



# National Professional Standards for highly accomplished teachers of science

*Final draft*

The Australian Science Teachers Association (ASTA) has led and managed the development of the final draft standards for highly accomplished teachers of science. The standards are one of a number of national professional standards being developed in specialist areas by the teaching profession in partnership with Teaching Australia.

The standards have three related elements:

- the **Charter** for the Australian teaching profession
- generic **capabilities** setting out the high level knowledge and skills expected of teachers operating at the highly accomplished level. They are organised in three categories – professional knowledge, professional practice and professional leadership
- **descriptors of accomplishment**, describing what highly accomplished science teachers know and do.

This document includes the Charter for the Australian teaching profession on page 2, an overview of the standards on page 3 and the full standards on pages 4-16. A guide to navigating the different elements of the standards is on page 17.

# Charter for the Australian teaching profession

## A statement of values and commitments

Teachers believe in the power of education to make a difference to the lives of individuals and to society. As teachers and principals we are committed to giving students the best education possible for them to lead fulfilling, purposeful and productive lives. We bring to the role high levels of professional knowledge, expertise and ethical commitment.

### TEACHING

Teachers set high standards for every student and respond to individual needs. We challenge students to be all that they can be, to set demanding goals for themselves and to make a contribution to others.

We provide a stimulating learning environment. We create schools that welcome students and foster the development of values, so that all students, whatever their personal circumstances, can participate and thrive. We provide experiences that engage each student's capacity to learn.

We inspire students to discover the joy of learning, drawing them into a world of knowledge, ideas and creativity. Our ambition for all is a lifelong engagement with learning.

### THE PROFESSION

Our practice reflects the essential balance between conserving and renewing what is, and anticipating and building what can be. We work in partnership with colleagues, families, other professionals and the wider community.

We take responsibility for the development and renewal of our profession. We act to advance the quality and reputation of teaching through professional learning and reflection.

We are specialists in teaching and learning. We have expertise in student development, including how young people gain knowledge, learn to think critically and develop creativity.

The teaching profession sets itself demanding standards. We act with judgement, integrity and respect to build the trust and confidence necessary for successful learning.

# National Professional Standards

for highly accomplished teachers of science

Final draft

## Standards overview

1. Professional knowledge	2. Professional practice	3. Professional leadership
<b>Contemporary and authoritative professional knowledge and understanding of:</b>	<b>Exemplary professional practice which includes:</b>	<b>Active and influential professional leadership to:</b>
<p><b>1.1 students and the factors that influence learning and development</b></p> <p>Highly accomplished teachers of science know that the developmental characteristics, personal dispositions, experiences and gender of their students influence their learning in science.</p> <p>Highly accomplished teachers of science know the contextual factors that influence the way their students interpret their world and their learning in science and understand the implications for their teaching.</p>	<p><b>2.1 building effective relationships and managing complex interactions</b></p> <p>Highly accomplished teachers of science build respectful relationships and manage complex interactions within the school to support their students' learning in science.</p> <p>Highly accomplished teachers of science initiate and manage relationships with key individuals in the immediate school community and beyond to strengthen their students' learning opportunities in science.</p>	<p><b>3.1 contribute to school planning, development and management</b></p> <p>Highly accomplished teachers of science contribute to building the capacity of the school as a sustainable learning community.</p>
<p><b>1.2 teaching science</b></p> <p>Highly accomplished teachers of science have a broad, deep and current knowledge of the dimensions of science related to their area of teaching and understand the strengths and limitations of the processes of scientific investigation and inquiry.</p> <p>Highly accomplished teachers of science understand the diverse drivers of scientific endeavour and the socio-cultural, environmental, economic and ethical implications of such work.</p>	<p><b>2.2 creating and maintaining engaging and intellectually challenging learning environments</b></p> <p>Highly accomplished teachers of science believe that all students can learn science: they create environments that stimulate interest and engagement in all dimensions of science and challenge their students' aspirations in learning.</p> <p>Highly accomplished teachers of science work with their students to create physically and emotionally safe environments that support students' learning.</p>	<p><b>3.2 encourage professional learning, critical reflection and professional discussion, drawing on evidence to improve practice</b></p> <p>Highly accomplished teachers of science engage with their colleagues in evidence-based analysis of their professional learning needs, to improve the quality of teaching and learning science.</p> <p>Highly accomplished teachers of science promote the need for ongoing professional learning to maintain the currency of their professional knowledge and practice in providing high quality teaching for learning in science.</p>
<p><b>1.3 effective pedagogies, assessment and reporting</b></p> <p>Highly accomplished teachers of science have an extensive and authoritative pedagogical content knowledge that helps their students to develop their scientific abilities and see the relevance of science in their lives.</p> <p>Highly accomplished teachers of science know that assessment practices must be clearly aligned with defined learning goals and capture meaningful, reliable evidence, from multiple sources to guide student learning, to provide a basis for reporting and to inform teaching.</p>	<p><b>2.3 planning, implementing and evaluating rigorous and inclusive learning programs</b></p> <p>Highly accomplished teachers of science design rigorous, personalised and contextualised programs that align with curriculum standards and provide opportunities for students to develop their interest, intellectual capacity and abilities in all dimensions of science.</p> <p>Highly accomplished teachers of science implement their learning programs purposefully and use evidence to evaluate the alignment of achievement with the intended and implemented curricula.</p>	<p><b>3.3 build an environment of confidence, resilience and success</b></p> <p>Highly accomplished teachers of science are proactive in helping members of the school community to identify and adapt to change and to create opportunities to celebrate success.</p>
<p><b>1.4 a wide range of resources, including interactive technologies, and their use in teaching and learning</b></p> <p>Highly accomplished teachers of science have insightful knowledge of the range of print, digital, technological and science-specific resources that support their teaching and students' learning in science.</p> <p>Highly accomplished teachers of science know the potential benefit of linking their students to science-based resources in school and non-school settings to enrich their science experiences.</p>	<p><b>2.4 using assessment and constructive feedback to inform teaching and learning</b></p> <p>Highly accomplished teachers of science apply their deep understanding of assessment practices purposefully to guide their students' learning in science and to judge their achievements.</p> <p>Highly accomplished teachers of science use evidence of their students' attitude and performance in science to inform the design, implementation and evaluation of their programs and their everyday teaching practice.</p>	<p><b>3.4 contribute to the development and renewal of the profession</b></p> <p>Highly accomplished teachers of science contribute actively to the development of their profession by assisting in the development of the individual and collective capacity of colleagues and by promoting the importance of science education in the wider community.</p> <p>Highly accomplished teachers of science recognise that the status of their profession depends on the quality of the contribution of the individual and collective membership, and their ability to advocate on the profession's behalf.</p>
	<p><b>2.5 communicating effectively with different audiences using a range of strategies</b></p> <p>Highly accomplished teachers of science draw on their expertise in an extensive range of media to communicate, to different audiences and for different purposes, aspects of their work as teachers of science and as members of their professional and wider communities.</p>	

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## I. Professional knowledge

### I.1 Contemporary and authoritative professional knowledge and understanding of: students and the factors that influence learning and development

**Highly accomplished teachers of science know that the developmental characteristics, personal dispositions, experiences and gender of their students influence their learning in science.**

Highly accomplished teachers of science are conversant with contemporary theories of learning and the complexities of science learning, and how to draw on them to create meaningful opportunities for their students to engage with science. They are insightful in their knowledge of the physical and cognitive characteristics of their students and their patterns of developmental progression. They see their students as individuals and know the variation in characteristics, aptitudes and dispositions that exists within groups; they know how the emotional and intellectual engagement of students and cultural relevance interact in influencing their students' learning and they understand the implications for teaching.

Highly accomplished teachers of science know that learning is a complex, interactive and iterative process and that past experiences shape their students' current views of science and themselves as learners of science. They know that high expectations and positive science experiences can motivate students and that misconceptions and alternative conceptions of science can be barriers to learning. They recognise that a student's level of competence in literacy and numeracy may affect their ability and confidence to engage with science-specific language and the literacies of science. They understand that this may affect their students' self-efficacy, openness to change, and their ability to take an active part in discussion and scientific investigation.

**Highly accomplished teachers of science know the contextual factors that influence the way their students interpret their world and their learning in science and understand the implications for their teaching.**

Highly accomplished teachers of science know that learning takes place in a social context across multiple sites and on different time scales. They understand it is influenced by societal and technological change and by culturally constructed protocols and ways of knowing. They know the diversity of social and cultural contexts of their students and understand how the economic, socio-cultural and family circumstances can affect their progress in learning science.

Highly accomplished teachers of science see this diversity positively and know how to draw upon it to create learning opportunities of personal relevance to their students. They understand that students are influenced by expectations and attitudes towards science of people significant to them and by the way science and science-related issues are dealt with in the media. They are acutely aware that these representations are powerful influences on their students' interest, aspirations and motivation to learn science.

Highly accomplished teachers recognise that their own personal qualities, their beliefs about science and their attitude towards teaching science influence their students' learning. By communicating enthusiasm as they engage with science, with its values and specific practices, highly accomplished teachers of science know they will be strong role models and advocates for science and its relevance to their students' lives.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## I. Professional knowledge

### I.2 Contemporary and authoritative professional knowledge and understanding of: teaching science

**Highly accomplished teachers of science have a broad, deep and current knowledge of the dimensions of science related to their area of teaching and understand the strengths and limitations of the processes of scientific investigation and inquiry.**

Highly accomplished teachers of science understand the nature and dimensions of science: that it is a body of knowledge, a way of thinking and communicating, asking and answering questions, and of interpreting events and phenomena from scientific perspectives. They are confident in their knowledge of the major ideas of the disciplines of science related to their area of teaching: the fundamental principles, laws, theories, models and facts and the conceptual themes of cause and effect, patterns of change, systems and interactions, structure and function. They understand the dynamic relationship and diversity of connections that exist between and within the disciplines and dimensions of science, technology and other areas of learning.

Highly accomplished teachers of science understand the distinctive modes of scientific inquiry: the ways of predicting and knowing, built on observation, objectivity, testing and evidence, that contribute to conceptual understanding and scientific literacy. They understand the interdisciplinary and collaborative nature of current scientific activity; they know how to model the diverse practices of science and habits of mind that constitute scientific inquiry and investigation. They understand the kinds of questions that can be tested scientifically and those that cannot; how to plan and conduct scientific investigations, collect evidence and interpret data. They can identify patterns and trends that inform their thinking and understanding and are able to transpose and communicate information in the language and literacies of science, integrating multimodal forms skilfully. They use scientific terminology and conventions and know how to incorporate these in their teaching.

Highly accomplished teachers of science understand the dynamic nature of science, its rapid expansion in all dimensions, its strengths and limitations. They know that the quality of their own professional knowledge of science affects how they engage with students, capture and stimulate their curiosity and interest and advance their learning in science. They maintain currency of their knowledge, relevant to their teaching, of developments in scientific research and of new contexts where science has been generated or applied. They keep abreast of technological advances that can contribute to improving their own knowledge and their skills and confidence in teaching contemporary science.

**Highly accomplished teachers of science understand the diverse drivers of scientific endeavour and the socio-cultural, environmental, economic and ethical implications of such work.**

Highly accomplished teachers of science understand that science is not only a dynamic body of knowledge and a way of knowing but also an area of human interest, endeavour and innovation. They are familiar with the heritage of science – the major historical discoveries and contributions of people of different cultures to our current knowledge and understanding of science and technology. They understand the diverse drivers and implications of scientific endeavour, both positive and negative, and the human qualities people bring to their work. They know the importance of exploring with their students the ways in which political, economic, societal and cultural beliefs and values have shaped science and its application.

Highly accomplished teachers of science recognise the significance of science in understanding aspects of everyday living and science-based issues in the public domain. They understand that science, its practices and relationship to technology and engineering, have socio-cultural, environmental, economic and ethical implications of direct relevance to the personal lives of students, to society and the sustainability of our planet. They know that as adults their students must be scientifically literate to function effectively in an advanced scientific and technological society and that their experience of science both in and out of school can prepare them for this.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## I. Professional knowledge

### **I.3 Contemporary and authoritative professional knowledge and understanding of: effective pedagogies, assessment and reporting**

**Highly accomplished teachers of science have an extensive and authoritative pedagogical content knowledge that helps their students to develop their scientific abilities and see the relevance of science in their lives.**

Highly accomplished teachers of science understand the social and educative purposes of learning science. Their pedagogical content knowledge is soundly based on their knowledge of science and its dimensions, of their students, authoritative theories of learning science, and experiential evidence. Their repertoire of teaching strategies is student-centred and relates to their teaching context, their students' stage of schooling and curricular requirements. Highly accomplished teachers of science understand the complexity of interactions between these elements and recognise the implications for developing the learning capacity of their students.

Highly accomplished teachers of science understand the importance of inspiring and motivating their students and engaging them collaboratively in structuring their science learning. They know how to nurture their students' curiosity, imagination and creativity and to make meaningful connections between science, other areas of learning and real-life experiences. They are able to demonstrate the relevance of science and technology to their students' lives by placing science learning in current and relevant contexts, engaging with them in debating contemporary science-related issues and events in the media and in the local community. They actively involve their students in the scientific processes of inquiry and investigation that require drawing conclusions based on reliable and valid evidence. They expect their students to justify opinions and decisions that take into account societal and cultural values as well as scientific considerations.

Highly accomplished teachers of science know how to draw on a variety of pedagogic strategies for timely diagnosis of their students' understanding and skill-base in science and for intervention to guide learning. Understanding that students view science and science learning through a cultural interpretative framework, they know how to reconcile disparate views and facilitate cross-cultural understanding. They recognise that teacher modelling of scientific thought processes and practices can scaffold learning and make complex concepts accessible. They know how to construct opportunities for their students to investigate their science-related questions independently and collaboratively in formal and informal settings, using diverse resources.

Highly accomplished teachers of science know how to design tasks that enable their students to develop interpretative and communication skills using the different discourses and representations of science. They understand that their students' everyday use of communication technologies can pose challenges but can be exploited to assist in accessing, manipulating and communicating science-related information. They know that through purposeful modelling the use of a variety of multimodal media and the language and conventions of science, they can help their students to demonstrate and communicate their science learning effectively.

**Highly accomplished teachers of science know that assessment practices must be clearly aligned with defined learning goals and capture meaningful, reliable evidence, from multiple sources to guide student learning, to provide a basis for reporting and to inform teaching.**

Highly accomplished teachers of science understand the dynamic relationship between assessment and their students' learning. They know that to be effective, assessment must focus on how students learn science, be integrated in planning for teaching, be situated in authentic contexts and be clearly aligned with learning goals. They know that their methods of assessment must be directed towards diagnostic and formative purposes and to summative benchmarking of achievement gains against curriculum standards.

Highly accomplished teachers of science understand the need for a variety of modes of assessment of their students' learning in science to provide multiple sources of evidence on which to base valid judgements. They know the formal and informal strategies to employ for frequent, constructive and personalised feedback to improve identified aspects of their students' scientific abilities and to help them to develop a critical ability to evaluate their own and other's progress. Highly accomplished teachers of science understand the importance of using meaningful and reliable records of the progress of individual and cohorts of students to meet reporting requirements for different audiences and purposes. They know that their records of such progress can be used to inform their teaching.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## I. Professional knowledge

### I.4 Contemporary and authoritative professional knowledge and understanding of:

**a wide range of resources, including interactive technologies, and their use in teaching and learning**

**Highly accomplished teachers of science have insightful knowledge of the range of print, digital, technological and science-specific resources that support their teaching and students' learning in science.**

Highly accomplished teachers of science understand that the quality of their teaching and of student learning in science is influenced by the resources available to them. They have an insightful knowledge of the range of facilities and resources that will support implementation of their science curriculum; they know how to use time, space, materials, equipment and emerging technologies purposefully and safely to enable students to develop their scientific capabilities. They are innovative and creative in knowing how to use everyday, non-specialist materials for scientific investigations in addition to specialist science equipment. They understand the importance of maintaining the currency of their knowledge of resources that have the potential to support contemporary science teaching and learning.

Highly accomplished teachers of science understand the value of print-based resources but are aware that students' use of everyday digital technologies present challenges in an educational setting. They are adept at knowing how to use such technologies to access and exchange scientific information and expertise, communicate procedures and findings of scientific investigations and form collaborative partnerships.

Highly accomplished teachers of science understand how digital technologies affect the way students think, interact with and process multiple streams of information. They know that computer-based technologies make access to information immediate; that data collection on fast, slow and distant scientific phenomena is possible, and interrogation and manipulation of information are facilitated. They know the creative potential of digital technologies in problem-solving, simulation and visualisation of complex scientific phenomena, concepts, processes and contexts, and for exploring, conducting and reporting on scientific investigations beyond the capacity of the immediate situation.

**Highly accomplished teachers of science know the potential benefit of linking their students to science-based resources in school and non-school settings to enrich their science experiences.**

Highly accomplished teachers of science know how to access, evaluate and select onsite and offsite resources to motivate and enrich science learning for their students. They understand that outreach programs such as science fairs, expos and competitions provide opportunities for students to extend their particular interests in science and to work independently or collaboratively. They understand the mutual benefits that may be gained by creating opportunities for linking their students to people in their school and wider communities for information and collaborative science-based enterprises. They know that science centres and museums, businesses and industry, special interest groups and sites in natural, built and virtual environments are rich resources for scientific exploration and for furthering understanding of the central role of science and technology in life and work.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 2. Professional practice

### 2.1 Exemplary professional practice which includes:

**building effective relationships and managing complex interactions**

**Highly accomplished teachers of science build respectful relationships and manage complex interactions within the school to support their students' learning in science.**

Highly accomplished teachers of science build and manage relationships with their colleagues and administrative and technical staff to support their students' learning in science. Through purposeful consultation they build productive relationships with their colleagues to design and implement differentiated, challenging science activities. They are particularly conscious of the complexities of managing interactions and activities for collaborative hands-on science investigations that may require practical organisation of resources and technical support.

Highly accomplished teachers of science observe and interpret the interactions of others insightfully. They are sensitive to and value the diversity of perspectives and abilities of others and create opportunities for them to participate and express themselves safely. With their students they use collaborative strategies and problem-solving approaches to strengthen relationships and resolve issues, but may employ professional help in dealing with socially inappropriate and potentially confronting situations. They use such opportunities to discuss with their colleagues and their students alternative ways of managing difficult situations and complex interactions.

**Highly accomplished teachers of science initiate and manage relationships with key individuals in the immediate school community and beyond to strengthen their students' learning opportunities in science.**

Recognising that parents and caregivers are partners in the education of their students, highly accomplished teachers of science create opportunities to establish and maintain productive relationships. They make themselves accessible and open in formal processes of information exchange such as reporting and face-to-face meetings, and create opportunities for informal communication. They use the knowledge gained about the values, priorities, expectations and concerns of individual families and the socio-cultural diversity of the school community to manage interactions with their students and others and to inform their teaching.

Highly accomplished teachers of science actively seek opportunities to build constructive and productive relationships with key personnel and organisations in the wider community that may support their teaching and enrich their students' learning in science.



# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 2. Professional practice

### 2.2 Exemplary professional practice which includes:

**creating and maintaining engaging and intellectually challenging learning environments**

**Highly accomplished teachers of science believe that all students can learn science: they create environments that stimulate interest and engagement in all dimensions of science and challenge their students' aspirations in learning.**

Highly accomplished teachers of science believe that all students can learn science; they have high expectations of their students and challenge them to achieve their personal best. Highly accomplished teachers of science are strategic in the way they engage their students in meaningful ways of learning science. They are purposeful in the direction that they take their students' learning aligned with the longer term goals of the curriculum, yet are opportunistic in stimulating their interest by exploiting contemporary issues, immediate events and phenomena and the students' everyday experiences. They challenge their students in ways that lead to the development of deep conceptual understanding of the major ideas of science and their interconnectedness; they provide frequent constructive feedback on progress to facilitate their students' ability to become self-regulating learners.

Highly accomplished teachers of science provide student-centred learning opportunities that engage and extend the conceptual understanding and scientific literacy of their students. They probe their students' understanding to identify and meet their needs; they build a positive learning environment by nurturing creative thinking and by providing supportive opportunities for students to actively investigate their own testable questions in individual and collaborative scientific enterprises. They model and teach the habits of mind of scientific inquiry they expect of their students. They challenge them, through direct and inquiry learning in a wide range of scientific investigations: to approach learning critically, to recognise problems, to ask questions and to justify and present evidence for their explanations and conclusions.

**Highly accomplished teachers of science work with their students to create physically and emotionally safe environments that support students' learning.**

Highly accomplished teachers of science are acutely aware of the changing nature of the contexts in which students learn science and the increasing part that informal, offsite and virtual environments play. In the school environment highly accomplished teachers of science make their physical space for learning visually inviting and organised flexibly to enable different ways of working. They provide specialist areas for hands-on science investigation and inquiry that are resourced and organised for ready access to support both implementation of the intended curriculum and spontaneous needs. With their students, highly accomplished teachers of science develop shared expectations of conduct and negotiate boundaries and consequences of inappropriate behaviours based on the rights of all to a safe and purposeful learning environment. They develop a set of orderly procedures for conducting hands-on investigations, adhere to mandated safety requirements and create a culture of personal and collective responsibility for maintaining them.

Highly accomplished teachers of science know that the learning environment includes not only the physical space of in-school and non-school settings. They demonstrate how to authenticate and evaluate online and virtual sites of learning and develop protocols for using digital methods of communication respectfully and safely. They are aware of how the social and emotional climate affects their students' interactions and learning, and work with them to create a supportive environment, respectful of individual differences; where student conceptions of science can be challenged safely; where students feel confident in posing questions, expressing ideas and opinions, and are comfortable with intellectual risk-taking.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 2. Professional practice

### 2.3 Exemplary professional practice which includes:

**planning, implementing and evaluating rigorous and inclusive learning programs**

**Highly accomplished teachers of science design rigorous, personalised and contextualised programs that align with curriculum standards and provide opportunities for students to develop their interest, intellectual capacity and abilities in all dimensions of science.**

Highly accomplished teachers of science apply their professional knowledge of science and their pedagogical content knowledge to design authentic, coherent, cohesive programs that meet the differing needs of their students yet are clearly aligned with science curriculum standards. In their planning highly accomplished teachers of science take into account the accessibility of different sites of science learning and the time and other resources available. They see the potential for using their immediate surroundings - local natural and built environments and designed sites – and are purposeful in drawing on the expertise of others. They build their programs around a judicious selection from the powerful ideas of science, scientific endeavour and contemporary issues. They make strong links within the disciplines of science and with other areas of learning; they articulate clearly the purposes of the learning sequence and the high yet achievable expectations they have of their students in the immediate and longer-term. They make the relationship between assessment practices and the intended outcomes clear.

Highly accomplished teachers of science plan opportunities for their students to engage with, explore and practise science. They design their programs to make connections with their students' prior knowledge and understanding and their interests and aptitudes, to engage them in meaningful activities and tasks over time. With their students they plan activities for working independently and collaboratively that help them to develop procedural knowledge and, in hands-on activities, the safe and accurate use of science-specific equipment and technologies and assessment of risk. Highly accomplished teachers of science design rich opportunities for their students to develop higher order thinking skills and the habits of mind associated with the practice of science; they plan purposefully for their students to become reflective, autonomous learners.

**Highly accomplished teachers of science implement their learning programs purposefully and use evidence to evaluate the alignment of achievement with the intended and implemented curricula.**

Highly accomplished teachers of science implement their learning programs purposefully but are alert and responsive to circumstances or to feedback that require immediate or longer term adaptive change. They are flexible and adjust their strategies to create different pathways to achieve goals; they employ direct instruction as appropriate and they use unexpected and unintended outcomes as opportunities for generating and exploring new questions. Knowing that deep conceptual understanding takes time to develop, highly accomplished teachers of science allow for different rates of learning and mastery of the processes and procedures of scientific inquiry and investigation.

As part of their regular practice highly accomplished teachers of science collect information from different sources on student interest and performance in their science learning. They reflect on the evidence and use their professional judgement to analyse their students' achievement gains, the appropriateness of learning tasks and the resources used, and the effectiveness of their teaching strategies. Based on their evaluation they make modifications to align, more closely, the intended curriculum with the implemented curriculum.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 2. Professional practice

### 2.4 Exemplary professional practice which includes:

**using assessment and constructive feedback to inform teaching and learning**

**Highly accomplished teachers of science apply their deep understanding of assessment practices purposefully to guide their students' learning in science and to judge their achievements.**

Highly accomplished teachers of science recognise that assessment is integral to teaching and learning. They align their assessment strategies with the goals of their science programs and know that what they assess places value on what is learnt. Their everyday assessment practices involve discussion with their students to develop a shared understanding of the diverse purposes and ways of learning science and how to demonstrate that learning best. They make clear the expectations they have of their students and how their understanding of science and their scientific abilities will be monitored and assessed against established criteria.

Highly accomplished teachers of science are skilled in assessing their students' current and developing understanding of all dimensions of science. They design rich, authentic assessment tasks that are themselves opportunities for learning. They know that contextual factors can affect their students' receptiveness to assessment and are sensitive in the approaches they take. They focus on students' work rather than the student; they use probing strategies, both formal and informal, early in the teaching programs to elicit and identify each student's prior knowledge of science and the literacies of science. They assess their students' scientific literacy, their level of procedural knowledge and their skills in the practice of scientific inquiry and investigation.

Highly accomplished teachers of science monitor their students' progress frequently using multiple methods to ensure reliability and to identify the full range of students' understanding and capabilities. They provide both impromptu and planned feedback constructively to help resolve immediate difficulties, to affirm their students' strengths and recognise achievements, or to discuss strategies for improvement. They guide their students in reflection and self-assessment to support their development as autonomous learners capable of identifying what steps to take to maintain their progress.

**Highly accomplished teachers of science use evidence of their students' attitude and performance in science to inform the design, implementation and evaluation of their programs and their everyday teaching practice.**

Highly accomplished teachers of science obtain data on their students' attitudes and performance in science to inform their teaching. Individually and collaboratively they analyse their programs, activities and teaching strategies to evaluate their effectiveness in meeting the immediate needs of their students and the longer term curriculum goals. They obtain data on summative aspects of their students' level of achievement at defined points in learning programs for their students, school, jurisdiction or national reporting and accountability purposes. With their colleagues they use this information to evaluate and benchmark students' achievement against established content standards in science. They reflect and act on the implications such analyses have for their future teaching of science.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 2. Professional practice

### 2.5 Exemplary professional practice which includes:

**communicating effectively with different audiences using a range of strategies**

**Highly accomplished teachers of science draw on their expertise in an extensive range of media to communicate, to different audiences and for different purposes, aspects of their work as teachers of science and as members of their professional and wider communities.**

Highly accomplished teachers of science understand the fundamental importance of effective communication in all aspects of their work as teachers of science and as members of their school and wider professional communities. They draw on highly honed interpersonal skills - written, oral, visual and behavioural skills of communication and their expertise in communication technologies - to build respectful relationships and communicate with different audiences according to the audience, purpose and context.

Highly accomplished teachers of science communicate the excitement of science, its discovery, endeavour and relevance through narratives and activities that make strong connections with their students. They design tasks that enable their students to recognise different discourses and representations in science and why different audiences and purposes require different ways of communicating. They enable their students to communicate their knowledge and understanding in all dimensions of science by modelling the use of a variety of print, digital and multimodal media. They discuss and evaluate methods of communication, their authority and safety. They adapt their teaching practice perceptively and skilfully to cater for their students' differing abilities in verbal and written use of the English language, their use of the literacies and conventions of science and communication technologies.

Highly accomplished teachers of science articulate, document and communicate clearly to students and others the rationale, learning goals and assessment criteria for their science programs. They collect multiple sources of evidence of each student's progress and achievements in science. They maintain reliable records, together with samples of their students' work, to facilitate open and frequent communication of their progress to parents and care-givers and to school, education authorities and other audiences, for accountability purposes. They communicate with their colleagues and school leadership on professional issues, reporting on the outcomes of evaluating their programs in science and on matters relating to policy, administration and management associated with their science teaching responsibilities.

Highly accomplished teachers of science model the collaborative nature of science investigation by expanding their communication networks with other schools, scientists and science-related organisations to access or exchange expertise and establish joint enterprises. They use school, professional and community networks, both face-to-face and virtual, to promote and publicise activities, events and achievements in science. They implement strategies for establishing and maintaining ongoing interactive informal and formal communication. They create opportunities to communicate with colleagues, parents and caregivers, personnel and organisations in the wider community to contribute specialist knowledge and skills to the planning and implementation of science learning experiences for their students.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 3. Professional leadership

### 3.1 Active and influential professional leadership to:

**contribute to school planning, development and management**

**Highly accomplished teachers of science contribute to building the capacity of the school as a sustainable learning community.**

Highly accomplished teachers of science contribute to the development the school's culture and vision, are active advocates for the value of science education to all and the place of science in the curriculum, in achieving the school's educative and social purpose. They create opportunities, both informal and formal, to share their insights and passion for science education with their immediate colleagues and with those who are in leadership positions. They contribute their expertise in knowledge of school, system, sector and government policies relating to science and science education, including an intimate knowledge of curriculum requirements, to the development of the science policy for the school. In discussions with members of the school community, highly accomplished teachers of science actively promote the benefits of planning for science-based innovations as part of whole-school development.

Highly accomplished teachers of science obtain evidence on which to base recommendations for future directions. They participate collaboratively in collecting reliable data on the attitude of staff, students and the wider school community towards the quality of opportunities provided for learning science. They initiate reflective dialogue with their colleagues to facilitate a shared view of the strengths and weaknesses of current teaching practices and student learning in science, and search for trends to identify areas in school planning, organisation and management relating to science education that require attention. They look for opportunities to shape the design and resourcing of a science curriculum that will excite, challenge and engage the interest of students and make it accessible and achievable for all.

In their particular sphere of work, highly accomplished teachers of science manage the planning and implementation of the science curriculum, their interactions with their students and with the school administration. Beyond the immediate school environment they take the initiative in making meaningful connections with business, industry and community groups in promoting and developing the school as an integral part of the local community. They see this as an opportunity for expanding students' understanding of science in the workplace and its relevance to society.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 3. Professional leadership

### 3.2 Active and influential professional leadership to:

**encourage professional learning, critical reflection and professional discussion, drawing on evidence to improve practice**

**Highly accomplished teachers of science engage with their colleagues in evidence-based analysis of their professional learning needs, to improve the quality of teaching and learning science.**

Highly accomplished teachers of science identify and respond to internal and external challenges to science education and teaching science, both personally and through collaborative processes of inquiry. They initiate professional discussion and offer and are open to critical feedback. In a supportive environment they encourage their colleagues to see themselves as significant resources for the professional learning and growth of each other, and challenge them to embrace change as an opportunity to learn. They increase their knowledge of science and new ways of teaching science based on contemporary research and evidence from the evaluation of their own and others' practice. With their colleagues they make regular opportunities for purposeful discourse about their practice and their students' progress in science. They use authoritative conceptual frameworks, standards of practice in science teaching, curriculum guidelines and evidence of interest and performance of students in all dimensions of science, as reference points for systematic individual and collaborative analysis of their work. They reflect deeply on the implications for their own and their colleagues' future learning and align identified needs with existing opportunities for professional learning or initiate and lead others in the process.

**Highly accomplished teachers of science promote the need for ongoing professional learning to maintain the currency of their professional knowledge and practice in providing high quality teaching for learning in science.**

Highly accomplished teachers of science understand that to be effective, change to practice requires participation in long-term individual and collaborative programs directly related to their work. They participate themselves and encourage others to actively target and pursue purposeful professional learning opportunities beyond the minimum. To extend and deepen their professional knowledge highly accomplished teachers of science read hard print and online literature; they may join online discussions, tap the expertise of scientists, scientific organisations, science educators and other relevant expertise in the community; they may participate actively in conferences and seminars to engage in professional discussion and to remain up-to-date on local, national and international developments and issues in science education. Highly accomplished teachers of science share with their immediate colleagues the insights gained through professional learning and discuss more widely the implications for the particular science curricular and pedagogic requirements of the school.

# National Professional Standards

*for highly accomplished teachers of science*

*Final draft*

## 3. Professional leadership

### 3.3 Active and influential professional leadership to:

**build an environment of confidence, resilience and success**

**Highly accomplished teachers of science are proactive in helping members of the school community to identify and adapt to change and to create opportunities to celebrate success.**

Highly accomplished teachers of science are intensely aware of the social, cultural, economic and political challenges that schools have to identify, evaluate and respond to constructively. They are problem-solvers and team builders; they apply their leadership qualities and expertise creatively and productively to achieve solutions even in difficult conditions. They contribute to the development of partnerships in the wider community that strengthen the capacity of their school as a vibrant, future-orientated and sustainable educational enterprise.

Highly accomplished teachers of science take personal responsibility for contributing to building a successful, resilient and forward-looking professional community. They are enthusiastic and passionate about science and their students' learning in science as part of the school's educational purpose. They identify, nurture and assist in managing the talents and abilities of both colleagues and students in their scientific endeavours. They view diversity in background and experience as strengths, drawing on them in their science teaching and in cementing relationships with their peers, students and other members of the school and wider community. They are opportunistic, confident and adaptive to change by being willing to try new ideas and take intellectual risks. They encourage such resilience in their colleagues and students by being supportive of their endeavours and by viewing difficulties and mistakes as opportunities for learning.

Highly accomplished teachers of science provide opportunities for their colleagues and students to experience success in their science endeavours, measuring success against achievement of personal and collective goals of teaching and learning. With their colleagues and students they celebrate initiatives, accomplishments and achievements in science teaching and learning thereby generating a positive environment and building confidence and self-esteem; they are quick to raise the profile of their school by publicising such successes.

# National Professional Standards

*for highly accomplished teachers of science*  
*Final draft*

## 3. Professional Leadership

### 3.4 Active and influential professional leadership to:

**contribute to the development and renewal of the profession**

**Highly accomplished teachers of science contribute actively to the development of their profession by assisting in the development of the individual and collective capacity of colleagues and by promoting the importance of science education in the wider community.**

Highly accomplished teachers of science regard the status of the profession as both an individual and collective responsibility. By assisting in strengthening the capacity of teachers of science in their own school they know they can contribute to increasing the capacity of the profession as a whole. They understand that teaching is an intensely social activity; that pedagogical development and change to systemic science education require mutually supportive interactions that are driven by effective leadership within and beyond the school. They promote the importance of high quality teachers of science to improving the learning of their students.

Highly accomplished teachers of science encourage and support the professional growth of their colleagues and help them to situate their practice in a wider context. They may mentor beginning and early career teachers of science, be critical friends to colleagues; they may inspire and mobilise others to engage with and respond to challenges facing their profession by developing a sense of shared purpose and strategic direction for action.

**Highly accomplished teachers of science recognise that the status of their profession depends on the quality of the contribution of the individual and collective membership, and their ability to advocate on the profession's behalf.**

Highly accomplished teachers of science demonstrate their passion and commitment to their profession. They enable their colleagues to see beyond the boundaries of their school to the wider professional community and engender a sense of responsibility to the profession as a whole, knowing that this may depend on the sense of personal efficacy of each teacher of science. They may engage in curriculum development, write articles, mount demonstrations and exhibitions; they may work with professional bodies or agencies to raise the profile of science education both within the profession itself and in the public domain. They may contribute to strengthening the profession by designing or conducting professional learning programs to share their pedagogical expertise. They may form partnerships with other schools to collaborate in improving their science teaching and learning.

Highly accomplished teachers of science are active members in organisations that represent teachers of science, or authorities that have responsibility for science education at local, state or national levels. In the education and public domains, they support and encourage others to support their profession's articulation of standards of practice, the profession's ways of recognising and rewarding accomplishment, and its expectation that members will engage in career-long professional learning. Highly accomplished teachers of science advocate for their profession purposefully. They promote science teaching as an exciting, challenging and dynamic career that plays a significant role in preparing students to live in a future society that increasingly depends on science and technology for its sustainability.

# National Professional Standards

for highly accomplished teachers of science

Final draft

A guide to the different elements of the standards.

## I. Professional Knowledge

} category

### I.1 Contemporary and authoritative professional knowledge and understanding of:

} capability

**students and what influences their learning and development**

**Highly accomplished teachers of science have high expectations of their students and know that the developmental characteristics, personal dispositions, experiences and gender of their students influence their learning in science.**

Highly accomplished teachers of science are conversant with contemporary theories of learning, particularly science learning, and how to apply them to the learning opportunities they provide for their students. They have insightful knowledge of the physical and cognitive characteristics associated with students at particular stages of schooling and their patterns of developmental progression; they perceive the considerable variation in characteristics and aptitudes that exists between individuals within groups of students and understand the implications for teaching.

} descriptor of accomplishment

Highly accomplished teachers of science understand that past experiences of learning science shape their students' current views of themselves as learners of science, and of science. They appreciate that positive science experiences can motivate students further and that misconceptions and alternative conceptions of science can be barriers to learning. A highly accomplished teacher of science recognises that the level of competence in literacy and numeracy that a student brings to the learning situation may affect their confidence and ability to engage with science-specific language and the literacies of science. They understand that this may affect a student's self-esteem, their openness to change, and their ability to take an active part in discussion and scientific investigation.