

SCIENCE TEACHERS ASSOCIATION OF NEW SOUTH WALES

POSITION PAPER

NSW Curriculum Reform



2020

CONTENT

Executive Summary	2
Need for Reform	4
Effective Implementation	5
• The need for Clarity	
Budgeting for Reform	
 Recognising Teachers as essential to the reform process 	
Reform Leadership	
Review of the Reform	
Response to Recommendations and Governments Response	7
Appendix	22





EXECUTIVE SUMMARY A Missed Opportunity

The Science Teachers Association NSW exists to advance the profession in NSW through the provision of quality professional development, information and advocacy for primary and secondary science educators. A strong science education is essential so that every school leaver has an understanding of the core concepts and the nature and practice of science, particularly the ability to think scientifically. We aspire to a society founded on the development of scientific language, logic and problem solving producing scientifically literate adults.

Professor Masters proposed an ambitious reform that sought to re-organise both the structure and content of the wider curriculum so that students would be placed at the centre of decisions, meaning that at an individual level, students are supported towards educational attainment. The need for a system reform was and still remains essential for growing the future students of NSW.



The Science Teachers Association NSW believes this is commendable and we acknowledge the NSW Government's leadership in undertaking this review in order to enhance the effectiveness of school education in NSW. The call for a review was welcomed by all stakeholders in NSW.

Having identified the stakeholder concerns and aspirations in the 2018 consultation, Professor Masters proposed recommendations that would refocus the curriculum so that students learn with deep understanding, build skills in applying knowledge and are supported at an individual level to progress along a learning continuum based on attaining knowledge and skill. There were innovative and exciting components to the final review report.

To deliver on the intent of this reform, significant cultural and organisational change is required to be managed not only within schools across NSW, the school systems, tertiary institutions and at NESA but also by our political leaders.

The Government responded to the Final Review Report 23 June, 2020 supporting most recommendations either outright or in principle and committed to delivering the supported reforms within a truncated four-year period, significantly less than the 10-year timeframe recommended by Professor Masters. Unfortunately, the recommendation that would have led to the most significant reform is unlikely to be progressed in this period, the end result being simply a change to the syllabuses for K-12. A change to the syllabus alone will not lead to improved learning in our students. It is the wider curriculum that needed reform. On analysis of the Final Report of the Review and the Governments response, it appears that the Government has fully supported the content change recommendations without much consideration to the structural changes required. In doing so the reform fails to deliver on the aspirations set during the review and recommended by Professor Masters. We believe there is a missed opportunity to deliver a strong vision and new opportunities that schools would relish. Opportunities will be lost if appropriate time and deep thinking is not given to create an outstanding curriculum and school structure for NSW as outlined in the Review.

This paper was developed by a Think Tank established to guide the positions of the Association throughout the reform process. It sets out our position on the need for reform, the elements that we believe are essential for effective implementation and our positions on each of the recommendations of the final review. The Science Teachers Association NSW agrees with the need for reform of the NSW Curriculum and agrees that strong leadership is required for this reform to be achieved. For this reform process to be successful it will require a long-term approach, multi-party political leadership and a commitment of adequate resources for its implementation.

The Science Teachers Association NSW welcomes the opportunity to work in partnership with the Review Committee and NESA to promote and implement the reforms and support the development of models that might demonstrate the application of these reforms. The Science Teachers Association NSW is a cross-sectoral organisation and is well-placed to support the professional learning of all science teachers across NSW through face to face delivered training, mentoring and on-line teacher training.

We look forward to continuing to engage with this reform as the process progresses and we welcome opportunities to actively contribute to the work of the Reform Team.

Priority areas for consideration by the Government in delivery of this review, identified by the Think Tank include:

- Sufficient time needed to develop and deliver the wider reform with appropriate processes
- Sufficient time to implement suggested changes & embed quality in teaching & learning
- Consulting with the Professional Teachers Associations as a major component of the reform
- Reduce, declutter and simplify the curriculum
- Mapping the conceptual development required for deep content knowledge starting with final year attainment standards and use a backward mapping process to design attainment levels across a 12 -K continuum, based on empirical evidence relating to students' abilities and with reference to appropriate theories of knowledge
- Map clear skills and concept progressions and integrated progressions with other subjects
- Support and communicate with Sector and School Leadership; those who will lead the change throughout the schools and those who will implement the systemic changes required for this reform to be successful
- Teacher Professional Learning, including mentoring, throughout the reform journey, to support teachers with a solid understanding of the syllabus and the intended progressions across the learning continuum

THE NEED FOR REFORM

The Science Teachers Association NSW acknowledges the consultations that have been undertaken by NESA since 2018 regarding the NSW Curriculum Reform. Notably the focus of the 2018 Consultation that elicited both areas of concerns and the aspirations of teachers for students in NSW.

We recognise the need for reform that addresses these concerns and aspirations, notably a curriculum that

- Focusses on skills development including critical thinking, logic, teamwork and communication developed through knowledge
- Supports life-long learning
- Ensures competency in numeracy and literacy within authentic contexts relevant to the schools
- Addresses the current overcrowding of the curriculum that prevents teacher flexibility
- Enables teachers to address the individual needs of students supporting their progression along a learning continuum
- Supports the needs of all students

Specifically;

In striving for excellence, we believe an education system ought to be able to deliver individualised learning, with flexibility to support each student's learning needs and ensure their developmental progress through the monitoring and support of students along their learning journey. Further, a holistic approach is needed- one that includes learning skills and content, the application of skills, and strengthens the wellbeing and resilience of students emerging into an increasingly complex and changing world. Science has the capacity to inspire students, to spark curiosity and infuse a spirit of inquiry and an interest in learning. The current prescriptive and crowded syllabus aligned ultimately to the HSC assessment promotes a 'tick-box' 'teaching for the test' approach to teaching in Stage 6 and a demotivation of student learning. There exists in science an untapped potential to use a student's natural curiosity of the world to introduce, strengthen and support a lifelong spirit of inquiry.

The aim of science education is a progressive learning of key ideas which enable the understanding of events and phenomena in the world around us. The current curriculum and syllabus hampers teachers' efforts to support the progressive learning of key scientific concepts to develop a deep understanding over time and the confidence in applying learnt knowledge and skills.

Coupled with these broad needs for reform, we aspire to an education system that will support students completing their schooling years with a scientific literacy that will enable them to understand the world around them, to have the skills and knowledge to engage in informed debate and decisions in a world where science and technology are increasingly important.



EFFECTIVE IMPLEMENTATION

Whilst recognising the need for reform and the potential for reform to affect positive outcomes for student learning, the Science Teachers Association NSW has concerns regarding curriculum change that disrupts teaching and student learning. Education Reform must be evidenced informed, long term and delivered with a multi-party approach so that implementation can be undertaken from a best practice perspective irrespective of election cycles.

Clarity

Clarity has long been a foundational element of effective policy implementation. We currently find ourselves in a situation where there is a lack of clarity and an insufficient timeframe to provide clarity that would deliver the intent of the Review's recommendations.

In the Final Review Report, Professor Masters recommended both content and structural change to take place over a 10 year period. The scope of the review however did not go as far as providing the detail for such change and consequently we are left with a lack of clarity as to how he intended his recommendations would be delivered.

The Government's response to the recommendations, truncating the timeframe and withholding full support for the structural changes dilutes the intent of reform and does nothing to address the lack of clarity nor does it provide the time required by NESA Curriculum Experts to develop modelling that would provide such clarity.

Such clarity is desperately needed for:

- the relationship between the new curriculum, syllabus and assessment, and
- the structural change that will support individualised learning

Budgeting for Reform

Effective reform implementation is only possible with a harmonised budgeting process. Whilst the review recommendations put forward by Masters' are evidence based and responsive to the concerns and aspirations of teachers, the lack of economic modelling of these recommendations and a truncated timeframe proposed by the Government places at risk the success of this reform.

The Science Teachers Association NSW believes multi-party commitment is required for this reform to succeed as intended by Professor Masters, thereby enabling a commitment by treasury in budgetary estimates over a longer, more appropriate time frame. The result will be adequate economic modelling for the desired reforms and allow for realistic mapping of resources, support and time required. The Science Teachers Association NSW is expecting to see a suitable budget allocation for this reform in the 2020 – 2021 Budget Papers.



Appropriate Timing

The recommended 10 year timeframe is more closely aligned to good policy implementation and inclined to achieve a positive result for education outcomes in NSW. We are disappointed that the Government has decided to truncate this timeframe into a four year period. This raises significant concerns for the quality of the reform, teacher preparedness and the ability for the reform to address the issues that it was designed to do.

Further, the existence of both the NSW Syllabus and the Australian Curriculum causes confusion and a lack of clarity for teachers and their expectations. The current reforms of both is the perfect opportunity to streamline, simplify and ensure consistency of core curriculum.

Recognising Teachers as Essential to the Reform Process

We reflect on the lessons learnt from previous Science Syllabus changes that were rushed through that caused teachers, students and parents significant concern. For effective statewide implementation of ambitious large-scale reform, Government must:

- Plan with a realistic timeline to effectively manage the implementation of the reform ensuring continuity of learning
- Genuinely consult with teachers in the development and implementation phase, respecting teacher agency in this process
- Pilot the reform in schools to ascertain feasibility in practice
- Develop adequate support materials
- Ensure professional development to support teachers throughout the reform
- Ensure ongoing professional development to support classroom teachers and school leaders
- Be transparent along the journey



Reform Leadership

Effective implementation of reform of this scale requires considered and strategic leadership. The stakeholder groups require stability in the governance of the reform consistent with the Education Act (1990) and expect leaders of the reform to be genuinely consultative, transparent and robust in their thinking and recommendations.

Review of Reform

To monitor effectiveness of the Reform and to ensure successful execution of its intent, a review of the implementation that sets out the timeframe and tools for measurement of its success is required. Recognising that success of implementation is tied to student outcomes, we note that PISA is currently used to assess the quality and equity of our schooling system on an international level, however the use of PISA results, particularly by the media, has a negative impact on teachers' morale and thus potential effectiveness in the classroom. We recommend a more useful measure to assess the success of this reform would be the Department of Education Validation of Assessment for Learning and Individual Development (VALID), NESA Results Analysis Package and the Dr John DeCourcy HSC analysis as more useful tools in assessing and tracking student outcomes statewide.



RESPONSE TO RECOMMENDATIONS

1.Design new syllabuses for each subject, including subjects of the senior years, to reduce the volume of mandated content where appropriate and to prioritise the learning of core facts, concepts and principles.

1.1 In each subject of the new curriculum, identify essential facts, concepts and principles, the understanding of which is developed in increasing depth over time, and where required, use this to identify content that is more peripheral and could be removed.

1.2 Decide how this core content is to be sequenced through new syllabuses, informed by evidence of how increasingly deep knowledge and understandings in a subject commonly unfold and are best developed over time. This is an ambitious approach that will require a longitudinal view of Science across the K - 12 continuum of teaching. All stages must consistently flow, particularly at the current junctures of Stage 3 to 4 and 5 to 6. The content at stage 6 should also be considered as part of this continuum, rather than preparation for university. Implementation should include a variety of stakeholders, including content and curriculum experts, and, of course, teachers. This should be a collaborative effort, in order to achieve the consistency necessary to span all subjects and educational stages. Finally, the sequencing of core content into progressions should be supported by a range of resources, mapping tools, assessment tools and comprehensive and sustained professional learning programs.

Some members noted that there are varying degrees of decluttering required of the science Stage 6 syllabuses, notably Biology and Earth and Environmental Science and some require language improvements including removal of lexically dense content descriptions.

We note that K-6 has undergone two syllabus re-writes in the recent past and that the teaching of science concepts is optional. This results in a wide range of abilities arriving in middle years.

A foundational science concept progression document detailing increasingly difficult big ideas and concepts along a continuum from K - 12 is required to form a solid framework for a sound syllabus. We strongly recommended this as pre-planning for any new syllabus documents.

The Science Teachers Association NSW recommends that backward mapping of concepts and skill progressions (to avoid repetition) and identifying lower order concepts (to avoid over-emphasis) from the Stage 6 Syllabus through middle and early years would provide an effective process for identifying the continuum of learning. This requires K – 10 to be reviewed and revised.

Such exercises would be complex and require substantial and comprehensive teacher input and sufficient time to get it right. Further such a document would form part of basic teacher training background knowledge and should be a public document.

With a mapped evidence-based continuum teachers can write teaching programs best suited for their students so that adjustments can be made and students are neither 'left behind' nor 'coasting'. It will also enhance classroom engagement and assist students to see the meaning and relevance of what they are learning. 2.Design new syllabuses not only to develop increasingly sophisticated knowledge and deeper understandings of a subject, but also skills in applying that knowledge.

2.1 Make explicit in new syllabuses for every subject that skills in applying knowledge are part of the intended learning, and show how these skills are to be developed over time. These skills include: subject-specific skills, but also skills in using technologies, sourcing and analysing information, critical and creative thinking, collaborating and communicating.

The focus on the integration of skills in the syllabus was strongly supported by the Science Teachers Association NSW and was considered to be fundamental to the Science Syllabus. We note that many of these skills are already present in the science syllabus outcomes 1 – 7 and explicitly stated in Stage 6, along with many other subject-specific skills. What is required is the backward sequencing from Stage 6 across the full learning continuum to be used in programming and teaching as a support document.

Our members would like to see the integration of skill with content knowledge in the K - 10 Science Syllabuses, similar to the Stage 6 document. Better communication of the intent of the syllabus design and structure in this area was requested.

Members noted there is little pedagogical research to inform the teaching of skills and therefore teachers lacked the ability and confidence in doing so. Support through specific Professional Learning in the teaching of skills, particularly scope and sequence, will be required for successful implementation.



3. Design new syllabuses that do not specify when every student must commence, or how long they have to learn the content of each syllabus.

3.1 Make new syllabuses untimed, with students progressing to the next syllabus once they have mastered the prior syllabus. Students who require more time should have it; students ready to advance should be able to do so. This is fundamental to the success of the reform with clear links to improving student learning. It enables differentiated learning and with the right resources, could address students being 'left behind' enabling students to progress as they are ready. If this recommendation is not implemented, we will be left with a syllabus re-write that goes someway to improve education in NSW however, more than a syllabus is required (Woolcock, 2003). Teacher quality and opportunity for innovative changes to curriculum and pedagogy have a greater impact (Luke, Weir and Woods, 2008).

Designing new syllabuses alone does not meet the guiding principles of the reform, however making the syllabuses untimed does. Untimed syllabuses enable teachers to set high expectations for learning with understanding, give students opportunities to apply their knowledge in unfamiliar situations, implement informative assessment, provide student agency and allow personal learning goals.

The Final Review lacked sufficient detail on untimed syllabuses and how this would support student attainment of standards to either support or reject. Members were positive about the general premise, however, the practicalities of managing this given the current structure of schooling requires further thought. Transition to an alternative structure would require sufficient time allocation.

Caution was given to managing unintended consequences of such a structure, for example, as increased anxiety due to detachment from social group and isolation. Addressing the obstacles to the significant structural change required, (e.g. transition support for teachers, more planning hours for teachers, changes to school timetabled hours, resources and physical spaces) would need to be appropriately modelled including with economic modelling and trialled to ascertain viability.

The following schools are successfully teaching untimed syllabus based on stage progressions not age and can be used as models

- Templestowe Vic
- Ascham School Remote Learning
- Lindfield Learning Village

3. Design new syllabuses that do not specify when every student must commence, or how long they have to learn the content of each syllabus.

3.2 Specify what students are expected to know, understand and be able to do as a result of being taught each syllabus in a subject and illustrate this standard with samples of student responses and work. The Science Teachers Association NSW fully supports the continued use of outcomes and detailing student achievement through the development of both minimum standards and exemplars of student work. Such work will make achievement standards more explicit for individual teachers and with Professional Development will help make teachers' judgements collectively more consistent. The samples can act as models that can be deconstructed by the teachers to identify key components of quality work.

Examples in practice

- MyScience Program
- Assessment Resource Centre Website
- Science Teachers Association NSW Young Scientist Program

4. In the early years of school, give priority to providing every child with solid foundations in the basics, especially oral language development, early reading and writing skills and early mathematics knowledge and skills.

4.1 Make explicit in the curriculum that oral language development, early reading and writing skills and early mathematics skills are top priorities in the early years of school, particularly for children who are less advanced in these areas, and that these take precedence over other aspects of learning.

The Science Teachers Association NSW supports the focus on oral language development, early reading and writing skills and early mathematics skills, noting that these skills are necessary for success in science.

However, these skills cannot be taught in isolation. Removing them from a science context isolates and disassociates the skills and prevents their application, "Content without context is noise" (Chapman, 2018).

Science should not be considered an 'other aspect of learning' but foundational to learning those skills.

Both male and female students in early years including those less advanced benefit from multiple opportunities in making observations and the use of age appropriate scientific language.

Examples in practice

• Literacy the next step - Sydney Catholic Schools

4. In the early years of school, give priority to providing every child with solid foundations in the basics, especially oral language development, early reading and writing skills and early mathematics knowledge and skills.

4.2 Develop a detailed and explicit curriculum for the teaching of reading as part of new syllabuses for the subject English, structured to assist teachers to establish and diagnose where individual children are in their reading development, and accompanied by evidence-based teaching advice. The Science Teachers Association NSW supports the idea of a more detailed and explicit curriculum in English, and more support for reading development, noting this will benefit progress in all subjects as it is a fundamental pre-requisite to developing knowledge and skills in science. This will address issues experienced in middle years where students do not have the literacy skills to engage with the science curriculum.

We note that the teaching of reading and comprehension in early years can be taught through scientific contexts. We recommend the development of resources to support such contextualised learning and would be willing to work with NESA to develop such resources.

We defer to the English Teachers Association of NSW on issues that relate to diagnosing conceptual gaps and skills deficits, and the evidence-based teaching required to ensure students' progress along a learning continuum.

Examples in Practice

• PETAA - ONLINE Grammar and Teaching: A twelve-week program

4.3 Structure the early mathematics curriculum to support teachers to establish the points children have reached in their mathematics learning, including by diagnosing conceptual gaps and skills deficits, and provide accompanying evidencebased teaching advice as part of new syllabuses in mathematics. The Science Teachers Association NSW supports this focus on Mathematics in the early years, noting it is a set of skills that can be transferred across a range of subjects and is fundamental to a number of scientific concepts. Further, the teaching of mathematics in early years can be taught through scientific contexts. We recommend the development of resources to support such contextualised learning and would be willing to work with NESA to develop such resources.

We defer to the Mathematics Association of NSW on issues that relate to diagnosing conceptual gaps and skills deficits, and the evidence-based teaching required to ensure students' progress along a learning continuum.

Mapping of concept and skill progressions is required to ensure that the cognitive demand is comparable in both mathematics and science and technology, and this carried through into Stages 4 – 6. At that coordination across the subjects complement the learning progressions for each subject.

5. In the middle years of school, give priority to providing every student with challenging learning material appropriate to their current level of attainment in the expectation that they meet (and ideally exceed) a minimally acceptable standard in each mandated subject by the completion of school.

5.1 Maintain the existing set of mandated subjects; for each subject define the minimum level of attainment every student should achieve by the completion of school; and provide teachers and parents/carers with a way of monitoring whether individuals are on track to achieve that standard. The Science Teachers Association NSW notes the declining NSW Science results on the Programme for International Student Assessment (PISA) since 2006. These declining results indicate that students are being left behind. We therefore support the defining of a minimum level of attainment, on the provision that this reform delivers the necessary structure and resources to support every student to reach those levels of attainment and that monitoring is used to support student progress.

Further to that, any monitoring results should be private between the teachers, student and parent. Public publishing of monitoring results has proved detrimental to school communities and student learning.

The practicality of delivering this recommendation raised a number of questions from our members, notably what support would teachers and students receive who were not meeting the minimum standards, the process for the setting of the minimum standard, their relationship to the continuum of learning for the subject and the agency of teachers to exercise their judgement. Professional Learning for Teachers on the minimum levels of attainment, the process for monitoring and where to access additional support for students who require it will be essential for this recommendation to improve our Programme for International Student Assessment (PISA) results.

For the intent of this recommendation to be successful it would be best delivered in conjunction with the untimed syllabus, so that students can work at their own pace and provided more support as necessary. Planned time for consolidation in the syllabus will assist attainment of minimum standards and deepen student knowledge.

Examples in practice

- Project Based Learning
- Templestowe College
- Stage 6 Depth Study 15 hour time allocation per year

5. In the middle years of school, give priority to providing every student with challenging learning material appropriate to their current level of attainment in the expectation that they meet (and ideally exceed) a minimally acceptable standard in each mandated subject by the completion of school.

5.2 Require every student to commence learning a second language during their primary years, making use of technology where possible. The Science Teachers Association NSW felt that this was a recommendation not relevant to the teaching of science.

5.3 - Develop a curriculum that specifies what every student should know and understand about Aboriginal cultures and histories, and incorporate this curriculum into Human Society and its Environment. The Science Teachers Association NSW supports the incorporation of Aboriginal cultures and histories in the curriculum and notes that this must be undertaken in a way that is genuine, authentic, developed in collaboration with Aboriginal people and not appear 'tokenistic'. This recommendation in isolation is unclear, is it implying that Aboriginal cultures and histories should be incorporated into the Human Society and its Environment curriculum and not delivered as a cross-curricular priority? If so, this seems inconsistent with the current Australian Curriculum and the rationale for it to be cross-curricular. We would be concerned if Aboriginal cultures and histories was narrowed to the learnings of one subject area.

We acknowledge the emerging success of Aboriginal cultures and histories focus within the context of science and believe with greater efforts in content descriptions these successes can be built upon.

The ACARA Aboriginal and Torres Strait Islander elaborations are a very rich resource and useful for all teachers of science.



6. In the later years of school, give priority to providing every student with opportunities to pursue personal interests and strengths through rigorous, specialised subjects, each of which builds solid theoretical foundations, provides opportunities to transfer and apply knowledge, and develops skills in the practical application of subject learning.

6.1 Eliminate the current bifurcation of learning in the later years by developing over time a new set of HSC subjects, each of which involves rigorous, high-quality learning that integrates knowledge and the practical application of knowledge. In our experience the bifurcation happens at the school level as opposed to the HSC subject level. The bifurcation at the school level happens as a result of the publication of league tables and number of band six results. Students are guided into ATAR vs non ATAR courses in order to maximise band 6 results. It is however important that students who do not want an academic pathway are supported in high quality subjects without being negatively labelled as 'non-ATAR'. It is unclear how the subject grouping into learning areas will address this issue.

We agree that the bifurcation of learning can be detrimental to students achieving their potential, limiting their future choices.

Elimination of the league tables will address the dichotomy between the practical and academic subjects and will lead to a better well-rounded education for students.

Better communication between high school, career advisers, TAFE and universities will support a clear pathway and subject selections for students.

Some Members of The Science Teachers Association NSW observe that more subjects that relate science to the work-place are needed.

Examples

- Science for Life (pre-2000 syllabus)
- Investigating Science and Science Extension are the current subjects which have 'wider' approach to the 'real world' application of science

6.2 Replace the existing learning areas in the later years with a newly defined set, allocate all future HSC subjects to these areas and promote them as focal points for schools' connections with relevant industries and post-school providers and pathway and career advice. We support the combination of science and mathematics as a learning area; however we recommend keep the science subjects, physics, chemistry and biology as separate subjects. This is an important foundation to the integration of subjects in tertiary studies.

New courses with direct links to vocational subjects would be fully supported and engaging for the wider student audience. Some examples could include for example physics in carpentry, chemistry through food technology, the biology of early childhood. These new courses would enable the Science Teachers Association NSW to be pivotal in building relationships between schools and industry.

Forming relationships with relevant industries would provide opportunities to upskill teachers in real world science. Where relationships exist, there may be opportunities for local industries to support students in their Depth Studies and Science Extension research. From our perspective this might be more helpful for regional and rural schools.

Examples in practice

- The Future Project Kings School
- CSIRO Scientist in Schools

6. In the later years of school, give priority to providing every student with opportunities to pursue personal interests and strengths through rigorous, specialised subjects, each of which builds solid theoretical foundations, provides opportunities to transfer and apply knowledge, and develops skills in the practical application of subject learning.

6.3 Require every student to undertake a major investigative project in a subject of their choosing, with common assessment criteria, moderation of teacher assessments, and performances forming part of a student's HSC results. The Science Teachers Association NSW supports the introduction of one major investigative project. The current NSW Science Syllabus is a successful example of major investigative projects in practice with both depth studies and Science Extension. These depth studies (one in year 11 and one in year 12) are part of the assessment schedules and they support the application of scientific process to develop knowledge, understanding and critical thinking and research skills in science.

With the current syllabus some students had excessive workloads due to taking multiple science courses requiring multiple depth studies. In introducing this reform, being a singular major investigative project, we hope that in the case of students studying multiple sciences, that only one major project will be mandated.

We question the notion of a common assessment across all subjects and wonder how this intends to be applied in practice. We recognise that this is possible with a skill driven framework and is already being applied in science. However, we note that this may lead to equity issues because specific subject outcomes are not always comparable across subjects.

Examples in practice

- Science Extension
- Science depth studies
- HSIE Personal Interest Projects
- Major projects

6.4 Establish a taskforce comprising representatives of the higher education sector, the school sector and the Universities Admissions Centre, to investigate the feasibility of not calculating and reporting the Australian Tertiary Admission Rank (ATAR). A taskforce to investigate the feasibility of not calculating the ATAR is a positive step in removing what is a redundant measure that impacts negatively on student learning and does not reflect the true capability of the students. The idea of subject scaling prevents many students from pursuing subjects that they really have a passion and impacts on their choices of science pathways. We recognise that the ATAR in some cases provides a motivation for students to excel, the taskforce ought to consider this impact when exploring alternatives. This is an opportunity for the broader education sector to review university entrance that could involve a number of stakeholders as part of that decision-making process.



7. Involve stakeholder groups, especially teachers, in all implementation phases of the new curriculum.

7.1 Consult and actively involve all relevant stakeholder groups in the planning, development and pilot testing of new curriculum arrangements. Without appropriate consultation and active involvement during development and implementation of this reform with key stakeholders, the reform will not be successful. The Science Teachers Association NSW believes insufficient time exists in four years to deliver this effectively and to a high quality. The Science Teachers Association NSW and our members are well placed, highly qualified and skilled to provide advice in the development of the curriculum.

Active involvement will ensure teachers have a clear understanding of the curriculum changes and what is required for effective implementation. More time is required to smoothly implement a sustainable and effective new curriculum.

Pilot testing will be essential for the successful implementation of this reform and we are concerned that four years does not allow effective pilot testing to occur. Further, the published Syllabus Development process on the NESA website does not include any time window for piloting in schools nor teacher familiarisation and programming.

Sufficient time is required for effective consultation with all stakeholders including those developing resources. In the past the Science Teachers Association NSW felt that when syllabus changes were rushed and textbooks were produced rapidly, many lacked the expected level of quality and relevance to the depth required in the syllabus, to support excellence in education.

7. Involve stakeholder groups, especially teachers, in all implementation phases of the new curriculum.

7.2 Implement a

communications plan to explain the urgency of curriculum reform and the key intentions, guiding principles and underpinning evidence base for the new curriculum, including by clarifying what is not intended. The Science Teachers Association NSW supports the implementation of a communication plan to explain the urgency of the curriculum reform. This 'urgency' does not mean rushing the reform implementation through, it does however, mean that there is a strong imperative for considered and long-term change in curriculum. The Reform must be sustainable for teachers, based on sound curriculum design, flexible to accommodate educational needs and feasible with students and teachers always in mind.

Transparency and a good understanding of processes and procedures for teachers to implement this reform is paramount for its success and sustainability.

It is the communication plan and resources that are urgent in order for teachers to achieve a clear understanding of the key intentions, guiding principles and underpinning evidence of the reform.

We would welcome the opportunity to work with NESA as a central partner in this communication plan, using our various communication channels to reach science teachers across the state.

8. Review current external demands on teachers' and school leaders' time in an effort to maximise the time available for teaching, learning and instructional leadership.

8.1 Review recent requests that schools add extra-curricular issues and topics to the school curriculum to determine whether all are still necessary, and review protocols for adding such issues and topics in the future. The Science Teachers Association NSW recognises the careful balancing required between decluttering the syllabus and being true to the community aspirations. We note that the Review refers to mandatory activity in the syllabuses rather than school selected extra-curricular activities. It is our understanding that schools will maintain their ability to respond to their local context.

We support the review of extra-curricular issues and topics and the development of transparent and robust protocols for future additions of mandatory activity in the curriculum. The inclusion of any extracurricular content must be considered essential to the entire student population across the state and support the best interests of education. The review must consider timing implications for teachers.

A process is required to ensure that any amendments do not negatively impact students living with disadvantage. In some lower socio-economic areas, the extra-curricular activities provide valuable knowledge, skills and support for students that they otherwise wouldn't be able to access. 8. Review current external demands on teachers' and school leaders' time in an effort to maximise the time available for teaching, learning and instructional leadership.

8.2 Review current paperwork and compliance requirements of teachers and school leaders with a view to reducing the time currently spent on such activities. This review should be undertaken by NESA and each school sector.

The Science Teachers Association NSW strongly supports the reduction of paperwork for teachers, so that they may focus energies on student learning and not administration. Paperwork that drives accountability for teachers should reflect the improvement in student learning.

Teachers require clear and unambiguous guidelines on reporting and compliance to prevent schools and sectors adding extra layers of paperwork and complex reporting and compliance requirements.

There is an opportunity for the Science Teachers Association NSW to support teachers in reducing time spent on paperwork by aligning compliance requirements to professional development training of teachers.





9. Work to ensure all components of the learning system – including professional capacity building, assessment and reporting processes, and broader improvement efforts – are aligned with the principles and intentions of the new curriculum.

9.1 Build a coherent system of support for the new curriculum's goals to promote learning with understanding, to build skills in applying knowledge, and to assist teachers to establish where students are in their learning so that individual needs can be addressed with appropriately targeted, evidence-based teaching

The Science Teachers Association NSW supports the building of a coherent system to deliver the goals of the new curriculum.

This system of support must include:

- A map of the continuum showing progression of concept and skills development from K-12
- Professional development for Pedagogical Content Knowledge based on the continuum
- Links with professional standards
- Access to experts in the experts in the field e.g. Professional Teaching Associations, Universities, Industry, Government Science Organisations
- Access to and help with unpacking external test data and using this for teacher performance monitoring to address areas where changes to teaching practices is required
- Increased integration with pre-service teacher training, for example including a system of school internships and formal mentoring.

We believe an essential step required in science is clarity on the principles and big ideas of science mapped across the K-12 learning continuum and corresponding assessments. This must be a foundational step of the reform efforts. This support system will improve capacity and also the capability of teachers to deliver the curriculum goals for example:

- how to set high expectations of themselves and their students.
- learning to track individual student's progress along the continuum is a key teacher capability, noting there is a significant distinction between the capability requirements of secondary and primary teachers, given the number of students they are reporting on and the face-to-face time with each student.

This support system will lead to improved informative assessment and allow students to be engaged in the process by having greater voice and choice in ways they can present their learning. 9. Work to ensure all components of the learning system – including professional capacity building, assessment and reporting processes, and broader improvement efforts – are aligned with the principles and intentions of the new curriculum.

9.2 In assessing student learning, give greater priority to students' understanding of core facts, concepts and principles, ability to apply these understandings in relevant settings, and skills in knowledge application.

The Science Teachers Association NSW recognises the importance of assessing student learning using the teaching and learning cycle along a continuum. Delivered well, quality teaching enhances student achievement of outcomes and their application of skills, understanding and extrapolation of knowledge into unfamiliar situations.

Professional learning opportunities could enhance teachers' ability to design assessment tools which incorporate more applications of understanding how to identify gaps in student learning and the nature of difficulties being experienced, as well as where on the continuum to extend students if they are ready.

We note getting assessment right for this reform will require an understanding of the expectations of depth, and the balance between core facts with the application of those concepts and skills.

The Science Teachers Association NSW members are best placed to support this reform and identify core facts and principles to develop assessment procedures and create the necessary training for teachers to understand the link between assessment and the syllabus.

9.3 Develop, implement and promote assessment and reporting practices to establish the points individuals have reached in their learning, to provide diagnostic feedback to support further learning, and to monitor students' longterm learning progress. This is an example of best practice and the Science Teachers Association NSW strongly supports these teaching practices of diagnostic, formative and summative assessment. Standardised tests are already assessing the continuum of literacy and numeracy (NAPLAN) and progress in science knowledge and working scientifically skills (VALID) in student learning. Some members of The Science Teachers Association NSW encourage the use of these tests to modify teaching practices and be able to better cater to the individual needs of all students in all three areas of assessment. The tools also allow long-term tracking of learning progress.

The Science Teachers Association NSW recommends that teachers be trained to apply those principles effectively and consistently. The Science Teachers Association NSW is in a strong place to collaborate with the stakeholders of this reform to develop good tools and strategies to implement those practices sustainably.

10. Invest in professional capacity building to support the implementation of the new curriculum.

10.1 Promote an understanding of teaching as the process of first establishing where students are in their learning and then providing stretch learning challenges appropriate to individuals' current levels of attainment. Knowing where students 'are at' is key for curriculum differentiation to cater for the needs of all students. Professional Learning, with respect to the new curriculum and specifically the content and skills expected at each stage along the learning continuum will be essential.

Whilst teachers already have data available to assess student prior knowledge and achievements (VALID, NAPLAN, school-based assessments), if these remain, they will need support to align their differentiation practices to the new curriculum. We note that such Professional Learning is already part of the Australian standards for teaching.

The Science Teachers Association NSW focus could include supporting teachers to be aware of 'cognitive overload' teaching practices and to also direct their lessons at each student's zone of proximal development.

The Science Teachers Association NSW suggests that more time and collaboration is needed to support the implementation of the new curriculum and invest in effective and sustainable professional learning in this area.

10.2 Develop and deliver professional learning to build teachers' skills in assessing and diagnosing student learning and their knowledge of effective, evidence-based teaching strategies. The Science Teachers Association strongly supports building the capacity and capability of teachers in assessing student learning and the use of diagnostic tools to support individualised learning. We also support ongoing Professional Learning in pedagogy content knowledge to ensure that teachers are supported in the delivery of contemporary evidenced-based teaching strategies.

The Science Teachers Association has vast experience in developing and delivering professional learning and extensive expertise to draw upon throughout our membership base. We are well placed to work with NESA to ensure that teachers are supported throughout this reform process. We believe best practice professional learning requires more than a 'one off' experience.

The Science Teachers Association NSW Logic Model for Professional Learning is an evidenced informed model for the development and delivery of effective professional learning, including assessment and pedagogical content knowledge. The model includes opportunities for teachers to be actively involved and supported throughout their learning, including opportunities for feedback and self-reflection.

APPENDIX

Definitions

Curriculum: The variables impacting of student learning, including syllabus, the background knowledge, cognitive and cultural resources that students bring to classrooms; teacher expertise gained through pre and in-service teacher education and practical experience; textbook selection and content; availability of further training and professional resources; school leadership; system governance and accountability structures; high stakes testing and examination; classroom assessment; available financial resources; the physical site of the classroom,

Syllabus: the syllabus is an official map of a school subject. That is, it provides teachers with a rationale and outline of the school subject in question, an overview and specification of preferred expected 'stuff' to be taught and learned, and description of operational ways of appraising standards for gauging student performance. The expected learnings can be stated in various forms (e.g., as knowledge, skills, competences, processes and experiences).

Learning Continuum: А stage-based map of progressive skills and knowledge details that achievement standards K-12. it includes clear progressions of learning across the years of school and makes explicit the long-term growth in a domain. It provides a basis for establishing individuals' current levels of attainment and for monitoring growth over time.

Untimed Syllabus - A stage-based approach as opposed to age-based, the syllabus does not specify when student must commence, or how long they have to learn, each syllabus. Students' progress to the next syllabus once they have reached a specified level of attainment for each syllabus. Students who require more time have it; students ready to advance are able to do so. What this looks like in practice has not been determined.

Familiarisation - A period of time allocated as part of change management to ensure that all stakeholders have the opportunity to familiarise themselves with the various elements of the change, including the need for change, the proposed change and implementation components,

Informative Assessment - the design and application of assessment information to understand and improve learning, supporting highly effective teaching and student learning.

Inclusive Curriculum - An inclusive curriculum is one where all students' entitlement to access and participate in a course is anticipated, acknowledged and taken into account.



THINK TANK

Individuals have self-selected to be part of the Science Teachers Association NSW Think Tank. This is an open group and individuals are welcome to join. The Think Tank has been established to inform the Association's positions throughout the reform process.

Margaret Shepherd, President Science Teachers Association NSW Julie Rogers, Vice President Science Teachers Association NSW Michael Peck, Bethany College Lois Cohen, Moriah College Samantha Irons, Narrandera High School Rachel Thompson, Sydney Catholic Schools Liz Thrum. Knox Grammar Silvia Rudmann, Gorokan High School / Aurora College Anne Marie Lord, Sydney Catholic Schools Cherine Spirou, Fairvale High School | Lachlan Macquarie College Kelly Jawerth, Catholic Education Diocese of Parramatta Tanya Riach, Condobolin High School Malcolm Hooper, Normanhurst Boys High Liz Turner, Kambala Helen Georgiou, School of Education | Faculty of the Arts, Social Sciences and Humanities, UOW Carl Masens, Girraween High School Jacqueline McCarthy, Abbotsleigh Maree Woods, Sydney Catholic Schools Susan Filan, Education Officer with Australian Earth Science Education. Ashley Mulcahy, Glenmore Park High School, Colin Harrison, St Phillips Christian College Alison Diskin, Department of Education High School Sally Biskupic, Catholic Education Diocese of Parramatta Anne Forbes, Macquarie School of Education, Faculty of Arts, Macquarie University NSW 2109 Joshua Baissari, Norwest Christian College Josephine Cali, Catholic Education, Diocese of Broken Bay Sue Coleman Jo Mendoza, William Clarke College



ABOUT SCIENCE TEACHERS ASSOCIATION NSW

About Us

Founded in 1951, The Science Teachers Association NSW inspires Science Teachers and the learning of science in NSW, providing leadership and promoting excellence in science education. We are an association led by science educators who volunteer their time to foster an environment of supportive collegiality. Science teachers seek to infuse their students with a love of science, inspiring curiosity and scientific thinking about the world within which we live.

We believe that both education and scientific endeavours remain at the forefront of a progressive society and it will be the next generation of thinkers who will tackle some of the world's greatest challenges. We are a hub for Science Educators where they can access resources, support and networks so that they can grow in their profession and continue to provide quality education.

Our Vision

To be a Dynamic and Professional Community of Science Educators.

Our Mission

To advance the profession in NSW through the provision of quality professional development, information and advocacy for the teaching of science.

Our Community

We are a hub for science teachers across NSW, our membership of over 2000 science educators seek and value excellence in a collegiate and supportive atmosphere. As education systems and the teaching of science evolves, we aim to play a significant role in being a voice for our teacher members. We support science teachers to smoothly adapt to change and facilitate the long-term pursuit of excellence in science teaching.

Our Product

Learn - We provide opportunities for teachers to continue to learn, supporting them to be inspirational in the classroom and to champion science literacy through the delivery of Professional Learning Conferences, Workshops and Mentoring Opportunities.

Network – We foster connections for teachers across K-12 to network with their peers, share resources and ideas in person, via our publications and supporting a vibrant online community of practice.

Discover - We support teachers in discovering innovative advancements in science, linking real world science to the classroom and enhancing teaching and learning through access to the latest research.

stansw.asn.au

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