



## Teacher Professional Lifecycle Framework

### Rationale

The Australian Science Teachers Association (ASTA) and our member Science Teacher Associations (STA) professional learning events and programs cater to the needs of science teachers across a range of experience levels from new graduates through to experienced and expert science teachers. This project will provide a mapped outline and define various stages of a P-12 STEM/science teacher's life. This document benefits marketing, materials and resource development, and professional development targeted to specific stages of a STEM/science teacher's career journey.

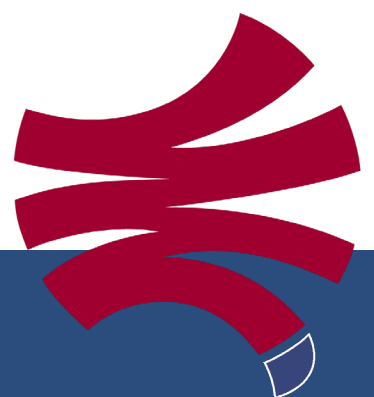
### Aim

To develop a framework for ASTA, the STA and other interested parties to link the Australian professional teaching standards with the emotional and personal career stages that science teachers will experience for P-10 science, STEM and/or technology classes. The framework will support the planning of strategic professional development.

### Abstract

There is a non-linear pattern of stages through which a science teacher will progress during their career. Given the Australian Professional Standards for Teachers (APST) outlines four major categories of professionalism, this framework deepens these stages by including the contexts that surround a teachers personal and workplace life as well as the different levels of expertise or engagement that fit within the standards.

The framework provides an outline for Science Teachers Association Professional Development providers to consider in the development of their programs in order to cater for the various needs of P-12 STEM/science teachers.



## 1. Introduction

An initial meeting of the advisory group consisting of various experts around Australia, concluded that the major focus of this project is the APTS and further research indicated that both teacher context and expertise level be considered when STA are planning professional development for science teachers. The framework design allows a rearrangement within each strand to select the appropriate components.

“Career cycles are not consecutive linear stages in which each teacher goes through the same sequence. However, research shows that many teachers have similar experiences in similar career stages” (Aydin, 2018 p. 2047).

For ease of reading and to encompass the future of integrated learning, the term STEM is used to cover all teachers of science and integrated science, technology, maths and engineering classes.

## 2. Australian Professional Teachers Standards (see Appendix 1)

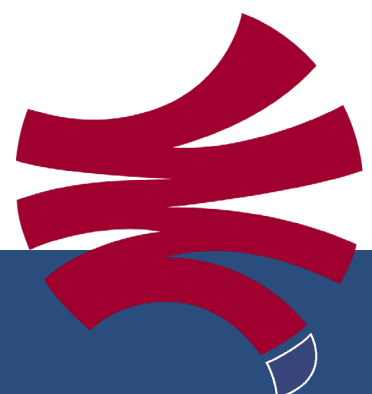
A STEM teacher’s career is a very personal journey. Whilst there are many documents that focus on teacher quality, there is no one size fits all nor is there a timeframe that will suit all teachers. Aydin (2018) notes that the individual contexts will differ and are often very much outside the teacher’s control.

The APST standards (See Appendix 1) are a public statement of teacher quality and can be easily linked to all STEM educators in Australia. The advisory group found that this document is the most important aspect of the TPLP and forms the basis of the framework being developed.

The APST standards descriptions define the work of teachers, however, it is not subject specific nor does it relate to the teacher environment and emotional stages of a teachers career. Fessler (1985) identifies that the personal environment and organisational environment as contributing factors to a teacher’s career journey. They will not all have the same journey of ups and downs.

There is also the generic phrase of early career, middle career and end of career that is anecdotally often used in Professional Development planning meetings. There is much research that can support the impact of both context and disposition on the quality and performance of a STEM teacher.

Whilst the career journey may differ, they can be fairly consistent overall (Burden 1982 cited in Aydin 2018). As such, the framework shows all aspects of a teacher’s career and provides foci for professional development providers.



### 3. National Professional Standards for highly accomplished teachers of science

The ASTA standards for highly accomplished teachers of science was developed jointly with ACER and Monash university in 2002. The purpose was to:

- Improve effectiveness of professional development
- Provide a basis for improving career path opportunities
- Provide incentives for longer term professional development focussing on student learning
- Strengthen the contribution the profession makes towards leadership in teaching, accountability and quality assurance.

The three major standards align neatly with the Australian professional teaching standards in these three areas (APST 1, 2 and 7) (Appendix 2):

#### A. Professional knowledge

- Highly accomplished teachers of science have an extensive knowledge of science, science education and students

#### B. Professional practice

- Highly accomplished teachers of science work with their students to achieve high quality learning outcomes in science

#### C. Professional attributes

- Highly accomplished teachers of science are reflective, committed to improvement and active members of their professional community.

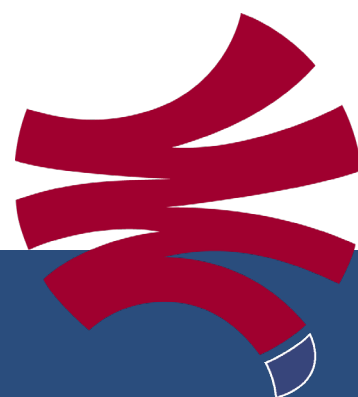
It is evident that the ASTA standards have not had the traction that they deserve. This document is thus an excellent example for Professional development that could align with the TPLP framework and be used in conjunction with the APST.

The ASTA standards for highly accomplished teachers could be used in conjunction with the framework so that teacher needs are more precisely addressed. One example of how to combine the documents can be seen in Figure 3A.

PD event	APST	Context	Life stage	ASTA standard
Chemistry workshop	Proficient	Science hesitant	Growing enthusiastic	Broad range and current knowledge of teaching, learning and assessment

Figure 3A

More examples of how the framework could be used can be found in Appendix 3.



## 4. Science teachers' organisational environment

Many personal and work related factors affect science teachers' motivation for undertaking the lifelong learning approach that is foundational to developing expertise in this career. These factors could include wellbeing, school supportiveness, Emotional Intelligence, isolation, collegiality, personal environment, (Fessler, 1985) and STA support.

The current impact of COVID and the necessity to implement remote learning as well as the decreasing supply of qualified science teachers also will have unknown consequences in 2022. More research is needed in this area.

These organisational contexts have been included in the framework as there is significant impact on science teachers (Fessler, 1985). Anecdotally there are other factors that could also be added to the list including: the lack of adequate funds and resources, insufficient time to plan and experiment with classroom strategies, large class sizes with high risk of safety conducting experiments, increasing pressure from media about quality teaching to name a few. These factors are significant and while they lack research background they have been included in the framework.

## 5. Collation of a framework

The research above and advice from the advisory committee led to the development of this framework.

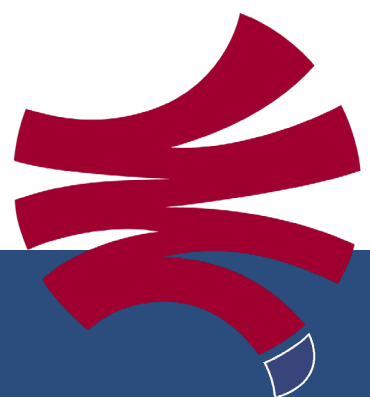
With so many different research models suggested for the career life cycle of a teacher, for the purpose of this document, an amalgamation of all models was created. The work included segments from models developed by Aydin (2018), Fessler (1985), Huberman (1989, 2001) Steffy (2001), White (2008) and Hattie (2013).

### 5.1 Advantages of the TPL framework

- Experienced and expert teachers can be a resource for STA to tap into (White, 2008). The mentoring arena is particularly useful to recognise expertise and provide a space to share it (White, 2008).
- Clear descriptions of levels of expertise that can be used to link to both teacher environment and APST in a non-linear manner.
- Opens the opportunity for tapping into Emeritis or actively retired expert science teachers.

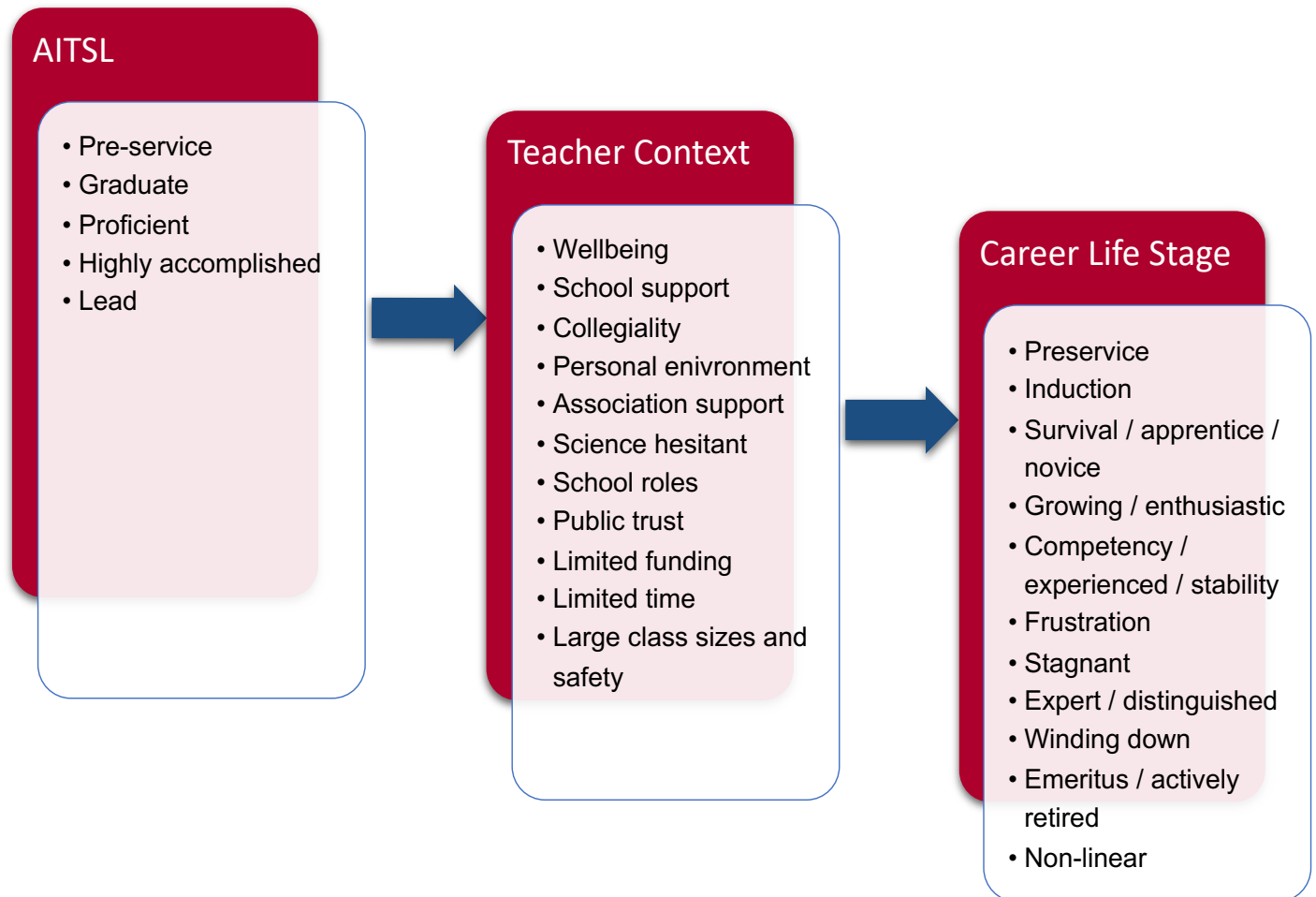
### 5.2 Limitations of the TPL framework

- Experienced does not mean expert (Steffy, 2001)
- Experienced could also be novices when learning something new (White, 2008)
- The organisational environment has a huge impact that may extend beyond the factors listed. Care needs to be taken to open this discourse.



## 6. Framework

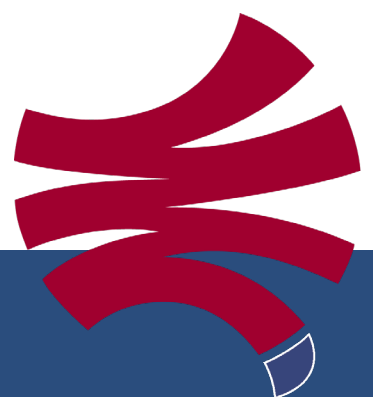
The framework below includes all the aspects that are relevant to teachers during their professional career and many pathways can be mapped in order to plan for relevant professional learning events.



## 7. Implications for ASTA and STAs

### Recommendations for use:

- Present workshops at CONASTA each year;
- Share with STAs;
- Present to the Government to request funding to develop resources for stages that are not commonly addressed in PD events currently;
- Share with members and the broader education sector.



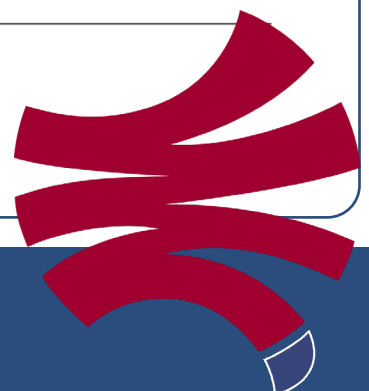
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## Appendix 1: Australian Professional Teachers Standards

Domains of teaching	Standards	Focus areas and descriptors
<b>Professional Knowledge</b>	<ol style="list-style-type: none"><li>1. Know students and how they learn</li><li>2. Know the content and how to teach it</li></ol>	Refer to the Standard at each career stage
<b>Professional Practice</b>	<ol style="list-style-type: none"><li>3. Plan for and implement effective teaching and learning</li><li>4. Create and maintain supportive and safe learning environments</li><li>5. Assess, provide feedback and report on student learning</li></ol>	Refer to the Standard at each career stage
<b>Professional Engagement</b>	<ol style="list-style-type: none"><li>6. Engage in professional learning</li><li>7. Engage professionally with colleagues, parents/carers and the community</li></ol>	Refer to the Standard at each career stage

<https://www.aitsl.edu.au/teach/standards>



# Appendix 2: National Professional Standards for highly accomplished teachers of science

## 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>	

Developed by the Australian Science Teachers Association in partnership with Teaching Australia.  
Final draft August 2009

[https://www.asta.edu.au/resources/professional\\_standards](https://www.asta.edu.au/resources/professional_standards)



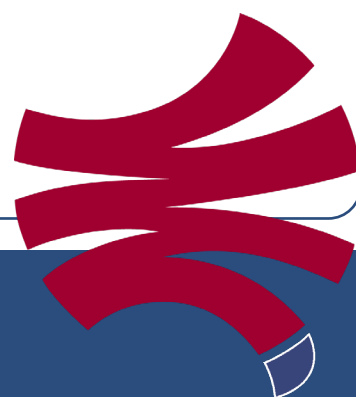
## Appendix 3: Examples of a planning document for PD

This planning allows the committees to have a focus for a wide audience of teachers.

PD event	APST	Context	Life stage	ASTA standard
Chemistry workshop	Proficient	Science hesitant	Growing enthusiastic	Broad range and current knowledge of teaching, learning and assessment
General science	Graduate	Wellbeing	Survival	Analyse, evaluate and refine their practice to improve student learning
Primary science and technology	Highly accomplished	Science hesitant	Experienced	Engage students in generating, constructing and testing scientific knowledge by collecting, analysing and evaluating evidence.

## Appendix 4: Summary of descriptions of teacher needs at each stage

Stage	Description - what are the learning needs of these stages? What are the emotional needs of these teachers?
<b>Pre-service</b> (Aydin, 2018, Fessler, 1985)	University preparation for the workplace. Preservice Teachers Emerging Professional Identities through participation in a Knowledge Building Community
<b>Induction</b> (Aydin, 2018 and Fessler, 1985)	“Meet the demands and obligations of teaching processes, young teachers are struggling to transfer their education to the classroom” (Christensen vd., 1983).
<b>Survival; apprentice, novice</b> (Aydin, 2018; Fessler, 1985; Steffy, 2001; Huberman, 1989,2001)	“Teachers feel uneasy, hesitant, inadequate and unprepared for their professional roles”. “Teachers are looking for technical skills, instructional strategies and content knowledge that can help them survive in the classroom (Burden, 1982) as cited in Aydin (2018)” Thought / Worry: “I’m not sure I can do this teaching thing! Does everybody else see me as incompetent?” (Huberman, 1989)
<b>Competency, experienced, stability</b> (Aydin, 2018; Fessler, 1985)	Teachers feel more relaxed in the classroom environment, develop appropriate teaching methods, seek innovation, and become more interested in pedagogy (Sikes, Measor and Woods, 1985 as cited in Aydin 2018) Take on the role of supervision of new and other teachers (White, 2010).





Stage	Description - what are the learning needs of these stages? What are the emotional needs of these teachers?
<p><b>Enthusiastic, growth, experienced</b> (Aydin, 2018, Fessler, 1985)</p>	<p>Teachers are interested in new projects and activities in order to contribute more to children (Katz, 1972)</p> <p>A period of relaxation in which they can comfortably play their professional roles, and rely on class dominance and teaching skills (Franey, 2015).</p> <p>The development of teachers' physical and intellectual aspects; energy, idealism, and self-confidence.</p> <p>Teachers like to teach and interact with students (Sikes, Measor and Woods, 1985).</p> <p>Thought/Worry: "I think I've almost mastered this teaching thing! Now how do I make sure every student learns in my class?"(White, 2008).</p>
<p><b>Frustration</b> (Aydin, 2018, Fessler, 1985)</p>	<p>Teachers are disappointed to see that their efforts are not effective. This frustration and self-doubt can be caused by the monotony of classroom instruction and inappropriate working conditions.</p> <p>There are also approaches that see this period as a period of revolt and change (Fessler and Christensen, 1992).</p> <p>Thought/Worry: "Just let me teach! I'm working as hard as I can, but how am I supposed to teach all of these kids with so few materials and so many extra duties?" (Huberman, 1989)</p>
<p><b>Stagnant</b> (Aydin, 2018, Fessler, 1985)</p>	<p>The decline in the teaching abilities of teachers is observed.</p> <p>Teachers often do not make any effort to improve themselves, and absenteeism rates are high. This stage is a time when teachers enter a career plateau (Fessler and Christensen, 1992).</p>
<p><b>Expert, distinguished</b> (Steffy, 2001; Hattie, 2003)</p>	<p>"Identity formation is a process of practical knowledge-building characterised by an ongoing integration of what is individually and collectively seen as relevant to teaching (Hattie, 2018).</p> <p>"Although they use knowledge building in a general sense, compared to Scardamalia and Bereiter (2003), the features they stressed, and which characterize the development of professional identity, were thought to be relevant to this examination of the emerging professional identity of preservice teachers". ( Hattie, 2018)</p>
<p><b>Wind down and exit</b> (Aydin, 2018, Fessler, 1985)</p>	<p>Teachers show great resistance to innovation, the profession has missed past periods, and they attach more importance to inertia (Huberman, 1989).</p> <p>Teachers are preparing to leave their profession at this stage of career wind-down and career descent, where professional involvement is diminishing.</p>
<p><b>Emeritus</b> Active retired (Steffy, 2001)</p>	<p>Deserve to be recognised.</p> <p>Like to share their expertise.</p> <p>Mentoring opportunities.</p> <p>Giving service back to the community.</p>

