

# Teaching Practice Standards for science & mathematics

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## The standards landscape

- Why do standards matter?
- What is out there?
- What and who do they apply to?



# Why do standards matter?

...because we spend public money

...because governments may use this as a criteria for allocating funding

...because good practice creates better learning outcomes for our students

...and because the world needs scientifically literate citizens



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By EMILY SCHULTHEIS / CBS NEWS / December 11, 2016, 4:11 PM

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# Standards for learning ... and teaching



## Learning standards

What are the outcomes of a degree?  
What is in a degree?

*Disciplinary standards*

*Competency standards*

## Teaching Practice standards

How is a degree delivered?

How does teaching support learning?

What support is provided?

*Online teaching standards*

*Peer review of teaching*

## Governance standards

How is quality defined?

How is quality measured?

How is quality maintained and improved?

*Uni policy and procedures*

## National regulations:

TEQSA Act, Threshold Standards for HE Providers, Australian Qualifications Framework

# Higher Education Standards Framework



The screenshot shows the TEQSA website header with the Australian Government logo and the text "Australian Government Tertiary Education Quality and Standards Agency TEQSA". A search bar is visible on the right. The navigation menu includes "About us", "Providers", "Students", "Complaints", "Search the National Register", and "Acts and standards". The breadcrumb trail reads "Home > Acts and standards > Higher Education Standards Framework 2015". The main heading is "Higher Education Standards Framework 2015". On the left, a sidebar lists "Higher Education Standards Framework 2015" and "Contextual overview of the H Framework 2015". Below these are links for "HESF Domain 1", "HESF Domain 2", and "HESF Domain 3".

**Domain 1: Student participation and attainment**  
**Domain 2: Learning environment**  
**Domain 3: Teaching**  
**Domain 4: Research and research training**  
**Domain 5: Institutional quality assurance**  
**Domain 6: Governance and accountability**  
**Domain 7: Representation, information and information management**

# Higher Education Standards Framework

## Teaching Practice standards



### Domain 1: Student participation and attainment

1.4. **Learning outcomes and assessment:** benchmarking, AQF, constructive alignment, assurance of learning

### Domain 3: Teaching

3.1 **Course design:** course specification, 'Teaching and learning activities are arranged to foster... achievement'

3.2 **Staffing:** 'skills in contemporary teaching, learning and assessment principles'

3.3 **Learning Resources and Educational Support:** contemporary, relevant, access

### Domain 5: Institutional Quality Assurance

5.1 **Course approval and accreditation:** institutional processes apply the HESF standards effectively

5.3 **Monitoring, Review and Improvement:** external referencing/benchmarks (progression, attrition, assessment), emerging developments in ...education, student feedback, guide and evaluate improvements

### Domain 6: Governance and accountability

6.3 **Academic Governance:** 'action to improve performance against institutional benchmarks for academic quality and outcomes', 'critically evaluating the quality and effectiveness of educational innovations'

## Other dimensions to consider



### Where do the standards apply?

Individual:  
HEA fellowship  
promotion and review

Discipline:  
Science TLOs  
Accreditation

Institution:  
HESF/TEQSA  
ACODE/BLASST



### What is measured?

#### Inputs:

Learning resource quality  
Teaching and learning time/volume  
Expertise of teachers

...and/or...

#### Outputs:

Student/staff perceptions  
Student/staff behaviours  
Student success, progress, attrition

## Quality measures: what is the local response?



| Outputs                                    | Measured by?                                     | Response? |
|--|--|-----------|
| Student perceptions                        | Student teaching evaluations<br>National surveys |           |
| Student behaviours                         | Engagement measures:<br>participation, LMS       |           |
| Student success,<br>progression, attrition | Assessment over time                             |           |

# Standards for learning ... and teaching



## Learning standards

What are the outcomes of a degree?  
What is in a degree?

*Disciplinary standards*

*Competency standards*

Science TLOs

RACI accreditation standards

PULSE Biology rubrics

## Teaching Practice standards

How is a degree delivered?

How does teaching support learning?

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*Peer review of teaching*

AUTC

UK-PSF

ACODE Benchmarks

## Governance standards

How is quality defined?

How is quality measured?

How is quality maintained and improved?

*Uni policy and procedures*

HESF (TEQSA)

QILT



# Focus on teaching practice does make a difference



Professor Carl Wieman at THE Teaching Excellence Summit, Glasgow, July 2018

The screenshot shows a video player interface. On the left, there is a slide titled "Making teaching expertise the norm--" with the subtitle "Science Education Initiative- experiment in changing how science departments teach at 2 large public research universities. UBC & U. Colorado". The slide lists several points: 1. It is possible, having transformed the teaching of ~200 science faculty and ~150,000 credit hours/year at UBC, with >90% in the best department's. 2. Factors that help and hinder, including help from science education specialists and faculty preference, and hinders from formal incentive systems and poor organizational structures. On the right, a video frame shows Professor Carl Wieman speaking at the event. The video player controls at the bottom show a progress bar at 29:40 / 47:15, along with play, volume, and other standard controls.

**Making teaching expertise the norm--**  
*Science Education Initiative- experiment in changing how science departments teach at 2 large public research universities. UBC & U. Colorado*

1. Is possible. Transformed the teaching of ~200 science faculty and ~ 150,000 credit hours/year UBC. >90% in best dept's

2. Factors that help and hinder.  
Help: 1) Science ed. specialists embedded in depts.;  
2) Once they learn, faculty greatly prefer this way of teaching

Hinder: 1) Formal incentive system **punishes** (only research counts). Takes ~ 50 hours to learn.  
Don't recognize teaching expertise. No meaningful evaluation of teaching.  
2) Dept organizational structures poor for innovating. ...

THE TEACHING EXCELLENCE SUMMIT

#TeachingEx

29:40 / 47:15

# Teaching Practice Standards for Science & Mathematics



## How can we use standards to improve learning and teaching?

Standards for Faculties/Schools/Divisions for teaching practice in science and mathematics could be:

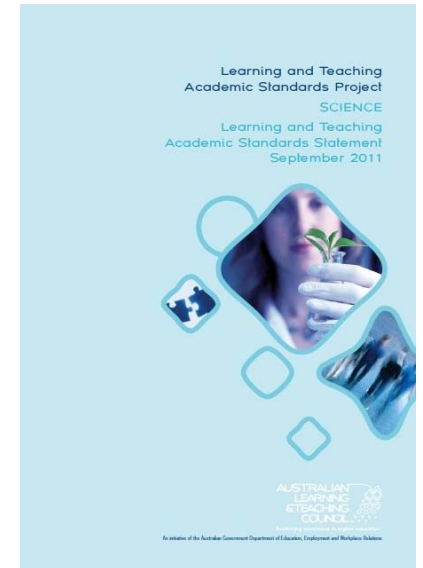
- consensus reference point for ACDS members
- basis for local policy and procedure
- basis for benchmarking

Quality measures combine:

Science TLOs (what is learnt?)

Teaching Practice Standards (how is it taught?)

Quality measures (what was the outcome?)



## Discussion: What is the utility of and what should be included in teaching practice standards for science and mathematics?



In small groups consider:

In setting teaching practice standards for Faculties/Schools/Departments:

- What is the primary use for teaching practice standards?
- What are the key domains/criteria that should be included?
- Which domains/standards have special application to science and mathematics?

Each table will consider teaching practice standards under one of the four general themes (one theme per table)

- A. Teaching and assessment design
- B. Teaching and assessment delivery
- C. Infrastructure for learning: spaces, online, student support
- D. Governance (including QA) and leadership