
LEARNING PROGRESSIONS AND ONLINE FORMATIVE ASSESSMENT
NATIONAL INITIATIVE – DISCOVERY PHASE

FINAL REPORT

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- ACARA Aboriginal and Torres Strait Islander Advisory Group
- ACARA National Assessment, Data, Analysis and Reporting Reference Group
- ACARA Students with Disability Advisory Group

-
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- Kimono
- Mathletics (3P Learning)
- Maths Pathway
- Pearson
- Prolearning
- Sentral
- SEQTA
- Time2Teach.

2 Attachments

- Attachment 1: *Audience profile and learning needs analysis*
- Attachment 2: *National Literacy and Numeracy Learning Progressions: Mapping methodology, key findings and recommendations for refinement*
- Attachment 3: *Critical and creative thinking: A report on existing and future work*
- Attachment 4: *Version 3 of the National Literacy and Numeracy Learning Progressions*
- Attachment 5: *A framework for national learning progressions and aligned assessments*
- Attachment 6: *Key advances in educational measurement*
- Attachment 7: *Digital resources quality assurance, metadata specifications and digital content specifications*
- Attachment 8: *Open Technology Framework report*
- Attachment 9: *Literature review: Formative assessment evidence and practice – Executive summary*
- Attachment 10: *Professional learning specifications and trial*
- Attachment 11: *Program logic and evaluation framework*

3 Abbreviations

ACARA	Australian Curriculum, Assessment and Reporting Authority
ACER	Australian Council for Educational Research
AITSL	Australian Institute for Teaching and School Leadership
ESA	Education Services Australia
NAPLAN	National Assessment Program: Literacy and Numeracy
NLNLPs	National Literacy and Numeracy Learning Progressions
NSRA	<i>National School Reform Agreement</i>
OTF	Open Technology Framework
PAT	Progressive Achievement Test
PGN	Professional Growth Network
PMB	Project Management Board
PMO	Project Management Office
TPRG	Teacher Practice Reference Group
VCAA	Victorian Curriculum and Assessment Authority

4 Context

A central finding of the *Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools* (Excellence Review) was that learning progressions can help teachers adapt their teaching to better support students' learning. The Excellence Review proposed that aligned, online and on-demand formative assessments, combined with professional learning and resources, can assist teachers to use and interpret learning progressions in order to improve the learning growth and attainment of every student every year.

Following the Excellence Review, the former Australian Government minister for education and training established an expert reference panel to shape a shared vision for learning progressions and formative assessment. The expert reference panel, consisting of Ms Christine Cawsey AM, Laureate Professor John Hattie and Professor Geoff Masters AO, delivered its report in November 2018. The report offered a vision for 'more effective classroom teaching and assessment practices made possible by the provision of on-demand, quality resources and aligned professional learning'.

At the end of 2018, all states, territories and the Commonwealth signed the *National School Reform Agreement* which includes two related national policy initiatives:

- i. Enhancing the Australian Curriculum to support teacher assessment of student attainment and growth against clear descriptors; and
- ii. Assisting teachers to monitor individual student progress and identify student learning needs through opt-in online and on demand student learning assessment tools with links to student learning resources, prioritising early years foundation skills.

The two national policy initiatives are closely related and Ministers agreed to bring them together and progress a Learning Progressions and Online Formative Assessment National Initiative (the initiative). Governance arrangements were put in place to oversee the initial discovery phase of this initiative, including establishing a Project Management Board and a Project Management Office.

Education Services Australia (ESA); the Australian Curriculum, Assessment and Reporting Authority (ACARA); and the Australian Institute for Teaching and School Leadership (AITSL) were contracted to provide services to the discovery phase of the initiative.

The objectives of the discovery phase were:

- further refinement of the scope and phasing to deliver a proof of concept
- learning progression design and process with initial focus on elements of literacy (reading and writing), numeracy (number sense and algebra), and creative and critical thinking
- technical requirements and selection criteria for assessment resources linked to the learning progressions
- user requirements, key issues and likely demand for system design
- system and vendor integration needs and workable approaches
- digital learning resources, including existing resources and new requirements
- models for professional learning that support embedded learning and cater for the different learning needs of the profession
- an overarching communication and engagement strategy (in association with contentgroup™, commissioned directly by the Project Management Board).

This report presents key findings from the discovery phase of the initiative and makes recommendations for an alpha phase of further work.

5 Executive summary

The discovery phase of the Learning Progressions and Online Formative Assessment National Initiative (the initiative) has left no doubt as to the importance of the initiative for education in Australia. The approach adopted in this phase – to consult extensively with the education profession – revealed a remarkable consistency of views among the teachers and school leaders across the country who were consulted. The overarching recommendation of this report is for education ministers to endorse a proposal for an alpha phase of further work to develop an innovative online, opt-in service that will support teachers to implement learning progressions and practise formative assessment to improve student learning.

It has become clear through the discovery phase that the real focus of this initiative is not the tools – the learning progressions and the assessments – but supporting and assisting the decisions teachers make about how to address their students' learning needs. To ensure their approach is truly evidence-based, teachers need to be able to access information that supports their judgements. They need access to resources, plans and practices that are informed by evidence and are associated with the greatest impact on student learning. This initiative offers an opportunity to build that evidence base of best practice while simultaneously providing a national approach to solving some fundamental difficulties in assessing and addressing student learning that teachers face every day.

5.1 What is the challenge and how should we meet it?

The core work of teachers in classrooms is to optimise student progress by using curriculum and assessments to monitor learning and inform their practice. Teachers all use versions of a teaching and learning cycle that encompasses planning, assessment and feedback to assist students to learn. Learning is achieved with more efficiency and effectiveness when teachers create or access quality resources and are adept at using them. It is understood that students will progress more quickly if their teachers know where they are in their learning and then teach to that point of need.

For the teachers consulted, personalising teaching is a noble goal that is necessarily limited in its realisation. Personalising or differentiating teaching for each student, in every lesson, across the curriculum is unrealistic. In their effort to identify individual learning achievement and differentiate teaching, Australian teachers and school leaders describe facing significant gaps across national education infrastructure and what has been presented to them by state and territory authorities. This exacerbates the issues. Teachers and school leaders have an Australian Curriculum, a National Assessment Program, and now also National Literacy and Numeracy Learning Progressions. However, the connections between these elements are not evident, and the structures are not sufficient to support teachers to implement curriculum and personalise teaching to improve learning. Every school involved in the discovery phase research described an array of digital systems, programs, assessments and other resources that they have sourced, developed and/or purchased in an attempt to assist teachers with their core work.

As a nation, we require our teachers and school leaders to do much more than plan, teach and assess; we also implicitly expect them to do the work of curriculum designers, test developers, psychometricians and data analysts. We have heard teachers say workload is an issue. Teachers expect to work hard, but their feedback is that too much is being expected of them, and left to them. They struggle to make connections across what is presented to them nationally and locally to determine where their students are in their learning. This creates uncertainty; and it is the uncertainty that becomes a burden. Are they making the best decisions? Are they choosing the right resources? Are they doing enough?

The discovery phase has clarified the 'pain points' shared by teachers and school leaders around the country, and offers insights into solutions that will meet the needs of teachers working to improve student learning progress. This report contains a proposal for an alpha phase for consideration by education ministers. Alpha and beta phases will be key to continuing a measured and evidence-based and profession-informed approach to this major infrastructure development. It is clear that the initiative cannot be conceived as a short-term deliverable, but should be understood as developing a new and important feature in the national education landscape to assist teachers in their day-to-day

work, and that will need to be curated and maintained. The initiative will not be finalised in two or three years' time. It will be an ongoing process that will underpin a sustained transformation in practice for teachers, to deliver improved learning progress for students.

5.2 The work undertaken in the discovery phase

The discovery phase of this initiative was well received by stakeholders and education professionals and was viewed as a prudent approach to evidence-based reform. Teachers and school leaders appreciated the extensive engagement undertaken with the profession as a starting point before embarking on solutions design. Other potential users, including students, parents, jurisdiction and sector representatives and vendors, were also consulted during the discovery phase.

There were three primary workstreams in the discovery phase, each led by a different agency:

1. learning progressions and assessments, led by the Australian Curriculum, Assessment and Reporting Authority (ACARA)
2. user-centred design research, delivery system and digital resources, led by Education Services Australia (ESA)
3. evidence base for professional learning and implementation assistance and a framework for evaluation, led by the Australian Institute for Teaching and School Leadership (AITSL).

The work undertaken in the discovery phase has produced clear findings derived from research and evidence as well as extensive consultation that inform the proposal for an alpha phase. On the basis of these findings, several products that are effective as individual assets for national school reform have already been developed. These products will provide a useful basis to the activities of an alpha phase. Key products are included as attachments to this report, with additional products also available for reference.

5.3 Learning progressions and assessments

ACARA's National Literacy and Numeracy Learning Progressions (NLNLPs) were developed to support the teaching and assessment of literacy and numeracy. The NLNLPs help teachers to identify students' current literacy and numeracy skills, determine next steps in learning and monitor learning progress over time.

During the discovery phase, the NLNLPs were rigorously scrutinised and found to be fit for purpose and robust in their current form and structure (see **Attachment 2** for a description of the analysis methodology and findings). Several recommendations were made including:

1. make refinements to content such as improving consistency and clarity of indicators
2. create milestones indicating curriculum expectations of achievement for each sub-element
3. develop common numerical measurement scales underpinning the NLNLPs
4. develop student and parent-friendly versions of the NLNLPs.

In this discovery phase, content refinements to the NLNLPs have already been made, and the updated, improved NLNLPs can form the backbone of the development in the alpha phase. The other recommendations are proposed for completion in the alpha phase.

ACARA has developed a definition and framework for national learning progressions aligned to the Australian Curriculum that is informed by the work on the NLNLPs and by the most current research and evidence. It is important to clarify the relationship of national learning progressions to the Australian Curriculum. National learning progressions sit within the broader framework of the Australian Curriculum. They supplement and underpin the Australian Curriculum; they do not replace the Australian Curriculum. Where learning progressions exist, they can help inform the refinement of the Australian Curriculum.

In the discovery phase, AITSL's work has led to a definition of formative assessment drawing on definitions used by W. James Popham and Dylan Wiliam. Formative assessment assists teachers to use their professional judgement to target

their teaching practices and better understand how well students have learnt what has been taught, the progress they have made and the progress they need to make. Formative assessment is a regular feature of classroom practice, though teachers may not necessarily label their routine observations, interactions, questions and checks on student learning that help them monitor student understanding as ‘formative assessment’. In the alpha phase, a fundamental task will be to share and embed nationally consistent definitions of ‘learning progressions’ and ‘formative assessment’, as well as other key concepts. The proposed definitions for national learning progressions and formative assessment are shown in Figure 1.

Definition of national learning progressions

National learning progressions describe the skills, understandings and capabilities that students typically acquire as their proficiency increases in a particular aspect of the curriculum over time. They describe the learning pathway(s) along which students typically progress in particular aspects of the curriculum regardless of age or year level, and are designed to help teachers ascertain the stage of learning reached, identify any gaps in skills and knowledge, and plan for the next step to progress learning.

Definition of formative assessment

Formative assessment is an adaptive process where assessment evidence of student learning is used by teachers to modify their instructional practices or by students to adjust their learning strategies. An assessment functions formatively to the extent that evidence gathered during learning is interpreted and used, by teachers and students, to make better teaching and learning decisions.

Formative assessment has the greatest impact on learning when assessments are aligned with a validated construct of learning progress, and when followed by evidence-informed teaching interventions and frequent, embedded formative feedback.

Figure 1: Definitions of national learning progressions and formative assessment

During the discovery phase, ACARA mapped assessments of literacy and numeracy currently used in Australian schools to the NLNLPs. There is a close alignment of these assessments to the progressions, making them suitable for use in the alpha phase. The mapping also identified gaps in the availability of assessments for all sub-elements of the NLNLPs. The alpha phase of this initiative should explore opportunities to work with interested jurisdictions and providers to expand the range of assessments in literacy and numeracy, applying quality assurance criteria and innovative design.

ACARA also investigated learning progressions and assessments in the general capability of critical and creative thinking (see **Attachment 3** for a report on the project’s investigations into creative and critical thinking). However, while several decades of data and research have established a robust basis for literacy and numeracy learning progressions, the same is not true for other aspects of the curriculum. There is little empirical data to support development of national learning progressions in other aspects of the curriculum, including critical and creative thinking and, in addition to this challenge, the discovery phase found little enthusiasm for such work from teachers. Literacy and numeracy are understood to have fundamental importance as the building blocks for learning in all areas of the curriculum. Gaps in student learning in literacy and numeracy can impede access to learning in the rest of the curriculum. Teachers perceive value in the alpha phase focusing on literacy and numeracy.

The overall question of whether national learning progressions are developed for other aspects of the Australian Curriculum beyond literacy and numeracy depends on empirical evidence and policy intent. The proposed online system will be designed to make it possible to incorporate other national learning progressions and assessments if it is subsequently decided that this is both a policy goal and is empirically supported. The system will also provide data

that could be used to inform these progressions and refine those developed for literacy and numeracy. Continuing research into critical and creative thinking in the alpha phase will allow this proposition to be tested further.

5.4 User-centred design research, system delivery and digital resources

Formative assessment is part of the everyday practice of teachers across Australia, and many are highly skilled and experienced in implementing it. However, the user-centred research approach led by ESA has provided insights into the challenges teachers and school leaders experience in their effort to teach, assess and plan to optimise the learning and growth of all their students. Those insights have informed proposals for the design of the solution (see **Attachment 1** for a full set of user profiles and insights). It appears there is no perfect model to copy in terms of international practices and digital resources. A scan of products used in the United States, Canada and Europe revealed useful models and experience but no mature examples of online formative assessment implemented in a federated system. This initiative affords an opportunity for Australia to be world-leading in an innovative solution design.

It is recommended that the proposed online system be conceived as an ‘ecosystem’ that can integrate with existing and potential technologies and digital programs, rather than a colossus that encompasses and replaces all existing systems. This recommendation responds to advice from schools that they are comfortable working with some existing resources and would prefer to retain them, but would welcome improved alignment of these resources to core frameworks such as the NLNLPs and quality-assured assessments. This also acknowledges the experience of several jurisdictions that experienced challenges in their attempts to develop and deliver major technology systems. A modular build, based on an integrative design, is an innovative and lower risk proposal.

A component of the national education infrastructure is the Learning Services Architecture: the technical standards developed to enable better operation of systems across boundaries. Jurisdictions have previously agreed to implement data standards, interoperability measures and data hubs but there is inconsistent implementation of these agreed national standards around the country. A coordinated national approach using an open technology framework is proposed to facilitate data exchange between the processes and systems required to plan, deliver and assess student learning (see **Attachment 8** for a report on the proposed Open Technology Framework). This initiative provides an opportunity to accelerate efforts by school system authorities and software companies in the Australian market to establish an effective and secure innovative digital learning ecosystem for Australian schools.

5.5 Professional learning and implementation support

For learning progressions and online formative assessment to impact positively on student learning, teachers and school leaders need access to quality professional learning and enabling conditions for effective implementation over time. Professional learning and implementation support should seek to build the capability and disposition of teachers and school leaders to embed effective assessment practices in schools and to use learning progressions and assessment resources in a way that promotes each student’s improved learning progress.

AITSL has previously identified principles of effective professional learning, drawing on evidence and research. Professional learning is most effective when it is sustained and embedded in the work of schools and teams. The principles will inform the design and testing of professional learning prototypes in the alpha phase. The discovery phase highlighted the need for teachers to access professional learning that is targeted to their individual needs and the needs of their schools (see **Attachment 10** for a report on potential national professional learning approaches). In the alpha phase, teachers and school leaders may benefit from assistance to identify the existing strengths, understandings and practices of teachers in relation to learning progressions and formative assessment. Practice relevant to the use of learning progressions and formative assessment is described in multiple areas of the *Australian Professional Standards for Teachers* and the *Australian Professional Standard for Principals*. These standards are useful organisers for differing levels of expertise and professional learning needs. Like students, teachers and schools will need a certain level of flexibility to adapt the professional learning offering, if they are to engage and access support to realise the benefit of the learning progressions and online formative assessments.

The discovery phase also revealed that a lack of consistent language about practices and concepts hampers teachers' ability to collaborate effectively – as they would like to do (see the *Environmental scan of professional learning and implementation support for formative assessment*). Furthermore evidence about high impact practices is not consistently shared or translated into practice in schools. Indeed, the evidence about high impact practices is slender. This project presents an opportunity to research, develop and disseminate a national evidence base about effective teaching practices and resources, beginning with embedding consistent language and understanding. Over time the teachers' engagement with the learning progressions and online formative assessment ecosystem will validate and reinforce our evidence base about what works best.

5.6 Monitoring and evaluation framework

During the discovery phase, AITSL led work to articulate how the initiative will contribute to raising levels of achievement in Australian schools, and drafted a framework for progressive monitoring and evaluation that can be iterated as the initiative progresses through design, development, implementation and refinement (see **Attachment 11** for the program logic and draft monitoring and evaluation framework).

This initial monitoring and evaluation framework should be adopted and adapted throughout all stages of the initiative with further development work undertaken during the alpha phase.

5.7 Communication and engagement

The importance of key audiences being able to understand and effectively engage with information about the initiative was identified at the outset. During the discovery phase, the agencies worked to an overarching communication and engagement strategy, developed by contentgroup™, which acted as a guide to support and target all communication on the initiative. A website was established (www.lpofai.edu.au) to share information about the discovery phase; a Teacher Practice Reference Group was convened to bring the voice of the profession to the foreground; the three education agencies involved in the initiative engaged closely with their existing advisory groups and took every opportunity to engage widely with as many stakeholders and different audiences as possible.

Communication and stakeholder engagement should remain at the heart of all activity during the alpha phase, and all such activity should continue to be guided by a coordinated communication and engagement strategy. The strategy will build on the insights from the discovery phase, and value propositions and key messages will be refined as the work during the alpha phase evolves.

An overarching high-level communication and stakeholder engagement strategy to bind the work of the three education agencies into a single, cohesive, compelling program of communication activity remains a high priority for clearly explaining and delivering the alpha phase.

5.8 Conclusion

The discovery phase has identified twin aims: for each student's learning to be maximised and for Australia to have a high-quality education system that has an optimal impact on student growth and achievement. The initiative may be conceived as having short- and long-term goals.

In the short-term, the alpha phase would develop prototype solutions as well as additional products to support teachers to work more efficiently and effectively, and address their immediate challenges by:

1. prototyping a user-friendly, system functionality and service that automatically connects the data and systems teachers want to use and that presents information about students' learning progress and achievement in meaningful, accessible ways including:
 - a. dashboard functions for teachers and student with progress visualisation and feedback
 - b. formative assessment delivery and observation data capture

- c. auto-suggestion of relevant digital resources
- d. single sign on with seamless teacher and student registration and mobile device support
2. sharing enhanced NLNLPs and aligning them to the Australian Curriculum and to assessments, in machine-readable format
3. prototyping multi-entry point professional learning for teachers and school leaders to support and assist teachers in effective implementation.

We should also be planning for transformation of practice in the longer-term. The system we develop now should build on current good practice and support the deft capture of teacher judgements, including their classroom observations and formative assessments. This will inform an evolving empirical evidence base of effective practices to underpin a suggestion engine that will identify quality plans, resources and processes to optimise student learning progress, and provide data that can be used to continue to refine national learning progressions.

5.9 Recommendations

The discovery phase has established a robust, evidence-based foundation for a further phase of work. The achievements, findings and products derived from the discovery phase can support an alpha phase that should continue to be strongly informed by teachers and school leaders as it moves to design, prototyping and testing.

As a result of work completed during the discovery phase the following actions are recommended:

1. **Note** the key findings from the discovery phase, as documented in this final report and its attachments, which show that:
 - a. teachers and schools need this initiative
 - b. there are challenges or pain points for teachers commonly experienced across the profession, which are often associated with having too little time to do the work they need to do
 - c. teachers and schools are already seeking and using online solutions but are struggling to identify quality, relevance and impact of products
 - d. there is no single existing solution that will address all of the challenges
 - e. teachers vary in their familiarity with learning progressions and formative assessment, and will require assistance in the form of appropriate professional learning to build their confidence.
2. **Note** the key products developed as a result of the discovery phase that can support and advance future national activity, including:
 - a. *Version 3 of the National Literacy and Numeracy Learning Progressions*
 - b. *Audience profile and learning needs analysis* which provides a body of research and insights generated by the extensive consultation with teachers and the broader education community
 - c. *National Literacy and Numeracy Learning Progressions: Mapping methodology, key findings and recommendations for refinement*
 - d. *Critical and creative thinking: A report on existing and future work*
 - e. *A framework for national learning progressions and aligned assessments*
 - f. *Key advances in educational measurement*
 - g. *Digital resources quality assurance, metadata specifications and digital content specifications*
 - h. *Online digital content analysis report*
 - i. *Draft content specifications for existing, third-party and new digital content report*
 - j. *Search functionality and system integration needs for the suggestion engine*
 - k. *Open Technology Framework report*
 - l. *Open Technology Framework consultation report*
 - m. *Literature review: Formative assessment evidence and practice*
 - n. *Professional learning specifications and trial*
 - o. *Program logic and evaluation framework*
 - p. *Environmental scan of professional learning and implementation support for formative assessment.*

3. **Agree** to proceed to an alpha phase to develop and test a prototype service for supporting and assisting teachers to implement learning progressions and use online formative assessment to improve student learning, that will involve the following activities:
 - a. consulting on and testing of hypotheses and functional prototypes with stakeholders and users
 - b. prototyping standards-based integrations with key vendors and stakeholders, including development and use of machine-readable NLNLPs
 - c. developing a user story map of features and iterative improvement based on ongoing consultation with users
 - d. updating the Schools Online Thesaurus to include the language of the NLNLPs
 - e. confirming suitability of identified technical standards and gaining agreement for their use going forward
 - f. defining a minimum viable product to inform a beta phase
 - g. developing the suggestion engine functionality to facilitate the transition of search functionality from the National Online Learning Services to the proposed ecosystem
 - h. developing common measurement scales underpinning the NLNLPs and calibrating existing assessments to the scales
 - i. adding milestones to link NLNLPs to the Australian Curriculum
 - j. developing student and parent-friendly versions of the NLNLPs
 - k. identifying opportunities to commission and partner with other organisations to explore further enhancement of the NLNLPs, in particular to assist teachers of students with diverse needs
 - l. undertaking continued research into learning progressions and assessments for critical and creative thinking
 - m. applying and testing the criteria and process against existing assessments and identifying new assessments aligned to the NLNLPs for access through the system
 - n. working with interested partners to research and apply advances in educational measurement to explore innovative assessments and innovative system design
 - o. developing digital resource prototypes that test the protocols, rubrics and frameworks developed in the discovery phase
 - p. creating a digital content plan
 - q. developing a standards-aligned rubric to help identify readiness of teachers and school leaders to adopt learning progressions and online formative assessment
 - r. reviewing existing professional learning materials and designing, developing and testing of professional learning prototypes
 - s. testing and adapting the initiative's draft monitoring and evaluation framework
 - t. beginning data collection, analysis and baselining for evaluation purposes
 - u. developing a communication and engagement strategy that explains and connects the work of alpha phase and builds the vision for the end system for users
 - v. capturing detailed design documentation including definition of a minimum viable product
 - w. preparing a proposal for a beta phase informed by the minimum viable product.

4. **Endorse** Version 3 of the National Literacy and Numeracy Learning Progressions to replace Version 2 on the Australian Curriculum website, and to provide the basis for further activity during the alpha phase.

5. **Endorse** the adoption of nationally consistent definitions of 'learning progressions' and 'formative assessment' as presented in this report, to establish and embed a shared understanding and basis for work in the alpha phase.

6. **Agree** that the views and needs of the teaching profession will continue to inform the initiative in the alpha phase.

Recommendations specific to the findings of the various work streams are at the end of each chapter in this report and provide the details behind these high-level project recommendations.

6 User research

6.1 Scope of work

In the discovery phase, Education Services Australia (ESA) conducted user research with teachers, school leaders, students, parents and carers. Jurisdiction leaders and vendors of commercial products were also consulted (see Chapter 11). The research focused on understanding the landscape in which users – especially teachers – are working in relation to monitoring student learning and supporting learning progress. Consideration was given to current approaches used by teachers to support student learning; existing methods of measuring progress; the challenges different users are facing; and any gaps in users' ability to achieve teaching and learning goals. Based on the findings from this research, high-level user needs have emerged and recommended features to address these needs were specified.

6.1.1 Research objectives

A multi-modal research design was implemented to facilitate the involvement of a wide range of schools, teachers, school leaders, students and parents and carers in a representative sample across states and territories, sectors, regions and school levels (for example, primary and secondary).

Within the wider landscape of monitoring student learning and supporting learning progress, specific areas identified for investigation of current practices in schools, in particular pain points and challenges, included:

- roles, duties and tasks performed by teachers and school leaders on a day-to-day basis
- planning processes within schools and classrooms
- devices and tools used; available and unavailable data, and the tools used to support data access and use; and online assessment and learning resources accessed/used by teachers and leaders
- the ways in which teachers and schools currently determine 'where a student is at' and 'where a student needs to progress to next' in order for them to achieve required learning outcomes
- the methods, frequency and reasons for delivering differentiated curriculum
- the levels of familiarity with and understanding of progressions in student learning and the National Literacy and Numeracy Learning Progressions (NLNLPs)
- the role of professional learning in driving improved student learning and assessment and the features of valuable professional learning experiences
- the range of attitudes, behaviours and experiences among students and parents and carers in relation to learning progressions and assessment at school.

6.1.2 Research activities

A Teacher Practice Reference Group (TPRG) was established, via recommendations from Australian Institute for Teaching and School Leadership's (AITSL) Professional Growth Network (PGN). The TPRG comprised 27 teachers and school leaders from across Australia who are representative of sectors, locations and school sizes. The TPRG's remit included: sharing practice and making contributions from prior learning; taking part in relevant consultation, user-centred design and research activities; and nominating and connecting the initiative team with other school community members where wider views were sought from teachers, school leaders, students and parents and carers. Although participation was voluntary, all participants were regarded as being representative of the intended end users of a future potential initiative.

Multiple methods were employed to gather data from users. In total, 78 school leaders ($n = 24$) and teachers ($n = 54$) were involved in one-on-one in-depth interviews across the country. For the purposes of validating the interview results, an online survey was then conducted, and responses were received from 93 teachers and school leaders. In addition, four 2.5-hour working sessions were conducted with 26 school leaders and teachers across four states (Victoria, New South Wales, South Australia and Western Australia) and four 2-hour ethnography research sessions

were conducted across three states (Western Australia, New South Wales and Victoria). For comparative purposes, field research was also conducted in three Australian schools and two schools in New Zealand.

Parent and student perspectives on various topics relating to learning and progress were collected from six 1.5-hour focus group discussions that were conducted with 18 parents and 18 students across three states (Western Australia, New South Wales and Victoria). To validate the results from the focus groups, follow-up surveys were administered to both parents and students across Australia.

6.1.3 Analysis of findings

Once research findings had been gathered, they were analysed and synthesised into a number of products that serve to present the research findings in a digestible format, assist decision-making in user design in the next phase of research, and build empathy with the users. Empathising with the users helps the design team to innovate to create better solutions.

Initially, a set of personas were developed, each of which represent a description of a typical but fictitious person who is a target user. Personas represent a cluster of users who exhibit similar patterns and features in their roles, experience, behaviours, needs and values. For this initiative, 18 personas were developed to represent classroom teachers, school leaders, students, parents and carers, system vendors and system owners (see example in Figure 2).

Classroom Teacher

Ruby
Metro
Full-time classroom teacher

"It would always be nicer if there were more easy to access or clear cut tools that had everything, like every level, in front of you and you could just pull what you needed quite often."

Background

Ruby has been teaching maths for six years and is currently in her third year of teaching year seven and eight students at an inner-suburbs school. Her school's leadership team have firm processes in place to establish consistency in the practice of all teachers and ensure students are achieving high standards. The school has a strong academic focus and formal assessments are routinely used.

A team including Ruby, four other teachers and the school's numeracy coordinator has weekly meetings to plan every lesson, agree on assessments, and review and moderate their classes against the school rubrics.

Ruby's year 7 and 8 students – all still making the transition from primary to secondary school – have come from several different primary schools and possess significantly different levels of attainment.

The planned lessons and assessments work well for the students performing to the standards or above. However, Ruby feels that there is very little time to support and differentiate for students that have missed something in the process.

Technology savviness

LOW HIGH

Overall teaching experience

LESS THAN 1 YEAR OVER 10 YEARS

Her goals

- Enable students to meet the school community's achievement expectations regardless of their current level of attainment
- Ensure students are progressing no matter where they started
- Ensure a consistent approach in teaching and assessment
- Ensure school processes and expectations are met in a timely and consistent manner
- Provide an encouraging environment that engages students so that they may progress and exceed outcomes
- Collaborate with parents, teachers and students regarding their learning progress and achievements

Her needs

- Evidence-informed strategies and resources to help tailor classroom lessons and activities, so that all students – possessing a wide range of attainment levels – can be catered for in a timely manner
- Learning gaps can be easily translated into learning goals and feedback for each student, as well as their parents
- Easy access to quality-assured teaching and learning resources that can help fill learning gaps, based on assessment results and Ruby's own classroom observations
- Assessment resources to identify progress consistently across all levels of attainment that can be used in the classroom, and that are aligned to school expectations
- A holistic picture of how a student in Ruby's class is progressing in their learning that incorporates assessment data and classroom observations
- A whole-class view that shows all of her students' progress to support in planning and moderation during weekly meetings
- Hands-on professional learning that helps Ruby effectively use any new tools and resources and provides guidance about how they can be tailored to her classroom and fitted into the school's lesson plans

Tools used in her classroom

Google
Centralised google drive for resources and recording data

EssentialAssessment
Assessment sheet generator for tests

Mathletics
Mathletics for homework and progress checks

Mini whiteboards
Mini whiteboards for daily classroom activities

Additional tools and sources of information

- work colleagues
- weekly collaboration and moderation sessions
- school planning sessions shared on Google Drive
- school-wide rubrics
- system/sector resources
- NAPLAN
- PAT-M for diagnostic
- past resources being used at school including worksheets
- classroom observation notes
- collaborations with other schools in the same network

Figure 2: Persona for Ruby

Journey maps were also developed to illustrate users' experience over time (as opposed to representing their experience as a snapshot). Individual journey maps were developed representing the aggregated experiences, over time, of classroom teachers, school leaders, students and parents and carers. Within each phase in the journey map, information needs, sources of information, highlights, pain points and feelings of the target audience were examined.

A service map was also created to illustrate a collective summary of the users and channels, showing the different touch points and user interactions with various sources of information.

The most common pain points were then drawn out of the personas, journey maps, service map and raw user research data and grouped into eight common themes of high-level user needs. These user needs were then further validated by the TPRG members through a series of mapping activities undertaken in a workshop. From the user needs, six hypotheses were developed. For each hypothesis, features were recommended to alleviate the pain points. In addition, a series of 'wireframes' were designed to represent how these features might occur within an online system. Wireframes are a set of images that display the functional elements of a website or page, used for planning the site's structure and functionality. The hypotheses and wireframes were developed for testing in the alpha phase. The full set of personas, journey maps and service map are in **Attachment 1**.

6.2 Key findings

The findings from this research have highlighted recurring themes that transcend school context, and identified preferred teaching approaches and student needs as part of the work that schools undertake as they monitor student learning and build learning progress. The journey maps showed that teachers (either individually or as a team) progress through five distinct phases when focusing on an upcoming topic or unit of work:

1. identify purpose/goals
2. plan
3. teach and learn
4. measure
5. feedback and next steps.

School leaders were also found to use the same five phases at the whole-school level.

Throughout the identified phases, teachers and school leaders use multiple data sources, along with extensive and frequent use of technology, online resources and tools. While research showed that teachers have become adept at drawing from myriad of online and offline resources, and in using tools to help in planning and designing lessons and activities, there is still too much time spent trying to evaluate and align each resource or tool to their jurisdictional curriculum.

Findings show a lack of overall data management and related protocols in schools. Teachers reported that schools repeatedly have issues establishing agreement on responsibility for collecting the different types of data and the methods of collecting and recording data. As a result, some types of formative assessment data were either not collected or were not collected with rigour. For example, the majority of teachers and school leaders indicated that they valued the in-depth and focused learning performance information they gathered from classroom observations. However, due to the time involved in recording, collating and analysing this type of formative assessment data, schools infrequently adopt this method.

Adapting teaching and learning programs to align with the curriculum, identifying and customising resources, and scaffolding assessments were identified as common tasks that teachers are required to undertake to cater for a wide range of student learning capabilities. These tasks require intensive planning that takes up a significant amount of time. Teachers noted that despite careful and thoughtful planning, unforeseen contextual circumstances that teachers must cater for in class still occur; for example, teachers often find they're required to make changes during a lesson when they realise that work planned for a student to cover a particular concept or learning goal is no longer appropriate (perhaps due to the student not making the progress expected). Less-experienced teachers often find these circumstances overwhelming as they have not developed or learnt about strategies that will assist in such situations.

Although teachers reported that they are constantly assessing student performance, they find it incredibly challenging to provide timely, personalised feedback and differentiated next steps for each student. This has a trickledown effect

on students, who described being sometimes unaware about where they are in their learning, where there are still gaps and what they need to focus on next.

Findings showed that, in general, teachers and school leaders have increasing awareness of the NLNLPs. This was particularly the case with New South Wales (NSW) teachers and school leaders, where there has been a systematic plan to support implementation in NSW schools across the state. Teachers who believe they have good knowledge and understanding of the progressions and their application, tend to view them as a useful tool in developing a common language around student learning and progress, and in creating high expectations among teachers, students and parents and carers. The NLNLPs are also seen by these teachers as a resource for diagnosing where students are at in their learning and where they should get to next.

A number of common barriers were identified as obstacles to schools' adoption of NLNLPs. Some teachers and school leaders perceive progressions as detailed and overwhelming, and believe it would take an excessive amount of time to become familiar with them. School leaders reported concern that adoption of the NLNLPs would add to teachers' work, especially if it were not underpinned by quality professional learning. Some teachers believed them irrelevant to their school or state.

It was evident in the findings that teachers highly value professional learning, and they appreciate the opportunity to collaborate with peers to explore new ideas, share knowledge and reflect on their own teaching approaches. Teachers and school leaders reported that among the professional learning sessions offered, they find the most value in courses and workshops that provide practical information, hands-on strategies, and that modelled techniques for dealing with the specific challenges and contexts they are addressing in catering for students with various levels of progress and achievement. Teachers also value professional learning that can be easily applied or adapted in the classroom. There is also a strong preference for the topic or focus of the professional learning to include those interventions that have clear evidence of impact on student learning and outcomes. Although most teachers do not describe individual research as professional learning, they regularly engage in this form of learning, particularly as they research effective strategies, resources and tools to use in their classes. Discussion with colleagues regarding their experience with resources and optimal strategies is another common form of informal professional learning practised among teachers. These views and practices are consistent with the findings described in Section 11.2.4.

The pain points teachers, school leaders, students and parents and carers are currently identifying in supporting student learning and monitoring progress converge into eight common themes of high-level user needs (see Figure 3).



Figure 3: The eight common themes of high-level user needs

6.2.1 Emerging features based on user needs

Based on the eight themes of high-level user needs that emerged from the user research findings, ESA developed a set of user requirements in the form of six hypotheses and wireframe representations of an online service that should be tested and refined in the alpha phase. Each of the following six hypotheses is supported by recommended features to address user needs.

Hypothesis 1 – Learning integration and visualisation will relieve teachers and school leaders of the burden of collating and analysing data from varied sources, searching for resources linked to the curriculum and learning progressions, and adapting or creating quality assessments. Learning integration and visualisation will enable teachers to better understand their students' current learning, provide personalised feedback, and plan differentiated next steps.

Hypothesis 2 – Alignment to learning progressions and curriculum of teaching and assessment resources, and data on student learning that is available and recorded will help teachers to assess students' current levels of attainment. It will also help them to identify progress and plan the next steps with confidence.

Hypothesis 3 – Assessment as a formative process will make it easier for teachers to record their classroom observations as evidence of learning, make assessment data readily available and easily shared, make planning and moderation among colleagues more efficient, and improve consistency and confidence in teachers' everyday judgements.

Hypothesis 4 – Recommendations and personalisation will make it more efficient for teachers and school leaders to plan and implement data-informed differentiation for students according to current progress and attainment. They

will have access to recommended next steps, digital resources and assessments that will enable them to effectively support students' next learning steps and provide personalised, timely feedback. Teachers will be able to easily identify groupings and outliers and have the ability to change their class groupings to support a variety of approaches for differentiation.

Hypothesis 5 – Discoverability and accessibility will significantly reduce the time teachers and school leaders spend searching for assessment and digital resources that are quality-assured, evidence-informed, curriculum-aligned, and practical for use in the specific classroom context. Having access to a database of curated resources aligned to learning progressions will enable teachers to address students' learning gaps and next steps with greater confidence.

Hypothesis 6 – Evidence-based learning pathways will provide teachers with a baseline for using learning progressions to inform their planning and teaching, and formative assessment practice. Teachers and school leaders can generate data-driven plans that are targeted to build on student strengths, address necessary student learning gaps, and provide differentiated next steps. The capacity to share these plans with colleagues will encourage consistency in practice and improve whole-school approaches.

Each hypothesis can be tested in the alpha phase. A representation of how an online system can address each hypothesis is represented graphically in a wireframe (see example in Figure 4). For the full set of hypotheses and features and five indicative wireframes see **Attachment 1**.

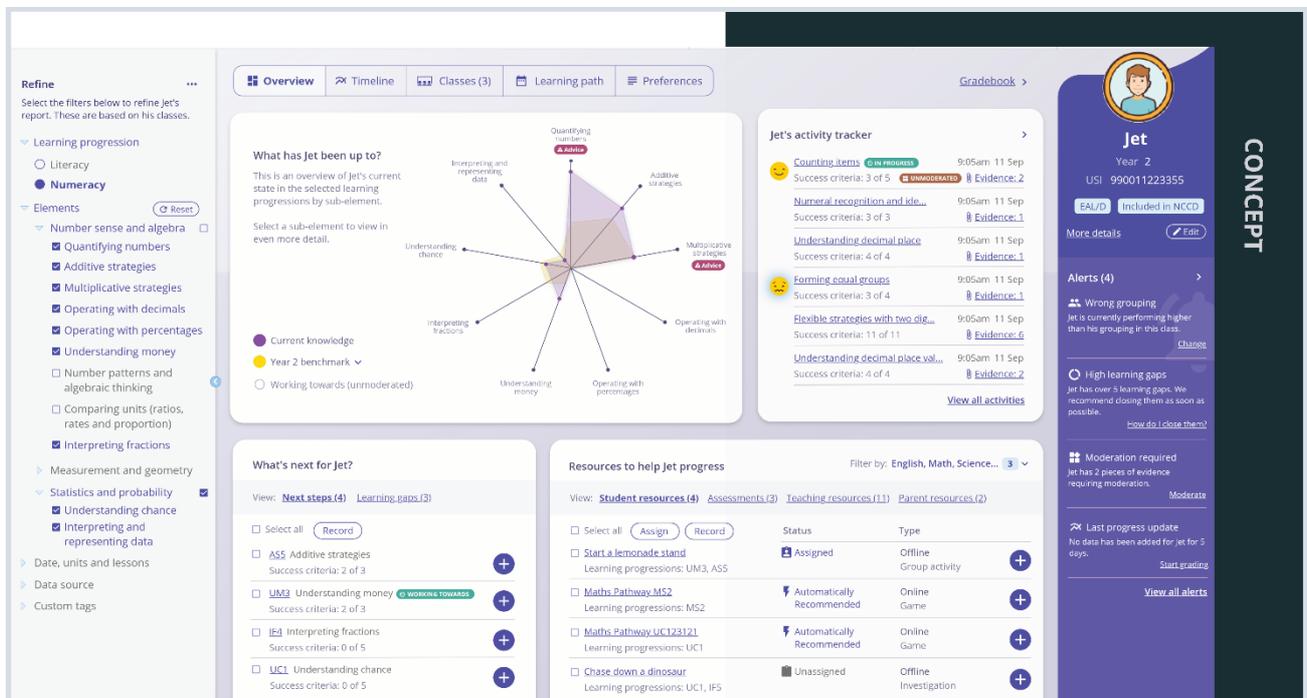


Figure 4: Wireframe diagram

6.3 Recommendations

That early in the alpha phase, consultation and testing of the hypotheses and simple, 'low fidelity' prototypes (see **Attachment 1**) should be undertaken with stakeholders and users.

That later in the alpha phase, a more detailed 'high-fidelity' prototype (HTML) be tested with stakeholders and users and that the prototype:

1. looks and works like a real service, and includes content and data that look authentic
2. has a range of features for the various user groups to interact with
3. provides a seamless, end-to-end user experience.

That in the alpha phase, a user story map of features based on the user research should be developed and iteratively improved in ongoing consultation with the user groups.

That at the end of the alpha phase, a minimum viable product (MVP) be defined and agreed.

7 Learning progressions

7.1 Scope of work

Literacy, numeracy and critical and creative thinking are three of the seven general capabilities within the Australian Curriculum.

National Literacy and Numeracy Learning Progressions (NLNLPs) were developed to assist teachers to locate a student's current literacy and numeracy knowledge, understanding and skills to determine and identify the learning that should follow. Version 2 of the NLNLPs was published on the Australian Curriculum website in January 2018 following a process of development, consultation, trialling and validation during 2016–17.

In the discovery phase, the Australian Curriculum, Assessment and Reporting Authority (ACARA) mapped and compared the NLNLPs with other existing progressions in literacy and numeracy. ACARA also analysed available empirical data from existing assessments to identify the level of alignment and any areas for refinement of the NLNLPs. In addition, ACARA gathered information on NSW experiences implementing the NLNLPs. NSW partnered with ACARA to develop the NLNLPs and has been implementing them in schools since 2018 as a key part of the NSW Literacy and Numeracy Strategy (2017–2020).

The mapping exercises and the insights gathered from NSW informed recommendations for the refinement of the NLNLPs and the development of a framework for national learning progressions.

The general capability of critical and creative thinking is currently expressed as a continuum of learning and its development is incorporated in Australian Curriculum learning areas as appropriate. In the discovery phase, ACARA worked with jurisdictions that are researching critical and creative thinking to identify further work needed to develop a learning progression for critical and creative thinking linked to the Australian Curriculum.

7.1.1 Mapping and validating the National Literacy and Numeracy Learning Progressions

The mapping process for the NLNLPs included five separate activities:

1. comparing the NLNLPs with the Reading and Mathematics learning progressions developed by the Australian Council for Educational Research (ACER)
2. cross-validating the NLNLPs with ACER's Progressive Achievement Test (PAT) items for Reading and Mathematics
3. validating an additional 400 National Assessment Program: Literacy and Numeracy (NAPLAN) Numeracy test items and a similar number of NAPLAN Reading test items (from NAPLAN paper tests from 2012 to 2016) and mapping them to the NLNLPs
4. comparing Brightpath writing performance data and descriptors to the Writing element of the NLNLPs
5. mapping jurisdictional assessment resources to the NLNLPs.

The comparative study between ACARA's NLNLPs and ACER's learning progressions was comprehensive. It involved:

1. comparing the development processes, general features and intended uses of each agency's learning progressions to provide insights into the defining features of learning progressions
2. systematically comparing and mapping the content of each agency's learning progressions – undertaken by ACARA and ACER expert literacy and numeracy teams – with regard to:
 - a. the sequence of acquisition of knowledge, skills and understandings
 - b. the substantive content included in the sequence of knowledge, skills and understandings
 - c. the clarity, comprehensibility and readability of the descriptions of the knowledge, skills and understandings
3. undertaking a cross-validation activity to evaluate the extent to which NAPLAN and PAT assessment data supported the constructs described in the ACARA and ACER learning progressions.

More details of the methodology used in all of the mapping exercises is in **Attachment 2**.

7.1.2 Scoping existing progressions in critical and creative thinking

The question of how best to describe and include general capabilities in the curriculum continues to be of significant international interest, as does the question of how to assess them in a valid and reliable way. While the Australian Curriculum uses the term ‘general capabilities’, internationally they are often described as ‘21st-century skills’ or ‘transversal competencies’.

There are a number of approaches to the conceptualisation of critical and creative thinking as a general capability, particularly on the relationship between the two and the extent to which it is both possible and desirable to integrate them. There is also a considerable body of research on the constructs of both critical thinking and creative thinking, but little empirical evidence on which to base a learning progression (or two).

ACARA identified that the Victorian Curriculum and Assessment Authority (VCAA) and the ACER were both undertaking work to define and assess critical and creative thinking as part of the curriculum.

ACER is undertaking research to investigate ways of assessing critical thinking and creative thinking. The ACER project aims to achieve, among other things, empirically supported learning progressions for critical and creative thinking. ACER has defined critical thinking and creative thinking separately and conceived of each construct as having three strands described in a three-level progression. ACER has also designed and trialled classroom-based assessments for Year 5 and Year 8 students and is analysing the resulting data to investigate validity, reliability and the extent to which the tasks allow conclusions about student learning of critical and creative thinking.

The Victorian Curriculum is substantially based on the Australian Curriculum but differs in its treatment of the general capabilities. The VCAA has chosen four capabilities – critical and creative thinking, ethical understanding, intercultural understanding and personal and social capability – and described each as a set of discrete knowledge and skills that can and should be taught explicitly in and through the learning areas. To support schools in implementing the Victorian Curriculum, the VCAA has developed a suite of assessment tasks for critical and creative thinking designed across the full range of levels from Years 1–10.

The structure of both the VCAA and ACER constructs for critical and creative thinking provided the potential for comparisons and links to each other and to the ACARA continuum for critical and creative thinking. For the discovery phase, VCAA and ACER agreed to work together, and with ACARA, to analyse the relationships between their existing work, and share data to enhance the empirical basis for the development of learning progressions.

A team of staff from ACARA, ACER and VCAA mapped the ACER critical thinking and creative thinking tasks to the VCAA learning continuum; the VCAA tasks to the ACER assessment constructs; and all assessment material to the ACARA learning continuum for critical and creative thinking. The aim of this mapping was to identify commonalities and differences in the construct definitions used by all three agencies and lead to a fuller understanding of the aspects of critical and creative thinking operationalised in each assessment.

More details of the existing work on critical and creative thinking is in **Attachment 3**.

7.2 Key findings

7.2.1 Refining the National Literacy and Numeracy Learning Progressions

The mapping and cross-validation activities completed during discovery confirmed that the NLNLPs are fit for purpose and robust in their current form and structure. The activities also provided evidence to support the need for content refinements, with minimal changes to literacy and more considerable changes to the national numeracy learning progression.

Overall, the various mapping activities confirmed the accuracy of the developmental sequences of literacy knowledge, understanding and skills in ACARA’s national literacy learning progression. In particular, this affirmed that in the early

levels of the sub-elements, there was little need for changes to content. Across all levels, the mapping indicated there was no unnecessary or repetitious content, and affirmed there was conceptual congruence across the literacy elements. Similarly, but to a lesser extent, the mapping activities confirmed the accuracy of the developmental sequences of numeracy knowledge, understanding and skills in ACARA's national numeracy learning progression.

Specifically, the results of the mapping and cross-validation exercises between ACARA and ACER found a high-level of alignment between the two sets of learning progressions and offered empirical support for both progressions. The exercises also provided clear direction for future refinement of the content for both agencies' learning progressions in four main areas:

1. clarity of progression
2. consistent use of terminology within and across levels
3. the specificity and clarity of indicators and examples
4. addressing gaps in content.

The mapping between the Brightpath progression and the NLNLPs also found a broad level of alignment regarding the key features of writing. In general, the Brightpath progression and ACARA's national literacy learning progression presented a similar trajectory of skill development. At some levels the granularity of the Brightpath descriptors revealed gaps in the national progression, and identified specific aspects that could be strengthened or added, particularly at the higher levels of imaginative (narrative) and persuasive texts.

The cross-validation of the NLNLPs with the additional 400 or so NAPLAN items for both reading and numeracy gave further empirical support to the sequencing of the current NLNLPs, while also providing direction for future refinements to the content.

A consolidated report on the mapping activities, key findings and recommendations for refining the content of the NLNLPs is in **Attachment 2**.

Based on the key findings and recommendations, ACARA has refined the content of the NLNLPs, producing improved national learning progressions (Version 3). Version 3 of the NLNLPs is in **Attachment 4**. Version 3 of the NLNLPs will replace Version 2 on the Australian Curriculum website, and will provide the basis for further activity during the alpha phase. These NLNLPs can also be used to inform any future refinement of the Australian Curriculum F–10 in English and Mathematics, and to check the literacy and numeracy demands of the curriculum content in the other learning areas of the Australian Curriculum.

While the NLNLPs have been improved as a result of discovery phase, they should continue to be refined on the basis of new and evolving empirical testing and evidence. For example, the Australian Association of Mathematics Teachers has been funded by the Australian Government to create an empirically based learning progression for multiplicative thinking and to produce a set of teacher guides, assessment materials and student work samples linked to the progression. Multiplicative thinking is an integral aspect of the sub-element of number sense and algebra in the national numeracy learning progression. This project, when completed by mid-2020, may provide scope for further refinement to the national numeracy learning progression and may also provide a model for further collaboration with other research-based mathematics projects.

Furthermore, one of the challenges faced by learning progressions everywhere is their ability to support teachers of students with diverse needs, in particular students with disability, to help teachers identify and measure each student's appropriate progress in learning and then identify the type of intervention or adjustment needed to optimise each student's next learning steps. Version 3 of the NLNLPs incorporates the sub-levels (or pre-first level indicators) from ACARA's literacy and numeracy continua into the national progressions. However, further research is needed to investigate ways to better support teachers and students with diverse needs to identify and assess their students' learning progress. Ambitious projects underway in the NSW Department of Education and the University of Melbourne should be monitored closely, as they may offer insights to making these improvements.

The interactive cycle of empirical testing and further refinement of national learning progressions also points to the need for a machine-readable form of the NLNLPs that is consistent with the machine-readable Australian Curriculum

and that can support version management and links to other curriculum frameworks, assessments and digital resources. This is explained in Chapter 10 as part of the Open Technology Framework.

7.2.2 Learning from the NSW experience

The NLNLPs were conceived as the critical underpinning to all actions in the NSW Literacy and Numeracy Strategy (2017–2020). The importance of having a common understanding of the sequence of learning in these foundation knowledge areas was seen as fundamental by NSW to engaging all teachers in a common effort to improve literacy and numeracy knowledge in students.

The NSW Department of Education developed a digital data collection and reporting platform (PLAN2), built to capture teachers' observations and assessments of students' demonstrated learning against NLNLPs indicators. The NSW Best Start Kindergarten assessment was revised, and new items were developed to improve coverage and align better with the NLNLPs. The NSW Department of Education also developed professional learning for teachers in primary and secondary settings, to support their understanding and use of the NLNLPs and PLAN2.

While the NSW experience is informative across a number of aspects of the discovery phase (for example, lessons learnt about professional learning captured in Chapter 12), there are some specific insights as to the quality and nature of the NLNLPs. Early analysis by NSW of data collected against the NLNLPs indicators in PLAN2 has delivered several insights that confirm other discovery phase findings about the quality, robustness and use of the current NLNLPs:

- Teachers improve the consistency of their judgements about student learning as they use the NLNLPs over time.
- Student learning progress can be accurately monitored over time, and reported in ways that give insights into the learning of individuals, groups and cohorts of students.
- The NLNLPs appear to be comprehensive, robust and accurate in the sequencing and descriptions in the indicators.
- The NLNLPs enable continuous data about student learning progress to be collected over time and made visible to all the teachers responsible for their learning, even if the students are moving across schools or sectors.
- Information from a variety of assessments can be plotted against the NLNLPs, expanding the evidence of student learning available to teachers.
- When teachers are introduced to the NLNLPs through an online diagnostic assessment, they are more likely to continue to use the learning progressions to update student information and plan for teaching.

The specific experience of NSW teachers also revealed that while the granular nature of the NLNLPs supports a detailed analysis of student learning, it provides some challenges for teachers in quantifying student progress. In their current form, the NLNLPs cannot be used to compare student learning achievement against expectations, or to gauge the adequacy of learning progress over time. Without a clear sense of expectation – as opposed to current learning – teachers may accept any learning progress as sufficient, even where attainment may fall short of the achievement standards described in the Australian Curriculum. For students whose learning is behind expectation, teachers need to plan to close the gap between where the student is at and where they need to be.

Another frustration experienced by NSW teachers – also identified from the extensive user research with teachers across Australia – was the difficulty of aligning assessment information derived from different assessments to create a clear, data-supported view of students' learning progress. Teachers described their struggles to connect data that is derived from different assessments and to align the various assessments to the NLNLPs.

Using learning progression data, measurement scales can be created to quantify the amount of learning growth over time for each student. If student literacy and numeracy milestones (representing curriculum end-of-year or stage expectations) are also mapped to the measurement scales, teachers will be able to use learning progression data to assess whether, at a given point in time, their students' progress and learning achievement meets expectations, and judge whether progress from one point in time to the next is adequate.

These findings support the need to develop measurement scales for the NLNLPs as part of the design requirements for a national learning progression. The comparison of the NLNLPs with the ACER's learning progressions also identified

that the NLNLPs do not have this design feature. The development of measurement scales for the NLNLPs will be important in allowing different assessments to be aligned to the progressions and enable coherence in data from disparate sources.

The language of the NLNLPs was also raised as an issue, both in NSW and through the user research. Teachers wanted access to student and parent friendly descriptions of the learning progressions to engage their students in monitoring their own progress and to use when reporting student progress to parents. This should also be pursued in the alpha phase.

7.2.3 Defining features of national learning progressions

Definitions of learning progressions vary, as do the purposes for which they are used and the ways they can be developed and structured. ACARA reviewed the literature on learning progressions, consulted experts in the field and drew on the comparison of the ACER and ACARA learning progressions, as well as insights from the NSW experience, to define a framework that sets the standard for national learning progressions aligned to the Australian Curriculum.

The complete framework is at **Attachment 5**, with key aspects highlighted in the box below. In the alpha phase, a fundamental task will be to promote and embed a shared and nationally consistent understanding of these aspects.

A framework for national learning progressions

Definition of national learning progressions

National learning progressions describe the skills, understandings and capabilities that students typically acquire as their proficiency increases in a particular aspect of the curriculum over time. They describe the learning pathway(s) along which students typically progress in particular aspects of the curriculum regardless of age or year level, and are designed to help teachers ascertain the stage of learning reached, identify any gaps in skills and knowledge, and plan for the next step to progress learning.

Relationship to the Australian Curriculum

National learning progressions sit within the broader framework of the Australian Curriculum. They supplement and underpin the Australian Curriculum; they do not replace the Australian Curriculum. The Australian Curriculum identifies what students need to learn; national learning progressions describe the learning pathway(s) along which students typically progress in particular aspects of the curriculum regardless of age or year level. Where learning progressions exist, they can inform the refinement of the Australian Curriculum.

Defining features of national learning progressions

- National learning progressions are primarily developed from empirical evidence about how learning progress is typically demonstrated by students.
- Empirical evidence is also supported by theoretical understandings of the nature of progress and informed by the practices of teachers.
- They describe observable student behaviours at increasing levels of sophistication or proficiency; and they include as many progression indicators at each level as can be supported by the empirical evidence.
- They have a qualitative aspect (the description of observable student behaviours) and a quantitative aspect (the numerical scale that empirically positions assessments and student responses to them).
- They have a horizontal structure that identifies the different elements, threads or strands of learning, and a vertical structure that divides learning into the levels of increasing proficiency.
- They are independent of a student's year or age, but should show alignment of expected typical progress against the Australian Curriculum.

7.2.4 Towards a shared view of critical and creative thinking

In the discovery phase, ACARA worked with ACER and VCAA to progress work on understanding the elements required to develop a learning progression in critical and creative thinking, by mapping the existing constructs each agency has developed and also mapping them to the ACARA continuum.

The initial document mapping showed high levels of congruence among the key components of the constructs, although they are put together from differing organisational ideas. For example, ACER does not use metacognition as an organiser, but the mapping identified at least five examples of elements VCAA's metacognition in the ACER construct.

The comparison of VCAA and ACER constructs for critical and creative thinking also identified key differences in approaches.

ACER has defined each skill as a unidimensional construct or singular skill. This has been done, in part, for ease of conceptualisation. However, ACER acknowledges that these skills do not necessarily work in isolation and that skills, and other entities such as discipline knowledge, attitudes and values, will also play an important role in how these skills are manifested. ACER also describes the skills of critical thinking and creative thinking in a generalised way, but acknowledges that the skills need context, are best taught and assessed within discipline contexts, and may play out differently in different aspects of the curriculum.

The Victorian Curriculum F–10 recognises that all learning areas and general capabilities in the Australian Curriculum make a distinct contribution to the development of a critical and creative thinker. The Victorian critical and creative thinking curriculum identifies transferable knowledge and skills that can be brought to bear on a range of different contexts and that are linked to, but not repeated or explicit in, content descriptions of the learning areas. In constructing critical and creative thinking into one capability, VCAA accounted for typical conceptualisations of creative thinking that often include a critical element – for example, in evaluating ideas, and for typical conceptualisations of critical thinking that often include a creative element, such as in speculative reasoning.

While the discovery phase work led to some insights that could inform future directions for the development of a learning progression for critical and creative thinking, much more research and work is needed. There is nothing yet like the theoretical and empirical data available in literacy and numeracy on which to base a learning progression for critical and creative thinking.

The overall question of whether national learning progressions are developed for other aspects of the Australian Curriculum beyond literacy and numeracy depends on empirical evidence and policy intent. The proposed online system will be designed so it is possible to incorporate other national learning progressions and aligned assessments if it is subsequently decided that this is both a policy goal and is empirically able to be done. It will also provide data that could be used to inform these progressions and refine those developed for literacy and numeracy. Continuing research into critical and creative thinking will allow that proposition to be tested.

More details of the mapping outcomes for critical and creative thinking is in **Attachment 3**.

7.3 Recommendations

That the updated NLNLPs (Version 3 at **Attachment 4**) are endorsed to replace Version 2 on the Australian Curriculum website, and to provide the basis for further activity during the alpha phase.

That the definition and defining features of national learning progressions (as described in the framework at **Attachment 5**) are endorsed to act as the national standard for existing and future learning progression development.

That the alpha phase further enhances Version 3 of the NLNLPs by:

1. developing a machine-readable form for the NLNLPs consistent with the machine-readable Australian Curriculum that can support version management and links to other resources
2. constructing common numerical measurement scales to underpin the progressions
3. adding milestones that indicate expectations of achievement against the Australian Curriculum for each of the sub-elements in the progressions
4. developing student and parent friendly versions of the progressions.

That the alpha phase identifies opportunities to commission and partner with other organisations undertaking research into learning progressions for literacy and numeracy, to continue to build the evidence base and, in particular, to investigate ways to support teachers of students with diverse needs.

That research into the development of a learning progression for critical and creative thinking continues in the alpha phase using the same principles that apply to the NLNLPs, and building on initial work and insights gained from working with VCAA and ACER in the discovery phase.

8 Assessment resources

8.1 Scope of work

The vision in the expert panel report was that a set of assessment resources be endorsed and made nationally available for teachers to use for formative assessment purposes in their classrooms. This set of assessment resources was to be diverse, able to assess a broad range of constructs within learning progressions, and serve as a best practice model for formative assessment.

In the discovery phase, the Australian Curriculum, Assessment and Reporting Authority (ACARA) set out to identify existing assessments in literacy and numeracy and investigate alignment to the National Literacy and Numeracy Learning Progressions (NLNLPs). ACARA also looked to identify current classroom assessments of critical and creative thinking. In addition, ACARA sought to identify evaluation criteria for selecting quality assessment resources and the technical considerations for aligning assessments to learning progressions.

This involved:

- undertaking a national stocktake of existing assessment resources used by schools
- mapping a range of existing jurisdictional assessments to the NLNLPs
- commissioning technical advice from the Australian Council for Educational Research (ACER) on considerations for evaluating assessment resources and aligning them to learning progressions
- commissioning a paper on recent advances in educational measurement
- undertaking an international scan to identify international assessment tools that most closely meet the vision for online assessment resources presented by the expert reference panel
- exploring the relationship between existing work by ACER and the Victorian Curriculum and Assessment Authority (VCAA) on assessing critical and creative thinking.

8.1.1 Existing assessment resources in literacy and numeracy

Early in 2019, ACARA undertook a stocktake of existing assessment resources being used nationally, including assessments that states and territories have invested in and any existing commercial solutions. The stocktake confirmed the value in starting with literacy and numeracy in the design and development of the initiative. Most of the assessment resources in use in schools focus on various aspects of literacy and/or numeracy; jurisdictions and schools see literacy and numeracy as key foundational areas for development; there are existing assessments and resources (for example, ACER Progressive Achievement Test (PAT), Brightpath and NSW Best Start assessments) with links to existing learning progressions, so there was also well established underlying data to draw on to inform the discovery phase.

Following the stocktake, ACARA approached jurisdictions so that the ACARA literacy and numeracy expert teams could map the following existing assessment resources to assess alignment to the NLNLPs:

- Queensland (Qld) Early Start – on entry to Prep, end of Prep, end of Year 1 and end of Year 2
- South Australia (SA) (United Kingdom (UK)) Phonics Screening Check – Year 1
- New South Wales (NSW) Best Start Kindergarten (Literacy and Numeracy) and Best Start Year 7 (Literacy and Numeracy)
- Victoria (Vic.) English Online Interview – Modules 1 and 2
- Victoria (Vic.) Mathematics Online Interview
- Victoria (Vic.) Fractions and Decimals Online Interview – Years 5–10
- Western Australia (WA) First Steps Diagnostic Assessments (Number).

8.1.2 Existing assessment resources for critical and creative thinking

ACARA worked with ACER and the VCAA during the discovery phase to identify existing assessments and research the development of new assessments for critical and creative thinking. Both VCAA and ACER had recently developed assessments for critical and creative thinking, and agreed to share that work with ACARA to help inform this initiative.

ACER has designed classroom-based assessments for Year 5 and Year 8 students. The assessments are designed to be integrated into classroom practice and are contextualised in the broad domains of the humanities and STEM, but do not require specific content knowledge. Students are involved in a project-based learning module with embedded assessments, during which they explore a short humanities or STEM module delivered on computer via Google Drive. The module is delivered by the regular classroom teacher, after having been trained by ACER researchers in the administration of the assessments. The assessments are delivered over the course of a whole or two half school days.

Through this work, ACER is aiming to develop empirically supported learning progressions and derived achievement scales for critical thinking and creative thinking. ACER also wants to produce a test structure for the assessment of capabilities across learning areas that can be generalised, and templates that teachers can adapt for their classrooms.

The VCAA has been working for some time on assessment tasks to support schools to implement the Victorian Curriculum. To support schools in implementing the critical and creative thinking aspect of the Victorian Curriculum, the VCAA has developed a suite of 27 assessment tasks. The tasks are designed across the full range of levels from Years 1–10. They are undertaken individually. The length of time to administer a task varies between 20 and 60 minutes. Teachers are provided with an administration guide. The tasks are self-contained including stimulus materials and a sequence of questions, most of which are open-ended and ask students to explain their thinking processes. The assessments do not assess the subject matter content used to provide context for the task. They are designed to assess the student's critical and creative thinking in a range of discipline-based tasks.

The assessment tasks were originally developed for paper and pencil administration and are now part of the VCAA Digital Assessment Library. This year the VCAA is re-calibrating the critical and creative thinking tasks and aims to have the revised tasks available by the end of the year. In addition, VCAA intends to tender for the development of additional critical and creative thinking tasks this year.

ACARA worked with the Association of Independent Schools in SA, the SA Department for Education and a group of government schools in NSW to organise a common group of students to undertake the assessments of critical and creative thinking developed by VCAA and ACER. Seventeen schools in SA and NSW agreed to participate. Students in Years 5 and Year 8 undertook both sets of tasks. VCAA also offered schools the opportunity to undertake their critical and creative thinking tasks at other levels. Schools were offered support to implement the tasks, as well as professional learning and reports on student performance.

The aim was to collect further empirical evidence on the measurement properties of the different assessments and, by generating common student data, enable comparison between the two constructs to identify commonalities and differences.

8.1.3 Learning from others and advances in educational measurement

Early in 2019, Education Services Australia (ESA) approached international experts in assessment tool design, measurement theory and formative assessment theory and practice, to learn first-hand from them about the tools they felt best met the goals of the initiative, and to identify innovations occurring in this field.

ACARA also commissioned a paper from Dr Timothy O'Leary, Research Fellow Melbourne Graduate School of Education, to provide an overview of recent advances in educational measurement and identify insights and implications for consideration during the alpha phase (see **Attachment 6**).

In addition ESA, ACARA and the Australian Institute for Teaching and School Leadership (AITSL) met with vendors for products commonly being used in Australian schools, such as Brightpath and Maths Pathways.

8.2 Key findings

8.2.1 Alignment of existing literacy and numeracy assessment resources to the NLNLPs

The identified jurisdictional literacy and numeracy assessments were mapped to targeted sub-elements of the NLNLPs.

All jurisdictional assessments were highly aligned to the NLNLPs. A well-aligned assessment was defined as having at least 75 per cent alignment of test items to indicators. The average alignment across all assessments was 90 per cent, with the SA (UK) Phonics Screening Check, NSW Best Start numeracy assessments and WA First Steps Diagnostic Assessment (Number) assessed as 100 per cent aligned. While highly aligned, none of the assessment resources mapped to all sub-elements of the NLNLPs. For example, the SA (UK) phonics screening check only targets one sub-element in the literacy progression (phonetic recognition and word knowledge), while the Queensland Early Start assessment covers most of the sub-elements of the NLNLPs.

The mapping analysis of these existing assessments also identified areas for refinement of the content of the NLNLPs, and in some cases affirmed the findings of the other mapping exercises described previously. The detailed findings from the mapping of the jurisdictional assessments is in **Attachment 2**.

Given the close alignment of these existing assessment resources to the NLNLPs, they are suitable for use in the alpha phase, noting further work is needed to ensure the assessments meet the quality assurance criteria detailed below.

The mapping also identified gaps in the availability of assessment tasks for all elements of the NLNLPs and across all year levels. Most of the jurisdictional assessments are targeted at the early years, and while commercial products (such as ACER's PAT assessments, the Brightpath resource or Maths Pathways) cover more years of schooling, they do not cover all aspects of the NLNLPs. Opportunities should be explored in the alpha phase to work with interested jurisdictions and providers to expand the range of assessment tasks/tools in literacy and numeracy, applying quality assurance criteria and investigating innovative design.

8.2.2 Assessing critical and creative thinking

VCAA and ACER agreed to explore opportunities to share existing data and align their immediate research activities on assessing critical and creative thinking, with the aim of being able to undertake common-student equating across both sets of assessments. The psychometric analysis will also provide empirical evidence of areas of commonality and difference to complement the construct mapping exercise.

The VCAA and ACER assessment tasks were administered to a set of common students in Year 5 and Year 8. The schools had until the end of Term 3 to complete the tasks. The marking and psychometric analysis will be completed by the end of the year.

Equating is generally performed in order to place the results from two different assessments, or test forms within an assessment, on a common scale so they can be directly compared. A series of psychometric analyses are performed to ensure any claims of comparability are valid. In this case, the aim is not principally to place the results of the VCAA and ACER assessments on a common scale (though this may be a by-product). Rather the aim of the process is to interrogate the results of the analyses to explore whether, how and to what extent the two assessments appear to be measuring a common construct.

Having established a broad level of construct agreement in the mapping exercise, this exploratory analysis will reveal whether there are areas of particularly strong (or weak) alignment. The results will help inform a common understanding of the construct of critical and creative thinking, which is an imperative underpinning of any future work on learning progressions for critical and creative thinking.

There are numerous possibilities for future work moving toward learning progressions and aligned assessments for critical and creative thinking. Existing definitions and continua should be refined in light of the evidence from the collaboration to date. Not yet fully understood is the role that domain-based knowledge plays in critical and creative thinking. Empirical research could be conducted in an alpha phase, administering assessments allowing for different levels of critical and creative thinking proficiency to be displayed, while controlling the level of domain-based skill required. Such work would help explore the impact of domain-based knowledge on the general capabilities and inform the extent to which these capabilities are general.

8.2.3 Evaluating assessment resources

ACARA commissioned ACER to provide advice on the technical considerations for evaluating assessment tasks and resources and aligning them to learning progressions. An evaluation framework or a set of criteria is required to support quality assurance and endorsement of the assessment resources that will be made available to teachers in the online system.

It is proposed that developers of assessment tasks and resources will need to demonstrate their resources can meet six quality assurance criteria as highlighted in the box below.

Quality assurance criteria for assessments aligned to national learning progressions

The following criteria will be used to evaluate, select and endorse assessment resources for inclusion in the national online formative assessment system:

1. the alignment of the assessment task/resource with the national learning progression (this requires an assessment of both qualitative alignment and empirical alignment)
2. the development process for the assessment task/resource
3. the content of the assessment task/resource
4. the diagnostic power of the assessment task/resource
5. the guidance for next steps in instruction associated with the assessment task/resource
6. the practical information about the use of the assessment task/resource.

The process of evaluation should be transparent and involve independent expertise reviewing the assessment resource and any supplementary material associated with its use, in conjunction with any evidence and information provided by its developers.

The process of applying the criteria will need to be tested in the alpha phase with some of the identified assessments from jurisdictions, as well as with commercial providers, to ensure it does not unreasonably limit the set of endorsed assessment resources. It may be that each criterion can be satisfied to different standards (for example, gold, silver, bronze). Teachers could then be free to choose the assessment resources that best address their immediate instructional objectives, fully aware of the features and relative quality of the assessment resources they are considering.

The assignment of a particular standard of quality to an assessment resource should also be open to review after some time. This is not only fair, but necessary, because, when they are endorsed and made available to teachers, many of the assessment resources will have access to much larger pools of respondents than they have ever had before, which will result in a great deal of new data that can be used to strengthen claims about quality.

More details of the criteria and the process are in the framework at **Attachment 5**.

8.2.4 Assessment gaps, advances in educational measurement and opportunities

The international scan and consultation with international experts identified three international assessment tools as worth exploring for their design, delivery and reporting features:

- ACTaspire <https://www.actaspire.org/>
- MAP (Measures of Academic Progress) <https://www.nwea.org/>
- e-AsTTle (Assessment Tools for Teaching and Learning) <https://e-asttle.tki.org.nz/>.

None of the three exemplar tools directly fits the purposes of this initiative, but they all have aspects of design, functionality and measurement that can provide useful learnings.

Consultation with international experts also raised important areas for consideration. Many of these considerations were also identified in Dr Timothy O’Leary’s paper on recent advances in educational measurement (see **Attachment 6**). Key collective insights about advances in educational measurement for consideration in the next phases of development are:

Cost effective assessment development – automated item creation and automated test assembly should be considered as features of the development process and test item generation functionality should be explored early in the design process.

Innovative test design – with evolving options for assessment construction and delivery, the online system should aim to be adaptive and multi-staged in nature, and richer in terms of the item format, response actions, media inclusions and interactivity. It is also worth considering if and how game-based and/or virtual performance assessments might be incorporated.

Automated scoring – using automated approaches to score writing content should be considered as this provides the capacity to perform deeper assessment of student knowledge in a more efficient manner.

Cognitive diagnostic assessment – as cognitive diagnostic assessment is an emerging facet of educational measurement, it is worth considering further research to determine its applicability to this initiative. Traditional test theories such as Classical Test Theory and Item Response Theory are widely used to determine student location along a single proficiency continuum. The Cognitive Diagnostic Model, currently the subject of research interest, should be investigated as a test theory for the online system, given its potential to provide more diagnostic information related to a set of skills or attributes.

Validity and score reporting – given that validity is a fundamental consideration for test development, the initiative must ensure a robust methodology from the outset and score reporting must be prioritised as a component of the design and development process.

The project should look for opportunities in the alpha phase to explore these considerations, and in particular work with and learn from existing products that demonstrate some of these aspects, such as Maths Pathways in Australia and the best of the international exemplars.

8.3 Recommendations

That the process of applying the quality assurance criteria (as outlined in **Attachment 5**) be tested in the alpha phase with some of the identified assessments from jurisdictions, as well as with selected commercial providers, to ensure it does not unreasonably limit the set of endorsed assessment resources.

That once measurement scales are developed for the NLNLPs in the alpha phase, national and jurisdiction assessments (such as National Assessment Program: Literacy and Numeracy (NAPLAN), NSW Best Start and SA (UK) Phonics Screening Check) be calibrated to the scales, using an expert-led process of mapping assessment item content to progression indicators and (where possible) to ensure the mapping can be validated by available assessment data from local and national tools.

That research into assessing critical and creative thinking continues in the alpha phase, building on the work commenced with ACER and VCAA in the discovery phase to deepen understanding of critical and creative thinking and

create opportunities to further investigate options for the design of learning progressions and aligned assessments for this general capability.

That work with interested jurisdictions, research partnerships and commercial providers explores the application of key advances in educational measurement to the design of the online system, and, in particular, to explore innovative test design for expanding the range of assessments in literacy and numeracy.

9 Digital resources

9.1 Scope of work

Both the Excellence Review and the expert panel report anticipated that the development of an online formative assessment system would be supported by high-quality digital resources.

In the discovery phase, Education Services Australia (ESA) examined how schools and teachers are currently being supported to access high-quality online digital content, and the extent to which content can be mapped against the National Literacy and Numeracy Learning Progressions (NLNLPs). In addition, ESA sought to understand user pain points and needs; identify key criteria for draft content specifications for digital resource content; examine licensing and procurement options; propose search functionality requirements; and identify system integration needs.

9.1.1 Digital resources content scan

ESA undertook a systematic scan of existing jurisdictional and commercial online digital content from both national and international providers. Examples of sources scanned for resources included commercial sites such as TeacherTube, government-supported sites such as Scootle, publicly available digital content housed on government and non-government education sector websites, international websites such as Google for Education, and keyword searches of generic internet search engines.

The review of existing digital content assisted in:

- identifying the types of digital content being accessed by teachers and students for learning
- assessing the quality of the content being accessed
- identifying the degree of alignment to the NLNLPs and the Australian Curriculum
- highlighting where potential gaps in digital content may exist.

Quality assurance criteria were developed to support the review of digital content. The complete rubric is at **Attachment 7**, with key criteria highlighted in the box below.

Quality assurance criteria

- Breadth
- Depth
- Integrity
- Alignment
- Purpose
- Research-based practice (reliability)
- Evidence-based impact
- Interactivity/Flexibility
- Accessibility (inclusivity)
- Relevance

A sample set of Scootle, national and international digital content was selected and mapped against the NLNLPs and cross-referenced with quality assurance criteria in the areas of reading, writing, number and algebra. This approach was taken to ensure rigour and validity within the process, and to identify any gaps in current digital content. A simple traffic light colouring system (green, amber and red) was used to highlight strengths and gaps found in the sample digital resources and content. The full results of the online content scan and analysis can be found in the *Online digital content analysis report*.

9.2 Key findings

9.2.1 User research findings related to digital resources

A synthesis of the user research findings identified the following recurring themes for teachers and school leaders in relation to accessing high-quality online content:

- Teachers lack confidence in assessing the quality of digital resources and how to use the content effectively.
- It is time consuming to find digital resources that assist teachers to plan the next steps for groups or individual students.
- It is time consuming to have to search for online content from a variety of sources (for example, Google web searches, national and international sites and commercial products) as opposed to going to one place.
- It is time consuming to align online digital content to meet curriculum outcomes in the first instance and then to also align it to the NLNLPs.
- There is limited access to digital content that supports students with disability and learning difficulties.
- Teachers want access to offline content alternatives when there are not enough devices, or there are technology issues.

The user research revealed that users wanted access to a federated system that could take assessment information collected by a teacher and suggest, with a high degree of alignment accuracy, quality-assured digital resources that may assist a student in progressing in their next learning steps. Such a single cohesive system does not yet exist. The user research showed that there is a significant burden on teachers to find, evaluate and align resources to the curriculum they teach. Most teachers recognised this as a substantial information need – they need direct access to resources that are quality-assured, evidence-based, research-based and curriculum-aligned. An innovative component of the proposed solution therefore is a ‘suggestion engine’ that would customise and prioritise recommendations to teachers about resources and approaches to improve student learning progress.

The *Search functionality and system integration needs report* documented search requirements and integration needs. Sample user maps, built on the recommendations and user stories in **Attachment 1** were developed to provide a high-level vision of what the user experience could look like. In the alpha phase, these user maps can be a starting point for further discussion around feasibility, viability and desirability with users and key stakeholders.

9.2.2 Digital resources review

The analysis and mapping of the sample digital content to the NLNLPs found significant ‘gaps’ within existing digital content when the age appropriateness of learning objects was considered. For example, content or visuals represented in current digital content aligned to early conceptual ‘place value’ or ‘phonological awareness’ ideas that were not age appropriate for students in Years 5–10.

Furthermore, some areas of the NLNLPs’ sub-elements were found to be under-represented. For example, there were limited digital resources available for students in Years 3–10 in relation to literacy-reading ‘Understanding Texts’. A further gap in digital content was found in the areas of research-based evidence of impact, and digital content related to highly effective teaching in action. Online digital content is also under-represented for the early years and to support students with disability.

Of the 6,925 online digital content and interactive learning objects sampled from Scootle, 4,280 were scanned from the Australian Curriculum: English. Of these:

- 23.6 per cent of the online content assisted teachers with curriculum and pedagogical practice – in the form of videos accessed via links to external sources, such as the Australian Institute for School Leadership (AITSL), or found in Scootle or text sources included within Scootle (for example, lesson plans and collections).
- 17.9 per cent could be made relevant to NLNLPs with additional refinement and updates in regard to the purpose of the online resource and how it delivers the learning progression sub-element or progression indicator.
- The majority of student user digital interactive learning objects for English (literacy) were found in years F–3 and involved cloze activities, grammar and or phonological activities.

- Student user interactive digital resources decrease once the curriculum moves to areas such as comprehension in reading and writer's craft elements in writing for Years 3 and above.
- There were more student user online interactive learning objects (by year level) for Mathematics (numeracy) than English on Scootle, especially interactive learning objects involving place value and number concepts.

The process of alignment showed that, when mapped against the quality assurance criteria, the quantity of available resources from the existing pool is reduced. More than half of international commercial content providers (for example, Khan Academy, YouCubed and Starfall) widely used in schools were found either to not align, or only superficially align, with the Australian Curriculum, and even fewer resources had any alignment to the NLNLPs.

In addition, the majority of content analysed nationally, internationally and in Scootle did not make clear or explicit:

- the purpose of the digital resource in addressing the needs of students
- the links back to the assessment used
- the relevant research to support why or how the online digital content or pedagogical rationale will support student users to progress in their learning.

The sample content examined did meet the quality assurance technology specifications (including accessibility) for integration. A finding from the mapping exercise is that potential third-party providers will require additional local curation to meet the quality criteria specifications if the content is to be dynamic, robust and usable across all education jurisdictions.

9.2.3 Draft content specifications and licensing criteria

Following analysis captured in the *Online digital content analysis report*, ESA drafted content specifications for online content, including accessibility and metadata requirements as they relate to the NLNLPs; developed guidance for the curation of existing online content; and drafted guiding principles for third-party providers and the future development of new online content. These specifications reflect user needs, international standards for digital online content and technological advancements. The specifications also address the need for interoperability, flexibility, robustness and scalability. While the specifications are based on requirements related to the NLNLPs, they can also apply to digital content in support of any national learning progression in the future (see the *Draft content specifications for existing, third-party and new digital content report*).

Given the need to broaden the collection of digital content, copyright and licensing guidelines were also investigated during the discovery phase, and recommended for exploring further in the alpha phase. An examination of licensing options found that flexibility tends to become more restrictive, as does the quantity of online content, if licensing negotiations are required with third-party providers for their content. The best option would be public domain, as this is the most open licence. Further detail is available in the *Draft content specifications for existing, third-party and new digital content report*.

9.2.4 Search functionality and system integration needs

The proposed suggestion engine should be able to address the user needs around ease of access to quality-assured, evidence-based, research-based and curriculum-aligned resources by:

- providing personalised recommendations of digital resources that consider current student attainment levels and capabilities, confirmed by assessment data
- continuously and intuitively refining recommendations by using learning analytics
- developing a ranking algorithm, ensuring that users always receive digital content and resources relevant to them
- allowing exploration and discovery of digital content and resources based on the Australian Curriculum and the NLNLPs, with the addition of other metadata in an agreed schema
- enabling integration between systems to allow seamless exchange of learning and assessment data.

Further detail is available in the *Search functionality requirements and system integration needs report*.

Figure 5, below, is a visual representation of the proposed suggestion engine and its corresponding system integrations.

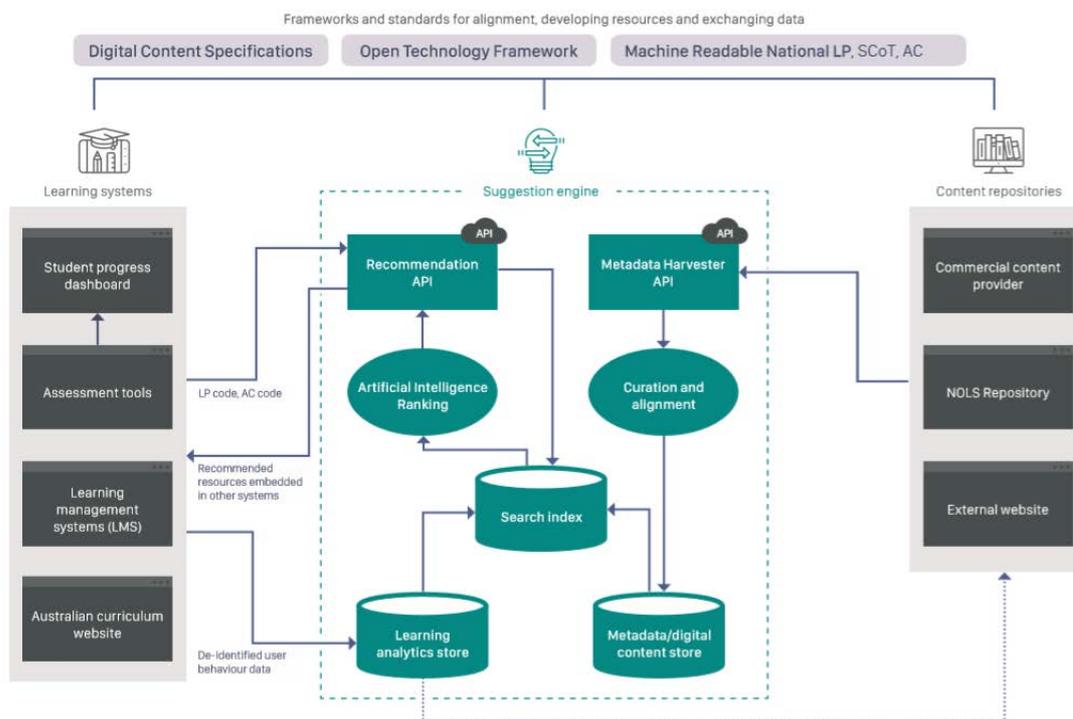


Figure 5: The proposed suggestion engine and corresponding system integrations

Underpinning the suggestion engine are the digital content specifications and the technical standards for how external systems could access a federated system and align resources to the NLNLPs. See **Attachment 7** for a visual representation of the proposed suggestion engine and its corresponding system integrations.

9.3 Recommendations

That the following activities be undertaken in the alpha phase to further investigate and test the findings from the discovery phase:

1. Identify new digital content in literacy and numeracy to test the application of the draft content specifications and to provide greater coverage across the NLNLPs.
2. Test the draft content specifications (including the quality assurance rubric, metadata schema and accessibility requirements in Attachment 7) to validate and/or refine them.
3. Test licensing parameters.
4. Test the search functionality requirements and the system integrations and invite jurisdictions and commercial providers to partner in these activities.
5. Undertake a technology scan and use the findings to inform the development and testing of the suggestion engine functionality, including artificial intelligence ranking, as a new module to be initially integrated with Scootle in the ecosystem.
6. Establish a protocol to ensure consistent input of metadata to facilitate easy and efficient navigation for users.
7. Update the Schools Online Thesaurus to encompass the language in the NLNLPs to support searchability and retrieval of content for users.
8. Develop a digital content plan following further consultation and collaboration with interested jurisdictions and commercial providers and develop and design new digital content in literacy and numeracy to provide greater coverage across the NLNLPs.

10 Open Technology Framework

10.1 Scope of work

As part of the discovery phase of the initiative, a proposed Open Technology Framework (OTF) has been drafted to describe how data will need to be exchanged between the processes and systems that support the vision of the initiative. An OTF will facilitate an integrated and seamless ecosystem of student information for teachers.

The OTF is a portfolio of interoperability standards selected to ensure that all solutions identified for use, or created under the auspices of the initiative, can share information seamlessly to create the most effective outcomes.

The activity has been undertaken in two phases: a consultation phase; and an OTF drafting phase.

During the initial phase, consultations were held with representatives of school system authorities and a cross-section of commercial product suppliers involved in online assessment and learning management. As part of the scope for the study, an approach was made through the chief information officers of the department of education in each state and territory to undertake consultation with those responsible for IT systems in their respective jurisdictions. Invitations were also extended to the Catholic and independent school sectors through their representatives on the National School Interoperability Project Steering Group. From a pool of over 250 potential product suppliers, a shortlist process identified 14 to be interviewed. Further details and the full list of organisations and people interviewed are in the *Open Technology Framework consultation report*.

The consultations aimed to establish an understanding of the current technical capabilities available to support formative assessment, and explore the role of interoperability standards within possible future formative assessment approaches. The challenges and opportunities that may arise in adopting a coordinated national approach were considered. This activity produced the consultation report, which is a summary of findings and a record of all responses from system and vendor consultations.

The first draft of the OTF was prepared based on the findings of the consultation report. It identifies the data exchanges that will be required by the initiative, existing standards that can be used to support those exchanges, and current standards gaps.

10.2 Key findings

The consultation confirmed that while mature formative assessment products are in widespread use, most of these products currently operate in information silos with limited scope to integrate with other IT systems and workflows used in schools.

Discussions also confirmed that student information systems and learning management platforms used by the majority of schools (both government and non-government) can exchange data with external systems using existing nationally agreed interoperability standards. However, integration with assessment systems has not yet been made a priority (aside from the national platform used for National Assessment Program: Literacy and Numeracy (NAPLAN) Online).

All organisations interviewed recognised the importance of streamlining the exchange of data between assessment tools and other IT products used in schools. All organisation acknowledged that this is necessary if the use of the National Literacy and Numeracy Learning Progressions (NLNLPs) and online formative assessment for individual students are to become part of mainstream practice in Australian school education.

The report in **Attachment 8** identifies six ongoing areas of work to be supported, and eight critical information exchanges between those work areas that will require ongoing interoperability support. The six identified work areas are:

1. **Reference data:** Creating and maintaining core shared information such as curriculums, learning progressions, measurement scales, teaching standards.
2. **Resources:** Creating assessment and teaching resources and adding metadata and classification data to resources and resource collections.
3. **Assessment:** Choosing assessments, delivering them to students, capturing responses and scoring and awarding results.
4. **Analysis:** Helping teachers and students to make the best sense of results arising from assessments.
5. **Teaching and learning:** Recording the ongoing daily activity of teaching in the classroom, capturing observations, planning and delivering lessons.
6. **Registration:** Managing core student personal information, authentication and identity information that allows students to be enrolled in systems that provide assessments and allow teachers access to assessment, content and analytics services.

Suitable standards have been identified for most, but not all, of the required information exchanges. In particular, work is required to enhance formative assessment reporting, including the development of a standard that captures the diagnostic detail required of formative assessment reporting.

In addition, some existing standards will need to be reviewed and enhanced for formative assessment results, particularly for rubrics. Pilot work is required to establish the feasibility of automated or semi-automated alignment of learning progressions with test items and learning resources.

Pilot work is also required to find effective ways of closing the data transfer gap between formative assessment and teacher planning. This requires moving beyond the current PDFs and data walls to feeding data directly into local school/classroom planning systems.

10.3 Recommendations

That in the alpha phase, work is undertaken to identify the current suitability of the identified standards and close identified gaps (see **Attachment 8**) and agreement is sought from stakeholders to use the identified standards going forward.

That the alpha phase should include activities to determine the most effective approach to support information exchanges by trialling various automated and semi-automated approaches for the scalable exchange of data. This will enable the alignment of search, assessment and reporting capabilities to the machine readable NLNLPs.

11 Professional learning and implementation support

11.1 Scope of work

For learning progressions and online formative assessment to impact positively on learning, teachers and school leaders will need to be able to access consistent, quality, standards-based professional learning and establish conditions for effective implementation over time. Professional learning and implementation support for the initiative should aim to build the capacity of teachers and school leaders to embed effective assessment practices in schools and to use learning progressions and assessment resources in a way that promotes each student's growth to higher achievement. The most effective professional learning provides opportunities for teachers to collaborate and learn from each other, and from experts, to work on areas of their practice to meet the current and future needs of students.

The purpose of the activities in the discovery phase was to determine what professional learning will be needed for the initiative to have a positive impact on learning, and to inform recommendations for the future development, testing and trialling of professional learning to support educators to understand:

- the purpose and uses of learning progressions and the principles of effective formative assessment
- how to integrate learning progressions and online formative assessment resources with other teaching practices
- how to use different forms of evidence of learning to inform teaching and school leadership
- how to overcome implementation challenges.

The goal during the discovery phase was to clarify how different professional learning modes could fit together to create a comprehensive program of professional learning for teachers and school leaders from a variety of school types, locations and cultural contexts. The consultation also considered how testing of professional learning resources could be aligned to, and potentially included in, existing and new professional learning approaches in systems and sectors.

The scope of the work undertaken during the discovery phase included:

- engagement with the teaching profession, including leading teachers and school leaders
- consultation with key stakeholders and experts in teaching and school leadership, including curriculum and assessment authorities, education system and sector leaders, professional learning providers, vendors, academics, professional associations and independent consultants
- preparation of an environmental scan on current professional learning and support offered by education systems and sectors in Australia
- review of evidence in published research literature on relevant, high-quality studies examining the impact of formative assessment and the professional learning and support required to develop teaching practice effectively
- review of findings on the current state of professional learning in Australia
- development of professional learning design and trial specifications.

11.1.1 Sources of insight into current professional learning needs and provision

The user research detailed in Chapter 6 indicated current needs of teachers and school leaders relating to the initiative, with implications for professional learning and other forms of implementation support. The Teacher Practice Reference Group (TPRG) was formed to provide a forum for direct engagement with teachers and school leaders and to ensure that the design, development and proposals for implementation of the initiative were enhanced by their expertise and insights. They provided specific input on current challenges of practice aligned to the *Australian Professional Standards for Teachers* and the *Australian Professional Standard for Principals* to help identify relevant learning objectives. They gave insight to professional learning preferences by sharing their experiences of effective professional learning and considered how implementation challenges could best be overcome.

The Australian Institute for Teaching and School Leadership (AITSL) commissioned an environmental scan to determine the professional learning and implementation support currently provided by systems and sectors and to help understand what lessons can be learnt from related initiatives and products or resources, in Australia and internationally. The environmental scan did not consider other professional learning accessed or conducted by schools locally, although it recognised the potential high impact of these school-based forms of learning reported anecdotally during user research and other forms of consultation. The complete *Environmental scan of professional learning and implementation support for formative assessment* is available for reference.

AITSL's School Leadership and Teaching Expert Standing Committee has been appointed as experts to provide advice on work to promote excellence in teaching and school leadership, to maximise impact on student learning in all Australian schools. AITSL's Professional Growth Network consists of representatives leading the professional development of teachers and school leaders from government, Catholic and independent sectors in all states and territories. These groups guided the initiative on professional learning needs and implementation considerations to promote approaches likely to have high impact on practice and learning.

11.1.2 Exploration of the evidence base for formative assessment

AITSL commissioned a rapid literature review to identify national and international research on effective formative assessment practices of teachers and school leaders, including their current capacity, challenges and needs. The review provides an analysis and critical review of evidence-based research relevant to formative assessment practices, including but not limited to the use of online assessment tools. See **Attachment 9** for the literature review executive summary. The complete *Literature review: Formative assessment evidence and practice* is available for reference.

Further evidence was obtained from activities previously undertaken by AITSL between April and December of 2017 to consider a broad evidence base and options for improving the quality of professional learning for teachers. This work was carried out in consultation with a wide range of key stakeholders and included a survey of more than 1,500 individuals from across Australia. The aim was to learn more about what professional learning Australian teachers undertake, how they undertake it, and whether it is effective. Findings from this work are published on the AITSL website in the [Uncovering the current state of professional learning for teachers](#) report, and were considered as foundational to the further research carried out during the discovery phase, which focused more specifically on professional learning to support this initiative.

AITSL considered themes emerging from all these research and consultation activities to develop professional learning design specifications and trial considerations that could inform recommendations on the future phases of the initiative. The report on professional learning design specifications is in **Attachment 10**.

11.2 Key findings

11.2.1 Towards a common language and understanding of formative assessment

Formative assessment is not consistently defined, nor is the practice consistently understood and enacted in schools. Review of the research literature reveals there is currently no agreed definition of formative assessment, and that formative assessment does not represent a well-defined set of practices. This was further reflected in the differing language and definitions of formative assessment evident in policy documents from across jurisdictions and during the consultation with system and sector leaders, teachers and school leaders.

While formative assessment definitions vary, most describe formative assessment as 'ongoing' and happening during 'teaching and learning.' A vital step in the formative assessment process is teachers using evidence to adjust their practice. Adjustments might include providing specific feedback to a student about his or her work, which includes information about next steps, or re-teaching a concept in a different way. Dylan Wiliam distinguishes between adjustments that occur over different time periods: a short cycle (adjustments made between and even within lessons); a medium cycle (within and between instructional units) and a long cycle (across marking periods, quarters

and semesters) (Wiliam 2006).¹ He points out that the evidence suggests that short and medium-cycle adjustments have more impact on student learning.

Despite variations in terminology, understanding and application, the research indicates there are models that seek to resolve this, as summarised in the following definition, drawing on the language of W James Popham and Dylan Wiliam.

Definition of formative assessment

Formative assessment is an adaptive process where assessment evidence of student learning is used by teachers to modify their instructional practices or by students to adjust their learning strategies. An assessment functions formatively to the extent that evidence gathered during learning is interpreted and used, by teachers and students, to make better teaching and learning decisions.

Formative assessment has the greatest impact on learning when assessments are aligned with a validated construct of learning progress, and when followed by evidence-informed teaching interventions and frequent, embedded formative feedback.

This definition recognises that what makes assessment practices or objects formative is the way they are used to improve teaching and learning, and not only the way they are designed and constructed. Such a definition can help teachers and school leaders understand how various forms of evidence of learning can function together to support improvements to teaching and learning.

11.2.2 Current teaching and school leadership needs for effective formative assessment

Practice relevant to the use of learning progressions and formative assessment, and effective leadership of change and innovation associated with their implementation, is described in multiple related areas of the *Australian Professional Standards for Teachers* and the *Australian Professional Standard for Principals*, and they are useful organisers of differing levels of expertise and professional learning needs.

The *Australian Professional Standards for Teachers* are a public statement of what constitutes teacher quality. The standards define the work of teachers and make explicit the elements of high-quality, effective teaching that will improve educational outcomes for students. Table 1 below lists the focus areas of these standards that describe the practices that teachers at all levels of expertise will enact to carry out formative assessment effectively. While this is not an exhaustive list, these are the areas identified by the TPRG as being most relevant to target with professional learning for the initiative.

¹ Wiliam, Dylan. 2006. 'Formative Assessment: Getting the Focus Right'. *Educational Assessment* 11 (3/4): 283–89.

Table 1. Relevant focus areas of the Australian Professional Standards for Teachers

Focus areas	
1.5	Differentiate teaching to meet the specific learning needs of students across the full range of abilities
2.1	Content and teaching strategies of the teaching area
2.5	Literacy and numeracy strategies
3.4	Select and use resources
3.6	Evaluate and improve teaching programs
3.7	Engage parents/carers in the educative process
5.1	Assess student learning
5.2	Provide feedback to students on their learning
5.3	Make consistent and comparable judgements
5.4	Interpret student data
5.4	Report on student achievement
6.3	Engage with colleagues and improve practice
6.4	Apply professional learning and improve student learning

All teachers are expected to know, understand and participate in formative assessment-related practices as described in the Graduate and Proficient career stages of these standards. Teachers operating at the Highly Accomplished and Lead career stages will routinely take on roles that guide, advise or lead others – drawing on in-depth knowledge of curriculum content and the skills to plan, evaluate and modify teaching programs to improve student learning. These teachers are effective and skilled classroom practitioners who work collaboratively to improve their practice and the practice of their colleagues. For example, they lead work with colleagues to diagnose learning needs, identify teaching interventions and modify teaching practices.

Teachers operating at the Highly Accomplished and Lead career stages have the potential to play a significant role in this initiative, and will need to be equipped to lead collaborative activities and improve practice in their schools so that an increasing number of teachers can operate at a highly effective level. It will be important for professional learning to not only develop the expertise of these teachers, but to also offer teachers a community of practice so they continue their own learning as they help other teachers to develop their formative assessment practices.

The needs of school leaders are equally important because they establish a vision, drive and monitor change and innovation, and provide resources for the school professional learning model. The practices of effective school leadership are described in the *Australian Professional Standard for Principals and the Leadership Profiles*.

The expectations for distributing and improving leadership at all levels in schools is further described in *Leading for Impact: Australian guidelines for school leadership development*. This recognises that ensuring quality teaching in

schools requires leadership and shared responsibility from teachers and school leaders with a range of formal and informal roles including, but not limited to, the school principal. Table 2 below lists the expected actions of effective school leaders, identified through consultation as most relevant to the initiative. These actions are described further in **Attachment 10**.

Table 2. Relevant leadership practices from the Australian Professional Standard for Principals and the Leadership Profiles

Professional practices	
Leading teaching and learning	Ensuring consistent and effective curriculum and pedagogical approaches
	Maintaining a feedback culture based on evidence of learning impact
Developing self and others	Implementing effective performance and development processes
	Identification of professional learning needs that will address student learning needs
Leading improvement, innovation and change	Effective change management and supporting innovative practice
Leading the management of the school	Meeting compliance requirements
Engaging and working with the community	Identifying culturally appropriate resources and teaching strategies

The review of the research literature revealed that formative assessment is most likely to impact on learning when assessments are aligned with a validated construct of learning progress, and when they are followed by evidence-informed teaching interventions and regular, embedded formative feedback (Lane et al, 2019)². Formative assessment relies on a valid underlying construct of how learning progresses, so the evidence gained from assessment can support teachers to make informed judgements about students' current understanding and misconceptions, and where they need to go next in their learning. User research and consultation with teachers and school leaders made clear that the evidence on high-impact assessment practices is not consistently translated into practice in schools.

Making appropriate decisions about the next steps in teaching is often the most challenging part of the formative assessment process. Scholars are increasingly realising that low pedagogical content knowledge is a barrier to the effective use of formative assessment and that teachers need to understand how learning progresses from simple to complex in their learning area. User research and consultation identified schools that have gone to considerable effort to create their own learning progressions to address this need. Use of the NLNLPs, when supported with professional learning, was found to be effective in building teachers' understanding of curriculum and their confidence in monitoring student progress to determine the best next steps in teaching and learning.

² Lane, R, Parrila, R, Bower, M, Bull, R, Cavanagh, M, Forbes, A, Pellicano, L, Powell, S and Ryan, M. 2019. *Formative Assessment Evidence and Practice Literature Review*. AITSL.

11.2.3 Recommended focus of professional learning for the initiative

Professional learning for formative assessment must cover different content for teachers and school leaders to have the knowledge and skills they need for continuous improvement and innovation. Formative assessment is complex, so there is not one single learning objective for educators, but many.

Findings indicate that the professional learning for this initiative needs to address:

- Formative assessment language, practice, benefits and expectations as described in the Australian Professional Standards for Teachers
- Understanding and interpretation of evidence of the impact of teaching on learning
- The purpose, use, and benefits of the NLNLPs to monitor student progress and inform next steps in teaching and learning
- Understanding of a variety of assessment approaches and building capacity to interpret data and make valid inferences based on multiple sources of evidence
- Strategies for effective feedback practices, including regular and embedded feedback focussed on next steps in learning.
- Teaching and learning strategies to break down critical concepts, find appropriate entry points for all students and redesign instruction to match students’ assessed understandings and misconceptions and translate the information obtained to inform effective instruction.

Some of this professional learning content is universal, meaning that any teacher might need the same knowledge and skills. Other content is specific to a teaching area or year level, meaning that professional learning should be tailored to have the greatest effect across the whole of the profession. For example, all teachers could collectively learn about common definitions and benefits of formative assessment. However, if teachers are learning about how to decide next steps of teaching after assessing student learning, they will likely benefit most if learning is targeted to their teaching area and year level. The range of professional learning content for teachers, from general to specific, is further illustrated in Figure 6 below.

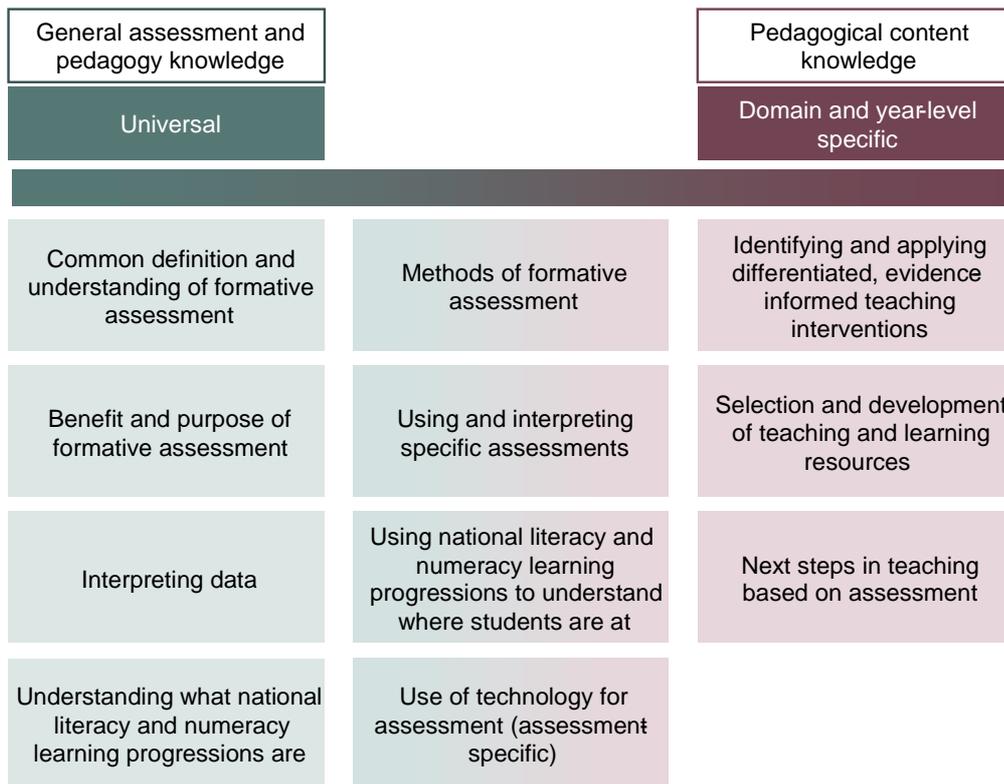


Figure 6: Professional learning content for teachers

Elements of the professional learning content for school leaders overlap with the teacher content. The difference will be that leaders who are working at the whole-school level need additional focus on vision setting, leading innovation and change, and high-level formative assessment knowledge, whereas leaders working more closely with teams of teachers need essentially the same detailed knowledge about formative assessment practice as teachers.

The professional learning for school leaders and leading teachers needs to address:

1. leading the interpretation of learning data and identifying patterns in aggregated data that reveal learning needs of students and learning needs of teachers
2. establishing and maintaining school-based professional learning communities engaged in instructional inquiry and focused on instructional improvement, student attainment and progress
3. establishing distributed leadership strategies to build shared vision and ownership and align expertise and resources that will support teachers’ learning about effective practice.

The figure below further describes these needs in three categories of professional learning content for school leaders: understanding formative assessment; goal setting and monitoring; and supporting professional learning.

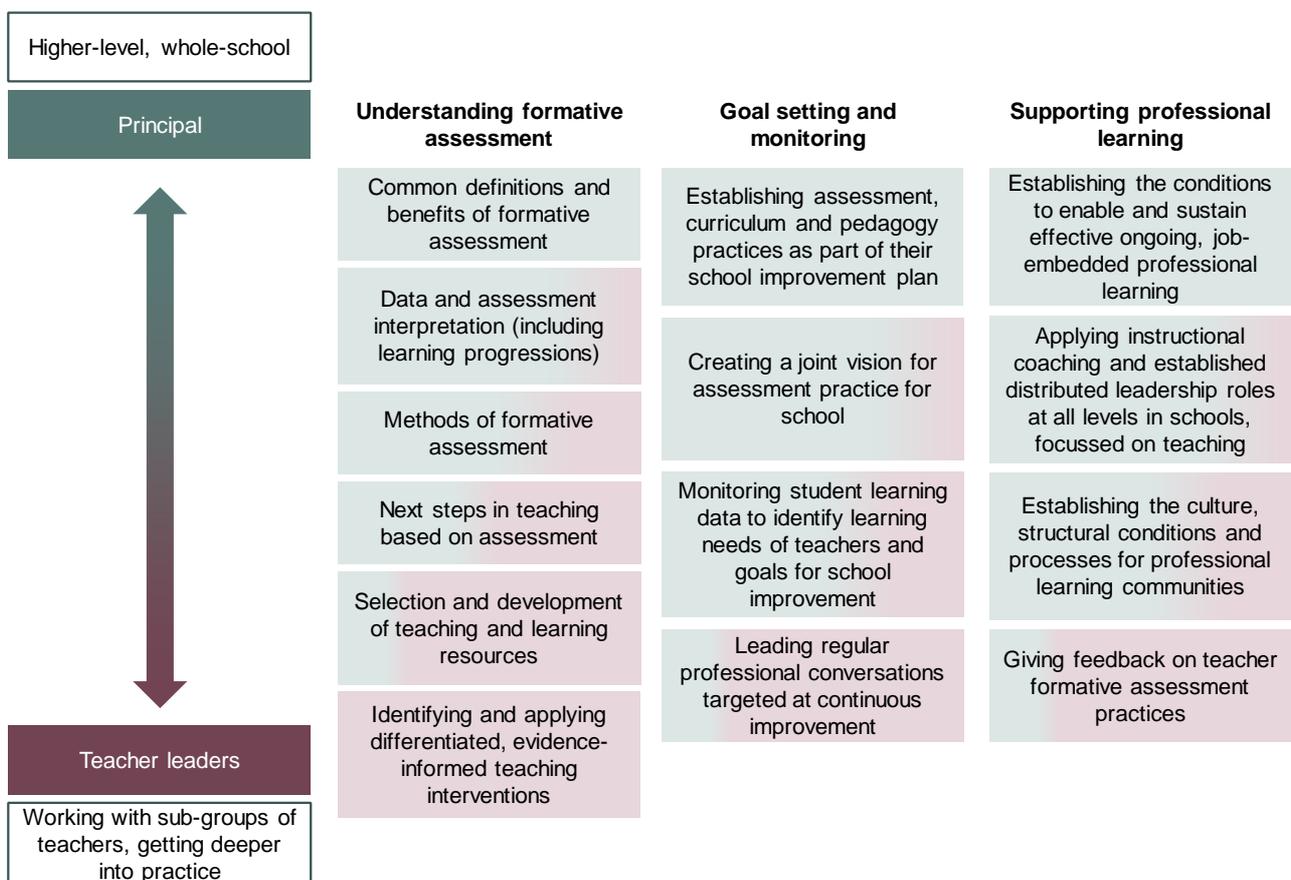


Figure 7: Professional learning content for school leaders

11.2.4 Modes of professional learning

Collaboration is critical for effective professional learning, as noted in the *Australian Charter for the Professional Learning of Teachers and School Leaders* and other professional learning frameworks across Australia. The research is clear that collaboration has more influence on effective classroom practice than isolated, individual professional development because it challenges educators’ existing beliefs and pushes them to explore new practices, developing their own knowledge and that of their peers.

Feedback from stakeholder consultations indicated that collaboration is important for learning, but it can be challenging in practice. Getting multiple schools together in a network appears to be more difficult than having experts come to individual schools and lead collaborative activities. However, stakeholders agree that there needs to be a shared vision across schools, and that sharing ideas and resources is beneficial.

An effective way to change teacher beliefs about assessment and assessment practice is through ongoing professional learning, embedded in a school environment, where teachers work collaboratively in teams. This type of professional learning can create a culture of continuous improvement that supports teachers to make and reflect on changes to assessment practice and also holds them accountable for doing so. School leaders need to carve out dedicated time for teachers to work on formative assessment, and to create clear goals, expectations and protocols to ensure that collaboration is productive.

One way to make collaboration more effective is to structure collaborative activities around an improvement cycle. The approach of improvement cycles resembles that of scientific inquiry. Teachers and school leaders start from a hypothesis or a research question, investigate available research and collect new data on student performance. They then trial new approaches and collect data on the trial to answer the initial research question or confirm the hypothesis.

Quality professional learning is embedded in daily practice so that it is deeply connected to student learning needs in each classroom. An improvement cycle is designed to ensure that teachers and school leaders enact effective professional learning that is tied to student learning. Because the improvement cycle enables schools and teachers to start and end with an assessment of student learning, any professional development activities will be selected based on a student learning need.

This does not mean that workshops and courses, for example, have no place in an effective professional development program. They can play an important role in delivering specific knowledge and skills to educators through access to experts and research, provided that these workshops/courses are embedded within a more comprehensive professional learning experience.

The environmental scan, consultations, and research review uniformly point to the fact that there is not one ideal professional learning mode, but that offering multiple modes, aligned as part of a systemic approach, works best. This means that teachers can customise some parts of their professional learning to suit their contextual needs, but everyone will understand clearly how the different options fit together and align. The professional learning could be seen more as one program with different options and sequencing, rather than many different professional learning offerings with unaligned content.

11.2.5 Transferring evidence into practice

The gap between evidence and practice is an implementation challenge shared by policy makers, systems, sectors and leaders in schools. There are consistently reported challenges to implementing formative assessment practice with high fidelity, including the diversity of individual and school needs, the need to build assessment and data capacity and the time required to identify improvement needs and ‘stay the course’ towards improved practice and learning. Furthermore, many jurisdictions report difficulty with monitoring the effectiveness of the professional learning and implementation support they provide.

Many state and sector professional learning initiatives align with research and are designed to be collaborative, expert-led and based within-school but, given the evaluation challenges, there is no strong evidence that these professional learning offerings are having the desired impact. It should also be noted that there is considerable anecdotal evidence of school-based and other forms of professional learning addressing formative assessment-related practices.

As a national initiative, the professional learning should be accessible and include content relevant to teachers and school leaders in a large variety of contexts and roles. For example, small schools may not have a leadership structure with experts in every subject area, and most school leaders have a teaching load. This means there is less capacity to

plan professional learning, ensure it is being implemented well, and support other teachers' development. Very large schools also have issues with effective professional development because it is difficult to achieve consistency of practice in a whole-school model. Some schools may have fewer resources available for professional learning and a higher staff turnover. These, and other contextual challenges, must be considered as professional learning is designed and tested, to determine what will work, for who and in what circumstances.

In future phases of the initiative, as resources are made available online, the specific use of computer-based formative assessment tasks will also need to be supported. When using technology to support formative assessment, it is vital teachers have the requisite software knowledge and skills, and that formative assessment using digital technologies is supported and integrated within regular classroom activities. Training in the use of technology alone is not likely to lead to effective integration in the broader set of teaching practices and must be part of the broader approach to capacity building that is aligned to the *Australian Professional Standards for Teachers*. Positive impact from online formative assessment is most likely to come from training in technology use alongside a variety of assessment and pedagogical approaches, including classroom-based approaches.

The nature of training required will depend on the exact new technology that may be developed, and the design of technical solutions should seek to minimise the learning required. The wide range of technology skills among teachers will necessitate training provided at the point of individual need, such as through instructional content embedded within the software. Embedded training materials for the use of technology would further support additional users such as parents, carers and students. Training needs will be minimised through user-centred design to ensure software is engaging and intuitive.

In the long-term, practice-focused, standards-aligned professional development that includes time and ample opportunities for collaboration, feedback and discussion is most effective in changing teachers' classroom assessment practices. In contrast, brief interventions, such as short-term workshops or presentations oriented around a product or resource, are less likely to change practice. The strongest evidence exists for professional learning that is work-embedded and situated within individual and school needs.

Although there is no consensus on which professional learning practices and protocols work best in formative assessment, teachers and school leaders appear to have a common understanding of the professional learning they perceive to be most relevant and effective. These tend to align with the nature of opportunities commonly provided through their systems, sectors and associations. There is an opportunity to build on and leverage existing approaches to provide nationally consistent, universally available professional learning materials that will make it easier for schools to identify, develop and amplify effective practice. Existing approaches include:

- online and blended learning materials matched to needs
- access to experts and coaches to identify and share evidence of impact, and to monitor and support high-fidelity implementation
- practice-focused, professional learning communities in schools, with access to practices and models for creating these.

At the same time, there is an opportunity to create and design innovative professional learning to develop capacity in assessment and particularly in formative assessment.

School leaders and system and sector leaders together play a vital role by influencing enabling conditions and by monitoring and supporting continuous improvement. The structural conditions that enable effective practice, such as regular, protected meeting times for meaningful examination of assessment practices, decentralised organisational structures and distributed school leadership practices, will make significant contributions to the effectiveness of the initiative. Alongside the necessary changes to individual teaching practices, this will require sustained effort. Progress milestones should be clearly communicated, and monitoring should take place throughout the design, development, delivery and implementation process to ensure the intended outcomes are achieved.

11.2.6 How to test, trial, develop and implement nationally consistent professional learning approaches

Design specifications developed during the discovery phase indicate professional learning for the initiative that is most likely to be effective at improving practice and learning. The specifications consider the nature of the support that should be provided in subsequent stages of the initiative to support effective implementation. These design specifications are intended to be tested by prototyping and trialling, and further iterated as products of the initiative are rolled out.

The design specifications consider scaling for impact, cost-effectiveness and implementation challenges and recognise that individuals and schools are at various starting points in their current practice. With this in mind, the specifications make clear that no single mode of professional learning or set of professional learning content will be adequate to build teaching capacity to align with the expectations of quality teaching described in the *Australian Professional Standards for Teachers*. Instead, professional learning must support teachers and schools to better understand their current practice and learning needs in relation to assessment and direct them to targeted forms of learning that will support innovation and continuous improvement supported by evidence, and build on teachers' current practice to better meet the needs of students.

Various forms of professional learning to build teaching and school leadership capacity for formative assessment practice already exist. It is recommended to build on what is already known and understood nationally about high-quality professional learning. Existing resources, products and efforts should be drawn on to amplify their positive impact and, where necessary, new materials and approaches should be developed to ensure teachers can engage with and benefit from use of learning progressions and online assessment resources.

Trials of professional learning prototypes will deepen understanding of the current landscape of practice and learning needs and help to identify any gaps or barriers to access and use. Trialling will reveal how schools use professional learning resources to implement consistent high-impact assessment practices, verified by data from formative assessment, and how professional learning ensures all teachers understand the expectations of quality teaching practice and how to enact them. The relevant needs and priorities for different jurisdictions, and findings related to implementation enablers and barriers, can also be considered during trialling of professional learning prototypes.

Prototypes could be developed and tested offline with early adopters in limited, diverse trial sites. In future iterations they should be online and interactive, to support the ongoing collection and sharing of evidence on teaching practices and interventions that have the greatest impact on learning.

The implications for the development and implementation of the potential national professional learning approaches are described in **Attachment 10**. The prototypes that could be designed and tested in line with the design specifications from the discovery phase, and a rationale for their development that can be confirmed or refined through the prototyping and testing process, are listed in Table 3 below.

Table 3. Rationale for professional learning prototypes.

Professional learning prototype	Rationale
Standards-aligned, readiness self-assessment rubrics for teachers and for schools	<ul style="list-style-type: none"> • Will support individuals to identify evidence-informed practice development goals, recognising that teachers have different levels of current expertise on formative assessment. • Will support school leadership teams to identify evidence-informed school improvement goals, recognising schools have different starting points. • Will direct to relevant professional learning opportunities that will develop individual practice and school processes in line with quality teaching and leadership standards. • Will support schools to customise a program of professional learning by building on the work they have already done on formative assessment and current professional learning approaches. • Will focus formative assessment professional learning around collaborative structures in schools where teachers use an inquiry cycle to identify specific learning needs.
Online professional learning modules for teachers	<ul style="list-style-type: none"> • Will outline content and processes to develop quality teaching practices aligned to <i>Australian Professional Standards for Teachers</i>. • Will be self-paced, universally accessible and relevant to teachers in diverse school contexts across Australia. • Will be relevant for teachers working in isolation, or to support whole-school development of practice. • Will contain flexible learning options that provide teachers access to expertise and the research base on formative assessment and the use of learning progressions, and what makes them effective.
Guidance resources for leading professional learning communities	<ul style="list-style-type: none"> • Will support expert leaders to develop formative assessment practice across schools and give advice for school-wide professional learning models to develop consistent, quality assessment practices. • Will support leading teachers and instructional coaches to: <ul style="list-style-type: none"> ○ observe and provide direct feedback on assessment practices to ensure that new technologies, resources and strategies are implemented in the way they are intended ○ monitor and evaluate the impact on practice and learning, using evidence gained from formative assessment ○ share evidence of impactful teaching interventions designed to meet immediate needs of learners identified through formative assessment. • Will be relevant to established or new professional learning communities. • Will underpin collaborative practices described at the Highly Accomplished and Lead teacher career stages of the standards.
Video case studies and practice translation guides	<ul style="list-style-type: none"> • Will identify, promote and amplify high-impact formative assessment practice, including effective use of learning progressions. • Will support schools to share details of learnings and positive outcomes of their inquiry and improvement cycles. • Will clarify what formative assessment looks like in practice and in real school settings. • Can be used by individual teachers or teacher teams to help improve their practice. • Can be used by leaders to structure professional learning workshops in schools or by other facilitators of professional learning.

Professional learning prototype	Rationale
Guidance and support materials for school leaders	<ul style="list-style-type: none"> • Should support expert leaders to share practice between schools. • Will support leaders to create the enabling conditions for effective teacher collaboration and sharing of assessment practice within and between schools. • Will support leaders to lead innovation and change for the adoption of learning progressions and online assessment resources and integration of their use in the broader set of assessment practices.

11.3 Recommendations

That in alpha phase, communication and engagement occurs with stakeholders to embed a common language, definition and consistent expectations for effective formative assessment practice across Australia, aligned to standards and based on the findings identified during the discovery phase, including the definition of formative assessment.

That in alpha phase, a standards-aligned readiness self-assessment rubric is developed for individuals and for school leadership teams, underpinned by a continuum of professional learning needs and school development goals. The rubric will support identification of readiness to adopt learning progressions and online formative assessment resources. The rubric should include a clear description of expected teaching and leadership practices, aligned to the *Australian Professional Standards for Teachers* and the *Australian Professional Standard for Principals* and tailored for individuals' career stage, capability and school context.

That existing professional learning modules and materials are reviewed in alpha phase and, where needed, new content is developed to ensure all schools have access to professional learning required to meet the breadth of development needs of teachers, leading teachers and school leaders described in the rubrics.

That offline prototypes of targeted, high-quality professional learning are developed in alpha phase, aligned to standards and to the recommended scope of content, design features and delivery modes identified in the discovery phase as outlined in **Attachment 10**. That these prototypes are tested in diverse trial sites that will be identified to match current professional learning needs and so early adopters can play a role in supporting future adoption by other schools.

12 Monitoring and evaluation

12.1 Scope of work

In the discovery phase, the Australian Institute for Teaching and School Leadership (AITSL) led work with the project team, teachers and school leaders to build a shared understanding of the initiative's vision and intended outcomes and to map these using a program logic model. The program logic articulated how the provision of learning progressions, online assessment resources and aligned professional learning can contribute to positive outcomes for target beneficiaries – students, teachers, school leaders, parents and carers, the school community and the education sector – and optimise learning for all Australian students. The program logic was used to underpin a draft monitoring and evaluation framework for the initiative. The program logic and the monitoring and evaluation framework will need to be further developed as the initiative progresses through design, development and implementation.

12.1.1 Development of a program logic and monitoring and evaluation framework

Workshops were initially based on the vision articulated in the expert panel report, and involved developing a theory of how change would unfold, by mapping backwards from the initiative's broader goals to early outcomes. Workshops were structured to elicit input and general agreement on the outcomes and principles of the initiative, and to articulate agreed pathways for improvement.

A resulting program logic flowchart and narrative, which will be further developed as new learnings come to light, provides a view of the end goal as the initiative moves through the next phases of design and development.

A monitoring and evaluation framework was also drafted, based on the program logic. The monitoring and evaluation framework includes:

- key evaluation questions
- outcomes aligned to the elements of the program logic
- success criteria and indicators
- data collection methods and measures.

The monitoring and evaluation framework helps ensure scalability and impact are considered, prepared for and tested during design and development. The evaluation questions, success criteria and indicators were developed in relation to impact and scalability considerations, including:

- impact on take-up, based on the recognition that it is difficult for good ideas or initiatives to spread or achieve widespread impact
- impact on policies and processes, based on the recognition that new and innovative approaches must be codified in policy and by institutions to achieve coherence or alignment across states and territories
- impact on mindsets, attitudes and practices, based on the recognition that school culture will play an important role in shifting teaching and learning practice, and that sustained implementation requires changes to be embedded in school communities.

The key evaluation questions focus on data collection and analysis. Success criteria and indicators support the collection of data that will help monitor change and improvement and guide further design and development. They include quantitative indicators such as frequency and number, and qualitative indicators such as evidence of quality, perception, feelings and attitudes.

Key evaluation questions will also allow the initiative to investigate a broad range of outcomes, including expected, unexpected, tangible and intangible outcomes, and what works, for whom, and in what circumstances, as well as barriers and enablers during development.

Suggested methods and measures were identified that could be used in the future for collecting both qualitative and quantitative information. These align with the range of methods recommended by the Digital Transformation Agency guidelines.

The program logic and draft monitoring and evaluation framework are at **Attachment 11**.

12.2 Key findings

12.2.1 Mapping the pathways to growth and achievement

The program logic articulates the shared vision and key ideas the initiative is trying to achieve. It includes the following areas where the initiative aims to contribute:

1. a shared vision, language and understanding of learning progressions and formative assessment
2. a recognition of the diversity of Australian schools and provision of equitable access to online, on-demand assessment services
3. improved capacity of teachers through ongoing professional learning that is targeted to their needs and focused on student learning
4. embedded use of learning progressions and formative assessment in teachers' practice and school improvement plans, and enhanced assessment, differentiation and curriculum skills and understanding
5. a shared responsibility for learning progress, with teachers using reliable data to accurately identify next steps in student learning and teaching
6. effective feedback on student learning, engaging parents and carers and enabling students to be well-informed, confident learners.

The program logic also identifies the pathway and outcomes towards achievement of the following long-term goals for the initiative:

1. The education sector can clearly communicate and share evidence of effective teaching across jurisdictions, and collaborate within and between schools, sectors, states and territories.
2. Schools collect evidence of learning progress and interpret this information to make decisions about teaching and school improvement, and to monitor progress.
3. Teachers' decisions are informed by evidence of learning so that teaching practice supports all students to make progress and reach achievement goals.
4. Students are well-informed about their progress and understand where they need to focus their efforts to reach their next learning goals.
5. Parents and carers understand their children's learning attainment and goals and, by being better informed, can engage in supporting learning progress.

These areas, and the outcomes and success criteria relating to each, are further detailed and illustrated in **Attachment 11**.

12.3 Recommendations

That the monitoring and evaluation framework described in **Attachment 11** is adapted throughout design, development and implementation of the initiative. That, in alpha phase, the program logic and the monitoring and evaluation framework, including outcomes, success criteria and indicators, should be tested, refined and iterated, confirming a refined program logic and monitoring and evaluation framework as new learnings come to light about how the initiative can meet the actual needs of users.

That, where possible, data collection, analysis and baselining begin in the alpha phase, and include:

1. identifying priority evaluation questions, outcomes and indicators to frame data collection and collation
2. identifying existing sources and collation of existing and new baseline data
3. determining a process for recording various forms of evaluation information and for collating further evidence.

13 Proposal for the alpha phase of the Learning Progressions and Online Formative Assessment National Initiative

13.1 Introduction

The work undertaken in the discovery phase by ACARA, AITSL and ESA has produced clear, evidence-based findings that inform a proposal for an alpha phase. On the basis of the findings, a number of products that are useful as individual assets to national school reform have already been developed. These products will provide a basis for the activities of an alpha phase.

This proposal assumes a continued collaboration between the three agencies to deliver the work of an alpha phase. Continuation of the collaboration is justified by the successful operation and delivery of the initiative in the discovery phase. It is also the most efficient and effective means of maintaining existing momentum on the initiative. Furthermore, the initiative is not at a sufficiently developed stage to describe services that might be requested of market providers. By the end of the alpha phase, the initiative will be defined in such a way that procurement of services on an open market for a beta phase would be practicable.

13.2 Objectives and activities of the alpha phase

The discovery phase has identified twin aims for the initiative: for each student's learning to be optimised and for Australia to have a high-quality education system that has an optimal impact on student growth and achievement. As the initiative progresses, it will build on existing good practice and develop solutions that address immediate challenges in the short term, as well as designing for transformation of practice in the longer term.

In the alpha phase the main objective will be to develop prototype solutions as well as additional products that will assist teachers and address the challenges they face in their efforts to optimise each student's learning. This will be done with continued close engagement and communication with teachers and school leaders, and other key stakeholders. Engagement and communication will guide design and development activities, embed a common language, definition and expectation for effective formative assessment practice across Australia, and build a shared understanding of the vision for the initiative.

As a result of the activity in the alpha phase, a second objective will be realised, which is to develop a proposal for a beta phase that will contain detailed design documentation, including a minimum viable product definition. The technical design is conceived as an ecosystem that will contain a range of functions and enable integration with other providers and systems. An organising structure for the ecosystem is illustrated in Figure 8. It shows that the system is expected to offer single sign on for users that gives them a one stop shop for access to the key functions, including an assessment bank, a learning progress tracker, an online test creation and delivery platform, a suggestion engine and a digital resources repository.

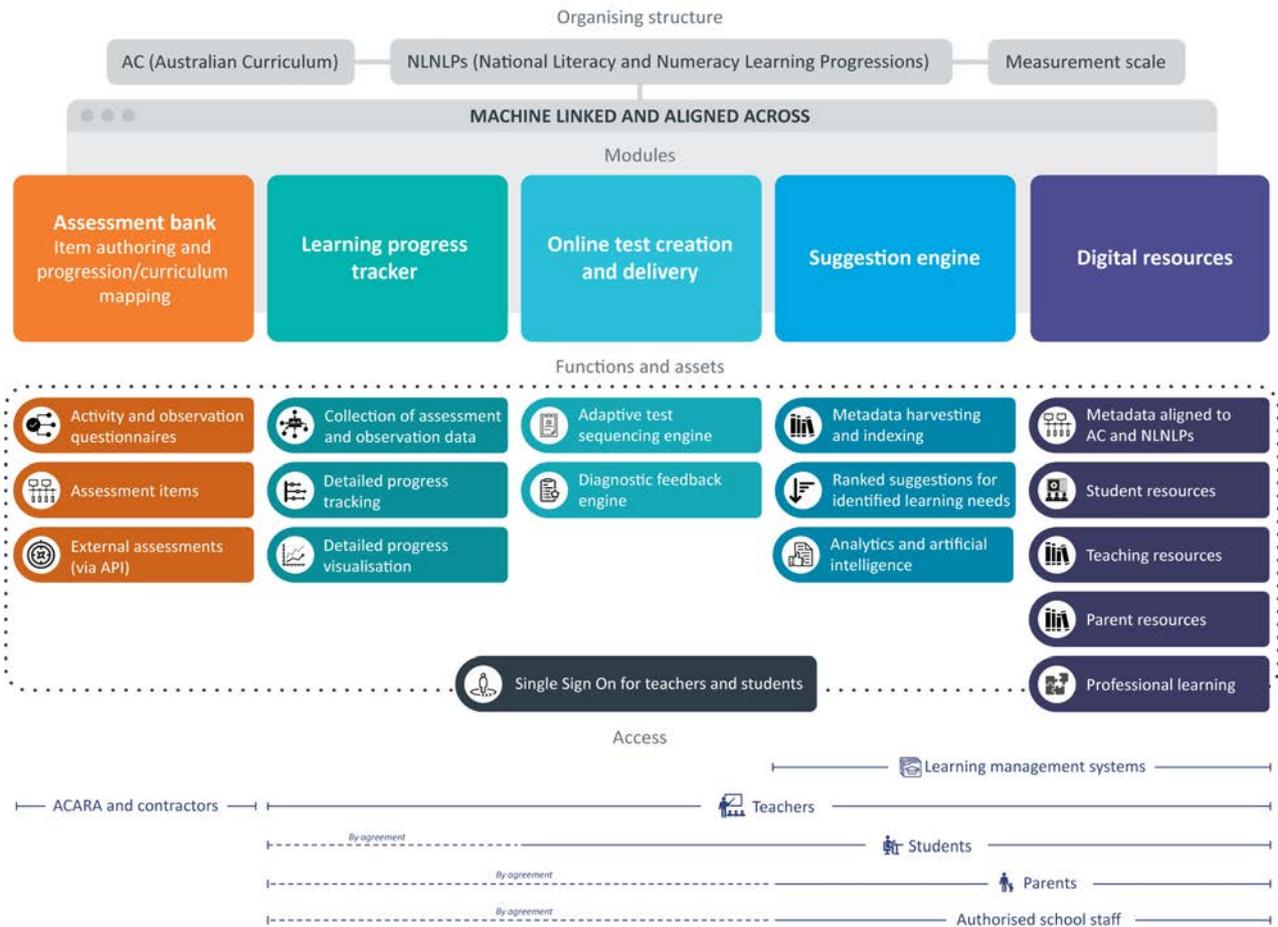


Figure 8: Solution architecture for testing in the alpha phase

13.3 Workstreams in the alpha phase

The workstreams are the key areas of work to be undertaken in the alpha phase. Each workstream has a designated lead agency. The workstreams are summarised in Table 4 below. More detail about proposed activities associated with each workstream are in section 13.4.

Underpinning the approach across all the workstreams in the alpha phase will be a stakeholder engagement plan. This will ensure the initiative continues to work closely with teachers and other stakeholders to guide the design, testing and refinement of prototypes and the definition of minimum viable products. It will also help embed common language, definitions and expectations among stakeholders. AITSL will develop the plan and the PMO will monitor and support its implementation.

As in the discovery phase, the work of the Project Management Office (PMO) will ensure coordination across the agencies and workstreams to ensure the project is delivered to schedule and budget. The PMO manages an integrated project planning framework including dependencies; manages risks and resolves issues; undertakes project reporting; and assures quality.

Table 4: Proposed alpha phase workstream key areas of work

Lead agency	Workstream	Description
ESA	1. Functional prototype design and testing	Developing and testing with stakeholders and users functional prototypes that are informed by the discovery phase user research, including: <ol style="list-style-type: none"> dashboard and data analysis functions for teachers and students with progress visualisation and feedback formative assessment delivery and ongoing observation data capture auto-suggestion of relevant and aligned digital resources single sign on with seamless teacher and student registration and mobile device support.
	2. Development of detailed design documentation	Using data from the prototyping activity to develop, define and agree design specifications that will include: <ol style="list-style-type: none"> the minimum viable product (MVP) definition with a finalised user story map infrastructure and system architecture design implementation privacy, security and accessibility requirements all other agreed functional and non-functional requirements.
	3. Testing the Open Technology Framework	Prototyping standards-based integrations with key vendors and stakeholders. Confirming suitability of identified technical standards and gaining agreement for their use going forward.
	4. Proposal for the beta phase	Preparing a proposal that includes build or buy options, procurement alignment strategies and proposed implementation plans.
	5. Digital resources	Prototyping of proposed and curated digital resources, testing the rubrics and frameworks developed in the discovery phase and development of a digital content plan and metadata protocols.
	6. Suggestion Engine	Researching available technology and developing the suggestion engine functionality as a re-usable module initially integrated in Scootle to allow the transition to the ecosystem from the National Online Learning Services.
ACARA	1. Learning progressions	Developing a machine-readable form for the NLNLPs consistent with the machine-readable Australian Curriculum that can support version management and links to other resources. Developing student and parent friendly versions of the learning progressions. Further exploring enhancements to support students with diverse needs.
	2. Measurement scales and milestones	Constructing common numerical measurement scales to underpin the NLNLPs and calibrating existing assessments to the scales. Creating milestones that indicate expectations of achievement against the Australian Curriculum.
	3. Assessment resources	Applying and testing the quality assurance criteria and process against existing assessments and identifying new assessments aligned to the NLNLPs for access through the system. Researching and applying innovation in measurement and assessment design.
	4. Creative and critical thinking	Continuing research into a learning progression and assessments for critical and creative thinking, building on the work commenced with ACER and VCAA in the discovery phase.

Lead agency	Workstream	Description
AITSL	1. Professional learning	Developing and testing prototypes of professional learning for teachers and school leaders that will build capacity to meet the relevant areas of the <i>Australian Professional Standards for Teachers</i> and the <i>Australian Professional Standard for Principals</i> identified during the discovery phase. Prototypes will include a standards-based rubric to help teachers and schools identify their readiness to adopt learning progressions and online formative assessment.
	2. Monitoring and evaluation framework	Further developing the program logic and monitoring and evaluation framework to support planning for data collection and monitoring and evaluation against the intended outcomes of the initiative. Beginning data collection and baselining for evaluation.
	3. Communications and engagement plan	Developing a communication and stakeholder engagement plan that ensures the initiative engages with users and stakeholders to guide the design, testing and refinement of prototypes and the definition of minimum viable products; embeds a common language, definitions and expectations among stakeholders and users; and that binds the work of the three education agencies into a single, cohesive, compelling program of communication activity.

13.4 Workstream activities

13.4.1 Communications and stakeholder engagement

As in the discovery phase, it will be vital for the initiative to continue engagement with the teaching profession and other key stakeholders. The following activities will ensure the initiative engages with the appropriate stakeholders to guide the design, testing and refinement of prototypes and the definition of minimum viable products.

AITSL will develop a communication and stakeholder engagement strategy for the alpha phase, including a timeline and details of engagement mechanisms and activities. A focus of this strategy will be to implement communications to embed a common language, definition and expectation for effective formative assessment practice among stakeholders and users across Australia, and to explain and connect the work of the alpha phase, building the vision for the end solution with users. The strategy will bind the work of the three education agencies into a single, cohesive, compelling program of communication activity.

To ensure the initiative is guided by the experience and expertise of teachers, school leaders and other users of the end solution, a set of expert teachers and other users with relevant expertise will be identified to take part in testing of functional prototypes for online resources and professional learning prototypes.

In addition, there will be continued engagement with a Teacher Practice Reference Group to be convened for the alpha phase. Membership and terms of reference will be confirmed with jurisdictions and schools so that a representative group of teachers and school leaders can continue to provide input to the initiative, including the design and delivery of prototypes and the definition of the minimum viable product and required professional learning.

13.4.2 Functional prototyping and design

The prototyping work will commence with consultation and testing of the hypotheses and functionality in simple low-fidelity prototypes with stakeholders and users. The functionality to be tested is informed by the discovery phase, and will include:

1. dashboard and data analysis functions for teachers and students with progress visualisation and feedback
2. formative assessment delivery and observation data capture
3. auto-suggestion of relevant and aligned digital resources
4. single sign on with seamless teacher and student registration and mobile device support.

A high-fidelity prototype (HTML) of the refined functions will then be tested with stakeholders and users. While the prototype will not be an actual functioning system, it will look and work like a real service. It will have a range of features for the various user groups to interact with, including content and data that look authentic. The goal is to show users what a seamless experience will look like that addresses their current challenges.

A user story map of features based on the user research will also be developed and iteratively improved. The results of each round of testing in functional prototyping will feed into a new design iteration, until the final map provides a refined and agreed vision for the system.

13.4.3 Development of detailed design documentation for a beta phase

At the end of the alpha phase, detailed design documentation that is informed by the user story map will be developed, defined and agreed, including:

1. a minimum viable product (MVP)
2. infrastructure and system architecture design
3. implementation privacy, security and accessibility requirements
4. all other agreed functional and non-functional requirements.

This will form design specifications for a beta phase, which could be used in a future procurement activity.

13.4.4 Testing the Open Technology Framework

The Open Technology Framework is key to the effective operation of the proposed ecosystem. During the alpha phase, work will be undertaken to confirm the suitability of the standards identified in the discovery phase and close any gaps. Integration prototyping will be conducted with vendors and jurisdictions.

Work will be undertaken to determine the most effective approach to support information exchanges by trialling various automated and semi-automated approaches for scalability. This will enable teachers to find and select assessment items in the system and enable the operation of the suggestion engine.

The review and development of standards and the development of machine readable learning progressions will support reporting in the ecosystem. During this activity different approaches to assessment analysis, reporting and data visualisation will be trialled.

With this information a prototype will be built and tested to identify how to close the data transfer gap between formative assessment and teacher planning (i.e. moving from PDFs and data walls to feeding data directly into local planning systems).

Updated Open Technology Framework documentation will include standards profiles, standards governance arrangements, new standards and approaches emerging from pilot work, and machine learning approaches.

13.4.5 Proposal for the beta phase

A key deliverable for the alpha phase will be a proposal for a beta phase that will incorporate all the findings from prototyping, the detailed design documentation and the refined Open Technology Framework. The beta proposal will include build or buy options, procurement alignment strategies and proposed implementation plans.

13.4.6 Digital resources

A major task in the alpha phase will be development of a digital content plan. Further consultation and collaboration with interested jurisdictions and commercial providers will be undertaken to plan for the development and design of new digital content in literacy and numeracy to provide greater coverage across the NLNLPs.

In the alpha phase the draft content specifications that were developed during the discovery phase will be tested and refined. These include the quality assurance criteria, metadata schema and accessibility requirements. Prototyping of proposed and curated digital resources will be undertaken.

Further work in the alpha phase will include updating the related topic threads in the Schools Online Thesaurus to encompass the language from the NLNLPs. This will aim to improve functionality and expediency of tagging resources and retrieval for users.

An investigation of a sample of digital content for development and procurement will be undertaken to inform the licensing parameters.

The search functionality requirements and system integration needs of the suggestion engine which were defined in the discovery phase will be tested in the alpha phase.

A technology scan will be undertaken to establish the best available approach to metadata harvesting and artificially intelligent ranking algorithms. The findings of this study will be used to inform the development and testing of the suggestion engine functionality as a new module to be initially integrated with Scootle as the first part of the proposed ecosystem.

A protocol will be established to ensure that metadata can be consistently input to facilitate easy and efficient navigation for users.

13.4.7 National Literacy and Numeracy Learning Progressions (NLNLPs)

In the alpha phase, further enhancements to Version 3 of the National Literacy and Numeracy Learning Progressions (NLNLPs) are planned. This will involve:

1. developing a machine-readable form for the NLNLPs consistent with the machine-readable Australian Curriculum that can support version management and links to other resources
2. developing student and parent friendly versions of the learning progressions.

Also, ACARA will identify opportunities to commission and partner with other organisations undertaking research into learning progressions for literacy and numeracy to continue to build the evidence base. Of particular interest are:

1. the projects underway in the NSW Department of Education and the University of Melbourne that are investigating ways to better support teachers of students with diverse needs to identify and assess their students' learning progress
2. the research project being undertaken by the Australian Association of Mathematics Teachers, who have been funded by the Australian Government to create an empirically-based learning progression for multiplicative thinking and to produce a set of teacher guides, assessment materials and student work samples linked to the progression. This project, due for completion in mid-2020, may provide scope for further refinement to the national numeracy learning progression and may also provide a model for further collaboration with other research-based mathematics projects.

13.4.8 Measurement scales and milestones

In the alpha phase a key task will be to construct common numerical measurement scales to underpin the NLNLPs using approaches such as Rasch modelling. An efficient methodology will be key in delivering the measurement scales in the alpha phase. NAPLAN scales will be a starting point for the process. These will be augmented to capture empirical data about the skills and understandings in the NLNLPs not currently assessed by NAPLAN. Groups of students undertaking NAPLAN in 2020 will attempt a range of activities/assessments reflecting the additional information from the NLNLPs that will be scored, analysed and linked to create the expanded measurement scales.

In addition, work will be undertaken to create milestones that indicate expectations of achievement against the Australian Curriculum for each of the sub-elements in the NLNLPs. This will build on the work undertaken by ACARA to identify potential proficient standards for reporting literacy and numeracy results. Experienced teachers from schools across a diverse range of settings will be asked to identify, utilising a standards setting methodology, the key milestones in the NLNLPs.

13.4.9 Assessment resources

Further work will be undertaken in the alpha phase to align existing assessments to the NLNLPs, identify and/or develop and procure new assessments for trialling in the alpha phase and develop and trial a process for evaluating and selecting assessments to include in the new system in the future that meet a set of quality assurance criteria.

The key will be the existence of measurement scales for the NLNLPs. Once measurement scales are developed for the NLNLPs, national and jurisdiction assessments (such as NAPLAN, NSW Best Start and SA (UK) Phonics Screening Check) can be calibrated to the scales, using an expert-led process of mapping assessment item content to progression indicators and, where possible, to ensure the mapping can be validated by available assessment data from the use of local and national tools.

In the discovery phase ACARA identified a set of quality assurance criteria for selecting assessments to include in the new system. In the alpha phase ACARA will need to test the process of applying the criteria with some of the identified assessments from jurisdictions, as well as with commercial providers, to validate the criteria and ensure the process does not unreasonably limit the set of endorsed assessment resources.

The criteria to identify and/or develop and procure new assessments aligned to the NLNLPs for access through the system will also be applied and tested. This will include working with interested jurisdictions, research partnerships and commercial providers to explore the application of key advances in educational measurement to the design of the online system, in particular innovative test design, and to also learn from existing products that demonstrate some of these aspects, such as Maths Pathways in Australia and the best of the international exemplars, in order to expand the range of assessments in literacy and numeracy that can align to the NLNLPs in the beta phase and onwards.

13.4.10 Critical and creative thinking

In the alpha phase, research will continue into a learning progression and assessments for critical and creative thinking, building on the work commenced with ACER and VCAA in discovery phase.

ACARA's continuum for critical and creative thinking will be reviewed and revised based on the mapping and analysis of the assessment data for tasks undertaken in the discovery phase. The initial mapping shows strong alignment between the Australian Curriculum general capability for critical and creative thinking, the VCAA curriculum in critical and creative thinking and the constructs for critical thinking and creative thinking developed by ACER, with differing degrees of emphasis on several elements.

We will also aim to provide further elaboration of detail between the levels of the Australian Curriculum continuum for critical and creative thinking as the next step towards development of an agreed learning progression.

This will be assisted by undertaking a further round of assessment trials using the expanded set of VCAA tasks, any revised versions of the ACER tasks and any others identified as useful to provide further empirical evidence against the revised and expanded continuum. By the end of the alpha phase, this work should provide the basis for alignment between a set of validated assessments and either a strengthened continuum for critical and creative thinking or a draft initial learning progression.

An additional form of analysis will be to investigate the relationship between 'embedded' or 'domain-based' critical and creative thinking in validated, discipline-based assessments in Science, in the first instance. A key issue in the discussion of critical and creative thinking is the relationship between this general capability and domain or disciplined-based expertise. In addition to exploring general assessments for critical and creative thinking in the alpha phase, we will compare domain-based assessments for evidence of their relationship to critical and creative thinking, and also how those assessments may be used together with specific critical and creative thinking assessments, to provide more support for teachers.

13.4.11 Professional learning

Learning design briefs will be written to support the creation of the following standards-aligned formative assessment professional learning prototypes:

1. Readiness self-assessment rubrics for teachers and for school leaders
2. Professional learning resources for teachers
3. Guidance and support materials for school leaders
4. Guidance resources for leading professional learning communities
5. Video case studies and practice translation guides.

These learning design briefs will be created in a user-centred design sprint that will engage teachers and school leaders with a high degree of expertise in formative assessment practice, learning designers, teaching, learning and assessment experts, professional learning providers and representatives of professional associations.

Learning design briefs for each prototype will:

1. build on the recommended scope of content, design features and modes outlined in the professional learning design specifications produced during the discovery phase
2. make clear the depth and breadth of learning content required within each prototype, aligned to the *Australian Professional Standards for Teachers* and the *Australian Professional Standard for Principals*
3. identify existing professional learning modules and materials and any gaps where development of new content is required to develop the full breadth of related teaching and leadership practice
4. outline the anticipated sequence of activities and interactions with professional learning materials and learning support needs to inform future testing of prototypes and data collection.

Expert writers, learning designers and content developers will be engaged to create offline working versions of targeted, high-quality professional learning prototypes. They will customise available existing learning content and develop new content where necessary to meet the learning design briefs.

An expert reference group will provide input to these prototypes before they are tested with teachers and school leaders in schools across Australia. These schools will be identified to align with the stakeholder engagement strategy for the initiative. The intention will be for early adopters to also play a role in supporting future adoption by other schools.

Professional learning prototypes will be tested by a range of teachers and school leaders and their use monitored in trial sites. Diverse trial sites will be identified to match current professional learning needs. For each prototype, data will be collected on their relevance, usability, their perceived benefits for developing practice and any unexpected benefits or challenges. Data will be analysed to inform the definition of the final requirements for professional learning for the initiative.

13.4.12 Evaluation and monitoring

The focus of evaluation activities during the alpha phase will be both on gathering information to inform the development and refinement of prototypes, and on preparing for future efforts to understand the contribution of the initiative towards its intended outcomes.

Evaluation expertise will be applied to design and facilitate effective, robust and reliable engagement with stakeholders during testing of prototypes and to document and communicate emerging findings and the evidence contributing to key decisions. The project team will conduct regular check-ins during the alpha phase to share key learnings, captured through the agreed mechanisms, and to collaboratively make sense of these to inform the communication of findings.

Planning for ongoing monitoring and evaluation of the initiative will begin in alpha to underpin future efforts to track the influence and impact of the initiative towards its intended outcomes. The program logic developed during the discovery phase will be refined to document and represent outcomes observed during the alpha phase. The monitoring and evaluation framework proposed in the discovery phase will also be iterated to align with future evaluation plans. Activities will include:

1. identifying priority evaluation questions, outcomes and indicators to frame data collection and collation
2. identifying existing sources and collation of existing and new baseline data
3. determining a process for recording various forms of evaluation information and for collating further evidence collected during alpha phase
4. confirming a refined program logic and monitoring and evaluation framework.

13.4.13 Project management

The PMO will be led by the Managing Director, whose role will be to provide strategic project leadership for the alpha phase of the initiative. Key responsibilities of the PMO will be to:

1. establish and manage an integrated project planning framework
2. establish and manage quality assurance processes
3. coordinate the reporting of progress of the alpha phase across the three agencies, including a focus on cross stream activities and interdependencies
4. provide reports on strategic risks and issues
5. provide quality project management support across the three agencies
6. support the implementation of the communication and stakeholder engagement plan and the monitoring and evaluation framework
7. establish and manage an integrated reporting process – monitoring progress and developing reports to meet requirements of governance.

The overarching project management methodology will follow Prince2 to provide a structured project framework via the implementation of key roles, processes and products to support achieving the project deliverables.

13.5 Project plan

The alpha phase will be a twelve month period commencing in mid-January of 2020. Final reports and agreed deliverables will be prepared and distributed in December 2020.

Alpha Phase High Level Phases and Timeline

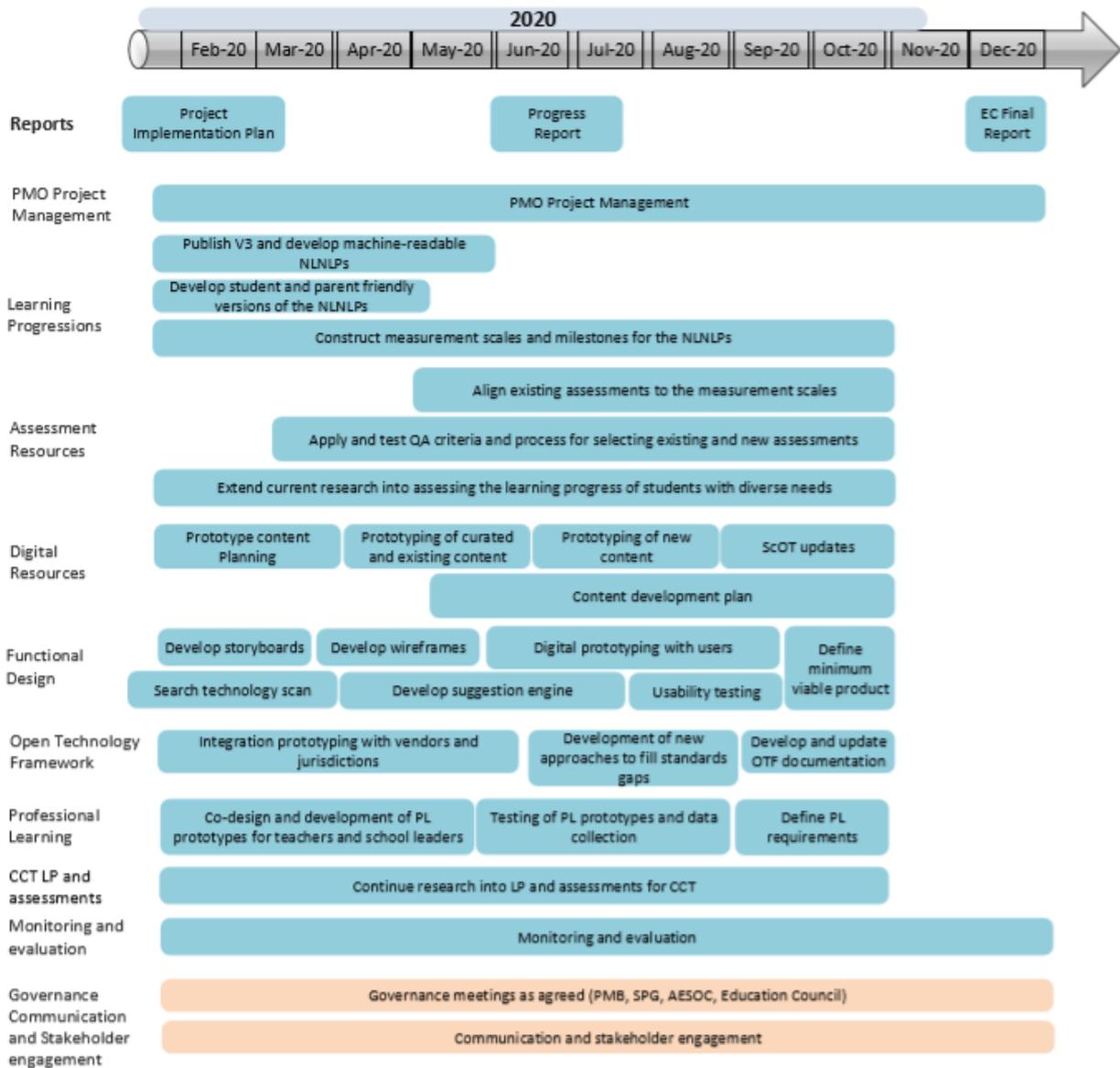


Figure 9: Timeline and key deliverables

13.6 Alpha phase budget

Table 5: Alpha phase budget

Item	Description	2019/2020 FY (ex GST)	2020/2021 FY (ex GST)	Total alpha phase cost (ex GST)	
ESA	Staff	\$959,356	\$1,192,344	\$2,151,700	\$3,139,510
	Operating costs	\$156,450	\$98,596	\$255,046	
	Consultants / Contracted services	\$565,968	\$166,796	\$732,764	
ACARA	Staff	\$575,671	\$690,807	\$1,266,477	\$3,103,977
	Operating costs	\$38,181	\$45,819	\$84,000	
	Consultants / Contracted services	\$1,009,432	\$744,068	\$1,753,500	
AITSL	Staff	\$480,992	\$480,992	\$961,984	\$2,239,025
	Operating costs	\$279,087	\$418,631	\$697,718	
	Consultants / Contracted services	\$347,594	\$231,729	\$579,323	
PMO	Staff	\$496,034	\$496,034	\$992,068	\$1,076,225
	Operating costs	\$28,618	\$28,618	\$57,236	
	Consultants / Contracted services	\$8,076	\$18,845	\$26,921	
TOTAL		\$4,945,459	\$4,613,279	\$9,558,737	\$9,558,737

13.6.1 Budget assumptions

1. Staff includes salaries and related costs.
2. Operating costs include travel expenses and communications and stakeholder engagement.
3. Consultants / Contracted services includes all necessary contracts, consultancy services and commissioned products.
4. The PMO will function across all workstreams but the budget may be allocated to one or more agencies.
5. Each budget stream incorporates 5% contingency.

14 Appendix A – Discovery phase scope of work

Project Management Board – Roles and responsibilities		
<ul style="list-style-type: none"> • Oversight, accountability and risk management of the overall project, ensuring linkages to existing work and other relevant working groups • Ensure project design is based on comprehensive stakeholder engagement, particularly with the teaching profession throughout all phases • Work closely with the national education architecture agencies (ACARA, AITSL and ESA) to ensure alignment with their remit and delivery of education reform activities as a joined up project • Oversee and monitor the design, development and implementation of an overall communication, engagement and change management strategy to support the project • Seek authorisation on key decisions and report to Education Council, through SPG and the AESOC, on project progress and key milestones. 		
	Activities	Outputs/Products
ACARA	<p>Learning progressions</p> <ul style="list-style-type: none"> • Mapping and analysis of existing learning progressions in literacy (focus on reading and writing strands) and numeracy (focus on the number and algebra strand) • Technical analysis of the ACARA and ACER progressions in literacy (Reading) and Numeracy/Maths (Number sense and Algebra) to compare content and sequencing, and identify agreed points of commonality and difference between the two progressions • Investigate alignment of the Brightpath resource (for Writing) and determine potential for informing any improvements to the ACARA Literacy (writing) progression. • Draw on the experience of teachers in jurisdictions working with the current ACARA literacy and numeracy progressions to inform the design specifications and any improvements • Based on the above activities, refine and update the current versions of the ACARA literacy and numeracy learning progressions for incorporation in the proof of concept phase • Work with Victoria and any other jurisdiction where work is being done on critical and creative thinking (eg Brightpath research) to review existing work to date and identify what further work needs to be undertaken to 	<p>Learning progressions</p> <ul style="list-style-type: none"> • Agreed alignment between the ACARA and ACER learning progressions in Literacy (Reading) and Numeracy/Maths (Number sense and Algebra) • Updated (if necessary) versions of the ACARA literacy and numeracy learning progressions – for incorporation into the proof of concept phase for the initiative • Design specifications for learning progressions linked to the Australian Curriculum • The initial development of a learning progression for critical and creative thinking and/or identification of further work that is needed to develop a learning progression for critical and creative thinking.

	<p>continue the development of a learning progression for critical and creative thinking linked to the Australian Curriculum.</p> <p>Assessment resources</p> <ul style="list-style-type: none"> • Stocktake of assessment resources for literacy and numeracy currently in use in Australian schools • Identify existing assessment resources linked to the literacy and numeracy learning progressions for incorporation in the proof of concept phase (including from commercial providers such as ACER PAT), including a technical analysis of their psychometric properties to align the resources to the learning progressions • Identify gaps in the assessment resources linked to the National Literacy and Numeracy Learning Progressions which could become the basis for procurement and/or development of new resources at a future stage • Work with jurisdictions where work is being done on critical and creative thinking to identify existing assessment resources. Where no resources exist, research the development of new assessments for critical and creative thinking. 	<p>Assessment items</p> <ul style="list-style-type: none"> • Selection criteria for sourcing assessment resources linked to learning progressions and technical specifications for linking assessment resources to learning progressions • Identified existing assessment resources in literacy and numeracy that meet the selection criteria—for incorporation into the proof of concept phase for the initiative • Identified gaps in the availability of assessment resources aligned to the literacy and numeracy learning progressions, which could become the basis for procurement and/or development of new resources at a future stage • Identified assessment resources in critical and creative thinking that meet the selection criteria or identification of further work that is required.
<p>AITSL</p>	<p>Research and development for professional learning</p> <ul style="list-style-type: none"> • Literature review to identify national and international research on effective formative assessment practices of teachers and school leaders, including their current capacity, challenges and needs • Environmental scan to explore current professional learning and implementation support to build capacity for effective formative assessment practices in Australian schools. 	<p>Research and development for professional learning</p> <ul style="list-style-type: none"> • A literature review on effective formative assessment practice • Report on environmental scan of current formative assessment professional learning and implementation support in Australian schools • Report on proposed professional learning model(s) including design features, scope and delivery mode.

	<p>Stakeholder engagement</p> <ul style="list-style-type: none"> • Convene Teaching Practice Reference Group—a representative group of teachers and school leaders who will shape and influence the direction of the initiative so that the needs of the profession are met and will contribute expertise to the design, development and implementation of project deliverables. • User research and consultation activities to design, develop, test and refine the professional learning model (design features, scope and delivery mode). <p>Evaluation and trial</p> <ul style="list-style-type: none"> • Establish and test with stakeholders the theory of change to underpin an evaluation framework for use of final products of the initiative to measure impact on teaching practice and student learning • Test design for trial of professional learning materials, including partnerships, modes of facilitation and implementation support. 	<p>Stakeholder engagement</p> <ul style="list-style-type: none"> • Stakeholder engagement plan that links and aligns to the initiative’s overarching communication and engagement strategy. <p>Evaluation and trial</p> <ul style="list-style-type: none"> • An evaluation framework describing the theory of change for use of final products of the initiative, including evaluation questions, success criteria and measurement indicators for impact on teaching practice and student learning • Report on the intended modes of facilitation and implementation support for future trial of professional learning materials.
<p>ESA</p>	<p>Platform functionality requirements</p> <ul style="list-style-type: none"> • Research to develop user types • Workshops to identify personas and gather user requirements • Interviews with identified persona groups to capture goals, needs, feelings and questions • Development of user journeys and empathy maps • Documentation and editing • Development of user interface wireframes and examples of assessment resource reports. 	<p>Platform functionality requirements</p> <ul style="list-style-type: none"> • Audience profile and needs analysis, including but not limited to varying types of: <ul style="list-style-type: none"> ○ teachers, students and parents ○ system owners and assessment vendors ○ school leaders • Requirements specification • Preliminary wireframes, system “look and feel” and branding options for testing in alpha phase • Design options and hypotheses for testing in the alpha phase.

<p>Digital resources</p> <ul style="list-style-type: none"> • Review of existing search and alignment tools and their fit for learning progressions • Requirements analysis of functional requirements for learning progression aligned search and integration needs • Review of existing digital resource types, educational soundness specifications and consideration of key characteristics for alignment to learning progressions • Research of third-party digital content suitable for alignment to learning progressions • Analysis of student needs in developing new digital content to support progression. <p>Open technology standards framework</p> <ul style="list-style-type: none"> • Research and analysis of metadata and learning services integration standards • Undertake needs analysis with system owners and vendors • Standards development and validation. 	<p>Digital resources</p> <ul style="list-style-type: none"> • Draft digital content requirements and educational needs analysis for content • Draft content specifications for existing, third party and new digital learning content • Definition of search functionality requirements and system integration needs. <p>Open technology standards framework</p> <ul style="list-style-type: none"> • Review of existing standards and gap analysis • Draft standards framework to allow alignment of assessment and digital content to learning progressions as well as approaches for seamless integration of existing system and vendor products.
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