessment into traditional senior secondary arrangements. This has been addressed through the introduction into some VET courses of external examinations which, while not contributing to VET qualifications, allow students to have their course outcomes count towards the ATAR. Other concerns include the fact that so-called 'entry-level' VET qualifications do not in reality facilitate entry to occupations. Although VET in Schools programs are intended to enhance transitions to work, research shows that they are not currently doing this; it is increasingly difficult to move directly into a meaningful job from a VET in Schools program alone.

There are widely held concerns about the narrowness and low level of many VET in Schools programs. VET subjects often are offered at relatively low levels (Certificate I to III); they are not perceived as being as rigorous as other senior school subjects; they tend to be less valued by students and parents; and employers often do not see them as being sufficiently work integrated or as providing authentic workplace or career exploration. There are concerns that many students currently participate in programs that do not deliver effective pathways into higher education, higher-level VET, apprenticeships, traineeships or skilled work.

A specific concern is that VET in Schools programs often prepare students narrowly for work in particular occupations, rather than providing them with broader exposure to an industry and the kinds of preparation that industry requires. Added to this are concerns about the cost burden on schools, the ongoing challenges of teachers maintaining industry currency, the role that VET in Schools programs play in reinforcing social stratification, and the polarisation of learning in the senior years into 'academic' and 'vocational' learning – with vocational learning usually being seen as of lesser value and appropriate for students of lower ability.

Internationally, vocational learning has been introduced into secondary education by increasing the number and range of available courses, sometimes dramatically. In some countries, including Sweden, Scotland and the United States, this has been done by adding vocational subjects within existing school qualifications. This is also the approach adopted in NSW. Under this approach, vocational learning can be constrained by the dominant curriculum and assessment arrangements that have evolved over time to meet the needs of university-bound students.

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[53] K Cheng, *Advancing 21st Century competencies in East Asian education systems*, Asia Society, 2017, p. 13.
[54] This section draws on a paper prepared for the Curriculum Review by Dr Justin Brown titled *'Integrating the "academic" and "vocational" in secondary schools'*, Australian Council for Educational Research, 2019.

In other countries, including England, France, Germany and Japan, stand-alone school-based vocational qualifications have been introduced, often with little or no integration with the general senior secondary curriculum. In some European countries, students are streamed into academic and vocational pathways from an early age, sometimes limiting students' opportunities to move between tracks and restricting subsequent choices and pathways. Although some countries have succeeded in introducing highly regarded separate vocational qualifications, it is not uncommon for such qualifications to be seen as 'second-choice' options.

> In Australian secondary schools, vocational education and training (VET) and academic learning are still conceptualised and taught as very separate streams – academic learning focuses on knowledge acquisition in traditional learning areas, and vocational learning through the VET in Schools (VETiS) program focuses on skills acquisition for a particular occupation or trade. This approach to education makes little sense given the range of capabilities that all people will need in the future workforce. There is a broader role for vocational learning in schools to begin cultivating these capabilities – many of which are best developed through applied learning and work-integrated learning.[55]

Broadly Defined Vocational Fields

Competency-based training and assessment have traditionally been based on specific skill sets intended to prepare trainees for specific, often narrowly defined, jobs. This approach has come under growing criticism as giving inadequate attention to the broader capabilities and attributes now required in modern workplaces. More broadly defined learning areas, sometimes referred to as 'occupational fields' or 'vocational streams', have been proposed as more consistent with modern concepts of vocations. In the opinion of Wheelahan et al.[56], a focus on more broadly defined occupational fields 'would provide a useful framework for structuring programs of study to prepare graduates for a broad range of related occupations in which common practices, and knowledge, skills and attributes are shared'.

According to advocates of vocational curricula based on broadly defined fields, this approach 'starts with the person and not specific skills, tasks or roles and asks about the capabilities that people need to achieve a range of outcomes'[57]. Vocational curricula are envisaged as developing students' capabilities in three domains: the theoretical knowledge needed for the field of practice and for higher level study; the technical skills that transcend particular workplaces; and the attributes the person needs for that occupation or profession, including ethical practice, communication skills, capacity to work autonomously and in teams, and creativity.

> Preparation for a vocational stream implies that education will have a broader focus because it is preparation for a number of linked occupations rather than being specific preparation for a specific job. In preparing students for vocational streams, the focus will need to move beyond specific tasks and roles within jobs, to broad fields of practice, where the focus is on the development of the person, the attributes they need and the knowledge and skills they require to work within a broadly defined field of practice.[58]

By organising the curriculum around broad fields of practice, students could be given opportunities to learn more about particular industries, alternative post-school pathways and possible future careers within each broad field. Students who wished to concentrate their study in a particular field could

55   M O'Connell & K Torii, 'Vocational learning in schools: an international comparison', in VET: *Securing skills for growth*, Committee for Economic Development of Australia, Melbourne, 2016, pp. 69–82, viewed 25 July 2019, <https://www.voced.edu.au/content/ngv%3A74069>, p. 70.

56   L Wheelahan, J Buchanan & S Yu, *Linking qualifications and the labour market through capabilities and vocational streams*, National Centre for Vocational Education Research, Adelaide, 2015, viewed 25 July 2019, <https://www.ncver.edu.au/research-and-statistics/publications/all-publications/linking-qualifications-and-the-labour-market-through-capabilities-and-vocational-streams>, p. 28.

57   J Buchanan, L Wheelahan & S Yu, 'Increasing young people's adaptability and mobility: from competency approach and twenty-first century skills to capabilities and vocational streams', in *Skills and the future of work: strategies for inclusive growth in Asia and the Pacific*, ILO Regional Office for Asia and the Pacific, Bangkok, Thailand, 2018, pp. 125–159, viewed 25 July 2019, <http://apskills.ilo.org/downloads/chapter-5-increasing-young-peoples-adaptability-and-mobility-from-competency-approach-and-twenty-first-century-skills-to-capabilities-and-vocational-streams-1/view>, p. 138.

58   G Moodie, N Fredman, E Bexley & L Wheelahan, Vocational education's variable links to vocations, Research Report, NCVER, Adelaide, 2013, viewed 25 July 2019, <https://www.ncver.edu.au/__data/assets/file/0024/9339/variable-links-to-vocations-2689.pdf>, p. 31.

be given advice on how to 'package' their senior secondary studies to develop the knowledge, skills and attributes appropriate to that field. This would require the integration of theory and application. For example, 'a student pursuing a pathway to an allied health occupation could embark on a senior secondary program of related academic and vocational subjects in health sciences. Similarly, a student aspiring to a post-school commercial cookery apprenticeship could undertake academic and vocational learning that builds the skills and theoretical knowledge needed for entry to and successful completion of the required employment-based training'[59].

> Work can be done to help students understand how traditional secondary school subjects can form a pathway into different broad vocational fields. Clusters of subjects can be identified that can support students to build a coherent study-plan that prepares them for a range of related careers in a field. For example, for a student interested in construction or engineering fields, the relevant pathway would guide them to selecting a range of mathematics subjects along with some vocational technology subjects. This vocational pathway would support them to build knowledge and skills that would be relevant to them, regardless of whether they choose to go on to enrol in a university engineering degree or take up an apprenticeship in carpentry.[60]

Senior secondary projects

A number of senior secondary qualifications have introduced a major project that students undertake as part of their study in the final years of school. Students usually complete projects on topics of their own choosing. These are in addition to any project work that may be included in individual subject requirements. Major projects, which are designed to promote and recognise skills not developed and assessed in traditional written examinations, sometimes are referred to as 'investigations' or 'research projects'. Examples of several major projects are provided here with brief summaries of their intended purposes and features.

South Australian Research Project

In South Australia, Year 12 students are required to undertake a Research Project and must achieve a grade of C− or better on the project to gain the South Australian Certificate of Education (SACE). The Research Project represents about ten per cent of a student's work for the year and is described as an opportunity for students to develop and demonstrate skills that will prepare them for further education, training and work. The Research Project is designed to develop and recognise skills in planning, research, synthesis, evaluation, and project management. Students choose a research topic in an area of interest and are expected, through the project, to develop abilities in questioning sources of information, making effective decisions, evaluating progress, being innovative and solving problems.

In undertaking the Research Project, students are expected to:

- generate ideas to plan and develop a research project;
- understand and develop one or more capabilities in the context of their research;
- analyse information and explore ideas to develop their research;
- develop specific knowledge and skills;
- produce and substantiate a Research Outcome; and
- evaluate their research.

These expectations include identifying one or more of the seven Australian Curriculum general capabilities and exploring that capability, or those capabilities, and its/their development in the context of their research.

Students use a 'research framework' consisting of four parts as a guide to developing their research:

1. initiating and planning the research;
2. developing the research;

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59   K Clarke, *Entry to the vocations: strengthening VET in schools,* Research Report, NCVER, 2013, viewed 26 July 2019, <https://www.ncver.edu.au/__data/assets/file/0015/8052/entry-to-vocations-2678.pdf>, p. 23.
60   S Joyce, *Strengthening skills: expert review of Australia's Vocational Education and Training system*, Commonwealth of Australia, Department of the Prime Minister and Cabinet, Canberra, 2019, viewed 25 July 2019, <https://www.pmc.gov.au/resource-centre/domestic-policy/vet-review/strengthening-skills-expert-review-australias-vocational-education-and-training-system>, p. 96.

3.   producing and substantiating the Research Outcomes; and

4.   evaluating the research.

Assessments are based on a Folio in which the student records their planning and development of the research (school assessed and worth 30 per cent); a Research Outcome that resolves the research question and presents the findings (school assessed and worth 40 per cent); and an Evaluation in which students evaluate and reflect on the research results (externally assessed and worth 30 per cent). Assessments are made against four criteria – planning, development, synthesis, evaluation – with five described levels of performance on each criterion, labelled A to E. Schools submit a sample of student work representing each grade between A+ and E− to a moderator for confirmation or adjustment.

Victorian Extended Investigation

In Victoria, students are able to undertake an Extended Investigation as part of the Victorian Certificate of Education. The Extended Investigation is designed to enable students to 'develop, refine and extend knowledge and skills in independent research'. Students can complete the investigation as an extension of other study they are undertaking or independently of their program of study.

The Extended Investigation enables students to:

•   develop and construct a rigorous research question;

•   understand and apply research methods;

•   explore a chosen area of investigation in depth;

•   develop as independent, critical and reflective learners;

•   develop research project management knowledge and skills;

•   analyse and evaluate findings and results; and

•   develop skills in written and oral presentation of research findings.

The investigation is conducted as part of a two-unit sequence at a standard equivalent to the final year of secondary school. Each unit involves at least 50 hours of scheduled, supervised instruction, as well as out of school time to undertake research that schools are required to monitor.

In the first unit, Designing an Extended Investigation, students devise a research question, set the parameters for their research, examine a range of research methods, conduct a literature review, and explore the purpose and ethics of undertaking research. They also develop a research plan, learn to apply the conventions of academic report writing, and make an oral presentation on the background and significance of their research question and the details of their research plan. Students develop skills in critical thinking, including constructing and deconstructing arguments, recognising the influence of cognitive biases, and critiquing propositions and arguments.

In the second unit, Presenting an Extended Investigation, students complete their investigation and write a final research report that presents and evaluates the conclusions of their investigation. Students are expected to demonstrate skills in research project management; data analysis; organising, synthesising and evaluating research findings; using conventions of academic writing and report structures; and using relevant research concepts and terms. They are required to explain their investigation, critically evaluate their research process, and defend research findings in a presentation to an educated non-specialist audience.

A mandatory component of the investigation is the maintenance of an Extended Investigation Journal. This is a formal record of a student's investigation, maintained throughout the project, which provides supervising teachers with documentation to authenticate student work and students with a mechanism to track, review and refine the focus of their investigation.

Student performance in the first unit is assessed through a school-assessed component (design and justification of research question; research plan; and oral presentation) and an external Critical Thinking Test. Performance in the second unit is assessed through a two-part externally assessed task: a final written report and an oral presentation incorporating defence before an external panel.

International Baccalaureate Extended Essay

The International Baccalaureate Diploma Programme includes a mandatory independent, self-directed piece of research culminating in a 4000-word paper. The Extended Essay is designed to provide students with an opportunity to investigate a topic of special interest to them and related to one of their six Diploma Programme subjects. It is also seen as practical preparation for undergraduate research.

The Extended Essay is designed to develop students' abilities to 'analyse, synthesise and evaluate knowledge'. Students are expected to develop skills in:

- formulating an appropriate research question;
- engaging in a personal exploration of the topic;
- communicating ideas; and
- developing and argument.

Throughout the process of researching and writing their Extended Essay, students are supported by advice and guidance from a supervisor – usually a teacher at their school. Students must meet with their supervisor three times in 'reflection sessions', with the third session being referred to as viva voce.

Performances on the Extended Essay are externally assessed by examiners appointed by the International Baccalaureate. The resulting scores (0 to 34) are reported as a grade from A (excellent) to E (elementary).

International Mathematical Modelling Challenge

Although not part of a senior secondary qualification, another instructive example of a senior years' project is the International Mathematical Modelling Challenge.[61] The aim of the Challenge is to provide students with opportunities to explore the application of mathematics in real situations to solve important problems. The Challenge is designed to develop and enhance students' abilities to visualise, understand and apply mathematics in real-world contexts.

In undertaking a mathematical modelling project, students are expected to 'develop a systematic and successful approach to addressing individual problems located in real-world settings' and to progressively become more able to address problems set by others and to identify and address problems themselves.

The mathematical modelling project expects students to:

- Describe the real-world problem. Identify and understand the practical aspects of the situation.
- Specify the mathematical problem. Frame the real-world scenario as an appropriate, related mathematical question(s).
- Formulate the mathematical model. Make simplifying assumptions, choose variables, estimate magnitudes of inputs, justify decisions made.
- Solve the mathematics.
- Interpret the solution. Consider mathematical results in terms of their real-world meanings.
- Evaluate the model. Make a judgment as to the adequacy of the solution to the original question(s). Modify the model as necessary and repeat the cycle until an adequate solution has been found.
- Report on success or document how further research could make adjustments and try for a better solution. Communicate clearly and fully suggestions to address the real-world problem.

Students work in teams to address provided mathematical challenges. Past challenges have included the development of mathematical models for scheduling the filming of movies; purchasing insurance for athletics events; choosing locations for international meetings; and choosing the best hospital.

Projects are assessed on:

- Problem definition (specification of precise mathematical questions for the general problem statement).
- Model formulation (identification of assumptions with justification; choice of variables; identification and gathering of relevant data; choice and justification of parameter values; development of mathematical representations).
- Mathematical processing (application of relevant mathematics; use of appropriate technology; checking of mathematical outcomes; interpretation of outcomes).
- Model evaluation (adequacy and relevance of findings; elaboration or refinement of problem; relevance of revised solutions; quality of answers).
- Report quality (succinctness; power to attract reader; overall organisation; logical presentation).

Major projects of these kinds provide students with opportunities to develop and demonstrate skills in applying subject knowledge to the investigation of meaningful real-world questions, problems and

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[61] P Galbraith & D Holton, *Mathematical modelling: a guidebook for teachers and teams*, Australian Council for Educational Research, Camberwell Australia, 2018, viewed 26 July 2019, <https://www.immchallenge.org.au/files/IM2C-Teacher-and-student-guide-to-mathematical-modelling.pdf>.

challenges. These skills are becoming increasingly important in workplaces and are crucial to most post-school learning, but are not adequately addressed by traditional written examinations. The introduction of major projects as components of senior secondary study is providing the education community with valuable practical insights into issues such as the authentication of student work and the assessment of individual and team contributions.

Proficiency standards

The US National Center on Education and the Economy (NCEE) has spent three decades researching the policies and practices of the world's highest performing school systems as measured by international surveys such as the OECD's Programme for International Student Assessment (PISA) and the IEA's Trends in International Mathematics and Science Study (TIMSS). The aim has been to understand the features of these high-performing systems and the educational principles that underpin those features.[62]

One conclusion of this research is that an important feature of high-performing systems is their expectation that every student will study a common, core curriculum – usually from the beginning of school until about Year 10 – and *will achieve a specified standard of attainment* on that curriculum. NCEE's Marc Tucker refers to this specified standard of attainment as a 'gateway' standard that requires students to 'demonstrate a specified level of knowledge and skills' representing satisfactory completion of the common, core curriculum and providing the foundations necessary for more advanced study. In the typical top-performing country, these standards are accompanied by examples of student work that meet the standard.

Once students demonstrate this standard, they are able to choose from a range of advanced courses of study 'depending in part on what they want to do and in part on how well they have done up to that point'. For students who require it, more time and support are provided to achieve the gateway standard. For example, Singapore 'makes sure that the least accomplished students have the time and support they need to reach the standard, no matter what it takes… For the students at the very bottom of the distribution, the time allotted to the core is extended, all the way to the end of high school, if necessary'. For advanced students who meet the standard, there is the possibility of studying enriched curricula and 'moving on to get more advanced qualifications earlier'.

> [In Singapore] the whole system is set up so that all but the most severely handicapped students are expected to meet a high, internationally benchmarked standard of academic achievement, including students who choose the vocational path.[63]

As well as setting standards in relation to the common, core curriculum, it is usual in high-performing countries to set standards for satisfactory completion of secondary education. And in many countries, the achievement of these standards is demonstrated through performances on external examinations.

There is growing recognition among high-performing countries that an urgent challenge is to provide every student with the levels of knowledge and skill that once were achieved by only some students. As Tucker notes, low levels of school achievement are increasingly unacceptable because 'much of the unskilled and semi-skilled work that used to be available to people leaving school with only basic skills will be done more reliably and cheaply by digital devices of all kinds'.

Currently, most countries 'sort' students on the basis of their school performance. The key to sorting is to hold time constant and to sort students on how much they learn in a fixed period of time. However, sorting systems are incapable of providing every student with the levels of knowledge and skill they now require. An alternative is to hold every student to the same high proficiency standard and to recognise that individuals will require different kinds and amounts of support (depending on the stages they have reached in their learning and the difficulties they are experiencing) and different lengths of time to reach that standard. This is the alternative that many high-performing countries are now implementing. 'It is designed not for sorting students into different futures, but for enabling all students to achieve high standards.'[64]

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[62] This section draws on Dr Marc Tucker's 2019 book *Leading high performance school systems: lessons from the world's best.*
[63] *Tucker, Leading high performance school systems: lessons from the world's best,* pp. 73−74.
[64]   Tucker, *Leading high performance school systems: lessons from the world's best,* p. 104.

If the aim is to get everyone to a high standard, then the standard must be high and constant, and the time taken to reach it variable, which is the exact opposite of the system we now have, in which time is held constant and the standard achieved varies with the student. We cannot sort our way to greatness.[65]

Tucker's advice to system leaders in the United States is to establish a new proficiency standard 'as the standard you want a steadily rising proportion of your students to reach by the end of 10th grade and all but the students with the most significant delays to reach by the time they leave high school'.

However, as Tucker points out, the specification of proficiency standards is only one element of the learning systems established in high-performing countries. Standards are accompanied by a curriculum framework that 'reflects both the logic of the subject and the normal developmental trajectory of students who study that subject'. It is 'carefully matched to what the research tells us about the way students actually learn the material'. And tightly aligned with this framework are syllabuses that specify in more detail what is to be learnt; accompanying teaching materials and methods; and assessments of student learning. No less important in high-performing countries are 'the strategies used to keep all students on track'. Teachers are expected to 'closely monitor their students' progress… and to add time and other resources if they start to fall behind'.

Based on research into the use of proficiency standards and aligned curriculum frameworks in high-performing countries, a number of American states are introducing their own 'college and career ready' standards. The Arizona state legislature has offered schools the opportunity to issue a Diploma to students who demonstrate the attainment of a specified level of knowledge and skills. Students who meet this standard before the end of Year 12 are able to commence advanced coursework, including through dual enrolment in a post-school institution. The Maryland Commission on Innovation and Excellence in Education has proposed a new high school graduation system based on the achievement of a 'college and career ready' standard. Students would be able to demonstrate this standard at varying times during their schooling and until the age of 21.

Standards of this kind shift the focus of teaching and learning from time served to standards achieved. They make explicit that it is not sufficient for every student to be exposed to a common, core curriculum. As a result of studying a subject – usually for most of their schooling – every student should be expected to achieve, at a minimum, a specified level of knowledge and skill in that subject. School systems based on this expectation recognise that individuals have differing learning needs and require varying kinds of support and lengths of time to achieve high standards. Rather than demanding that all students progress in a lockstep fashion through the curriculum, and then using the outcomes of this process to sort students by their performance, high-performing countries recognise that when students meet a proficiency standard is less important than the fact that every student eventually meets it.

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[65] Tucker, Leading high performance school systems: lessons from the world's best, pp. 71–72.

6. DESIGN PRINCIPLES

Any major change to the school curriculum must be guided by a clear set of design principles. These principles provide the theoretical foundations and rationale for change. They indicate desirable directions of change and play a role in guiding any redesign process.

Input to the Curriculum Review – including through public consultations, targeted focus groups, written submissions, reviews of research and international curriculum reform experiences – has suggested a number of principles relevant to any future redesign of the NSW curriculum. These principles are outlined here.

Learning with understanding

Essential to school learning is the development of increasingly deep understandings of core concepts and principles in an area of learning, around which factual and procedural knowledge is organised.

This principle sees learning with understanding as a central goal of every school subject. As students make progress in a subject, they not only acquire more sophisticated knowledge and higher levels of skill, they also develop deeper understandings of the concepts and principles at the heart of the subject. These concepts and principles enable students to structure and make sense of the material they are learning and are a crucial aspect of increasing competence.

Learning for understanding can be contrasted with the superficial memorisation of facts and procedures. Although no curriculum intends to promote superficial learning, this can be the outcome when curricula specify large amounts of material to be learnt, focus on the performance of specific tasks or are based on checklists of outcomes or skills. When a curriculum attempts broad 'coverage' of a subject, there is often pressure to address many topics in a short space of time, resulting in an emphasis on memorisation and the learning of disconnected information. Such curricula are sometimes referred to as 'mile wide and inch deep'. Learning for understanding is further compromised when assessment processes prioritise the testing of facts and skills over assessments of thinking and understanding.

Learning based only on following specified routines, reproducing provided information and/or performing low-level tasks is particularly detrimental if it limits opportunities and quality of learning for particular groups of students. Learning with understanding must be an objective for every student if they are to be well prepared for life and work in an increasingly knowledge-based society.

Research studies provide insights into conditions that promote learning with understanding. These conditions include a deliberate intention in curricula to develop depth rather than breadth of learning. The development of deep understanding usually requires a decision not to attempt comprehensive coverage of many topics, but to teach a smaller number of topics in depth. This means focusing effort on what is central to a subject – core knowledge and understandings that develop over extended periods of time and that characterise experts in the field.

The development of deep knowledge and understanding is more difficult than superficial factual and procedural learning. It also cannot be rushed; it requires substantial time. Students must have opportunities to engage with multiple examples of the application of a concept or principle in a range of contexts. In this way they learn to transfer what they have learnt to new situations. Through in-depth studies of applications, students come to understand the conditions to which knowledge, concepts and principles can be applied and develop an ability to recognise similarities, differences and meaningful patterns in information.

Learning with understanding also requires teachers who are able to promote students' deep understandings of subject matter. Teachers must know what higher and lower levels of conceptual understanding look like in a subject and how these are reflected in students' thinking and work. They

must be able to provide a range of application contexts that challenge and build student understanding. And they must be skilled in identifying and monitoring improvements in thinking and conceptual understanding.

The implications of this principle for curriculum design are that the school curriculum should prioritise the progressive development of students' understandings of a relatively small number of fundamental concepts and principles that are central to the subject and around which important knowledge and skills can be organised. Increasing depth of understanding should be prioritised over the superficial coverage of a comprehensive range of topics and factual and procedural knowledge. The progressive development of deep understanding is a long-term agenda that requires time and opportunities to revisit concepts and principles in increasing depth and varying contexts across the school years. Assessment processes must reinforce this priority by focusing not only on the recall and reproduction of facts and procedures, but also on the quality of student thinking and understanding. And teachers are likely to benefit from resources and professional learning to support such teaching and assessment.

Skills in applying knowledge

By incorporating both theory and application, school subjects develop students' appreciation of practical relevance, as well as their skills in applying knowledge to real-world contexts and problems.

Motivation and engagement in learning generally are higher when the material being learnt is meaningful to the learner and when its potential use and relevance are clear. Many students complain that they are unable to see how what they are learning has any personal relevance or why they should be learning it, beyond the fact that they will be assessed on it. For this reason alone, it is important that the curriculum provides time and opportunities for teachers to explain, and students to explore, the relevance and practical application of curriculum content.

Real-world applications and hands-on experience also are capable of providing students with deeper understandings of facts, processes, concepts and principles. Opportunities to apply learning in a range of contexts and to a variety of challenges not only increase interest and engagement, but also can give practical meaning to otherwise abstract concepts. Research suggests that, when students engage with applications of what they are learning, they also are more likely to remember what they learn.

Beyond this, if students are to be informed citizens capable of making decisions in their own best interests and the best interests of society, then they must understand the relevance of, and be able to apply, what they have learnt to real-world issues. Abstract learning that cannot be related to lived experience will be of little assistance to students in thinking about and making sense of experience. The ability to apply what is learnt, rather than simply reproduce it, is captured in the concept of 'literacy'. For example, the Organisation for Economic Cooperation and Development (OECD) defines reading literacy, mathematical literacy and scientific literacy not simply as abilities to recall and demonstrate facts and procedures, but as abilities to apply knowledge to engage with real-world issues. Literacy is the ability to put knowledge to work.

> Scientific literacy is the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to recognise, offer and evaluate explanations for a range of natural and technological phenomena; describe and appraise scientific investigations and propose ways of addressing questions scientifically; and analyse and evaluate data, claims and arguments in a variety of representations and draw appropriate scientific conclusions.[66]

For all the above reasons, every school subject should provide a mix of theory and application, with opportunities for students both to acquire new knowledge and understandings and to apply their new learning to practical, real-world issues and experiences. And, through these practical applications, students should be expected to build deeper knowledge and understanding.

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[66] OECD, PISA 2015 *Assessment and Analytical Framework – Science, Reading, Mathematic, Financial Literacy and Collaborative Problem Solving*, OECD Publishing, Paris, 2017, viewed 26 July 2019, <https://www.oecd.org/publications/pisa-2015-assessment-and-analytical-framework-9789264281820-en.htm>, p. 22.

Providing students with opportunities to apply what they are learning also provides contexts in which to build skills of application. These skills include asking and refining questions; designing and conducting investigations; gathering, analysing and interpreting information or data; collaborating and communicating with others; drawing conclusions and reporting findings; setting goals, planning, monitoring, evaluating and reflecting on what has been learnt; critical and creative thinking; and managing self and time.

Skills in applying knowledge often can be built by providing students with engaging, open-ended problems to solve or projects to complete. When problems and projects are open-ended, they allow students at different levels of attainment to engage in the same challenge in different ways. The objective is to provide all students with opportunities to apply – and often extend – their learning by working with others to achieve a shared goal. Although projects and problems (for example, in medical education) sometimes are treated as contexts in which to introduce factual and procedural knowledge, more commonly they are part of a 'two-phase' approach in which students are first introduced to knowledge and skills and then apply them in a range of real-world contexts.

Research studies suggest that providing students with opportunities to apply their knowledge in these ways results in higher levels of intrinsic motivation linked to greater levels of student choice; improved student attitudes and engagement; deeper levels of content knowledge and conceptual understanding; and improved knowledge about uses of technologies.

The implications of this principle for curriculum design are that the school curriculum should provide opportunities for students to apply their knowledge, skills and understandings to meaningful, real-world questions and challenges over an extended period of time and drawing on learning from different subject areas as required. These opportunities should be designed as contexts in which students are able to develop and demonstrate a range of skills in applying and building knowledge.

High expectations

Every student should make excellent ongoing progress in their learning and all should reach high standards in key areas of learning by the time they leave school.

This principle is based on the belief that high expectations should be set for every student's learning. The principle has two components: first, every student should be expected to make excellent ongoing progress in their learning, where 'excellent' progress may be differently defined for different students; and second, every student should be expected to achieve high standards in a small number of specified learning areas by the time they complete their schooling.

The expectation that every student should make excellent ongoing progress recognises that, for some students – especially those with disabilities and learning difficulties – progress may occur in smaller increments and at slower rates. Some of these students also may experience setbacks. As a result, excellent progress for some students may be different from the higher rates of progress expected of others.

For the great majority of students, the expectation should be that they will make steady, strong progress in their learning across the years of school. This high expectation for learning is sometimes described as 'a year's progress for a year of school', however the specification of expected progress in a year of school can be problematic. A reasonable expectation for some students may be less reasonable for others. For example, children in the early years of school who begin the year with very limited reading skills usually make significantly greater progress in their reading than children who begin the year with high levels of reading skill. This is simply because they are beginning from a lower base (or steeper section of the reading growth curve). For these students, greater reading progress should be expected over the ensuing school year. Nevertheless, in a general sense, every student should be expected to make excellent personal progress in their learning every year.

The second aspect of this principle expects every student to achieve high standards in specified areas of learning by the time they complete thirteen years of school. These areas of learning might include (but not necessarily be limited to) English, mathematics, science and human society and its environment. In each identified area of learning, students should be expected to reach a high standard of knowledge, understanding and skill that both prepares them for life beyond school and provides a base for students choosing to undertake advanced study in the area in the senior years of school. This expectation represents every student's 'common entitlement'. As a result of attending school, every student should be exposed to, and have opportunities to learn, a common core of curriculum content and all should be expected to achieve at least minimum (but high) standards in those core areas during their school years.

The high expectations defined by this principle (excellent year-on-year progress and the achievement of high standards by the completion of school) are different from other commonly defined expectations. For example, 'high expectations' often are defined in terms of performance standards that all students in each year of school are expected to meet. A limitation of such standards is that they often represent inappropriately low expectations for some students, but inappropriately high expectations for others. Although setting the same performance expectation of every student often appears 'equitable' and a way of improving overall levels of performance, widely varying levels of attainment in each year of school mean that no single standard can represent an appropriate level of challenge for every student.

The implications of this principle are that the school curriculum, through its design, should support teachers to: establish where individual students are in their learning at any given time; provide every student with appropriately challenging learning opportunities; monitor the progress individuals make in their learning over extended periods of time; and evaluate whether students are on track to achieve expected high standards in identified learning areas by the completion of school.

An inclusive curriculum

Within each school subject, the same curriculum should apply to all students, recognising that individual learners are at different points in their learning and require different levels and kinds of support.

An inclusive curriculum is accessible to all students. In particular, it does not limit some students' access to learning on the basis of cultural or language background, disability, learning difficulties or current level of attainment. An inclusive curriculum is designed to minimise the likelihood of some students being locked into narrow courses, low expectations or restricted pathways to high achievement.

This general principle is sometimes referred to as the principle of 'universal design' and was introduced by architects to describe services and environments accessible to the widest possible range of users without the need for specialised designs or modifications to meet the needs of specific groups. Universal design aims to provide equality of access and to avoid segregating or stigmatising some users.

Applied to the school curriculum, universal design involves developing curricula that are accessible to the widest possible range of student backgrounds and achievements and avoiding the design of separate curricula for specific groups. It recognises that individuals will engage with the common curriculum differently (for example, because of their different levels of progress) and will require different learning opportunities and support to do this. But these are seen as implications for pedagogy, not curriculum design.

Inclusive curriculum design depends on an understanding of the different backgrounds and starting points students bring to their learning and of the ways in which curricula can deny or limit full access for some students. For example, a curriculum can be less accessible if it is based on assumptions about cultural and linguistic starting points that do not apply to some students. An inclusive curriculum not only will avoid barriers of these kinds, but also will facilitate access by attempting to build connections to student backgrounds to encourage a sense of belonging within the curriculum. This is important for Aboriginal and Torres Strait Islander students, but it also is important for students from a range of cultural backgrounds.

Decisions to design separate curricula for particular student groups are made with good intentions, but often have unintended and unanticipated consequences such as categorising and labelling students, setting low expectations, and placing ceilings on how far individuals can progress in their learning. For example, separate curricula for students with disabilities or learning difficulties can result in lowered expectations and restrict access to higher levels of learning and attainment. An alternative to separate curricula is to view the same curriculum as appropriate to all students, but to recognise that some students are at earlier stages in their learning and so require challenges and opportunities appropriate to those earlier stages. Rather than designing a separate curriculum, work may be required to better understand typical student needs and the nature of progress in these earlier stages of learning.

The same observation can be made of curricula that provide parallel 'streams' within the same school subject, often intended for students with different levels of ability. For example, students sometimes are given a choice between a lower-level (possibly 'applied') mathematics course and a higher-level course. This can result in students attempting to decide whether a higher performance on an easier course would be preferable to a lower performance on a harder course. In addition, lower-level courses usually deny students access to higher levels of attainment. An alternative is a common, inclusive curriculum designed around a view of learning as long-term progress and recognition that every student is at

some point in that progress. Inclusive curriculum design means ensuring that teachers are supported to establish where students are in relation to this common progression of learning and to provide curriculum content at an appropriately challenging level.

There are various other ways in which the design of the school curriculum can limit some students' access to quality learning. These include the construction of narrow courses that limit access to a broad, general education. Such courses often are designed primarily to provide knowledge for post-school study or skills for specific occupations. Rather than limiting some students' learning in these ways, an inclusive curriculum provides every student with a breadth of knowledge, understandings, skills and attributes as preparation for further study, life and work.

The implications of this principle for curriculum design are that, within each school subject, the curriculum should be designed as far as possible to be inclusive of, and accessible to, every student. This requires a design based on recognition that every student is at some point in their learning and is capable of further progress if provided with learning opportunities appropriate to their backgrounds, starting points and current levels of attainment. In general, separate curricula designed for specific groups of students (with the exception of advanced courses that enable students to specialise in particular aspects of a subject) are not consistent with the universal design principle or the intentions of an inclusive curriculum.

Emotional engagement

Curiosity, discovery, wonder and passion should be motivators and features of learning for every student throughout their school years.

Students' attitudes to school and their emotional engagement in learning are key determinants of learning success. Depending on its design, the school curriculum can either promote or undermine students' levels of emotional engagement.

From a very young age, children display curiosity, an enthusiasm for exploration and discovery, and joy in learning about the world around them. Learning comes easily and is largely intrinsically motivated as children explore what interests them. Once children are in school – and often the longer they are in school – learning tends to be motivated not by curiosity and wonder, but by other influences, including the desire to please others. Personal investment and emotional engagement become increasingly externally motivated rather than arising from personal interests, curiosities and passions. By the secondary years, there is little joy in learning for many students, and by the completion of secondary school, joy often has been replaced by the stresses of externally motivated learning and competition with others.

A consequence of this common student experience is increasing disenchantment and disengagement, particularly through the middle years of school. Teachers sometimes describe two categories of students: those who learn to play the 'game' of school, however joyless it may be at times; and those who fail to see the relevance of what they are being asked to learn and disengage. For the latter group, negative attitudes often are exacerbated by continual reminders that they are performing below expectation. Large numbers of students currently develop negative attitudes to school and disconnect from the learning it requires – either by withdrawing emotionally or by their growing non-attendance. The school curriculum and its design inevitably influence these attitudes.

There is no inherent reason why curiosity, discovery, wonder and passion should not be motivators and features of learning for every student throughout their school years and beyond. This is not to say that students should be free to learn whatever they wish whenever they choose, but that learning should provide opportunities for every student to learn in ways that are intellectually stimulating and that allow them to explore the meaning and relevance of what they are learning. This includes opportunities to develop deeper insights, make new connections, solve meaningful problems and create new solutions. In other words, intrinsically motivated, curiosity-driven learning should be an aspiration for the entire school curriculum.

Teachers are in powerful positions to build students' emotional engagement and positive attitudes to learning, but they normally work within the constraints of mandated syllabuses. Ideally, teachers create classroom environments in which students feel supported to take risks in their learning, are not afraid to make mistakes, are recognised for the efforts and personal progress they make, and receive feedback that is encouraging, positive and helpful in guiding next steps in learning. Such teachers believe every student is capable of making progress in their learning with effort and appropriate support (commonly referred to as a 'growth mindset'), and they recognise and celebrate excellent progress when they see it.

The school curriculum, through its design, can enable teaching of this kind. However, this is difficult when the amount of content that must be covered is so extensive that teachers do not have time to connect with students' personal strengths and interests. The promotion of positive attitudes to learning also is more difficult when teachers are required to assess and grade each student against age-based expectations and this is prioritised over acknowledging and celebrating learning progress.

The implications of this principle are that time must be made within the school curriculum for teachers to connect with students' interests and current levels of attainment and to explain the meaning and relevance of what they are teaching. They must have time to design learning activities that spark curiosity and intrinsic interest in learning and understanding. Emotional engagement also is likely to be promoted by opportunities for students to see the improvements they are making in their learning, and by positive, constructive feedback on how they can continue to make progress.

Continuity of learning

Learning at school is ideally a continuous and seamless process through which knowledge, skills and understandings are progressively developed over time.

Underpinning this principle is a conception of learning as long-term student progress or growth in an area of learning. As students learn, they develop increasingly sophisticated knowledge, deeper conceptual understandings of subject matter, more advanced skills in applying knowledge, and higher levels of other personal attributes relevant to the learning area. Under this conception of learning, a student's knowledge, skills, understandings and attributes are developed progressively throughout their time at school with new learning building on earlier learning and laying the foundations for future learning. This process may involve revisiting material to address it in new and more sophisticated ways and to develop deeper student understandings.

Rather than being based on specified sets of outcomes that all teachers must teach and all students must learn in each year of school, a curriculum built around the concept of progression recognises that students inevitably are at widely varying levels of attainment and provides teachers with a frame of reference for establishing the points individuals have reached in their learning and ensuring that each student is provided with appropriately targeted, challenging learning opportunities.

The progression of increasing competence that underpins the curriculum in a learning area must be established from empirical evidence about the nature of student learning. It should be based on an understanding of how new learning in the area builds on prior learning and the role that prerequisite knowledge and skills play in successful further learning. It should incorporate logical sequences of content and be informed by typical paths of learning as established from analyses of actual student learning. In short, it should be built not merely from adult beliefs about appropriate orders for introducing content, but from the empirical study of how students learn in practice.

Descriptions of the progression of learning in school subjects must be developed for each subject separately because the knowledge, skills and understandings that students develop through their learning differ from subject to subject. The English Teachers Association (ETA) and the Department of Education have developed descriptions of progressions of increasing proficiency in English in their *Textual Concepts* resource. The ETA describes these progressions as 'a new way to design learning in English'. The progressions 'foreground what is at the heart of subject English' and 'make explicit what is important to teach and learn'. They have been designed to assist teachers to develop students' understandings of 'the conceptual basis of the subject', to chart the development of students' understandings of important textual concepts and processes, and to differentiate their teaching to address students' varying levels of attainment. For example, the 'Argument' progression describes students' developing understandings of the use of various forms, modes (visual, spoken, written and performative) and media to persuade others. On this progression, 'students move from the statement of personal likes and dislikes to the expression of a supported opinion and a reasoned consideration of other positions and finally to the formulation of a thesis in a sustained argument' (see Figure 3).

Such descriptions of progress capture what is central to a school subject – the core concepts, principles and ways of thinking and working that develop across the years of school. These skills and understandings usually transcend the specifics of the contexts in which they are developed. For example, students' understandings of argument could be developed through a wide variety of interchangeable contexts. The *Textual Concepts* resource expects students to 'practise and analyse argument in all modes and media', including reviews, poems, satire, essays, narratives, documentaries, posters, speeches, gestures, stand-up comedy, photojournalism and social media. In the study of

English literature, there may be categories of texts to which all students should be exposed, and some texts may be more appropriate at higher or lower levels of student development, but beyond this, specific texts usually are seen as convenient but interchangeable contexts for developing the understandings and skills at the heart of the study of literature. Or in history, while there may be specific historical facts or periods about which all students should learn at some point in their schooling, the analytical skills and deep understandings and thinking at the heart of subject History usually could be developed in any number of contexts, such as the American Civil War, the Ming dynasty, colonial Australia or the French Revolution.

Continuity and seamlessness are central ideas in this conceptualisation of learning. Learning is seen as a continuous and potentially ongoing process. In this context, divisions of learning into phases (from pre-school to post-school) and stages are artificial impositions on an ideally continuous process. Phases and stages were introduced historically as responses to public demand for access to increasing levels of education. But the approaches to curriculum, teaching and assessment that were developed for these different stages are often different, and students can experience serious disjunctures in their learning at the transitions between them – especially from preschool to Kindergarten, Year 6 to Year 7, and from Year 12 to post-school study. Years of school also are imposed divisions that can produce discontinuities in learning, especially if teachers believe their role is to deliver the same year-level content to all students with limited attention to individuals' current levels of attainment and readiness.

This conceptualisation of learning as a continuous process, coupled with the fact that students in the same year of school are at widely varying points in their long-term progress, is at odds with a curriculum structure that generally expects teachers to teach, and all students to master, an identical set of year-level syllabus outcomes. And for at least some students, this structure creates discontinuities in learning across largely arbitrary transitions.

The implications of this principle for curriculum design are that clarity is required about the nature of long-term progress in a learning area. There needs to be an explicit and shared understanding by teachers of what deeper knowledge, more sophisticated understandings and higher level skills look like in an area of learning – in other words, of the nature of increasing competence, proficiency or attainment in the learning area. The curriculum must make this progression explicit and easy to understand, and it must do this by describing and illustrating the progress students are expected to make towards higher levels of attainment or expertise during their time at school. This shared understanding of the progression of learning should inform efforts to ensure greater seamlessness of learning and to minimise the impact of transitions between stages and years of school.

Stage 6: Students appreciate the elegance of argument as a scholarly conversation conveying us from familiar knowledge to new perceptions. They learn that: an argument acknowledges and synthesises a range of ideas and perspectives; arguments that rely on assumptions are not necessarily well-founded; arguments transform concrete details into abstractions; arguments, in different forms, modes and media, convince in different ways; the narrative may present arguments through its thematic concerns; components of argument build on and respond to one another in an act of creativity; and argument achieves unity through the interplay of logical development and aesthetic and rhetorical features.

Stage 5: Students understand that the thrust and shape of argument is influenced by the contexts of composition and reception. They learn that: argument is the logical development of a supported thesis with the purpose of bringing audiences to a new intellectual or emotional understanding; rhetorical devices are chosen for their effect for particular audiences and purposes; and arguments, despite claims to objectivity, come from a particular perspective.

Stage 4: Students understand that argument is the deliberate staging of ideas and feelings, through spoken, visual and written language, in the development of a thesis to influence a response. They learn that: argument can be a projection of the individual voice in an individual style; judicious choice of evidence and language develop the strength of an argument; and a thesis and supporting evidence of an argument provide the framework on which its conclusions are based.

Stage 3: Students understand that an argument takes into account audience, form and purpose. They learn that: arguments can be objectively or subjectively presented; language

choices (visual, spoken and written) can strengthen arguments; and an argument may provide an informed assessment of a range of opinions.

Stage 2: Students understand that opinions should be supported by information and ideas presented in a structured way. They learn that: opinions can be refined through negotiation with others; paragraphs contain a single idea; paragraphs are made up of topic sentences and evidence; and certain language (e.g. description, modality, aspects of images) carries a persuasive force.

Stage 1: Students understand that ideas, information and images need to be expressed in a clear and organised way. They learn that: certain phrases (e.g. I think that…I know that…) project opinion; images can reinforce ideas; and arguments are expressed through different types of texts, modes and media.

Early Stage 1: Students have opinions about texts and issues.

Figure 3 English textual concepts learning progression [67]

Recognition of diversity

Teaching is more effective when it takes account of students' backgrounds, starting points, strengths and learning needs.

This principle places students and their needs at the centre of the teaching and learning process. What teachers teach at any particular time, how they teach it, and how long they spend teaching it are not centrally prescribed, but are decided by teachers in response to students' particular circumstances and learning needs. This principle recognises that students have widely varying backgrounds, levels of attainment and learning needs and that teaching is more likely to lead to successful learning when it acknowledges and responds to this variability. Again, the design of the curriculum can make this easier or harder for teachers to do.

In contrast to this principle are approaches that place the curriculum at the centre of the teaching and learning process. Under these approaches, the curriculum is treated as relatively fixed. Syllabuses spell out what teachers are to teach and all students are to learn and how much time they are to spend doing this. This is often considered 'equitable' and the best way to lift standards in schools. All students are held to identical expectations and are assessed and graded on how well they master year-level syllabus outcomes. Equity is defined as 'equal treatment' and the same learning expectations are assumed appropriate for every student. When it becomes obvious that syllabus expectations are not appropriate for some students, the usual response is to create an alternative syllabus for that student subgroup. But these alternative (usually 'easier') courses invariably lower expectations, risk categorising and labelling students, and often impose ceilings on how far individuals can progress in their learning.

The principle being described here assumes a common, inclusive curriculum but recognises that students are at very different points in their progress through that curriculum and often make progress at different rates. It also recognises that students have varying cultural and language backgrounds and that these can result in mismatches between the assumptions and expectations of schools and those of local communities, and so place some students at a disadvantage. Effective teaching recognises and takes advantage of students' varying backgrounds and starting points, adapting and contextualising the content of the curriculum as appropriate. Equity is defined not as equal treatment but as adaptation to ensure that every student's learning needs are equally identified and addressed. However, there must be flexibility in the curriculum to allow teachers to do this, as well as willingness to consider the relevance and appropriateness of curriculum expectations for all students.

The identification of appropriate starting points for teaching and learning also is made necessary by the fact that the most advanced ten per cent of students in each year of school are typically five to six years ahead of the least advanced ten per cent of students. In other words, in any year of school, at any given time, there is enormous variability in students' levels of attainment. This is significant because, to maximise the likelihood of successful learning, individual students require learning opportunities at an appropriate level of challenge – not within their comfort zones and not so far ahead of them that they

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66   NSW Department of Education & English Teachers' Association of NSW, *English textual concepts: argument*, English Textual Concepts, 2016, viewed 26 July 2019, <http://englishtextualconcepts.nsw.edu.au/content/argument>.

lack the prerequisites for success, but at a level where they are stretched and may require assistance to succeed. When all students in the same year of school are held to identical syllabus expectations, there is a risk that the least advanced students will struggle and fall further behind in their learning and the most advanced students will be inadequately challenged and not achieve their potential.

Access to an inclusive curriculum, the identification of current levels of attainment and next steps in teaching and learning, high expectations for progress and long-term achievement, and targeted interventions and accommodations that address individual learning needs are equally essential for students with disabilities and learning difficulties. And for every student, the diagnosis of learning gaps, misunderstandings and errors is likely to be an important part of teachers' work in ascertaining where individuals are in their learning.

For teachers, the challenges of understanding students' varying backgrounds and starting points and of meeting individuals at their points of need are much greater than the challenge of delivering the same year-level syllabus to everybody. But a large body of international research identifies such teaching as essential to ensuring that every student learns successfully.

The implications of this principle for curriculum design are that the school curriculum must provide flexibility for teachers to establish and understand students' backgrounds and starting points and to teach accordingly. It must be designed in a way that not only enables but also promotes such teaching. Curriculum design must support the more effective teaching and learning that results from taking into consideration students' cultural and language backgrounds, making connections to local contexts and issues, and slowing down or speeding up teaching depending on student needs.

Personal learning goals

Learning is promoted by clear, appropriately challenging learning goals, with support for students to plan and monitor their own learning progress.

Successful learning is more likely when students work in an environment in which they are emotionally engaged and personally challenged, and when they can see the relevance and purpose of what they are learning. Learning also is more likely when students understand what is expected of them, know what success looks like and are able to monitor and reflect on their own learning achievements and progress.

Appropriate goals are a key to successful learning. Goals must be challenging, achievable and appropriate to students' current levels of attainment and learning needs. They must provide stretch targets that build on and extend prior learning. The setting of goals at an appropriate level is a critical feature of effective teaching; students do not learn effectively when taught what they already know or what they are not yet ready to learn. The importance of this principle is often underestimated in practice. Much time and energy can be spent on off-target teaching and learning.

An implication of this principle is that learning goals must be appropriate to individual learners. Because students are at different points in their long-term progress, goals at an appropriate level for some students often are insufficiently challenging for more advanced students but too challenging for less advanced students. An ongoing task for teachers is to ensure that every student is provided with demanding but realistic learning challenges that stretch and extend them and that maximise the likelihood of their successful further learning.

Near-term learning goals, rather than long-term goals, are likely to be more effective for motivating effort, providing useful feedback, allowing students to monitor their own progress and providing an ongoing sense of accomplishment. Students' confidence in their ability to learn successfully and views of themselves as learners are promoted by their ability to set short-term goals for learning and to monitor progress in achieving those goals.

Direct student involvement in goal setting usually is beneficial to motivation and engagement. In contexts outside school – for example, in game environments and sporting contexts – students commonly expect to be able to personalise activities and challenges, to set targets for improvement, and to monitor and record personal bests. In contrast, learning at school often does not provide opportunities for students to set personal goals, to decide when they will demonstrate achievement or to monitor personal improvement over time. This is not simply a matter of pedagogy; the structuring of the school curriculum and the way students progress through the curriculum can make it easier or harder for teachers and students to set personalised learning targets and to monitor long-term progress in an area of learning.

The implications of this principle are that the school curriculum should be designed to enable appropriately challenging learning goals to be set for individual students. The setting of next steps in learning and goals for attainment is ideally a process that includes both teachers and individual learners. Curriculum design should facilitate personalised goal setting and provide a basis for monitoring learning progress over time. Curricula based on a design that expects teachers to deliver the same curriculum content to all students in the same year level and to assess and grade performances on this common content generally do not provide an adequate basis for setting and monitoring the achievement of personal learning goals.

Curriculum flexibility

Within a clear framework of expectations, teachers should have flexibility to decide what to teach, when and how to teach it, and how much time to spend teaching it.

The prescribed school curriculum must provide sufficient flexibility for teachers to adapt their teaching to the circumstances and needs of the students in their care. Flexibility enables teachers to connect with individual learners' starting points, interests, strengths and learning needs and so is a key to maximising every student's chances of learning successfully.

There is always a tension in school curricula between the specification of essential common content and flexibility for teachers to tailor what they teach to students' varying backgrounds, circumstances and levels of attainment. A balance must be struck between these two considerations. A question of any school curriculum at any time is whether it specifies an appropriate common entitlement while also giving teachers adequate flexibility to address individual learning needs.

An inflexible curriculum limits teachers' opportunities to tailor their teaching, usually because it fills available teaching time with mandated subjects and topics, requires schools to address social issues not being addressed elsewhere, specifies large numbers of syllabus outcomes, and constrains when content is to be taught and how much time is to be spent teaching it.

In practice, examples can be found of both extreme prescriptiveness and extreme flexibility. One extreme sees the curriculum as a detailed blueprint and is based on a belief that, if all teachers deliver centrally prescribed content in optimal ways, then student learning will be maximised. The other extreme gives teachers and students unfettered freedom to decide what to teach and learn based on local contexts and personal interests. Most curriculum designers consider neither extreme to be in the best interests of all students.

One indication that a curriculum is overly prescriptive is concern by teachers that they are unable to adapt their teaching adequately to meet the learning needs of students. Teachers may say they have difficulty teaching all mandated content; have insufficient time to teach in depth or to explain the relevance and application of what they are teaching; are unable to slow down teaching to ensure that students have understood and to reteach when required; do not have flexibility to tailor teaching to students' differing starting points and backgrounds; and lack time to work with individuals or to provide quality feedback.

In contexts in which the school curriculum is overly prescribed, teachers tend to focus on 'delivering' the year-level curriculum. The priority is to ensure that all syllabus outcomes are covered and every student is exposed to, and has an opportunity to learn, the mandated content. Under time pressure, teachers may find it difficult to differentiate their teaching and to respond to students' varying levels of attainment and learning needs. High levels of prescriptiveness can erode time to establish and understand where individuals are in their learning and to tailor teaching and learning accordingly.

When teachers are required – or feel they are required – to cover large amounts of content, they are less likely to focus their teaching on fundamental concepts and principles at the core of a subject and around which factual and procedural knowledge can be organised. Instead, all content may be treated as more or less equally important. High levels of curriculum specification reduce teachers' time to build students' deep understandings by revisiting and illustrating concepts in a variety of contexts.

A lack of flexibility also limits students' abilities to investigate practical applications of what they are learning, to pursue personal strengths and interests and to build skills in applying knowledge. When syllabuses contain large numbers of outcomes that teachers are required to teach and students are expected to learn, open-ended activities that require significant time – such as the team-based solution of complex problems or major research projects – can be difficult to accommodate. In this way, high levels of curriculum specification can limit students' understandings of how learning is applied and restrict opportunities to develop skills in knowledge application.

The implications of this principle for curriculum design are that a crucial balance must be struck between the specification of essential curriculum content and the flexibility that teachers require to adapt what they teach, when they teach, and how long they spend teaching to the backgrounds, starting points and learning needs of individual students.

Informative assessment

Assessments should provide quality information about the points individuals have reached in their learning and the progress they are making toward the achievement of high standards.

Approaches to assessing and reporting student achievement have powerful influences – both positive and negative – on the kinds of teaching and learning that occur in schools. An important principle is that assessment processes should embody and promote what is known from learning research about the conditions necessary for highly effective teaching and learning.

A first implication is that assessment processes should promote teaching and learning for understanding. They should promote and provide information about students' mastery of core factual and procedural knowledge in a subject, as well as their understandings of fundamental concepts and principles. The assessment of a narrower range of deep knowledge and understanding should be prioritised over the assessment of superficial recall of large amounts of information.

Assessments should also include an evaluation of students' understandings of the contexts to which core knowledge and understandings can be transferred and applied, and students' skills in applying knowledge. These skills include the ability to gather, analyse and interpret relevant information; think critically and creatively to address issues or solve problems; plan and undertake investigations; communicate and collaborate with others; make relevant uses of technologies; and draw and report conclusions. Assessments of students' abilities to transfer and apply knowledge should be an integral part of assessment in every school subject throughout the years of school.

Assessment processes should promote intrinsically motivated learning and mastery rather than extrinsically motivated performance. As far as possible, assessments should encourage learning for its own sake, including willingness to take risks and make mistakes, rather than encouraging a focus on comparative performance, risk aversion and fear of failure. Assessment processes should also build students' understandings of the relationship between effort and success and confidence in their own abilities to learn successfully (that is, a 'growth mindset').

Findings from learning research underscore the importance of teachers establishing where students are in their learning to guide next steps in teaching and learning. This is a core purpose of assessment. It includes establishing the points individuals have reached in their learning in a subject (that is, their overall levels of knowledge, skill and understanding), as well as the more detailed diagnosis of problems learners are having, misunderstandings they have developed or skills they have not yet mastered.

Assessments should encourage students' sense of autonomy and control over their own learning and provide opportunities for metacognitive behaviours such as goal setting and monitoring learning progress, including the ability to reflect on long-term improvements.

Common approaches to assessing and reporting learning in schools fall short on most of these criteria. One reason is that, rather than being designed to establish, diagnose and understand where individuals are in their long-term progress in an area of learning and to monitor the progress they make over time, most assessment processes are designed to establish how well students have learnt what they have just been taught. The assessment process is typically seen as a process of judging learning success. If a student can demonstrate most of what has been taught, they are rewarded with a high mark or grade.

There are obvious consequences of this approach. Less advanced students are judged and graded year after year against year-level curriculum content for which they often are not yet ready. Many receive low grades year after year, failing to reflect the progress they are making and sending a strong message that they are poor learners. Some eventually disengage. Parents are aware that these students are performing below year-level expectations but often are not aware of just how far behind they have slipped.

On the other hand, more advanced students tend to receive high grades on year-level expectations year after year. These students start each school year ahead of most other students. For many, the year-level expectations are insufficiently challenging, with some achieving high grades (and perhaps coming to expect high grades) with limited effort. Parents are aware that these students are performing well on year-level expectations but often are not aware of the higher levels of which they are capable.

A focus on judging and grading often encourages a performance orientation and extrinsically motivated learning. Students are more focused on how they perform against year-level expectations and other students than on where they are in their learning, what progress they have made, and what they need to do next. By defining learning success only as performance against year-level standards, assessment processes also restrict students' abilities to see the long-term progress they are making and to exercise greater control over their learning by setting personal learning goals and monitoring learning progress.

The implications for curriculum design include the need to structure the curriculum in a way that permits teachers, students and parents to see where individuals are in their long-term learning progress, to set realistic but challenging goals for further learning and to monitor the progress being made toward high levels of attainment. The supporting role of assessment is to establish the points individuals have reached in their learning, to illuminate the progress they have made, and to diagnose obstacles to further progress. Feedback to students and parents should communicate this information.

Student agency

Opportunities for students to build on their strengths and pursue personal interests and passions improve student motivation and engagement.

The degree of autonomy students have in shaping and directing their own learning is an important determinant of attitudes to learning, motivation, engagement and perseverance. When students have a level of control over what and how they learn – that is, a level of 'agency' as learners – they also are supported to develop skills in self-regulation and independent learning and are likely to develop higher levels of self-confidence.

A common complaint among school students is that they do not see the relevance of what they are learning. This often results in lack of interest and disengagement and is likely to be exacerbated if students feel they are passive recipients of transmissive teaching that has little connection to their everyday lives. In contrast, students have come to expect the world outside school (especially social media environments and online games) to provide high levels of personalisation and control, as well as immediate feedback and gratification. Schools increasingly compete for students' time and attention with alternatives designed to be highly engaging and sometimes addictive.

In this context, it is important that schools empower students to become more self-directed in their learning, exercising a degree of choice, taking initiative, and pursuing personal interests and strengths. Within clear goals for learning, the perennial challenge is to promote student curiosity and intrinsically motivated learning through relevant and meaningful learning opportunities.

Students have a degree of control over their learning when, beyond a guaranteed common core of learning, they are able to choose the subjects they study and the timing of those subjects. Project-based learning also provides important opportunities for greater student agency as students shape and drive the questions or topics they will address, the processes they will follow, and the nature of the products of their work.

Providing students with greater decision making in their learning is not the same as expecting students to 'discover' facts, concepts, relationships and principles for themselves. This latter approach, sometimes referred to as 'discovery learning', also emphasises the value of learning through application and experience, but is based on the idea that students need to 'construct' knowledge for themselves, often through trial and error.

As with many other aspects of teaching and learning, decisions about appropriate degrees of student choice are a matter of balance. The challenge is to strike a balance between learning that is entirely passive and receptive, and the expectation that students left alone to explore through hands-on learning will discover for themselves. Increased levels of student choice and control over their learning are best provided in a context of clear learning expectations and accountabilities and close teacher supervision, monitoring and intervention when required.

The implications for curriculum design are that, beyond ensuring that every student has access to a common entitlement of learning (that is, opportunities to learn an identified core of subject knowledge and skills), students should be given freedom of choice to build on strengths and personal interests. Within subjects, opportunities for students to make choices from optional topics and to choose problems and research topics aligned with their interests are likely to lead to higher levels of motivation, engagement and attainment.

Integrated learning

All school subjects, including in the later years of school, should combine theory and application and be of similar rigour and demand, minimising academic/vocational and knowledge/skills distinctions.

Underpinning this principle is the intention that every school subject, including every subject in the senior years of school, should be designed to contribute to a student's broad education by developing subject knowledge and understandings, skills in applying knowledge, as well as relevant personal attributes. In this sense, every subject should adopt an integrated approach to the development of knowledge, skills and attributes and, in the later years of school, should be designed to prepare students simultaneously for further study, life and work.

In contrast to this intention would be subjects that are narrow in their focus – for example, subjects focused only on providing knowledge required for post-school study in the same subject, or only on providing skills required for a particular post-school occupation. Most existing school subjects have a stated intention to develop a range of knowledge, skills and attributes. The point of this principle is to ensure that every subject provides significant breadth of learning in practice.

Working against this principle of integration are dichotomies that have emerged in the school curriculum. One of these dichotomies distinguishes a focus on teaching and learning disciplinary knowledge from a focus on developing general skills and capabilities such as problem solving, entrepreneurial skills, research skills, creativity, critical thinking, communicating and teamwork. At one extreme, advocates of traditional disciplinary knowledge often are dismissive of what they see as the undervaluing of accumulated human wisdom in favour of 'soft' and fuzzily defined 'capabilities'. At the other extreme, advocates of '21st century' skills see these as the skills required to function in modern workplaces and in a rapidly changing world, and may consider disciplinary knowledge to be easily accessible through technology and at risk of becoming redundant.

The principle of integrated learning seeks to eliminate this dichotomy by viewing the application of knowledge (and skills in knowledge application) as an integral part of learning and competence in a subject. Within each subject, students should be given opportunities to explore meaningful applications of what they are learning. This may include applying knowledge to the solution of problems or in the context of student projects. These applications provide contexts in which skills such as problem solving, critical and creative thinking, teamwork and communicating can be developed and demonstrated.

Rather than giving these skills labels such as 'general capabilities', 'key competencies' or '21st century skills', thereby making them seem separate and perhaps in competition with disciplinary learning, an integrated view of the curriculum sees skills in applying knowledge as an essential part of disciplinary learning and a requirement for high levels of competence in every subject.
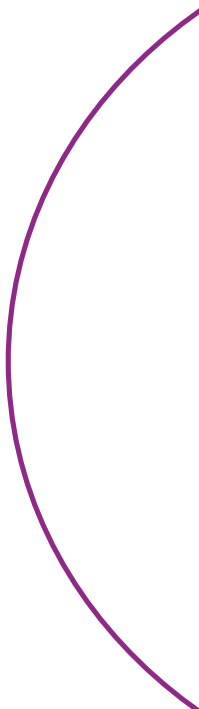
A second dichotomy working against the principle of integration is the distinction between 'academic' and 'vocational' learning – currently a feature of the curriculum in the senior years. This distinction generally differentiates subjects considered to provide a foundation for university study from subjects that provide a foundation for vocational study or direct entry to work, although this distinction is often blurred with students pursuing many different paths to vocational and higher education qualifications and careers. Nevertheless, vocational subjects in the senior years commonly are perceived as lower-level subjects available to 'non-academic' students not aspiring to an ATAR.

The current academic-vocational distinction can lead to a narrowing of students' experiences as they focus on specific purposes for their learning. Some students' learning is narrowly focused on achieving the highest possible ATAR. This may include taking subjects that are not well suited to students' interests or abilities but are perceived to improve their chances of a high rank. Other students' learning is narrowly focused on acquiring skills for a specific job, even when the long-term future of that occupation may be in doubt. These instrumental purposes for learning often hinder the provision of a broad, general education to every student in the senior years of school.

The principle of integrated learning seeks to eliminate this dichotomy by making every subject in the senior years a rigorous, high quality course that integrates and prioritises both theory and application. For some subjects, this will mean introducing a greater focus on practical applications and skills in knowledge application. For others, it will mean a greater focus on the theory underpinning practical applications. The ultimate objective is parity of esteem for all subjects, achieved through rigorous, integrated learning in every subject.

The implications of this principle for curriculum design are that every school subject should be designed to contribute to a broad education by incorporating both theory and application; by integrating knowledge, skills and attributes; and, in the senior years of school, by simultaneously preparing students for further study, life and work. In these ways, every effort should be made to minimise currently unhelpful knowledge/skills and academic/vocational distinctions.

7. REFORMING THE CONTENT OF THE CURRICULUM

Much of the input to the Curriculum Review through public consultations and written submissions addressed matters relating to the content of the curriculum. Issues raised with the Review included: concerns about the amount of material currently mandated in syllabuses; questions about the ongoing relevance of teaching factual and procedural information that is now readily accessible in digital form; calls for greater emphasis in the curriculum on the development of conceptual understanding and the teaching of 'big ideas' at the core of disciplines; calls to give greater priority to the application of knowledge and to students' skills in applying knowledge; and concerns about the number of subjects required for the Higher School Certificate and implications for the breadth and depth of student learning.

The Review was reminded of the challenges schools now face in supporting the social, ethical, physical and emotional development, health and wellbeing of students in their care. These have always been priorities for schools, but in a changing and increasingly uncertain world, and with a decline in the role of other institutions, there are new levels of concern for students' mental health, resilience and optimism. Schools continue to place a high priority on inculcating values, promoting positive attitudes and mindsets, and developing character. Some felt that they were able to give less attention than was desirable to these aspects of student wellbeing and development, in part because of the amount of time required to teach mandated syllabus content. It is important that these aspects of student growth and development are recognised as part of the broader curriculum of schools, and that time and support are provided to teachers to address these priorities, including through a wide range of traditionally 'extra-curricular' school activities.

Creating a less crowded curriculum

The concern most commonly raised with the Review related to the 'overcrowding' of the curriculum. Many teachers reported difficulties in covering syllabus expectations adequately, particularly given other requirements they had to meet. The Review was told that the volume of curriculum content and additional demands on teachers' time meant that many were unable to teach as they believed they should be teaching. Although this was not the experience of every teacher, it appeared to be the experience of most. And while there were concerns about the amount of content in primary syllabuses, this issue was not confined to any particular stage of school; the over-prescription of content appeared to be a concern for teachers across the school years. Many people drew the Review's attention to the urgent need for a less crowded curriculum and for fewer extraneous demands on teachers' and school leaders' time.

Teachers described pressures from a number of directions. Much of the pressure arose from the amount of content in syllabuses. Teachers regularly described being under pressure to cover large numbers of specified 'dot-points'. Some reported that the volume of content meant they were unable to teach in depth, and instead moved quickly from one dot-point to the next in an effort to cover everything, often skating across the surface of the curriculum in the process. This was not true of all syllabuses, including some recently redeveloped syllabuses, but a consistent comment from many teachers was that there was simply too much to cover in most syllabuses.

Some people questioned whether teachers were over-interpreting what was mandated in syllabuses and attempting to teach more than was necessary. There was speculation that some teachers were covering not only mandated content, but also material that was intended to be illustrative rather than essential. On the other hand, some teachers believed it was not always clear in syllabuses what was mandated and what was not. It was also suggested that many teachers worked in schools with a strong focus on compliance and so had become risk averse. Support for this suggestion came from some individual teachers' explanations that the reason they attempted to cover everything in syllabuses was

to avoid their school being judged 'noncompliant' or their students being disadvantaged when they reached the Higher School Certificate. Whatever the explanation, many teachers described feeling under pressure to cover large amounts of syllabus content and described the outcome as a form of teaching that they themselves considered less than ideal.

Adding to the crowded nature of the curriculum were concerns about extra requirements imposed on schools by governments and school systems. Submissions to the Review listed a variety of topics that had been added to the work of schools in recent years in response to specific events, pressure from lobby groups, and government concerns about health and social issues not being addressed elsewhere. Schools pointed out that these issues were added with little or no consideration of their impact on the rest of the curriculum or the workload of schools. There was rarely any systematic evaluation of whether these additions achieved their purposes, and when new issues were added, nothing was removed.

A range of other recent developments were considered to have reduced teachers' time to teach the curriculum. These included external compliance requirements. There were numerous references to 'box-ticking' and paperwork now required of teachers. A particular issue for some teachers was the amount of time spent on programming (lesson planning). The Review was shown examples of extensive documentation prepared by some teachers as part of their programming. It was explained that this documentation was required by principals so that it could be put on file in anticipation of visits by NESA inspectors. But according to some teachers, the required documentation did not always reflect what they did in practice.

For others, the number of mandated subjects added to curriculum overcrowding. This did not appear to be an issue in primary or lower secondary schools, but was raised as a concern in the senior school. Here, the number of units mandated for the Higher School Certificate was described as filling available time and constraining opportunities to provide students with a more rounded education – for example, by incorporating opportunities for in-depth study in partnership with tertiary institutions, community service activities, extended research projects, work experience or other vocationally oriented learning. The Review was encouraged to recommend a reduction in the number of units required for the Higher School Certificate to create time and space for alternative and broader forms of learning in the senior years.

The consequences of over-specified syllabus content were identified as: reduced ability to slow down teaching and to reteach when necessary; less classroom time to develop students' deep understandings, including by explaining and illustrating the relevance and practical application of content; reduced ability to work with individual students to diagnose difficulties and to provide personalised teaching; and reduced opportunities to attend to student wellbeing and to support students with personal issues impinging on their learning. Increased teacher workload and stress also were identified as consequences of overcrowded syllabuses.

REFORM DIRECTION 1

Address concerns about the 'overcrowding' of the curriculum and the resulting pressures on schools and teachers. In particular:

- commence a review of syllabuses to identify how the volume of mandated content can be reduced in most syllabuses (an appropriate objective might be to reduce mandated content by 15 to 20 per cent, on average);
- as part of this review, check syllabuses for clarity about what is mandatory and what is not;
- consider whether there has been a drift of content to earlier years of school and whether this has added to 'overcrowding' in the earlier years;
- review recent (past five years) requests that schools address extra-curricular topics to determine whether all are still required, and review protocols for adding such topics in the future; and
- ask NESA to investigate options for reducing the time teachers and school leaders currently spend on compliance activities.

For exploration: Creating a less crowded curriculum

- For which syllabuses is a reduction in the amount of content most required?
- Is it useful to specify an average percentage reduction as a target?
- If so, is 15 to 20 per cent too large? Too small?
- Is greater clarity about what is mandatory required?
- If so, how can the design of future syllabuses improve clarity about what is mandatory and what is optional?
- Are schools being asked to address too many additional (extra-curricular) topics?
- If so, what should be considered when making decisions about such additional topics?
- How can the burden of compliance activities be reduced for schools while still maintaining effective accountability and oversight?

Promoting deep understanding

There was strong support in submissions to the Review and also in findings from the science of learning for focusing learning in each school subject on the development of essential disciplinary knowledge and students' deep understandings of organising concepts and principles. From the perspective of teachers, the need to 'declutter' syllabuses implied the need to focus teaching and learning on what really mattered – the core knowledge and understandings at the heart of a subject, with an accompanying reduction in the amount of peripheral factual information that often leads to overcrowding and detracts from deep learning. From learning research, there is clear evidence that high levels of expertise in any field depend on deep understandings of fundamental concepts and principles, usually acquired over many years and in terms of which expert knowledge is organised.

An implication is that, in each school subject, there must be clarity about core knowledge and pivotal concepts and principles. These need to be clearly identified and prioritised over content that is less central and could be given reduced attention or eliminated from syllabuses. In every subject, there are large amounts of material that could be included in the school curriculum. Every existing syllabus is the result of past decisions and agreement about what to include and what to exclude. Any future reduction in syllabus content must work from the centre out, first identifying the essence of a subject – the fundamental knowledge, concepts and principles essential to developing a deep understanding of the discipline.

One indicator of the centrality of a concept or principle is likely to be its sustained relevance across the years of school and the fact that students develop deeper understandings of that concept or principle as they revisit it in different contexts and develop increasing appreciation of its range of applications. A well-constructed curriculum is built around central ideas of this kind – threads that run through the curriculum and have broad application and explanatory power – and provides opportunities for students to transfer and apply their increasingly deep understandings to a variety of meaningful contexts.

Thus the challenges in each subject are to identify core knowledge, concepts and principles and to develop empirically based understandings of how these typically develop across the years of school. These core aspects of learning need to be incorporated into syllabuses in ways that promote their progressive development over time and accompanied by resources and professional learning to build teachers' capacities to teach for conceptual understanding.

An example of work of this kind is the English Textual Concepts resource developed by the English Teachers Association and the Department of Education to identify a set of core concepts in English and to describe increasingly deep understandings of these concepts across the years of school. Another example, Six Big Ideas in mathematics, has been developed to focus teaching and learning on core mathematical concepts and to describe increasing levels of conceptual understanding, thinking and problem solving across the middle years of school. An important feature of these examples is that they are based not simply on adult beliefs about how understanding should develop over time, but on evidence about how students' understandings typically unfold in practice.

REFORM DIRECTION 2

As part of the process of reducing the amount of mandated content in syllabuses, identify and prioritise key knowledge, skills and understandings that are central to a subject, are developed in increasing depth across the years of school, and against which less central (factual and procedural) information can be understood and organised.

> **For exploration: Promoting deep understanding**
>
> • Should mandatory syllabus content focus on core knowledge and conceptual understandings?
> • One way to identify mandatory 'core' content is to focus on knowledge, skills and concepts that are developed over a number of years. Is this an effective approach?
> • What other approaches might be useful in identifying core content?

Building skills in applying knowledge

There was also strong support in consultations and submissions to the Review for greater emphasis in the school curriculum on the application of knowledge in meaningful, real-world contexts. This was seen as a priority for all subjects throughout the years of school. By reducing the total amount of content in syllabuses, time needed to be made to allow students to apply what they were learning. At the same time, there was a need to prioritise the progressive development of students' skills in knowledge application, including skills in using technologies, working with others, critical and creative thinking, analysing situations, collecting and evaluating information, clarifying and solving problems, and communicating. Many argued that developing skills of these kinds was now more important that ensuring comprehensive coverage of large amounts of factual and procedural knowledge in a subject.

In public discussions of this topic, a distinction is sometimes drawn between traditional disciplinary knowledge on one hand and skills in applying knowledge on the other. This has not been helped by the well-meaning introduction of labels such as '21st century skills', 'general capabilities', 'key competencies' and 'soft skills', giving skills in applying knowledge the appearance of being separate from the development of expertise in a discipline. In consultations for the Review, frequent references were made to this knowledge-skills 'tension' and the need to resolve it.

The position taken here is that the application of knowledge should be an integral part of learning in every school subject. It is not sufficient that students memorise and reproduce; the ability to transfer and apply knowledge and understandings to new and unseen contexts is an indicator of the depth of student learning. High levels of competence in a subject include the ability to put knowledge to work. Opportunities to apply knowledge also can give practical meaning to otherwise abstract concepts and make it more likely that students will remember what they have learnt. Beyond this, practical applications often enhance student interest, motivation and engagement.

When students are given opportunities to apply knowledge, they also are provided with contexts in which to develop and demonstrate skills in knowledge application. Many schools already do this through projects in which students work together on a meaningful challenge or problem, drawing on knowledge from different areas of learning as required. Complex problems or projects often require the kinds of skills required in modern workplaces, including working in a team, exploring possible solutions to problems, communicating and critical thinking. Such projects are conducted over a period of time and, in some cases, also require a level of entrepreneurial thinking and skill.

Opportunities to apply knowledge and to build students' skills in knowledge application should be components of every school subject across the school years. Skills in applying knowledge should be seen as an aspect of competence and attainment in a subject, rather than as 'general' skills that need to be 'embedded'. Teachers' assessments of performance on complex projects or problems should include assessments of such skills.

REFORM DIRECTION 3

Include in the expected learning outcomes of every syllabus, throughout the years of school, the transfer and application of knowledge to meaningful contexts, as well as relevant skills in knowledge application (such skills might include critical and creative thinking, collaborating, interpreting information/data, communicating and using technologies).

> ### For exploration: Building skills in applying knowledge
>
> • Should skills in applying knowledge (such as critical and creative thinking, collaborating, interpreting information/data, communicating and using technologies) be included as learning priorities in every syllabus?
> • Are skills of this kind more important in some stages of school than others?

A common entitlement

An issue raised with the Review – including in the Review terms of reference – was the question of the common curriculum content every student should have an opportunity to learn and the common outcomes (knowledge, skills and attributes) every student should be expected to develop during their schooling. This included the identification of essential, foundational learning that should be expected of every student. Questions were raised about the appropriate range of subjects every student should study, the times at which these should be studied, and for how long. And related to this were questions about student choice and opportunities for individuals to pursue personal strengths and interests, especially in the later years of school.

On the basis of this input, and with the concept of a 'common entitlement' in mind, the Review proposes that the content of the future school curriculum be designed to ensure that every student:

• **first establishes solid foundations in literacy and numeracy and social and emotional development**
Ensuring that every student is on track to meet minimally acceptable levels of literacy, numeracy, and social and emotional development should be the top priority in the first few years of school. This should take precedence over providing exposure to a broader curriculum in these early years, especially for children who begin school with developmental delays and low levels of language and other foundational skills. There should be a strong focus on ensuring that every student masters essential enabling skills in reading. Many children begin school behind most of their age peers and not performing at the levels currently assumed by the school curriculum. Teachers sometimes believe they are required to teach the Kindergarten curriculum to all children whether or not they are ready for it. A future curriculum should be designed on the expectation that, for children who require it, the focus will remain on ensuring at least minimally adequate levels of foundational skills before they are exposed to all mandated Key Learning Areas.

• **studies a specified range of subjects and achieves at least minimally acceptable standards in those subjects by the completion of their schooling**
Currently, students in NSW primary schools study six Key Learning Areas each year: English, Mathematics, Science and Technology, Human Society and its Environment, Creative and Practical Arts (including Art and Music), and Personal Development Health and Physical Education. Students in the lower secondary school study English, Mathematics, Science, and Human Society and its Environment each year, together with two of: Languages other than English, Technological and Applied Studies, Creative Arts, and Personal Development, Health and Physical Education.

In consultations and submissions to the Review, there were few calls to change these requirements. Some argued for less siloed and more integrated learning. Others argued for more project-based and less discipline-specific learning. And a number argued that more priority should be given to general skills/capabilities, with less emphasis on comprehensive coverage of factual and procedural subject knowledge.

Every student's common entitlement currently is defined only in terms of these requirements to study specified Key Learning Areas in particular stages of school. The common entitlement does not extend to the minimum level of achievement every student is expected to reach. For example, no student is expected to reach any particular level of language proficiency as a result of their mandated study of a language. There is a mandated Year 10 mathematics syllabus, but some students successfully complete Year 10 still performing at the level of an average Year 6 student.

Any future curriculum would benefit from a common entitlement based not only on mandated subjects and hours, but also on the minimum level of knowledge, understanding and skill every student is expected to reach in a subject.

- **develops at least basic knowledge about, and appreciation of, Aboriginal languages, cultures and histories**
  As the first peoples of Australia, Aboriginal people have a unique place in NSW society. The Review believes the school curriculum should be designed to ensure every student develops at least basic knowledge about, and appreciation of, Aboriginal languages, cultures and histories. It also should be designed to minimise the cultural gap many Aboriginal students experience by incorporating Aboriginal knowledge and perspectives in ways that allow students to see their backgrounds reflected in schools and the school curriculum.

  Aboriginal knowledge and perspectives are relevant across the curriculum and throughout the years of school and should be introduced in authentic and meaningful ways, drawing on local communities and resources as appropriate. In this process, the Australian Curriculum's key concepts of Country/Place, Culture and People provide a useful organising framework.

  To achieve these objectives, time must be created within the curriculum. Teachers will require ongoing support in the form of professional learning and quality resources and through initial teacher education programs. And school leaders will be crucial to leading the incorporation of Aboriginal knowledge, perspectives and cultures into schools and classroom teaching, as well as in building partnerships with families, elders and the NSW Aboriginal Educational Consultative Group.

- **studies a language other than English from primary school**
  Currently, the mandatory study of languages is limited to 100 hours in one language during one year, usually in Year 7 or Year 8. The Review is persuaded that a long-term objective should be to increase significantly language learning in NSW schools. Currently, Australia lags many other countries, including major English-speaking countries, in the number of students studying a second language. In an increasingly globalised world, intercultural and language skills will be essential to international engagement and are likely to deliver social, political and economic benefits to the state of NSW. There is strong evidence that language learning also increases students' understandings of their first language, improves literacy levels, and promotes a range of other cognitive skills.

  Importantly, language learning should commence in the primary years (if not before), as it does in many other countries. Research is clear on the benefits of learning a language from a young age. Continuity of language learning also is critical. Considerable work has been done, especially in Europe, to develop progressions of increasing language proficiency to guide teaching and monitor developing language proficiency over time. Rather than classifying students by their exposure to a language (such as 'second language', 'home user', and 'first language learner'), the curriculum should be structured to target and recognise students' levels of language proficiency, regardless of their ages, year levels and how those proficiency levels were achieved.

  Clearly, this proposal depends on the availability of teachers able to teach languages other than English in primary and secondary schools, including priority languages of the region, such as Indonesian and Chinese. It is envisaged that technologies could play a crucial role in supporting language learning in every NSW school. This proposal is viewed as a long-term objective towards which schools and school authorities would need to work.

> A key challenge is the lack of continuity in language learning. Languages, like mathematics, are subjects where much of the learning is cumulative and progresses in certain ways. Very few students, however, anywhere in Australia have access to continued language learning through their primary and secondary schooling… There is no way to know, in fact, that any student in NSW is gaining any level of language proficiency at any stage of schooling.
>
> **Sydney Institute for Community Languages Education**

- **undertakes rigorous, high quality learning in areas of personal strength and interest in the senior years of school**
  Once a student has met at least an identified minimum expected level of attainment in a Key Learning Area, they should have the option of either discontinuing study of that subject or commencing specialised study of the subject at an advanced level. Ideally, this could occur at any

time, with some students commencing advanced study of a subject in Year 10 or earlier, and others commencing advanced study in Years 11 or 12. In this way, there would be greater flexibility in the timing and duration of students' learning – something that is likely to become more possible as technologies play a greater role in personalising learning. Eventually, part of a student's common entitlement would be flexibility in when they were able to demonstrate the achievement of minimum expectations and begin pursuing advanced learning in areas of personal interest and passion.

Every student should also be entitled to rigorous, high quality learning in the subjects they choose to undertake in the senior years of school. There is a widely held view that this is not the case currently, with some students undertaking low-level (usually vocational) courses that do not provide the levels of knowledge and skill appropriate to study in the senior years. This is not to argue that every course should be focused on 'academic' learning, but it is to say that every student is entitled to an education that will do more than equip them with low-level skills for occupations that sometimes have questionable futures. Every student is entitled to a rich program of study in the senior years that provides knowledge, skills and attributes to equip them for further learning, life and work. This proposal is elaborated in Reform Direction 11.

- **develops deeper understanding of content through practical applications of learning to real-world problems and meaningful projects in the senior years of school**
The common entitlement proposed here includes the opportunity for every student to develop deeper understanding and a broader range of skills through opportunities to apply their learning to challenging real-world problems and contexts. Currently the final years of school tend to be dominated either by learning that is focused on the acquisition of knowledge required to perform well in the Higher School Certificate, achieve a high ATAR and gain admission to a university course of choice, or on the acquisition of skills required for specific occupations or occupational groups. A clear message from the consultations and submissions to the Review was that increased priority should be given to the transfer and application of learning to meaningful, real-world contexts, and that every student should be provided with greater opportunities to develop skills in knowledge application. This priority was seen as relevant throughout the years of school, including during the senior years.
In reviewing the content of senior syllabuses, consideration should be given to the specification of outcomes relating to the transfer and application of disciplinary knowledge and understandings and to skills in knowledge application. Beyond this, and to provide every student with an opportunity to work as part of a team to apply their knowledge and skills to complex, meaningful challenges, it is proposed that a single major project be introduced as a requirement in the final years of school. This proposal is elaborated in Reform Direction 13.

It is proposed that the major project constitute two of the ten units required for the senior certificate and that it be part of the evidence available to tertiary institutions for use in student selection. As a result, students would undertake a smaller number of senior secondary subjects. The Review was told that some higher education courses already select on the basis of a smaller number of subjects. The addition of the major project would broaden students' programs of study to include practical applications of disciplinary content, more time for problem solving, and increased opportunities for students to develop and demonstrate skills in the application of subject knowledge. In this way, the major project would provide broader evidence of students' achievements.

REFORM DIRECTION 4

In revising the content of the curriculum, provide every student with a 'common entitlement' (that is, a specification of what every student is entitled, and expected, to learn while at school) that includes:

- prioritising literacy and numeracy and social and emotional development over other mandated areas of the curriculum for children who require this in the early years of school;
- studying a specified range of subjects and achieving at least minimally acceptable standards in those subjects by the completion of their schooling;
- developing a basic knowledge about, and appreciation of, Aboriginal languages, cultures and histories;
- learning a language other than English from primary school;
- undertaking rigorous, high quality learning in areas of personal strength and interest in the senior years of school; and
- developing deeper understanding of content through practical applications of learning to real-world problems and meaningful projects in the senior years of school.

For exploration: A common entitlement

- Should there be a 'common entitlement' for every student (that is, the specification of what every student is entitled, and expected, to learn while at school)?
- Should literacy and numeracy and social and emotional development be prioritised over other mandated areas of the curriculum for children who require this in the early years of school?
- Should the current set of mandated Key Learning Areas in primary schools and lower secondary schools be retained as a minimum, common entitlement and experience?
- Should every student be expected to develop a basic knowledge about, and appreciation of, Aboriginal languages, cultures and histories?
- Should every student be expected to study a language other than English from primary school?
- Should every student in the senior years of school be expected to apply their learning to real-world problems and meaningful projects?

8. REFORMING THE STRUCTURE OF THE CURRICULUM

Other input to the Review from public consultations and written submissions related to the structure of the curriculum. A common call, particularly from parents and teachers, was for a more flexible curriculum. There was concern that the curriculum was inflexible in the sense that it told teachers what to teach, when to teach it, and how long to spend teaching it. This often constrained teachers' abilities to make decisions in the best interests of individual students. Specifications of the timing and duration of teaching – often referred to as 'mandated hours' – were resulting in a 'lock-step' curriculum that expected every student to progress through the same content at the same rate. There was a perceived need not only for a less crowded curriculum, but also for a more flexible curriculum that trusted teachers' professional judgements about the timing and pace of content delivery. Findings from learning research support these calls for curriculum flexibility; in general, successful learning depends on teachers being able to adapt and tailor teaching to individuals' background knowledge, understandings, interests and current levels of attainment.

Creating a more flexible curriculum

Historically, the structure of the school curriculum has mirrored the structure of schooling itself. Schooling has been organised into time periods such as phases, stages, school years, semesters and terms, and the curriculum has been structured to align with these periods. This intention is illustrated in Figure 4: a sample scope and sequence chart for the teaching of mathematics in Year 6.[68] The chart summarises what is to be taught and the sequence in which it will be taught. The outcomes to be taught and learnt in each term are identified, along with the number of lessons per week to be dedicated to each strand/sub-strand of mathematics in each term. Through scope and sequence charts of this kind, teachers are encouraged to address particular topics at particular times and for specified lengths of time.

Mathematics sample Stage 3 scope and sequence – Year 6 (illustrating the completion of Stage 3 by the end of Year 6)

Term 1	Strands/ Substrands	**Number and Algebra 1:** (3 to 4 lessons per week) Focus: Whole Numbers, Addition and Subtraction, Multiplication and Division, Fractions, Decimals and Percentages, Patterns and Algebra
		Measurement and Geometry 1: (1 to 2 lessons per week) Focus: Length, Mass, Time, Position
	Outcomes	**Number and Algebra 1:** MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA, MA3-5NA, MA3-6NA, MA3-7NA, MA3-8NA
		Measurement and Geometry 1: MA3-1WM, MA3-2WM, MA3-3WM, MA3-9MG, MA3-12MG, MA3-13MG, MA3-17MG

Term 2	Strands/ Substrands	**Number and Algebra 2:** (3 lessons per week) Focus: Addition and Subtraction, Multiplication and Division, Fractions, Decimals and Percentages
		Measurement and Geometry 2: (1 lesson per week) Focus: Area, Two-Dimensional Space, Angles
		Statistics and Probability 1: (1 lesson per week) Focus: Chance
	Outcomes	**Number and Algebra 2:** MA3-1WM, MA3-2WM, MA3-3WM, MA3-5NA, MA3-6NA, MA3-7NA
		Measurement and Geometry 2: MA3-1WM, MA3-2WM, MA3-3WM, MA3-10MG, MA3-15MG, MA3-16MG
		Statistics and Probability 1: MA3-1WM, MA3-2WM, MA3-3WM, MA3-19SP

Term 3	Strands/ Substrands	**Number and Algebra 3:** (3 to 4 lessons per week) Focus: Addition and Subtraction, Multiplication and Division, Fractions, Decimals and Percentages, Patterns and Algebra
		Measurement and Geometry 3: (1 to 2 lessons per week) Focus: Volume and Capacity, Three-Dimensional Space
	Outcomes	**Number and Algebra 3:** MA3-1WM, MA3-2WM, MA3-3WM, MA3-5NA, MA3-6NA, MA3-7NA, MA3-8NA
		Measurement and Geometry 3: MA3-1WM, MA3-2WM, MA3-3WM, MA3-11MG, MA3-14MG

Term 4	Strands/ Substrands	**Number and Algebra 4:** (2 to 3 lessons per week) Focus: Whole Numbers, Multiplication and Division, Fractions, Decimals and Percentages, Patterns and Algebra
		Measurement and Geometry 4: (1 to 2 lessons per week) Focus: Length, Area, Volume and Capacity, Mass, Time
		Statistics and Probability 2: (1 lesson per week) Focus: Data
	Outcomes	**Number and Algebra 4:** MA3-1WM, MA3-2WM, MA3-3WM, MA3-4NA, MA3-6NA, MA3-7NA, MA3-8NA
		Measurement and Geometry 4: MA3-1WM, MA3-2WM, MA3-3WM, MA3-9MG, MA3-10MG, MA3-11MG, MA3-12MG, MA3-13MG
		Statistics and Probability 2: MA3-1WM, MA3-3WM, MA3-18SP

Figure 4 Mathematics sample Stage 3 scope and sequence

[68] NSW Education Standards Authority, *Mathematics sample Stage 3 scope and sequence – Year 6 (illustrating the completion of Stage 3 by the end of Year 6)*, n.d., viewed 26 July 2019, <https://syllabus.nesa.nsw.edu.au/assets/global/files/maths_s3_sampless3.pdf>.

When a curriculum is overly prescriptive about when teachers should teach particular content and how long they should spend teaching it, there is a risk of limiting teachers' abilities to adapt their teaching to the attainment levels and learning needs of individual students. This is especially problematic when teachers are attempting to cover large amounts of content and are working with students with widely differing learning needs.

> There should be greater professional trust in teachers and principals, and less prescription of content and time allocations, affording greater flexibility for schools and teachers, who know their learners and their diverse needs best.
>
> **Modern Language Teachers Association of NSW**

Fifty years ago, it was common practice in many countries to assign students to classes based on their performances at school. For example, the highest performing Year 7 students were assigned to class 7A, the next highest to class 7B, and so on, based on comparisons of students' performances across the entire year level. The intention was to ensure that students were provided with teaching appropriate to their varying levels of attainment. However, the unintended consequence was that students became locked into streams from which they rarely escaped; students in 7D also ended up in 8D, 9D and 10D and became labelled as D stream students.

The logical response was to abandon this practice and to assign students instead to 'mixed ability' classes. However, it is questionable whether sufficient attention was paid to the challenge this policy presented to teachers or to the support many would require to work with students of such widely varying levels of attainment. Currently, in each year of school the most advanced ten per cent of students are typically five to six years ahead of the least advanced ten per cent. This average range is not found in every classroom, but it is found in many. In today's classrooms, students often are at very different stages in their progress and have vastly different learning needs.

Teachers are expected to find ways to address this reality, for example by 'differentiating' their teaching. But at the same time, they often are presented with a curriculum predicated on the assumption that students in the same year of school are more or less equally ready for the same content. In other words, not only have teachers been given limited support to address students' widely varying needs, but they also feel they are being asked to teach a 'lock-step' curriculum that specifies what and when they should teach every student and how long they should spend doing that. And then they are expected to assess and grade each student on how well they have learnt this common body of curriculum content.

The consequences are well known. Again, students are compared with their age peers. Less advanced students in the tail of the distribution, when assessed and graded against year-level curriculum expectations, tend to achieve low grades year after year. Many are labelled 'D-students' or worse, even though they may be making good absolute progress in their learning. More advanced students tend to achieve high grades on what, for them, often are middling year-level expectations, and they sometimes do this by cruising and making limited year-on-year progress.

Mixed ability classes require a flexible curriculum, not a lock-step curriculum. Rather than a pre-constructed scope and sequence chart that specifies what will be taught, when it will be taught and for how long it will be taught in the coming school year, teachers need support in establishing where individual students are in their learning at any given time and in deciding what to do next to promote further learning. This is likely to be different for different students. And, rather than (or perhaps in addition to) assessing and grading every student against the same year-level expectations, teachers need to be able to identify, acknowledge and communicate the progress that individuals make in their learning.

REFORM DIRECTION 5

Commit to the development of a more flexible school curriculum that does not specify when teachers should teach specific content and how long they should spend teaching it, but instead provides a framework that enables teachers to establish the points students have reached in their learning and to identify appropriate next steps in teaching and learning.

> **For exploration: Creating a more flexible curriculum**
>
> - Is there a need for a more flexible curriculum that is less prescriptive about what teachers are to teach, when they are to teach it, and how long they are to spend teaching it?
> - How realistic is the alternative conception of the curriculum as a frame of reference that enables teachers to establish where individuals are in their learning?
> - What are implications for resources and accountability?

Restructuring the curriculum

Teachers currently operate under two somewhat opposed expectations. On one hand is the expectation that they will deliver the year-level curriculum to every student guided by a scope and sequence chart that pre-specifies the content, timing and duration of their teaching for the year. Given the amount of content that sometimes has to be covered, this can be a challenging task. On the other hand is the expectation that, in the process, teachers will differentiate their teaching to meet the varying needs of the students they teach. The Review was told that these two expectations largely explain the pressures teachers are under.

Most teachers are well aware of the widely varying achievement levels and learning needs of students in each year of school. Some teachers expressed frustration that they have difficulty addressing individuals' varying needs because of the amount of syllabus content they are expected to teach. This variability is evident from students' performances in NAPLAN. The graph in Figure 5 shows that the best readers in Year 3 are already reading at the level of the average Year 7 student.[69] The poorest readers in Year 9 are still reading at the level of the average Year 5 student. As a result, in any year of school, students differ widely in the kinds of texts they can read and the kinds of support they require to improve their reading. The picture is similar for numeracy, except that the variability in numeracy levels does not reduce over time (and there is some international evidence that students' levels of mathematics achievement become more varied the longer students are in school).
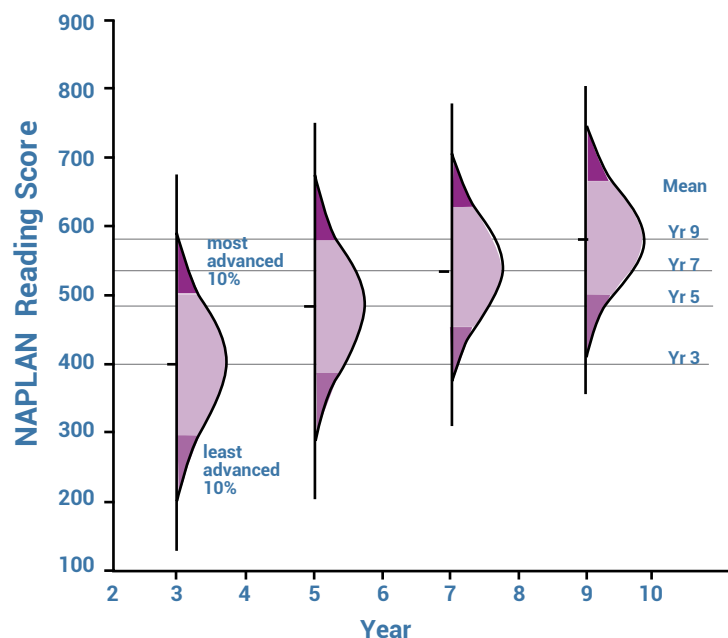

Figure 5 NAPLAN reading distributions

Research is clear that the way to maximise learning is to provide individual learners with learning opportunities at an appropriate level of challenge. This challenge must be a stretch challenge that extends each student, not a challenge well within their comfort zone or so far ahead of them that they lack the prerequisites for successful learning. And this is the nub of the problem; it is difficult for

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[69]   Department of Education and Training, *Through growth to achievement,* p. 29.

teachers to provide individuals at widely varying levels of attainment with learning opportunities at appropriate levels of challenge when they see their task as teaching a common, and often large, set of pre-specified, year-level learning outcomes to all students. For some teachers this is a dilemma. Is their primary task to teach the year-level outcomes to everybody or to ensure that each student is presented with well-targeted, individualised content and learning opportunities?

This problem is compounded by the requirement that teachers assess and grade each student on the prescribed year-level outcomes. A consequence of this requirement is that less advanced students tend to receive low grades year after year. These low grades provide little or no indication of the absolute progress individuals make because successful learning is defined solely in terms of year-level expectations. Worse, these students often infer that they are poor learners. More advanced students tend to receive high grades on year-level expectations year after year, sometimes without being challenged to the higher attainment levels of which they are capable.

An alternative is to think differently about the curriculum and teachers' roles in relation to the curriculum. Rather than specifying a set of outcomes that every teacher is to teach and every student is to learn in each year of school, the curriculum could be conceptualised as a specification (description and illustration) of long-term progress towards deeper knowledge, more sophisticated understandings and higher level skills in a subject. The curriculum then becomes a frame of reference for teacher use in establishing the points students have reached in their learning and for designing learning opportunities that challenge and extend further learning. In this way, the role of teachers changes from delivering a fixed set of year-level outcomes to every student to establishing and understanding where individuals are in their learning and targeting teaching accordingly.

This frame of reference would describe and illustrate absolute levels of attainment in a subject. An analogy here might be grades in music or proficiency levels is swimming. These define absolute levels of attainment unrelated to age. The curriculum in an area of learning similarly might define absolute levels of increasing knowledge, understanding and skill. Given that some students in each year of school are at least five to six years ahead of some others in their learning, these levels would provide a frame of reference for establishing each student's current level of attainment and providing appropriately targeted teaching.

When reconceptualised in this way, the curriculum also provides an alternative approach to evaluating learning success. Rather than assessing every student against the same set of year-level outcomes and assigning them a grade, an assessment would be made of an individual's progress from one attainment level towards the next, thus providing information about both the student's absolute level of attainment and their progress over time. The sequence of attainment levels would enable a student's learning trajectory to be monitored over multiple years – just as in music and swimming. And the expectation should be that every student would make excellent progress every year, regardless of their starting point.

Importantly, reorganising a curriculum into a sequence of attainment levels does not imply a reorganisation of classes or schools. The point is to separate the structure of the curriculum from the structure of schools, not to change the structure of schools. There are good social reasons for keeping students of the same age together as they progress through school. The challenge is to recognise the variability in attainment levels within each age group and to ensure that every student is provided with appropriately targeted learning opportunities that stretch and extend their learning. Some teachers may address students' different learning needs by grouping them (for example, for reading or mathematics), but this is not the only, and may not be the most effective, strategy. Some schools may choose not to have age-based classes, but there is nothing in this proposal that requires that.

This proposal also does not require the development of an 'individual learning plan' for every student. Again, the point is to ensure that teaching is better targeted on the attainment levels and learning needs of individual learners, but this could be achieved in a variety of ways, without requiring a separate plan for each student. Schools may choose to develop an individual learning plan for each student, but there is nothing in this proposal that requires that.

The restructuring of the curriculum into a sequence of attainment levels, each with an associated syllabus, also does not make explicit, whole-class teaching less important. Even in classrooms in which students are working at different levels, whole-group teaching often will be of benefit to all students. There are likely to be topics that are best addressed with all students simultaneously at particular points in the schooling process. But explicit, whole-class teaching when appropriate is not the same as assuming all students in a year level are equally ready for an identical curriculum and will achieve the same outcomes at the same times.

It is also possible that a curriculum structured as a sequence of attainment levels may be less necessary in some learning areas than others. The reason for creating a more flexible curriculum is the observation that students in the same year of school are at very different points in their long-term progress and so are not equally ready for the same learning challenges. This is certainly true in literacy, numeracy, science, civics and citizenship and ICT literacy. Whether it is true in all areas of the curriculum is unknown. If, in a particular subject, students began the school year at similar starting points, then there would be much less need for curriculum flexibility to cater for individual differences.

Finally, it is sometimes believed that holding all students in a year level to the same expectations is 'equitable' and the most effective way to lift attainment levels across the board. However, there is little equity in providing some students with content that is well targeted on their learning needs, and others with content that is either much too easy or much too difficult. An 'equitable' curriculum would be designed to provide every student with learning opportunities targeted on their current levels of attainment and learning needs. This is the way to maximise the likelihood of every student making good further progress in their learning and so raising overall levels of student attainment.

REFORM DIRECTION 6

In each Key Learning Area, reorganise the K-10 curriculum into a sequence of syllabuses, with each syllabus corresponding to a particular level of attainment (knowledge, understanding and skill) rather than a particular year of school.

For exploration: Restructuring the curriculum

- How feasible would it be to reorganise syllabus content not into year levels but into a sequence of levels of increasing knowledge, understanding and skill?
- Is this more feasible in some learning areas than others?
- How practical would it be for a teacher to have students working at more than one attainment/syllabus level?
- What support is needed for systems, schools and teachers to meet the needs of students working at different attainment/syllabus levels in a classroom?

Setting high expectations

Students attend school for up to 13 years. During this time, every student should be expected to achieve, and ideally exceed, the minimum levels of knowledge, understanding and skill necessary to function effectively in society. Currently this is not happening. Each year in Australia, 40 000 students reach 15 years of age not having achieved the minimum level of reading the Organisation for Economic Cooperation and Development (OECD) considers necessary for life beyond school. In numeracy the figure is 57 000. Large numbers of students in Australian schools start behind or fall behind and do not achieve adequate standards of performance – even in foundational skills of these kinds – while at school. The Review regularly heard reports from parents, employers and higher education and vocational teachers about school leavers with unacceptably low levels of basic skills.

The Review is proposing that, in Key Learning Areas, explicit and clear standards are set for the level of attainment every student should reach, at a minimum, by the end of their schooling. Most students should be expected to reach this standard by the end of Year 10. Some may reach it earlier, others later, but achieving and surpassing this standard should be the goal for every student.

The standard would represent the level of performance required to function effectively in adult society. This would be a relatively high standard. For example, in science, a judgement would need to be made about the level and breadth of knowledge required to engage meaningfully with scientific ideas in everyday life. Students usually would be expected to meet this level of attainment in science before commencing specialised, advanced study of one or more branches of science in the final years of school.

Inevitably, some students will reach this standard earlier than others. Most may reach it by the end of Year 10; some may reach it before Year 10. A decision would need to be made about whether students who have met the standard are able to commence advanced study prior to Year 11 and what the implications would be of not reaching the standard by the end of Year 10. Ideally, students who meet

the standard in a learning area and who wish to commence advanced study would be able to do that, however there may be practical reasons in schools why that is difficult. In some learning areas, students who have not met the standard by the end of Year 10 might be required to continue their study in that learning area until they do. For example, in mathematics, students who have not met the standard might be required to continue their study of mathematics until they do. This does not necessarily mean that every student would continue their study in a traditional mathematics classroom. There would be other ways for students to develop their mathematical knowledge and skills, including in workplaces and online learning environments.

It is envisaged that decisions about whether or not a student had met the standard in a Key Learning Area would be made by teachers, possibly with the assistance of externally provided assessment resources.

REFORM DIRECTION 7

In each Key Learning Area, establish a standard that every student should meet by the completion of their schooling. This standard should be set at a level of knowledge, understanding and skill necessary to function effectively in adult life and usually should be met before commencing advanced study of that subject in the final years of school.

> ### For exploration: Setting high expectations
>
> • In Key Learning Areas, should there be an identified level of attainment (knowledge, understanding and skill) that every student should be expected to reach, at a minimum?
> • Should this apply to all key learning areas, and if not, in which key learning areas should minimally acceptable levels of attainment be set?

Monitoring whether learning is on track

The advantages of structuring the curriculum in Key Learning Areas into a sequence of attainment levels accompanied by a clearly specified standard that every student is expected to reach during their schooling include the possibility of each student being engaged and challenged by content appropriate to their current level of attainment and learning needs. As they progressed through the attainment levels, students would be better able to set appropriate goals for their learning, see the progress they were making, and understand the relationship between effort and success. The entire system would promote and recognise ongoing progress in learning and set high expectations for both growth and ultimate attainment.

With the establishment of clear standards, teachers are likely to benefit from a way of monitoring whether students are on track to achieve those standards. One way of providing this is illustrated in Figure 6.

The vertical axis in Figure 6 shows increasing levels of attainment in a subject – sometimes referred to as a 'progression' of attainment levels. Students are expected to progress through these levels of increasing knowledge, understanding and skill during their school years, but the levels are not tied to particular years of school. The attainment levels have been clustered here into shaded groups and numbered within each group. It is proposed that a syllabus be developed for each attainment level within each group (for example, four syllabuses at the 'Beginning' level, each building on prior syllabuses). The labelling of the groups and the number of attainment levels within each group would need to be decided. These labels have been provided as a starting point for discussion.

The standard that every student is expected to reach in this learning area has been labelled 'Proficient'. More specifically, every student would be expected to demonstrate the knowledge, skills and understandings described and illustrated for Attainment Level 4 within the Proficient level, as judged by their teacher/s.
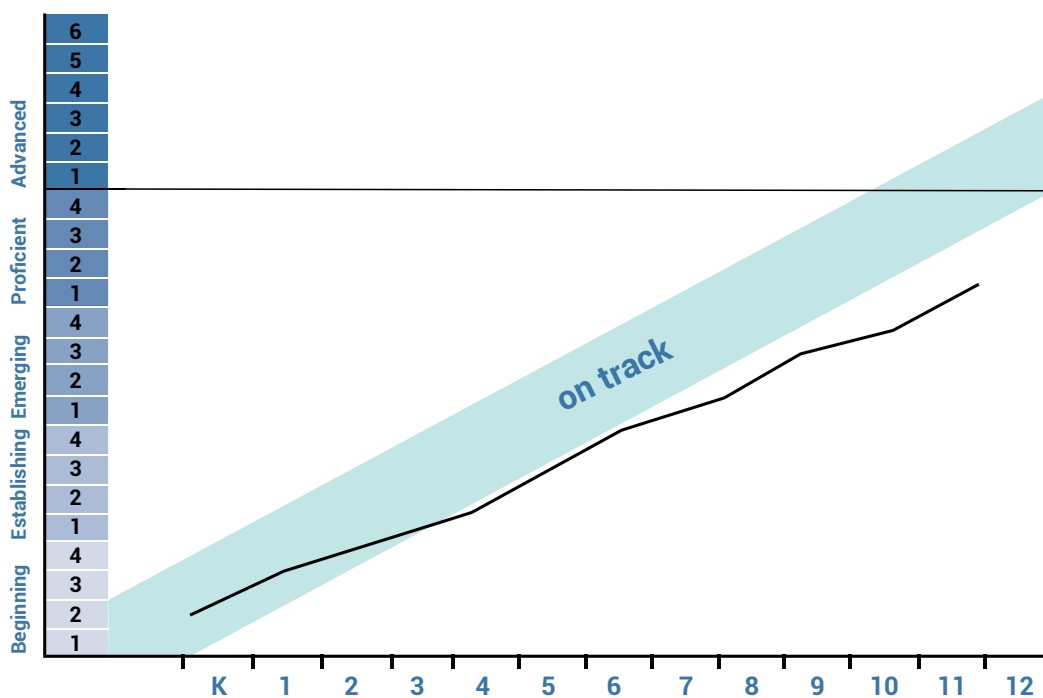
Figure 6 Framework for monitoring long-term learning progress

The horizontal axis shows years of school. In this way, there is a separation of attainment (vertical axis) from time (horizontal axis). The 'on track' region of the diagram shows the path students need to follow to meet or exceed the expected standard by the completion of school. By establishing the attainment level at which a student is working at various times during their schooling, it would be possible to plot a student's learning trajectory in a subject over time and to establish whether they were on track to meet this standard. The hypothetical trajectory of one student (not on track) is shown here.

> One of the main points of focusing on progressions is to provide teachers with a conceptual structure that will inform and support their ability to respond appropriately to evidence of their students' differing stages of progress by adapting their instruction to what each student needs in order to stay on track and make progress toward the ultimate learning goals.[70]

There would be several advantages of this approach to planning and monitoring learning. First, by establishing the attainment levels at which students are working, teachers would be better positioned to ensure each student was provided with learning opportunities at an appropriate level of challenge. Second, rather than grading students against the same year-level syllabus expectations, each student's performance in the subject would be reported as the attainment level they had reached and the progress they had made over time. Third, teachers would have a basis for studying individuals' learning trajectories and making decisions about the adequacy of their long-term progress and the need for any special intervention. For students who were not on track, the earliest possible intervention would be appropriate. Fourth, there would be a better basis for reporting attainment and progress to parents. Currently, parents know if a student is performing below year level expectations (from their low grades), but usually do not know how far behind they have slipped.

It is sometimes proposed that every student should make 'a year's progress for a year of school'. But it is usually unclear what this means in practice. The 'on track' diagram provides a basis for evaluating the adequacy of each student's annual progress in a subject.

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[70]   Corcoran et al., *Learning progressions in science*, p. 19.

REFORM DIRECTION 8

In each Key Learning Area, encourage teachers' use of attainment levels as a frame of reference for monitoring and communicating students' learning trajectories and progress toward the achievement of the expected standard.

> **For exploration: Monitoring whether learning is on track**
> - Is the concept of a student being at least 'on track' through their school years a useful idea for the majority of students?
> - What are the strengths and/or weaknesses of the 'on track' concept for monitoring student learning progress across the years of school?
> - What are the resourcing implications for supporting a student who is performing below the 'on-track' expectation?

Ensuring continuity of learning

An issue raised with the Review was the impact of current curriculum structures on the continuity of student learning. It was pointed out that the division of the curriculum into time periods (especially stages and school years) sometimes results in different approaches to teaching, learning and assessment in different stages of school. As a result, some students experience setbacks at the transition from one stage to the next. This was a particular issue in transitions from pre-school to kindergarten, primary to secondary, lower secondary to senior secondary, and senior secondary to post-school learning. Year-to-year transitions also can function as disjunctures in student learning.

In addition, the structure of the curriculum can impose artificial ceilings on how far individual students can progress in their learning. For example, if the curriculum in a subject is 'streamed' and students are required to choose between an easier stream and a more advanced stream, students choosing the easier stream can be denied access to more advanced content and so be limited in how far they can progress in their learning, once again undermining continuity of learning.

Ideally, learning in a subject would be conceptualised as a continuous process through which students progressively developed more advanced knowledge, deeper levels of understanding and higher level skills – potentially throughout their schooling. Expectations based on phases, stages, school years, and school terms ideally would be much less important than evidence of students' underlying, ongoing learning progress. Transitions would not function as discontinuities or interruptions in learning. And rather than having ceilings imposed on how far they could progress, every student would be able to progress as far as they were able.

Continuity of learning is promoted by a curriculum that acknowledges and accommodates students' widely varying levels of progress and attainment. Rather than expecting every student to make the transition from one part of the curriculum to the next at the same time, the curriculum is structured to enable individual students to progress when they ready. In this way, some students in the senior secondary school may be undertaking university-level studies or engaged in advanced vocational learning; some pre-school children may be engaged in activities usually undertaken in kindergarten; and some lower secondary students may still be focused on mastering foundational literacy skills. Boundaries between phases, stages and school years become blurred when the school curriculum is designed to ensure that every student is provided with well-targeted, appropriately challenging learning opportunities.

REFORM DIRECTION 9

Make continuity of learning an objective in every school subject by minimising the impact of transitions between stages and years of school; providing curriculum structures that recognise and accommodate students' varying levels of attainment, regardless of year level; and removing structures that impose ceilings on how far students can progress in their learning.

> **For exploration: Ensuring continuity of learning**
> - How can the curriculum be structured to minimise disruptions to learning that often occur between stages or from one school year to the next?
> - What would it mean to dispense with streaming (different courses) and to view students as being at different points on the same continuum of learning in a subject?
> - What resources or support would systems/schools/teachers require to ensure greater continuity of student learning?

Assessing and communicating learning

A restructured and more flexible curriculum requires a different approach to assessing and reporting student learning.

Under a traditional curriculum structure, teachers teach the outcomes specified for each year level, students are expected to master those outcomes, and the role of assessment is to determine how well each student has done this. Assessments commonly are undertaken at the end of a stage of school, school year, school term or topic, and how well a student has learnt the taught outcomes is reported as a percentage, mark or grade (A to E or equivalent). When used in this way, assessments are described as serving a 'summative' purpose. Assessments can also be undertaken during the course of teaching to establish how well students have learnt what has been taught to that point and to identify any difficulties they may be experiencing – information that can be useful for identifying gaps in learning and the need to reteach. When used in this way, assessments are described as serving a 'formative' purpose. In both cases, assessments are made in relation to a common set of pre-specified outcomes and are designed to determine how well these have been learnt and can be demonstrated.

In contrast, when the curriculum for a subject is reorganised into a sequence of attainment levels, as proposed here, the purpose of assessment is to establish the level a student has reached in their learning at any given time and to evaluate the progress they have made. To establish the level a student has reached, it is necessary to have a framework against which long-term progress in a subject can be assessed and monitored. Each attainment level in this framework describes the knowledge, understandings, skills and perhaps other attributes associated with that level. These provide the syllabus for the attainment level. However, this syllabus is not tied to any particular age or year of school; students of different ages and in different years of school often will be working to achieve the same attainment level.

The assessments teachers make under this approach are to establish where individual students are in their learning – that is, what they know, understand and can do at the time of assessment. The results of the assessment can be used by the teacher to decide whether a student has achieved a particular attainment level, to identify the level at which they are now working, and to diagnose the details of the student's progress within their current level. The methods of assessment teachers use to do this will not necessarily be different from the assessment methods they use currently.

The significant difference is in how learning is then evaluated and communicated. Rather than assigning each student an A to E grade based on how well they demonstrate the common set of year-level outcomes, students and parents are told the level at which a student is working and what progress they are making toward the achievement of that level. This should include feedback on what is still required to achieve the level. The full sequence of attainment levels in a subject provides teachers, students and parents with a framework for monitoring the long-term progress individuals make in their learning and evaluating whether they are on track to achieve and exceed the proficient standard.

An advantage of assessing and communicating learning in this way is that successful learning is defined not solely in terms of performance against age-based expectations, but in terms of the progress individuals make – from one attainment level to the next and also within the current attainment level – toward proficiency in the subject. Rather than telling less advanced students they are performing poorly (through low grades), this approach has the potential to acknowledge and celebrate excellent progress, even if a student is still behind most of their age peers and not at the level hoped for by that time in their schooling. And rather than telling more advanced students they are performing well (through high grades), even if they are cruising, making limited year-on-year progress, and not achieving the levels of which they are capable, this approach expects every student to make excellent progress from their starting level every year.

Teachers would require guidelines and criteria for deciding whether a student had 'achieved' an attainment level. This decision would be based on assessments of the student's mastery of the knowledge, understandings and skills associated with that level. Examples of student work at each level and online resources that teachers could use to assess achievement of a level may assist in this process.

REFORM DIRECTION 10

In Key Learning Areas, replace grades against pre-specified year-level outcomes with information about the highest attainment level a student has achieved and the progress they are making toward the achievement of the next level – as assessed by their teacher. Provide this information in a form that also allows parents/carers to see whether a student is on track to achieve the proficient standard in the subject.

For exploration: Assessing and communicating learning

- Should reporting be focused on communicating the points individuals have reached in their long-term progress in an area of learning?
- Should information on the progress students have made over time also become a greater focus for reporting?
- Would it be useful for parents and carers to know whether students were 'on track' to achieve the standards expected of them by the completion of their schooling?

9. REFORMING THE SENIOR SCHOOL CURRICULUM

The Review also received considerable input concerning the senior years of school. Issues raised with the Review included concern about the narrow purpose of much student learning in these final years. For many students, the senior years were described as having a single purpose: to achieve the highest possible ATAR. This narrow focus was considered to drive a range of undesirable behaviours, including the 'gaming' of ATAR (for example, students choosing lower-level courses rather than more advanced courses in the belief that this would lead to a higher rank) and HSC examination preparation practices that included memorising and 'regurgitating' pre-prepared answers. For other students, the similarly narrow purpose was to acquire skills for specific occupations. At a more general level, there was concern about the dual nature of 'academic' and 'vocational' learning in the senior years of school and the associated undervaluing of non-academic pathways.

Creating a more integrated curriculum

It was pointed out to the Review that, at the time the school leaving age was raised to 17, the opportunity had not been taken to pause and consider the kind of curriculum that would best meet the needs this full age cohort. Instead, the assumption had been made that most students would pursue an academic pathway. The result was an increase in the number of students seeking an ATAR and admission to university and the continuing bifurcation of learning in the senior secondary years into academic and vocational studies. In the opinion of many who spoke to the Review, the senior years continued to be strongly skewed towards preparing students for university rather than providing all students with a broad education that would prepare them for further learning, life and work.

Some 'academic' senior subjects are designed to provide students with factual and procedural knowledge required to study the same or related subjects at university – for example, mathematical facts and procedures required for the study of university mathematics or university subjects requiring mathematics. Although not necessarily specified as prerequisites, these senior subjects typically provide knowledge required or assumed by universities. Other 'vocational' subjects are designed to provide students with skills specified in industry frameworks as requirements for particular industries or occupations. Whether in the form of knowledge or skills, the content of senior subjects tends to be driven by post-school requirements.

An alternative would be a curriculum for the final years of school that was less focused on meeting the requirements of particular post-school destinations and more focused on providing every student with a broad education that prepared them for ongoing learning, life and work. In such a curriculum, there would be no place for dichotomies that separate academic from vocational learning, theory from application, and knowledge from skills. Every subject would be designed to develop students' disciplinary knowledge, understandings, skills and attributes; integrate theory and practical application; set demanding and high expectations for every student's learning; and include learning relevant to the world of work. Such a curriculum would be designed by the school sector to reflect its best judgements about the best ways to prepare all young people in the final years of school for their futures.

The development of a more integrated senior curriculum of this kind would be a long-term agenda requiring a number of years of planning, introduction and implementation. It would require a shift in approach and a change in arrangements which, in many cases, have been in place for decades. And it would have to be driven by a conviction that the school curriculum could be more effective than it currently is in providing every student with a rigorous, high-quality preparation for ongoing learning, life and work. A conclusion of this Review is that a more integrated approach of this kind is both possible and desirable.

This long-term agenda should include a reduction in the number of subjects available in the senior years. The vision would be for a smaller number of rigorous 'advanced courses' that incorporate content

from the many existing subjects – sometimes in the form of options. Each of these advanced courses should include a mix of theory and application, with the possibility of this mix varying from course to course. Each course should be designed to build students' knowledge and understandings, as well as their skills in applying knowledge, together with other relevant personal attributes.

It is envisaged that many of these advanced courses would be modifications of existing HSC subjects, often with an increased focus on developing students' deep understandings of disciplinary concepts and principles, less emphasis on comprehensive coverage of factual information, and more attention to practical applications and the development of students' skills in applying their knowledge. Some other subjects may incorporate content from existing VET subjects and have a greater emphasis on practical applications and the development of vocationally relevant skills. However, low-level, standalone VET courses and courses focused narrowly on specific occupations should be replaced by advanced courses designed to provide deep knowledge and widely applicable capabilities in an area of learning. The content of some existing VET subjects may be incorporated as options within advanced courses. But no advanced course should be narrow in its focus; all should integrate knowledge, skills and attributes and provide broad foundations for further learning and work.

REFORM DIRECTION 11

Commit to a long-term agenda to develop a more integrated approach to learning in the senior years of school through the development of a limited set of rigorous, high-quality 'advanced courses', each of which incorporates both theory and application and is designed to develop knowledge, understandings, skills and attributes for further learning, life and work.

For exploration: Creating a more integrated curriculum

- Is the creation of a more integrated (less polarised into 'academic' and 'vocational') curriculum in the senior years a desirable long-term objective?
- Over time, should there be a reduction in the total number of subjects available in the senior secondary school by consolidating some existing subjects into rigorous, high-quality courses?
- What would be the implications of expecting every senior secondary course to include a balance of underpinning theory (knowledge and conceptual understanding) and transfer and application of knowledge?

Recognising progress and attainment

Consistent with the intention that every advanced course should promote rigorous, high-quality learning, a common structure of progress and attainment is proposed for all courses. This structure would be consistent with the structure in the earlier years of school – that is, a sequence of attainment levels defined for each course. For advanced courses based on existing HSC subjects, the set of attainment levels would replace current achievement 'bands'.

The significant difference would be that in most, if not all, advanced courses, there would be a syllabus associated with each attainment level. In this sense, each advanced course would be 'modularised'. It would be structured so that students worked their way through the attainment levels (modules) with teachers assessing and recording the achievement of each level. In some advanced courses, it may be possible for students to choose to complete only some modules, introducing the possibility of recognising the achievement of individual modules in the form of 'micro-credentials' based on teachers' assessments of student achievement.

This proposal is underpinned by a belief that learning in the senior years of school also should be a process through which students develop progressively more sophisticated knowledge, deeper understandings and higher levels of skill over time. Teaching and learning in these years should be structured to promote such progress, rather than being focused on preparing students in these years to answer questions on a final examination. To the extent possible, modules (of which there might be between four and six) in each advanced course should be designed to build on learning in earlier modules. This would encourage reflection on the nature of the progress students are expected to make in an area of learning during the final years of school and also provide a framework for monitoring this

progress. In some advanced courses, existing HSC achievement bands may provide some guidance and a starting point in constructing a sequence of attainment levels.

Ideally, students would be able to commence an advanced course when they were ready – for example, once they had achieved the Proficient standard in a subject and wished to commence advanced study. Some students may achieve one or more attainment levels in an advanced course by the end of Year 10. And the highest attainment level in a course may include content usually contained in post-school courses, in which case students' achievement of that level might contribute to a higher education or vocational qualification. It is envisaged that structuring each advanced course as a sequence of attainment levels would ensure a consistent approach across the school years, promote continuity and flexibility of learning and blur current distinctions between academic and vocational learning and phases/stages of learning.

As in the earlier years of school, teachers would assess levels of student knowledge, understanding and skill in each advanced course. They would use these assessments to decide whether a student had achieved an attainment level and to monitor progress toward the achievement of the next level. Guidance and criteria for the achievement of each level would be required, and assessment resources and work samples are likely to be useful to teachers in making these decisions. It is proposed that these assessments and decisions provide the school-based component of a student's reported level of attainment in a course.

There also would be an external assessment of a student's attainment. In some courses, this may take the form of a written examination of the entire course content toward the end of Year 12, as at present. In other advanced courses, the external assessment may take other forms, including supervised online assessments and external evaluations of students' performances or work. For example, in some advanced courses, rather than sitting a final examination, students may sit a supervised, externally developed online assessment of the content of each module/attainment level – ideally, when students felt ready to demonstrate mastery of that content.

REFORM DIRECTION 12

For most, if not all, advanced courses, structure the course as a sequence of attainment levels, replacing current achievement bands. Use teachers' assessments of the content of each attainment level (module) as the school-based component of a student's reported performance in the course. Supplement this with an external assessment of attainment, not necessarily in the form of a final written examination.

> ### For exploration: Recognising progress and attainment
> - What would be the advantages and disadvantages of structuring each advanced course as a sequence of 'modules' or attainment levels through which students progressed?
> - Would there be value in having teachers assess students' performances on each module and in making these assessments the basis of the school assessment in each course?
> - What would be the workload implications?
> - Should there be an externally assessed component of every advanced course (not necessarily in the form of a written examination)?
> - What more could be done to address concerns that end-of-school examinations promote the memorisation and 'regurgitation' of pre-prepared answers?

Introducing a major project

In addition to giving increased priority to practical applications of knowledge and the development of students' skills in applying knowledge in every advanced course, it is proposed that a new standalone component of the senior certificate be introduced in the form of a major project.

Each student would choose the primary learning area in which they wished to undertake their major project and may work as part of a project team. Projects would be complex in nature, usually requiring knowledge/skills from more than one area of learning. Guidelines would be developed specifying the broad parameters and minimum requirements of a project, together with criteria that teachers would use in assessing students' performances on the project.

It is envisaged that, in undertaking the major project, students often would work as part of a project team on a meaningful problem or challenge. Depending on the nature of the project, students are likely to be engaged in such activities as gathering, analysing and evaluating information, working with others, communicating, thinking critically, creating and evaluating solutions, using technologies, and presenting project outcomes. Some projects may require entrepreneurial thinking and skills. Every project should involve the application of advanced subject knowledge and understanding to a real-world problem or context.

A number of current HSC subjects include the requirement that students undertake a project as part of their study. Projects also are common features of many workplaces and are likely to become increasingly common as people work together to develop innovative solutions to problems and to create new knowledge, products and services. The advantages of the proposed major project include the opportunities it provides for students to develop and demonstrate a range of essential skills not currently included in every student's program of learning in the senior years.

REFORM DIRECTION 13

Introduce a single major project that every student is to undertake in the senior years of school, usually as part of a project team and in a learning area of their choosing (the specifications for the project should require the application of learning to a complex problem or challenge that requires a range of knowledge and skills).

For exploration: Introducing a major project

- Should every student be required to undertake a major project as part of their studies in the senior years of school?
- How should the major project be implemented to:
    - support students to collaborate or work in teams?
    - identify and attribute effort of individual students?
    - minimise any advantages some students may have because of access to superior resources?
    - ensure access for all students (including those in remote settings)?
    - ensure consistent assessments of student work?
- Should the project be undertaken individually or as part of a project team?
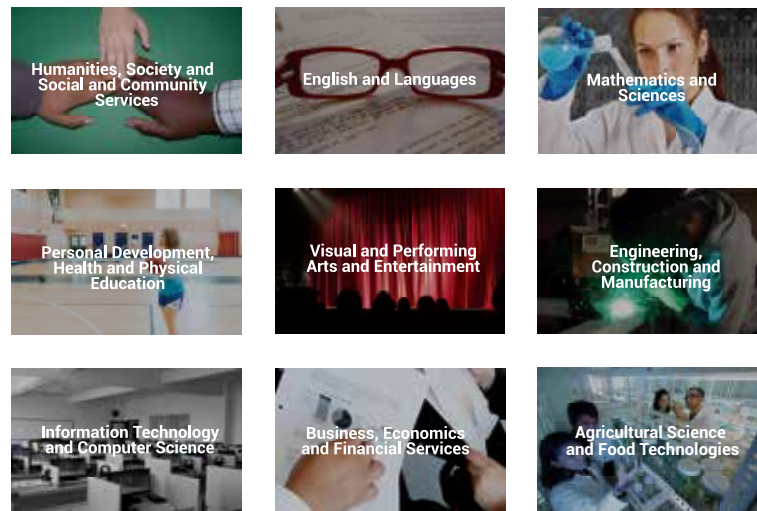

Redefining learning areas

Higher School Certificate subjects currently are grouped into nine 'learning areas'. This grouping reflects the academic-vocational divide, with eight learning areas representing 'academic' areas of study and the ninth being VET (typically appearing last on the list).

Current Learning Areas

- Human Society and its Environment
- English
- Mathematics
- Personal Development, Health and Physical Education
- Creative Arts
- Science
- Technologies
- Languages
- VET

The Review proposes a more integrated curriculum in the senior years of school, and every advanced subject being designed to prepare students for further study, life and work through the simultaneous development of relevant knowledge, skills and attributes. It is proposed that new learning areas be introduced to reflect this intention. In the first instance, these learning areas would simply incorporate

all existing 'academic' subjects and all existing 'vocational' subjects. The titles of these groupings would need to be discussed and agreed, but as a starting point and to indicate the general intention, Figure 7 shows nine suggested learning areas.

Humanities, Society and Social and Community Services

English and Languages

Mathematics and Sciences

Personal Development, Health and Physical Education

Visual and Performing Arts and Entertainment

Engineering, Construction and Manufacturing

Information Technology and Computer Science

Business, Economics and Financial Services

Agricultural Science and Food Technologies

Figure 7 Suggested learning areas

An advantage of these proposed learning areas is that, rather than treating VET as a separate learning area, they recognise applied and vocational learning as features of every area of the advanced curriculum. Within each learning area, some subjects would have a greater emphasis on theory and others would have a greater emphasis on application, but the intention is that every subject should be a mix of theory and application.

Importantly, these nine learning areas are intended simply as groupings of subjects in the senior years of school. They are not industry groupings, but subject groupings. There is also no intention that students would be restricted in any way in their choice of subjects. Students would continue to choose subjects freely from across these groupings, although some may begin to gravitate towards one learning area in preference to others.

Each new learning area is envisaged as a focal point for collaboration between schools, universities, vocational education providers and industries within that area. Teachers and other school staff associated with a learning area could play a direct role in building such partnerships, providing career advice within the area, connecting students with advances in the field, and providing guidance on relevant post-school courses and pathways. For some teachers, the role would be broader than the preparation of students for Year 12 subject examinations. This approach may provide a better approach to careers advice than approaches dependent on individual teachers providing advice across all learning areas, post-school courses and career possibilities.

Over time, consideration should be given to the desirability of developing new advanced courses – possibly to replace some existing subjects – to provide broad foundations for further study and work within particular learning areas. These advanced courses should be designed to provide more than narrow academic knowledge or narrow vocational skills in the area; they should be rigorous, high quality courses that integrate theory and application, with the possibility of students accumulating credit towards university or vocational qualifications.

> Just as what we used to call vocational education is going to have to be built in the future on a much stronger academic foundation, academic education will have to be much more applied than it has been… Teachers will have to be thinking constantly about how they can get their students to apply to real-world problems what they are learning, constantly going back and forth between theory and practice.[71]

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[71] Tucker, Leading high performance school systems: lessons from the world's best, p. 113.

REFORM DIRECTION 14

Introduce a new set of learning areas to reflect a more integrated approach to the curriculum in the senior years. Learning areas should be defined to incorporate all existing academic and vocational subjects, but the intention over time should be to reduce the number of subjects in each learning area to a set of high quality advanced courses, each of which includes both theory and application and is designed to develop knowledge, skills and attributes relevant to the learning area.

For exploration: Redefining learning areas

- Would the redefinition of learning areas reduce the current academic-vocational dichotomy/tension?
- How could redefined learning areas be developed to provide focal points for improved collaboration between schools, universities, vocational education providers and industries?
- How could redefined learning areas support better information on post-school pathways, including further education, training, careers and employment?


Reviewing ATAR

Although not part of the school curriculum, ATAR has a dominating influence on teaching and learning in the final years of school and was the subject of much comment in consultations and submissions to the Review. There were concerns about the status ATAR now has in the minds of parents and students as the single measure of educational attainment following thirteen years of school. In this sense, it overshadows the Higher School Certificate. Submissions to the Review argued that this needed to change, with the Higher School Certificate reinstated as the predominant credential and measure of school attainment. There were also concerns about the distorting influence ATAR has on student learning, with students commonly choosing subjects they believe will maximise their ATAR rather than building on their individual strengths and pursuing personal interests. UAC strongly refuted beliefs that ATAR can be maximised in this way, but parent and student perceptions persist, with some students taking 'easier' subjects in an effort to maximise their rank.

There were also concerns about the impact university admissions processes have in creating hierarchies of secondary school subjects by identifying those that can be used in calculating ATAR (Category A courses), those that can be used within limits (Category B courses) and those that cannot be used (Board Endorsed courses). ATAR also has an influence post school, leading some students to enrol in post-school courses not because they are in their area of interest, but because they are reluctant to 'waste' a high ATAR. Subject choices made in the secondary school in an effort to maximise ATAR can leave students less well prepared for particular university courses – for example, if students have chosen general rather than advanced mathematics. And there is also a sense in which ATAR (or its absence) ranks university and other post-school courses.

NSW universities and UAC were well aware of the negative influences ATAR has at the transition from school to university. They were also well aware of the importance now attached to ATAR and the many uses being made of it beyond its intended purpose, including by schools in their marketing efforts and by the media as a simple measure of performance. The UAC submission called for schools and universities to work together to consider ways of reducing the pressures around ATAR.

In discussions with the Review, officers of UAC explained that students are admitted to university courses on the basis of their 'Selection Rank'. The Selection Rank is calculated for each university course separately. The process is depicted in Figure 8. Each student's HSC subject scores are put through an inter-subject scaling process (Step A) to produce scaled HSC subject scores. The best ten scaled units determine the student's ATAR (Step B). The ATAR is then entered into a UAC process (Step C) that determines the student's Selection Rank for a university course to which they have applied. Other evidence of student performance also can be introduced into this process at the discretion of individual universities, together with 'adjustment factors' (formerly 'bonus points'). In some cases, ATAR is the only input to Step C. In others, additional evidence and adjustment factors mean that students' Selection Ranks are not the same as their rank by ATAR.
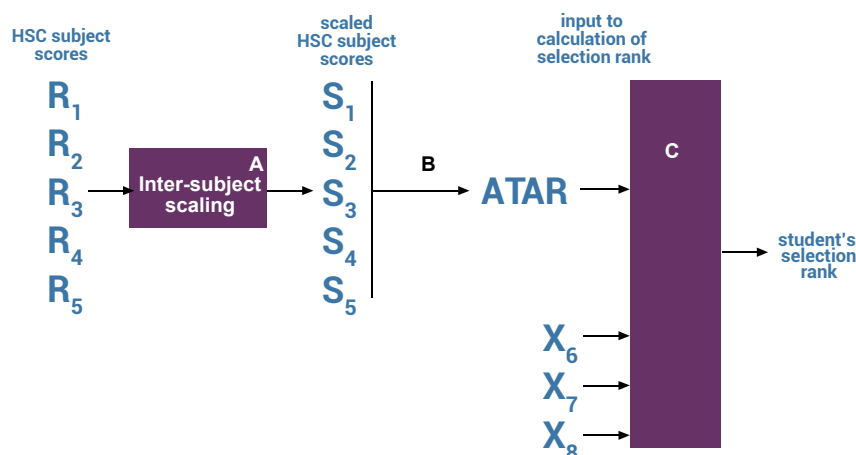
Figure 8 Current process for deriving course selection ranks

As UAC pointed out, the calculation of ATAR is an intermediate step in the calculation of the rank that determines whether a student will be offered a place in a university course. And course Selection Ranks are constructed for each course separately.

This raises a question as to whether the calculation of ATAR could be bypassed entirely in the calculation of course Selection Ranks. Since a student's ATAR is completely determined by their scaled subject scores, it seems feasible that a student's scaled subject scores could be entered directly into the UAC process (Step C) for calculating their Selection Rank in any course as shown in Figure 9.
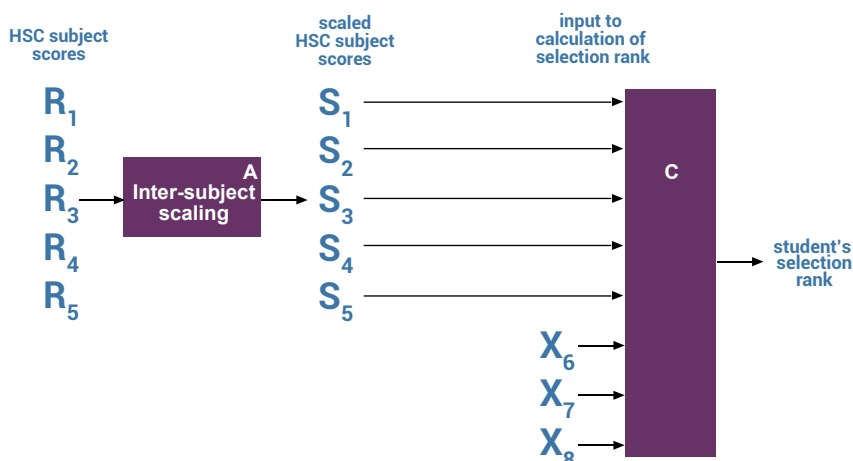
Figure 9 Possible process for deriving course selection ranks

If this were possible – and technically it is not obvious why it would not be possible – then it would obviate the need to report ATAR. There would be no single rank of all students and so no rules for its calculation. Instead, there would be Selection Ranks (as there are currently) for individual university courses and transparency around the information used to rank applicants to each course. This process could be managed by UAC as at present.

It is important to emphasise that the process being suggested here would change the internal process, but would not change the outcomes. Students' Selection Ranks would be exactly as they are currently. There would be no change in the information available to universities and no change in current selection decisions. The only change would be in not reporting ATAR.

However, there could be longer-term implications of this change. For example, with the focus shifting to Selection Ranks rather than ATAR, individual higher education courses could require particular senior secondary subjects to be included in the calculation of their Selection Rank – that is, to specify prerequisites. It might also be possible to differentially weight scaled subject scores if a course considered that desirable, thereby giving greater weight to some school subjects in the ranking process. In these ways, universities may have greater flexibility to decide on the most appropriate ways to rank applicants to particular courses. This is a direction many courses appear to be moving in already with the inclusion of other evidence and adjustment factors.

The advantage from the perspective of the school sector is the possibility of removing ATAR as a single measure of school achievement. It would be replaced by multiple course Selection Ranks, potentially as many as there are courses. This would provide an opportunity to enhance the status of the senior certificate as the predominant indicator of school achievement. If the number of senior secondary courses was reduced to a smaller set of high-quality courses as proposed by this Review, then eventually all senior courses might be included in the inter-subject scaling process. The goal should be genuine parity of esteem with all senior courses being available for inclusion in student selection processes.

There is no guarantee that the removal of ATAR would result in less 'gaming'. This issue needs to be addressed by schools and universities working together to explain that the purpose of the inter-subject scaling process is to adjust for any differences between subjects. In parallel, there needs to be further research into ways in which this intention may not be realised in practice.

It would be important that the course Selection Rank did not simply replace ATAR. One way to ensure this would be to change the way in which the Selection Rank is reported. For example, an applicant might be told at the start of the 48-hour window in which they are able to change course preferences that there are 73 available places in their course of first choice and that they are currently ranked 91st. Similar information might be provided for their other preferences. This would provide them with information they could use in deciding whether to change their preferences. On the other hand, if each course Selection Rank were reported in the same way as ATAR (0 to 100), then there is a risk that this would become the default ATAR, despite Selection Ranks being differently constructed for different courses.

An issue raised with the Review was the need for an ATAR for the six to seven per cent of students who apply to interstate universities. Everything required for the construction of a student's ATAR would still be available under the alternative canvassed here. In Queensland, where ATAR has not existed, but students have received an Overall Position (OP) instead, an ATAR has been constructed for Queensland students applying interstate. The same should be possible for NSW students applying interstate.

Another concern was that ATAR currently provided 'transparency'. However, this is largely artificial. Universities outside Australia manage their selection processes without using an ATAR-equivalent and usually with transparency about how evidence is used in the selection process. It would be important that students understand what information is included in the ranking process for each of the courses to which they apply. There were concerns that the removal of ATAR would make NSW different from the rest of Australia. However, given national concerns about the influence of ATAR, this could be seen as an opportunity for NSW to lead thinking and practice in university admissions. Finally, there were concerns about the inability to use ATAR for secondary purposes such as benchmarking other qualifications and comparing and marketing schools. ATAR was not developed for these secondary purposes and they do not compensate for the significant negative impact ATAR is currently having on secondary schooling in this state.

REFORM DIRECTION 15

The school sector should work with the university sector and UAC to explore the possibility of not calculating and reporting ATAR, replacing it instead with transparent information about the basis for constructing course-by-course Selection Ranks, which should show an applicant's rank in relation to the number of places available in each of their preferred courses.

For exploration: Reviewing ATAR

- Should the school sector offer to work with the university sector and UAC to explore the feasibility of not calculating and reporting ATAR as part of university selection processes?

10. LEADING REFORM

This Review has proposed deep changes to the school curriculum, including a significant redesign of its content and structure. The purpose of the proposed reforms is to support teachers to maximise every student's chances of learning successfully and reaching high standards of attainment in key learning areas by the time they leave school. Reforms of this depth will be implemented successfully and achieve their intended benefits for students only if:

- **the urgency of change is widely understood;**
- **sufficient time – possibly up to a decade – is provided to plan, trial and implement new ways of thinking and working;**
- **all stakeholders, especially teachers and school leaders, are supported to implement change; and**
- **other aspects of schooling, including assessment and reporting practices, initial teacher education, and ongoing professional learning, are aligned with and support changes to the curriculum.**

This will require strong leadership at all levels of school education, from governments to classrooms. This final section of the Review considers challenges in leading the proposed reforms.

Conveying urgency

Leaders of curriculum change will need to explain the urgency of change. This includes the fact that a large and growing proportion of NSW students are leaving school with unacceptably low levels of attainment, including in basic skills such as reading and numeracy. These students usually have performed below expectations throughout their schooling. Many have fallen increasingly far behind as year-level syllabuses have moved increasingly far ahead of them. At the same time, the low-skill occupations these students might once have entered are rapidly being replaced by machines or lost to low-wage countries and, as technology advances, the range of jobs capable of being performed by machines will expand. If students are to find meaningful employment, avoid long-term economic disadvantage, and become active and engaged adult members of society, then every student will require levels of knowledge and skill currently achieved by only some. As many other developed countries are recognising, this is an urgent challenge with far-reaching implications, including for social cohesion.

Adding to the challenge is the fact that many NSW syllabuses currently contain significant amounts of factual and procedural content that teachers feel compelled to cover. Teachers describe feeling under time pressure to teach the extensive content of many syllabuses. The consequences for students are that teaching and learning can be focused on coverage rather than deep understanding. Overcrowded syllabuses erode teachers' time to work with students who are slipping behind in their learning and to challenge and extend more advanced students. And there is often limited time for teachers to explain the relevance and practical application of what they are teaching or for students to build deeper understandings by transferring and applying their learning to different contexts. When teachers are focused on covering large numbers of 'dot-points' in syllabuses, there is also less opportunity to develop broader capabilities and attributes students are likely to require for future life and work.

In the senior years, the school curriculum continues to be determined by the needs of post-school destinations. It is bifurcated into an 'academic' stream focused on forms of learning that can be assessed by external examination and that provide a basis for university selection, and a 'vocational' stream focused on skills for specific occupations. This separation of knowledge-for-university and skills-for-work encourages a view of vocational learning as a relatively low-status activity – despite the aspiration of almost all students to pursue successful pathways to future careers. There is an urgent need to broaden the nature of learning in the senior years of school to better prepare all students with knowledge, skills and attributes that will equip them for further learning, life and work.

The Review's proposed reforms are responses to these concerns. They require significant changes to the content and structure of the school curriculum and so cannot be implemented as minor modifications to the existing curriculum or as complementary additions. And because they involve deep change, they can be implemented only with planning and testing over an extended period of time.

Building alignment

International efforts to improve educational outcomes often begin with the observation that improvement depends on changing what happens in classrooms. This observation has led some governments and school systems to develop curricula that specify in great detail what every teacher should teach and every student should learn – from week to week, if not day to day. The assumption is that, if every student in a year level is taught the same tightly specified curriculum, then outcomes should improve.

Other efforts to improve outcomes go further and specify not only what teachers should teach, but also how they should teach. This may include encouraging or requiring teachers to use particular teaching methods. These methods sometimes involve tightly scripted lessons. Again, the assumption is that by ensuring every teacher teaches the same curriculum in the same way, outcomes should be improved.

Yet another strategy has been to allow teachers to decide how they will teach, but to hold teachers and schools accountable for improving student performance through centrally developed testing programs, public reporting of test results, and incentives for improved results, either in the form of rewards or sanctions.

Although popular in the English-speaking world, and sometimes associated with improved test results, strategies of these kinds generally do not deliver deep and sustained improvements or world-class performances.[72]

More recently, the study of countries that perform unusually well in international achievement surveys has revealed the powerful potential of education systems to promote improvement and high performance through the overall conditions they create for teachers and schools.[73] There is evidence that high-performing countries create strong alignment of the various elements of their schooling systems, including the curriculum, examinations and other assessments, reporting processes, pedagogical practices, initial teacher education, teacher professional learning, school leadership, school organisation, education system support, and enabling legislation. In high-performing countries, these and other elements form an aligned learning 'system' underpinned by common principles.

The school curriculum is a key component of such a 'system'. Through its content and structure, the curriculum influences and shapes other elements, including approaches to teaching, assessment and professional learning. Effective curriculum design is capable of promoting improved student learning and higher levels of attainment. However, ineffective design can hinder quality teaching and learning and so reduce the likelihood of improvement.

Reforms of the curriculum are unlikely to achieve their objectives if they are not part of a broader set of reforms of the 'system' in which they are embedded. For example, the intentions of curriculum reforms are undermined by assessment and reporting practices that are not aligned with those reforms or guided by the same principles. Curriculum reforms are unlikely to be implemented effectively if teachers lack the knowledge and skills required for implementation or if they work in environments in which incentive structures are misaligned with reform intentions. If curriculum reform is to succeed, major components of the broader learning system must be brought into alignment, and key stakeholders must be committed to the reform's overall objectives and rationale.

For these reasons, it is essential that any redesign of the NSW curriculum is accompanied by careful and detailed consideration of the implications for other aspects of the broader learning system. Leaders of curriculum reform will need to lead reforms of the content of the curriculum, the structure of the curriculum, processes for assessing and reporting student learning, classroom teaching, and school leadership. The curriculum reform objectives, principles and rationale must be mirrored in parallel changes to all these other elements.

[72] M Fullan, *Choosing the wrong drivers for whole system reform*, Seminar Series 204, Centre for Strategic Education, East Melbourne, Vic., 2011.
[73] Tucker, *Leading high performance school systems: lessons from the world's best*

Reforming content

The Review's first major proposal is to reduce the amount of content in most current syllabuses, thereby providing teachers with time to teach core disciplinary content in greater depth, provide increased opportunities for meaningful applications of learning, and better address the learning needs of individual students.

It is proposed that, in syllabuses where a reduction in content is judged desirable, an exercise is undertaken to identify core disciplinary knowledge, skills and understandings. This is likely to involve the identification of 'big ideas' in a subject, including central concepts, principles and ways of thinking and working. This exercise would attempt to identify the essence of the discipline – the conceptual understandings and disciplinary methods around which less central factual and procedural knowledge is organised.

Said another way, the proposal is to prioritise depth over breadth of learning – to focus syllabuses on the development of students' deep understandings of a relatively small number of big ideas rather than on comprehensive coverage of large amounts of factual detail. Although the acquisition of increasingly sophisticated knowledge is an essential aspect of every learning area, when conceptual understanding is prioritised, specific facts and topics often serve primarily to illustrate core concepts and to build depth of understanding.

The reason for prioritising core disciplinary concepts is that they are crucial to deep understanding of a subject and to students' abilities to transfer and apply their learning to new and unseen contexts. They give meaning to facts and procedures that otherwise can appear fragmented and disconnected, enhance knowledge retention, and enable students to recognise connections and patterns in information. Deep conceptual understanding also is essential to problem solving and to the creation of new ideas, products and solutions. As Bialik and Fadel note, 'by internalizing the most important concepts of each discipline and across disciplines, which we will call core concepts, students are better equipped to deal with multifaceted problems and have a more diverse set of tools with which to interpret the world'.[74]

Curriculum design often pursues 'coverage' of factual and procedural content rather than prioritising essential disciplinary concepts, principles and ways of thinking and working. Curricula that specify large amounts of material that teachers are expected to teach and students are expected to learn frequently result in relatively superficial teaching and learning. This is compounded when assessment processes value how much content students have memorised and can reproduce, rather than the depth of their conceptual understanding.

Nevertheless, deep conceptual understanding relies on mastery of factual and procedural knowledge. Erickson et al emphasise the important 'synergy' between disciplinary knowledge and skills, and core concepts, generalisations and principles, which they describe as the 'essential enduring ideas that students must understand at a deeper level'.[75] Specific knowledge serves to substantiate and illustrate general concepts and principles, which in turn provide a way of organising and making sense of factual content. As Erickson et al note, 'one cannot understand the conceptual level without the supporting factual knowledge'. In a concept-based curriculum, factual and procedural knowledge play a crucial role in building depth of understanding.

> Increasing technological processes provide the opportunity for the emphasis of curriculum to be flipped so that students spend more time focused on transfer (the process of making use of knowledge outside of the context in which it was learned) and expertise (a highly developed understanding of some domain of knowledge, including particular ways of perceiving and interpreting information) via concepts rather than on learning content that can now be easily accessed and manipulated… Rather than spending undue amounts of classroom time amassing information, the time can now be much better spent reaching the more profound goals of an education, namely expertise and transfer, preparing students for the types of tasks they will actually be expected to do in the workforce. The main way to reach these goals is to restructure knowledge around core concepts [emphasis added].[76]

[74]   M Bialik & C Fadel, Knowledge for the age of artificial intelligence: what should students learn?, Center for Curriculum Redesign, Boston, Massachusetts, January 2018, viewed 24 July 2019, <https://curriculumredesign.org/wp-content/uploads/CCR_Knowledge_FINAL_January_2018.pdf>, p. 3.
[75]   LH Erickson, LA Lanning & R French, Concept-based curriculum and instruction for the thinking classroom, Corwin Teaching Essentials, Corwin, Thousand Oaks, California, 2007, p.3.
[76]   Bialik & Fadel, Knowledge for the age of artificial intelligence: what should students learn?, p. 12.

A considerable amount of work has been done internationally to identify core disciplinary concepts and ways of thinking and working in a range of disciplines. In History, efforts to identify a disciplinary core have recognised the importance of integrating historical knowledge (for example, knowledge of events, people, periods, changes); historical concepts (for example, continuity and change, cause and consequence, historical significance, empathy, contestability); and historical skills and methods. In practice, school history curricula sometimes overemphasise knowledge at the expense of conceptual understanding and historical thinking. As in other areas of the curriculum, a deep understanding of key concepts and disciplinary ways of thinking and working is central to the learning of History. However, deep conceptual understanding and historical thinking are not possible in the absence of historical knowledge and opportunities to apply concepts in particular historical contexts.

> 'Historical thinking' has a central role in the theory and practice of history education. At a minimum, history educators must work with a model of historical thinking if they are to formulate potential progression in students' advance through a school history curriculum, test that progression empirically, and shape instructional experiences in order to maximize that progression.[77]

In mathematics and science, studies of student thinking often have been motivated by a desire to understand the varying conceptions students have of major ideas, including by identifying common student misconceptions. The primary objective has been to support classroom teachers in their assessment and promotion of student understanding rather than to inform curriculum design – with some notable exceptions, particularly in science.

In identifying the knowledge, skills and understandings that should form the core of future NSW syllabuses, it will be important to draw on international efforts of these kinds to identify core disciplinary learning. The focus should be on knowledge, skills and understandings that are specific to each learning area. There are some general ideas such as 'change', 'interdependence' and 'relationships' that are important in many learning areas. Erickson et al[78] refer to these as 'macro concepts'. There may be some similarities in how these concepts develop in different learning areas and some value in making connections across learning areas. However, in general, these concepts are conceptualised and developed differently in different disciplines.

Similarly, there are general skills such as 'logical reasoning', 'critical thinking' and 'creative thinking' that are relevant to most, if not all, learning areas. These may have similar features in different disciplines. However, these too usually will need to be interpreted and operationalised differently in different learning areas because skills such as reasoning and thinking are undertaken in relation to discipline-specific content. Reasoning in algebra is not the same as reasoning in history.

A useful general guide to deciding on core syllabus content will be the extent to which a fact, idea or skill is important to learning across the years of school. Is a particular piece of factual information introduced at one point in the curriculum and then not referred to again, or is it a prerequisite for further learning? Is a concept important only to a particular topic, or does it have general relevance? Is it the intention that students will develop increasingly deep understandings of a concept or increasingly sophisticated mastery of a skill throughout the years of school? In general, core knowledge, skills and understandings will not appear in isolation, but will be crucial components of a sequence or progression of long-term development in an area of learning.

Reforming structure

The Review's second major proposal is to reorganise the curriculum in each key learning area into a sequence of increasing attainment levels. This is an alternative to the current practice of developing a single syllabus for all students in each year of school. Under this proposal, every student would progress through the same sequence of attainment levels. However, at any given time, each student would be working at the level they had currently reached, thereby ensuring that they were being appropriately challenged in their learning and maximising their chances of successful further progress.

77   P Seixas, 'A model of historical thinking', *Educational Philosophy and Theory*, vol. 49, no. 6, 2017, pp. 593–605, viewed 25 July 2019, <https://doi.org/10.1080/00131857.2015.1101363>, p. 593.

78   Erickson et al., *Concept-based curriculum and instruction for the thinking classroom.*

The construction of a useful sequence of attainment levels depends on clarity about the nature of increasing proficiency in a learning area. Each attainment level must represent a higher level of knowledge, understanding and skill than the attainment levels below it. Considered together, the sequence of attainment levels must make explicit what it means to develop or become more proficient in the learning area throughout the years of school.

An example of a sequence of attainment levels is provided by Siemon et al.[79] They constructed a sequence of eight 'developmental levels' of numeracy attainment from 'relatively naïve beginnings' (Level 1) to 'more sophisticated understandings and capacities' (Level 8). These levels are shown on the left of Figure 10. At each level, the numeracy skills typical of students at that level were described and illustrated, with the authors noting the possibility of developing teaching and learning materials appropriate to students at each level.
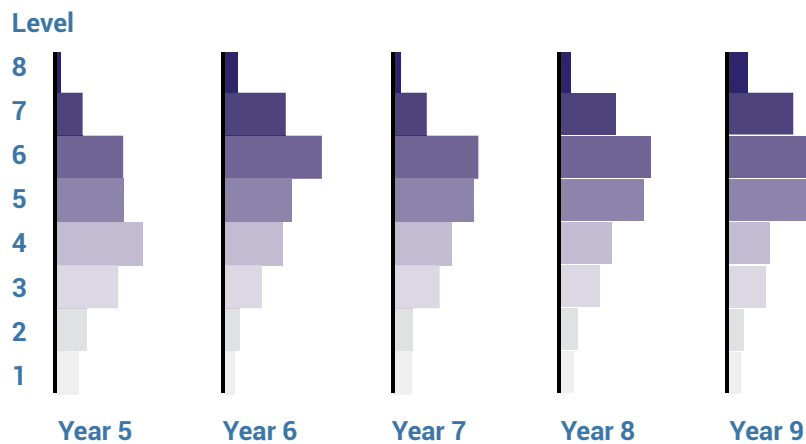

Figure 10 Sequence of attainment levels (Based on Siemon et al., p. 13)

Figure 10 shows the proportions of students assessed at each level for about 1300 Australian students in each of Years 5 to 9. A striking feature is the spread of students across the eight levels in each year group. The authors noted that, because Level 1 corresponds in the current curriculum to about Year 2, and Level 8 corresponds to about Year 9, 'the spread within each year level represents a range in students' mathematics achievement equivalent to seven years of schooling'. This example illustrates the importance of recognising that students are at very different points in their long-term progress and of constructing frames of reference for establishing individuals' current levels of attainment, regardless of their age or year group.

An essential step in constructing such a frame of reference is to describe and illustrate the nature of long-term development in an area of learning. In most learning areas it is likely to be appropriate to describe and illustrate progress by first describing and illustrating progress in particular aspects of the area. For example, attainment levels in mathematics might be developed by first describing development in particular aspects of mathematics including, but not limited to, algebraic reasoning, geometric reasoning and statistical reasoning.

Day et al have developed descriptions of how algebraic reasoning develops across the middle years of school, although they note that algebraic reasoning also needs to be cultivated in the primary years.[80] The authors refer to these descriptions of development as a 'learning progression' incorporating three big ideas: Equivalence, Pattern and Function, and Generalisation. Their algebraic reasoning progression is designed to 'identify where students are in their learning journey and where they need to go next' and 'to design teaching advice to help teachers provide appropriate activities and challenges to support student learning'.

79 D Siemon, A Barkatsas & R Seah (eds), Researching and using progressions (trajectories) in mathematics education, Brill, The Netherlands, 2019, p. 13 (figure 1.1).
80   L Day, M Horne & M Stephens, 'Reframing mathematical futures II: developing students' algebraic reasoning in the middle years', in D Siemon, T Barkatsas & R Seah (eds), *Researching and Using Progressions (Trajectories) in Mathematics Education*, Brill, The Netherlands, 2019, pp. 126–156.

One of the biggest problems confronting the teaching and learning of algebra is that while the end points or goals of algebraic reasoning may be clear to teachers and textbook writers, not enough is known about how important and sophisticated concepts, such as the three big ideas [Equivalence; Pattern & Function; Generalisation], develop and how they can be supported throughout the primary and junior secondary years. Within the same classroom, some students may have achieved a relatively deep understanding of key algebraic ideas while other students may be operating at a much more basic level. Expressed another way, teachers need to know how to gather reliable evidence to show the level at which students are operating, and what specific teaching is most likely to move everyone's thinking forward.[81]

The method used by Day and her colleagues could be applied to the development of attainment levels across a wide range of learning areas. Their study began with a review of the research literature to identify a small number of 'big ideas' of algebra. The three big ideas they identified provided the core of their approach to algebraic reasoning. The literature review also revealed that very few attempts to describe the nature of progress in algebra made use of core ideas of this kind.

On the basis of their review of the research literature, the authors drafted a 'hypothetical learning progression' consisting of eight levels, with the three big ideas represented at each level. Although the focus of the progression was on algebraic reasoning, it was considered important also to identify algebraic content in the progression 'as students, at different levels, need content about which to reason'.

This initial learning progression constructed from the research review provided a basis for developing tasks to explore students' levels of algebraic reasoning. A total of 25 tasks and 75 subtasks were developed, each with its own scoring rubric (usually a 3-point scale) for teacher use in judging the quality of student reasoning. A purpose of the rubrics was to 'show teachers what they need to look for, and how to foster the kinds of classroom discourse and feedback that will move students' reasoning forward'. The tasks were trialled on students in Years 7 to 10, revised and then administered to more than 1500 students across Australia.

The statistical analysis of the resulting data was used to construct a map showing the difficulties of all subtasks as reflected in students' success rates. Although the three big ideas informed task development, because they proved so 'intertwined' in practice, a single map was developed to include all subtasks. This map was used to inform the final learning progression, with the eight levels now being 'based on the evidence of what the students at these levels could actually do'.

The analysis of the data showed that students found algebraic reasoning more challenging than the hypothetical learning progression anticipated. The authors speculated that algebraic thinking and reasoning are underemphasised in the school curriculum and that 'many students, and possibly some teachers, perceive the focus to be almost exclusively on symbol transformation and manipulation'.

Generalised descriptions of the eight levels of algebraic reasoning were then developed (see Figure 11) and the levels were elaborated for teachers with illustrative learning activities and assessment tasks. Teaching advice also was developed for each level to support teachers to consolidate learning from earlier levels of the progression and to introduce the next level of algebraic reasoning.

Following the study, the authors made their algebraic reasoning progression, reasoning tasks and scoring rubrics available to all teachers, noting that they 'provide teachers with a window on student thinking about algebra and enable them to know more about their students' understandings, which should enable them to better target their teaching'. They also noted that learning progressions of this kind have implications for curriculum design which 'should be based on what students can actually do and how they usually progress'. And they developed a series of six professional learning modules to support teachers in their development of algebraic reasoning.

Finally, recognising that students in any classroom are likely to be at different levels of attainment, and that teachers need to cater for this diversity, the authors provided examples of learning activities that could simultaneously be used with students working at a range of levels. These activities can be

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81   Day et al., 'Reframing Mathematical Futures II', p. 126.

thought of as low-floor, high-ceiling activities, with each activity being accessible to less advanced students, but also challenging and extending more advanced students.

The method used by these mathematics educators to construct a progression in algebraic reasoning could be applied to any learning area. The steps include a review of the research literature, the drafting of a progression (possibly around 'big ideas'), the construction of relevant tasks, the analysis of students' performances on those tasks, the revision of the draft progression based on evidence, and the development of aligned learning activities and teaching resources. Such a progression could then inform and become part of the description of attainment levels for the learning area as a whole. Importantly, the construction of a learning progression does not assume that content must be taught in some fixed (lock-step) sequence. Rather, a learning progression is a description and illustration of what it means to become increasingly proficient/expert and so can be developed for any area of learning.

> In recent years, attention has turned to the development of evidence-based learning trajectories (or progressions) as a means of identifying what mathematics is important and how it is understood over time. But for this information to be useful to practitioners, it needs to be accompanied by accurate forms of assessment that locate where learners are in their learning journey and evidence-based advice about where to go to next.[82]

Reforming assessment

The Review's proposals have important implications for how student learning is assessed, monitored and communicated.

First, the proposal to restructure the curriculum in each key learning area into a sequence of attainment levels, each with an associated syllabus, provides a new frame of reference for assessing learning. Under this proposal, each student's current level of attainment would be assessed and reported in terms of this sequence of levels, as would the progress they make over time. This is a marked departure from the use of a single year-level syllabus as the frame of reference for assessment, with every student being assessed and graded on how well they perform on this common syllabus.

Each attainment level would describe and illustrate the knowledge, skills and understandings that define that level. The associated syllabus would make clear the outcomes students are expected to demonstrate at that level and provide teachers with guidance on the kinds of teaching and learning opportunities likely to be appropriate for students working at that level.

Teachers would assess students to establish the level at which they were working – that is, their current level of knowledge, understanding and skill. This would require an on-balance judgement; students may demonstrate some outcomes above the level at which they are working, and may not demonstrate all outcomes below their current level.

Having established the level at which a student is working, the focus would shift to aspects of the learning area the student still needed to master to 'achieve' that level. This more detailed diagnostic analysis would identify gaps in a student's knowledge, skills and understandings and appropriate next steps and goals for further learning. Feedback would be provided to assist students to monitor progress toward the achievement of their current level.

Teachers would be given guidance in deciding when a student had 'achieved' a level. This might take the form of examples of student work that met the requirements for the level, as well as assessment resources that teachers could use in making this decision. When a student was judged to have achieved a particular level, this would be communicated to the student and his or her parent/s or carer/s. This method of communicating attainment and progress would replace the reporting of grades on the same syllabus at fixed times of the year.

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[82] eds Siemon et al., *Researching and using progressions (trajectories) in mathematics education*, p. 6.

Level

8   Is able to combine a facility with symbolic representation and an understanding of algebraic concepts to represent and explain mathematical situations. Explanations are sophisticated using logical thought and the language of reasoning. Can use multiple representations in a coordinated manner to solve, analyse, convince and conclude. Can visualise the form and structure of a function, at least graphically, from a real context. Is able to work in a context-free environment using symbolic language and treat algebraic expressions (e.g. 3X+2) as single entities. Can generalise more complex situations. Is able to establish and describe equivalence involving the four operations explaining relationships in symbolic terms. Can use abstract symbols to solve problems in context with multiple steps.

7   Is able to use and interpret algebraic conventions for representing generality and relationships between variables. Beginning to use sound logical reasoning with appropriate reasoning language (e.g. if... then, must) evident. There is more coordination of multiplicative thinking and the associated language to notice algebraic structure. Can recognise and use the relationships between multiple entities and connections between and within different representations. Able to establish and describe equivalence explaining relationships using the distributive property and the inverses of addition and multiplication. Can generalise quite complex situations and in more direct situations beginning to use simplest form.

6   Can use and interpret basic algebraic conventions to represent situations involving a variable quantity. Beginning to explain using logical language and to use if... then reasoning. Uses symbolic language but the need for simplification is still being developed. Able to generalise simple arithmetic relationships with justification, including multiplicative relationships, but is often still context bound. Can show why several expressions are equivalent, typically employing numerical (non-symbolic) justifications.

5   Able to use multiplicative reasoning in simple situations. Can reason with more complex additive situations involving larger numbers and subtraction but usually by examples. Has moved from algebraic expressions to using equations. Can derive a strategy that maintains equivalence, but cannot yet generalise. Able to use symbols to express rules. Can follow, compare and explain rules for linking successive terms in a sequence. Beginning to generalise using words or using some symbolic generalisations in simple situations. Recognises and represents simple functional representations. Can justify an argument using mathematical text. Beginning to generalise but connects closely to building on in context.

4   Beginning to work multiplicatively and simultaneously coordinate variables, although still uses specific examples to convince. Able to reason and generalise in simple situations. Can recognise and interpret relevance of range from table and/or graphs and to recognise functional relationships. When faced with more complex algebraic situations is unable to use the full range of explanation or handle all of the information simultaneously. Beginning to transition to abstraction by inserting a number for a pronumeral.

3   Beginning to use symbolic expression and elementary reasoning. While still using arithmetic approaches there is evidence of relational reasoning with the numbers and providing some explanation. Beginning to recognise simple multiplicative relationships but without explanation. There is some evidence of coordination of two ideas but explanation is limited. Algebraic expressions are used rather than equations. Beginning to recognise equivalent relationships. Can explain simple generalisations by telling stories, manipulating materials and very simple use of symbolic language.

2   Beginning to recognise patterns and relationships and conjecture about this. Able to identify numbers that vary and numbers that stay the same. Engages with the context, but arithmetic reasoning typically based on calculations is still being used. Recognises some multiples and some relationships like 6 more/6 less, while not necessarily recognising equivalence. Can work with simple scales and transfer from a table of values to a graph.

1   Can continue simple patterns, but likely to build them additively. Reasoning is confined to specific incidences and numerical examples of simple physical situations. Arithmetic thinking is used. Abstraction and generalisation not evident at this stage.

Figure 11 Levels of algebraic reasoning[84]

83   Day et al., 'Reframing Mathematical Futures II', pp. 143–144.
84   Day et al., 'Reframing Mathematical Futures II', p. 142.

Progress (or growth) in a learning area over time would be reflected in a student's progressive achievement of the attainment levels for that area. As noted in Reform Direction 8, the sequence of attainment levels in a learning area could be used to monitor and communicate a student's long-term progress and to evaluate whether they were 'on track' with expectations for their year level and to achieve the standard of proficiency expected of every student by the time they leave school.

Second, the proposal to reduce the amount of content in most syllabuses and to shift the focus from broad content coverage to deep understanding of core concepts, principles and ways of thinking and working in a discipline has important implications for methods of assessment. The sequence of attainment levels for a learning area should describe and illustrate increasingly sophisticated knowledge, increasingly deep conceptual understanding, increasingly accomplished skills, and increasing ability to transfer and apply learning to practical problems and situations. Assessment processes need to provide information about all these outcomes.

The assessment of conceptual understanding generally requires open-ended tasks that allow students to demonstrate their level of understanding. Most tasks designed to assess the recall of information or the application of routines provide limited information about student thinking. For example, students can sometimes solve physics problems by identifying the appropriate formula, substituting numerical values correctly, and calculating the right answer, but still harbour fundamental misconceptions about the underlying physics (such as believing that if an object is moving there must be a force acting on it). The assessment of growth in conceptual understanding requires an appreciation of how student understanding typically evolves, as well as an appreciation of common student misconceptions. Open-ended assessment methods are required to explore the depth and details of student understanding.

Similarly, the assessment of students' abilities to transfer and apply their learning to new situations depends on opportunities to observe students doing this. Problem-solving activities and major projects can be useful contexts for gathering information about the depth of student understanding and for assessing skills in applying knowledge, such as critical and creative thinking, communicating, and skills in working as part of a team.

The use of assessment to establish the points individuals have reached in their learning – with a particular focus on their increasingly deep knowledge and conceptual understanding – to identify next steps in teaching and learning, and to monitor progress over time is a significant shift from some more traditional uses of assessment. A common use of assessment has been to establish whether students have mastered a set of year-level syllabus outcomes for the purpose of assigning marks and grades. The approach to assessment proposed by this Review is based less on judging student learning and more on understanding where individuals are in their long-term progress for the purposes of supporting further learning.

Leading pedagogical change

The Review's proposals have wide-ranging implications for classroom teaching. Successful implementation of the proposed changes and the anticipated benefits for student learning will be realised only if these implications for teaching are recognised and supported.

Underlying the Review's proposals is a view of teaching as the process of establishing where students are in their learning and then providing targeted teaching to challenge further learning. Establishing where students are in their learning includes understanding their current levels of attainment, but also includes understanding their starting points (for example, cultural/language backgrounds, motivations, interests, and specific learning difficulties).

This might be described as a 'teaching' mindset. It places students at the centre of the teaching and learning process and assumes that, while students may be at different points in their learning and may be progressing at different rates, every student is capable of making further progress if they can be engaged, motivated to make the required effort and provided with well-targeted teaching that meets individuals at their points of need. The Review's proposals assume – and depend on – teachers bringing this mindset to their teaching.

It is possible to imagine a quite different mindset in which teaching is viewed only as a process of delivering a pre-specified syllabus to all students in the same year of school in the same way. This 'delivery' mindset places the syllabus at the centre of the teaching and learning process and is focused on content delivery rather than on identifying where students are in their learning and then tailoring teaching to learners' levels of readiness and learning needs.

The Review's proposals assume the incorporation of a 'teaching' mindset into all aspects of the broader schooling system. For example, initial teacher education programs and ongoing professional learning need to be driven by recognition that teaching, at its heart, is about understanding where learners are in their learning and designing and targeting teaching and learning opportunities to maximise further learning.

A teaching mindset needs to be accompanied by a teaching skill set.

First, teachers require a deep understanding of how knowledge, skills and understandings typically develop in an area of learning over an extended time period. This is an essential part of their pedagogical content knowledge. It is rarely adequate for a teacher's knowledge to be limited to a single year level because almost all teachers teach students with a wide range of attainment levels. If teachers are to provide every student with appropriately challenging learning opportunities, then they usually require an understanding of the nature of learning and students' learning needs at widely differing stages of progress.

Teachers' appreciation of how knowledge, skills and understandings unfold in an area of learning can be enhanced by research of the kind described above for algebraic reasoning. The findings of empirical learning research should be routine features of initial teacher education programs and ongoing professional learning, as well as informing sequencing in the school curriculum.

Second, teachers require skills in establishing and understanding the points individuals have reached in their learning. These skills usually are not the same as skills in assessing how well students have mastered year-level syllabus outcomes. For example, for a student who is working well below curriculum expectations, assessing how they perform on year-level outcomes may provide few insights into the nature of the difficulties they are still experiencing. Such insights are likely to depend on assessments of earlier, foundational knowledge and skills and the diagnosis of gaps and misunderstandings in learning. Similarly, for a student who is performing well above curriculum expectations, knowing how they perform on year-level outcomes may provide few insights into their actual level of attainment and what they are now capable of learning. To establish and understand where individuals are in their learning, teachers require a different approach to assessment and a different skill set.

These skills need to be developed through initial teacher education and ongoing professional learning. The development of teachers' understandings of the nature of long-term progress in an area of learning needs to be accompanied by support in establishing and diagnosing where individual students are in their learning. Quality assessment resources can assist in this process, particularly if they are designed to support teachers in identifying students' levels of conceptual understanding and the quality of their thinking.

Third, having established where students are in their learning, teachers need effective ways to promote further learning. Effective teaching strategies and interventions will depend on the points individuals have reached and the kinds of difficulties they are experiencing. Teaching will need to be based on evidence of what works in practice, but the same strategies are unlikely to be appropriate for all students; teachers will need to differentiate their teaching to address students' varying learning needs. This is not to suggest that each student will need individualised support. In most classrooms, students' varying learning needs might adequately be addressed by identifying and working with a number of students at broadly similar stages in their learning.

Again, quality teaching and learning resources appropriate to students at different points in their long-term progress are likely to be valuable to teachers, including low-floor, high-ceiling activities of the kind described by Day et al for use with students working at a range of attainment levels.

Finally, the Review's proposals for curricular and pedagogical reform are more likely to be realised in practice if teachers are given time for the kinds of professional work these reforms require. This includes time for appropriate professional learning; time to collaborate with colleagues on the implementation of curriculum, teaching and assessment changes; and time to identify and address the specific learning needs of individual students.

> When teachers in the top-performing countries are not teaching class, working with other teachers, or observing them, they are often tutoring students who need extra help. This is a key factor in the ability of these systems to close the performance gap while they are raising average achievement. [85]

Leading school change

The success of the curriculum reforms proposed by this Review will depend to a significant extent on effective school leadership. The Review's proposals require changes in the kinds of learning valued by schools and changes in how that learning is supported, assessed, monitored and communicated. Deep changes of this kind must be led by school leadership teams committed to change.

A first challenge for school leaders will be to support a school-wide shift in the kinds of learning that are prioritised and valued. This shift will give greater priority to the development of students' understandings of core disciplinary concepts and ways of thinking and working. These deeper understandings will be developed in part by reducing the breadth of content coverage in syllabuses and by providing more opportunities for students to transfer and apply their knowledge and understandings to a range of contexts. The shift will also give greater priority to the development of students' skills in knowledge application, including skills in problem solving, creative thinking, collaborating and using technologies.

These changes will require leadership that values and drives a shift in priorities. Leaders have a crucial role to play in promoting school-wide collaboration around the change agenda proposed by this Review. Teachers will benefit from opportunities to work with colleagues to refocus their teaching. They will also benefit from professional learning that builds appreciation of how student understanding and thinking in a learning area develop across the years of school, and practical guidance in assessing and monitoring that development. And they will benefit from time to plan and implement new approaches to student learning, including through practical applications. Leaders in schools are in influential positions to make the case for these changes and to create conditions to enable and promote change.

A second challenge relates to the Review's proposal for the monitoring of learning progress. This is a significant reform designed to improve the ability of schools and teachers to track how individuals are progressing in their learning across the years of school; to identify students who are not on track with year level expectations; and to intervene to ensure that every student is on a trajectory that will at least meet – and ideally exceed – the proficiency standard expected of all students by the time they leave school. Essential to this reform is the restructuring of syllabuses to form a sequence of attainment levels that schools can use to establish where individuals are in their learning and to monitor long-term progress. School leadership teams are in influential positions to promote the improved monitoring of both attainment and growth.

The proposal to give higher priority to the progress students make also has implications for communicating/reporting learning. Under this proposal, the traditional approach of grading (A to E) every student's performance on the same year-level syllabus would be replaced by information about the level at which a student was working and the progress they had made over time. This would allow parents/carers to see students' trajectories of long-term progress and to make judgements about the adequacy of that progress. This would be a major change in the information available, and a major change in schools' reporting practices. Again, such whole-school change would depend on strong school leadership.

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82   Tucker, *Leading high performance school systems: lessons from the world's best*, p. 147.

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