



Future of Schooling in Australia Conference
Melbourne, Sept 2007

Towards a National Science Curriculum

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Australian Council *for* Educational Research



senior secondary school

Australian Certificate of Education

ACER, 2006

Curriculum and Achievement Standards

ACER, 2007

Australian Certificate of Education
ACER, 2006



Australian Certificate of Education
ACER, 2006

Australian Certificate of Education

ACER, 2006

ACT	ACT Year 12 Certificate
NSW	Higher School Certificate
NT	Northern Territory Certificate of Education ^[1]
QLD	Senior Certificate ^[2]
SA	South Australian Certificate of Education
TAS	Tasmanian Certificate of Education
VIC	Victorian Certificate of Education
	Victorian Certificate of Applied Learning
WA	Western Australian Certificate of Education

^[1] based on procedures of the Senior Secondary Assessment Board of South Australia

^[2] to be replaced by the *Queensland Certificate of Education* in 2008

ACT a grade (E, D, C, B, A)

NSW a mark out of 100, placing the student's result in one of six 'bands' (Band 1, Band 2,... Band 6)

QLD an 'achievement level' (Very Limited, Limited, Sound, High, Very High Achievement)

SA/NT *currently*: a score out of 20, placing the student's result in one of five grades (E, D, C, B, A)
proposed: 7 levels (not yet achieved, E, D, C, B, A, A+)

TAS an 'achievement level' (Preliminary, Satisfactory, Commendable, High, Exceptional Achievement)

VIC a score out of 50

WA a grade (E, D, C, B, A)

7 WACE courses (2008): a 'level' (3, 4, 5, 6, 7, 8) and a 'band' (first/medium/high) within that level



States and Territories vary enormously in the resources available to support senior secondary curriculum development, student assessment and certification.

(eg, NSW >\$50m; Tasmania <\$2m)



The minimum requirements for the award of senior certificates vary significantly across Australia. It is harder to achieve a senior certificate in some jurisdictions than in others.



Proposition

Regardless of where they live in Australia, students in the senior secondary school should have similar opportunities to engage with the fundamental knowledge, principles and ideas that underpin school subjects.

(a curriculum 'guarantee')



Recommendation #1

“That a core of *curriculum essentials* be identified—at least in some nominated senior school subjects—and that national panels of subject matter experts be established to identify this core...



"We are recommending the identification of curriculum essentials: fundamental knowledge, principles and ideas that should be taught in a subject, regardless of jurisdiction."



Recommendation #2

“That achievement standards* be developed, at least in some nominated subjects, to ensure a level of comparability of students' Year 12 achievements in those subjects across Australia.”

*described and illustrated achievement levels

Curriculum and Achievement Standards

ACER, 2007



Curriculum and Achievement Standards

ACER, 2007



five subjects

- English (including Literature)
- Mathematics
- Chemistry
- Physics
- Australian History



Q. What is currently offered in syllabuses/curriculum frameworks across the country?

(what is common? what is different?)

Curriculum and Achievement Standards

ACER, 2007

	PHYSICS Topic	Frequency (states)		
		1	2-6	7-8
1.	Newtonian mechanics			✓
	Force and motion			✓
	Energy and momentum			✓
	Gravitation			✓
2.	Waves			✓
	Electromagnetic waves			✓
	Photonics		✓	
	Sound		✓	
3.	Electromagnetism			✓
	Static electricity		✓	
	Current electricity			✓
	Electronics		✓	
	Magnetism			✓
4.	Astronomy/astrophysics	✓		
5.	Thermodynamics	✓		
6.	Atomic and nuclear physics			✓
	Radioactivity			✓
	Nuclear power			✓
	Interactions of light and matter			✓
7.	Special relativity	✓		
8.	Measurement			✓
	SI units			✓
	Uncertainty in measurement			✓
9.	Materials/structures	✓		

Curriculum and Achievement Standards

ACER, 2007

	CHEMISTRY Topic	Frequency (states)		
		1	2-6	7-8
1.	Atomic Structure			✓
	Historical development of the atomic theory			✓
	Periodicity, periodic table			✓
	Chemical Bonding			✓
2.	Structure of Materials			✓
	Properties and uses of substances			✓
	Aqueous chemistry			✓
	Gases and the atmosphere			✓
3.	Stoichiometry			✓
4.	Quantitative Chemistry			✓
	Analytical techniques			✓
5.	Reactions and equations			✓
	Acid and bases			✓
6.	Equilibrium			✓
7.	Thermochemistry			✓
	Energy, enthalpy			✓
	Rates of reactions			✓
8.	Electrochemistry			✓
	Oxidation & reduction			✓
	Redox potentials			✓
	Faraday's Laws			✓
	Metal reactivity			✓
9.	Organic Chemistry			✓
	Nomenclature			✓
	Functional groups			✓
	Biochemistry			✓

Finding

95% of Chemistry topics

90% of Advanced Mathematics topics

85% of Physics topics

are common to all state and territory
curricula



In English and Australian History

there is general agreement on skills...

English (incl. Literature)	30%+
Australian History	75%+

but not on kinds of texts in English
or on history topics

Q. What is 'essential' content for all students taking these subjects?

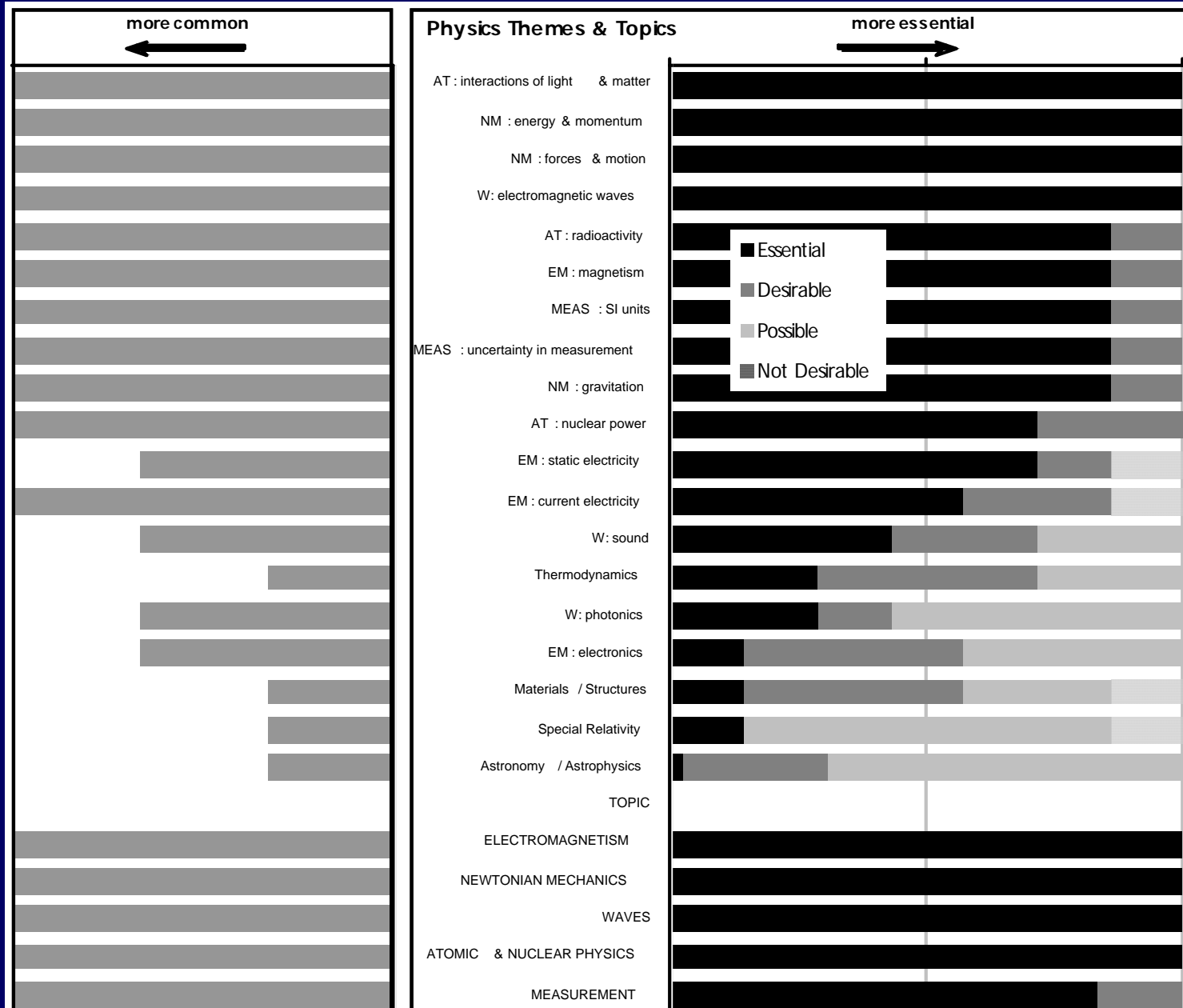
Curriculum and Achievement Standards

ACER, 2007

Content	Rating				Comment
	Essential	Desirable	Possible	Not desirable	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
n.					
Other:					

Curriculum and Achievement Standards

ACER, 2007





Finding: Physics

Almost all topics identified as 'essential' by the majority of reviewers are present in all state and territory curricula.

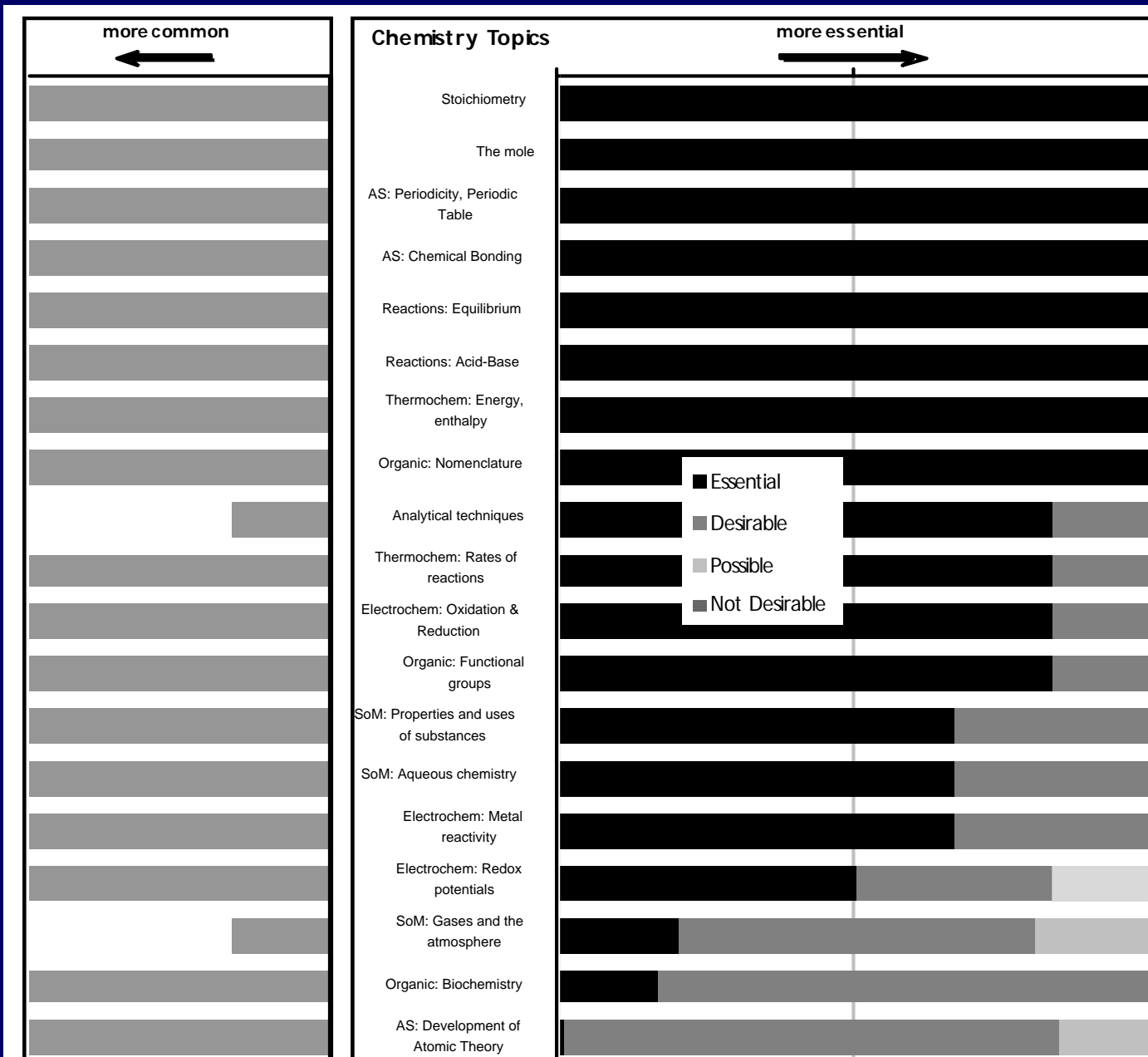
Exception

Static Electricity & Electronics

(judged 'essential' by the majority of reviewers but not included in all state/territory curricula)

Curriculum and Achievement Standards

ACER, 2007





Finding: Chemistry

The same topics appear in almost all states and territories; almost all were considered essential by the majority of reviewers.

Exceptions

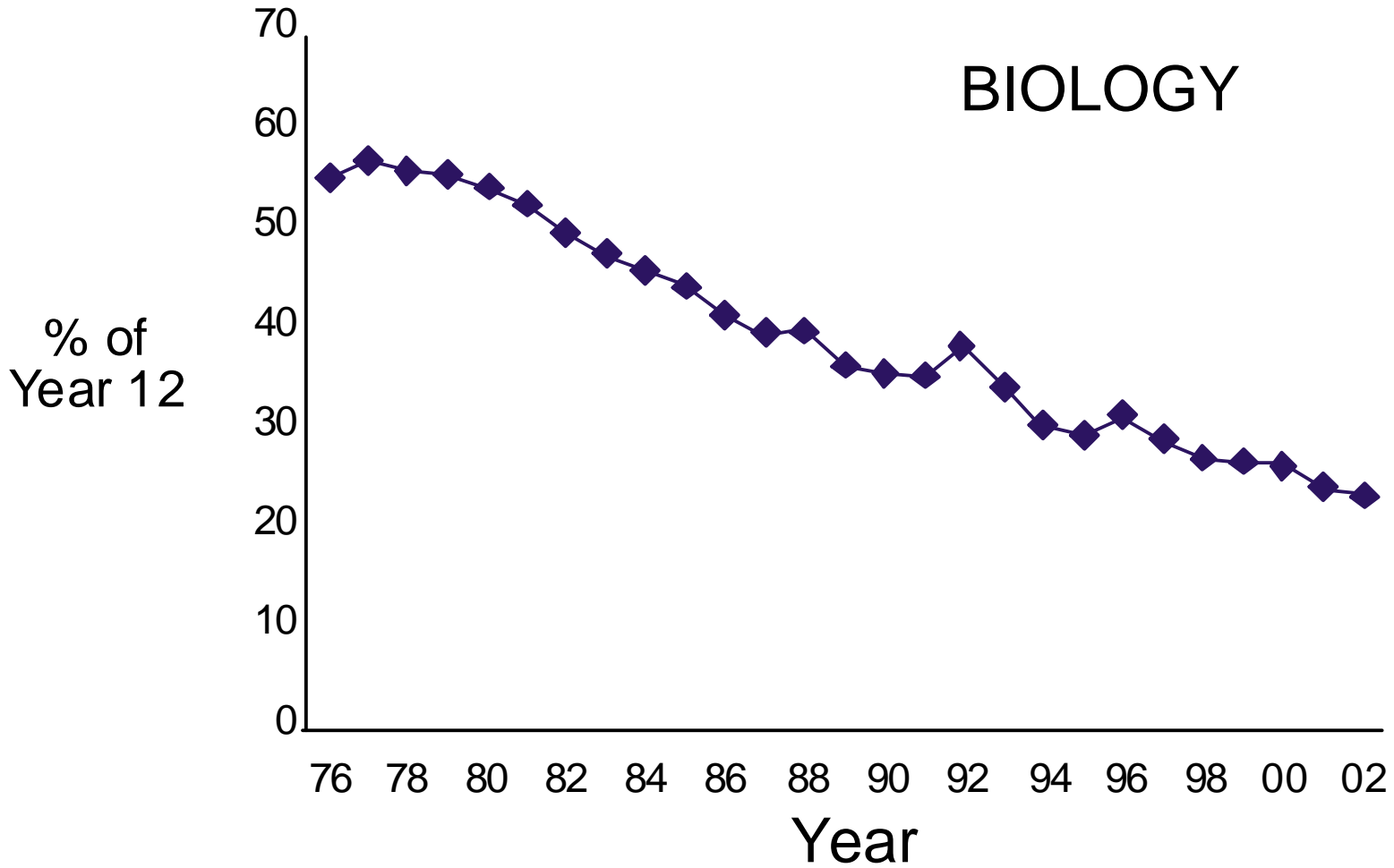
Analytical Techniques and Gases in the Atmosphere

(rated 'essential' or 'desirable' by almost all reviewers, but appear in only some curricula)

Historical development of atomic theory

(included in all state/territory curricula, but no reviewer considered this essential)

final thought...





"The traditional science curriculum, designed principally to train young people as a preparation for entering the science discipline, is the very instrument that is turning them away from science."

(Tytler, 2007)



If, in developing a national science curriculum, we do nothing more than iron out differences between 20th century state curricula, then we will have missed an important opportunity.