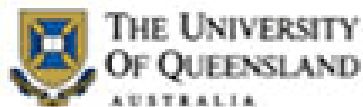


Project Team



Why are quantitative skills (QS) in Science important?

Concerns

- Secondary students lacking skills and confidence in quantitative skills
- How to embed QS in science curricula to develop these in students?
- Technology - driven society demanding quantitative literate graduates
- World-wide problem

Definition: QS are defined as the ability to apply mathematical and statistical thinking and reasoning within a given external context, in this case, Science

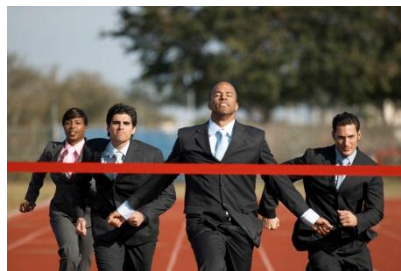
In the beginning

and throughout the project we held
to plan

meetings



on track



(project manager)

What we were hoping to do

Outcome 1: Curriculum Structures	International benchmarking of undergraduate science curriculum structures that effectively integrate QS.
Outcome 2: Model for Curricula Change in Higher Education	A model for Institutional curriculum change processes based on four phases: need, vision, implementation and evaluation.
Outcome 3: Framework for Academic Change information	A framework for cross-disciplinary academic collaboration, supporting adaption, adoption and evaluation of educational approaches/resources.
Outcome 4: High Profile Dissemination Activities	A symposium in 2012, a special issue with a high rated journal, and the development of an interdisciplinary Australian 'QS in Science' network.

How did we do this

Outcomes 1 and 2

- ✚ a case study approach was used – 13 case studies from 11 universities in Australia and 2 from overseas.

Outcome 3

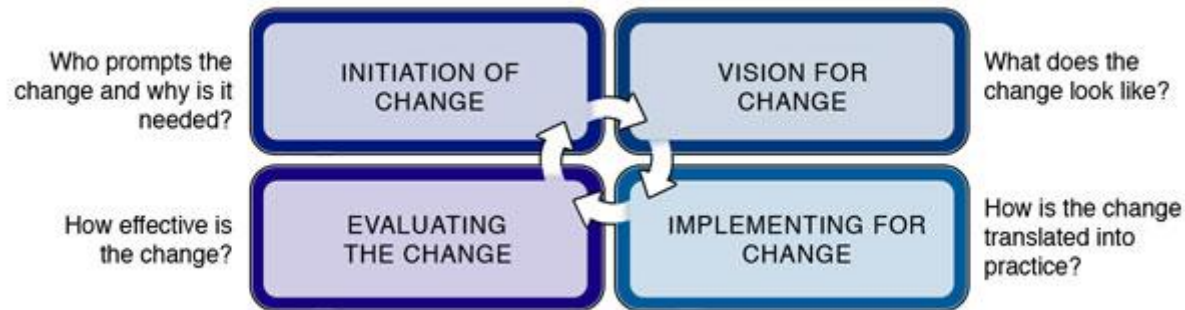
- ✚ two institutions (UWS and UQ) have started on projects - both are yet to be finalised

Outcome 4

- ✚ [CUBEnet-VIBEnet-QS in Science symposium](#) *Game on!: Preparing our biology and biomedical graduates for the future*, December 19th 2012
- ✚ [Quantitative skills in science: integrating mathematics and statistics in undergraduate science curricula](#) a Special Issue in the *International Journal of Mathematics Education in Science and Technology (IJMEST)*. Publication date is September 2013

Model for Curricular Change

Fullan's work (1983, 2007)



What we found...

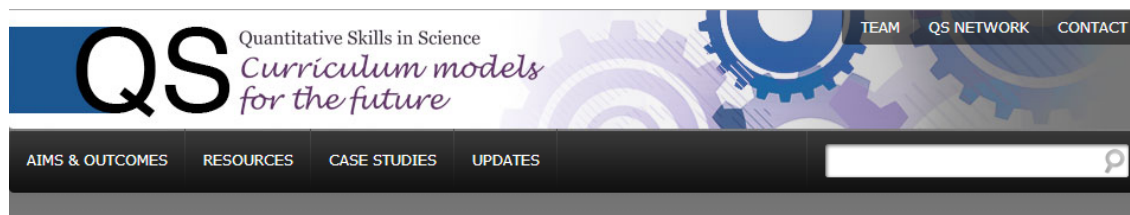
- ✚ Lack of shared meaning for QS
- ✚ Lack of communication about QS across the disciplines
- ✚ Lack of curricula leadership for QS
- ✚ Lack of evaluation and evidencing of QS curricular learning outcomes
- ✚ Lack of QS reform efforts when organisational restructuring is occurring
- ✚ Lack of connection between attributes, outcomes and standards
- ✚ Lack of knowledge and adaption of QS educational resources

Our recommendations ...

1. Formulate a shared meaning for QS in science
2. Development and maintenance of effective communication channels across and within disciplines
3. Fostering of curricular leadership in QS
4. Development of an evaluation framework for QS



Resources developed



Aims & Outcomes

Project Aims

"The state of the mathematical sciences and related quantitative disciplines in Australia has deteriorated to a dangerous level, and continues to deteriorate." - Professor Gavin Brown, 2009

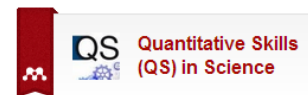
Simply stated, quantitative skills relate to numbers and how they are used for measuring, recording and analysing data for instances, or performing mathematical or statistical calculations. Quantitative skills (QS) provide an important foundation in many areas of higher education including Science (ie Physics, Chemistry, Biology), Engineering and Mathematics.

Quantitative skills (QS) are essential in science


Recent research suggests that the level of QS in science need to be significantly improved. As a starting point, the QS in Science project will collaborate with Australian and international universities, looking for science programs that produce better skilled science graduates.

The QS in Science project will promote and support strategic change in higher education via the enhancement of learning and teaching in science and mathematics. This will be achieved by articulating contemporary undergraduate curriculum models that are innovative and future-looking, and which meet the needs of students, industry and society. The movement to transform science education, to better reflect the interdisciplinary and quantitative nature of modern science, requires a 'whole of program' approach with QS as an essential component. However, institutions continue to struggle to understand how to better integrate QS into their programs.

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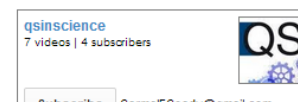
Recent papers in this group

 **Scientists and mathematicians collaborating to build quantitative skills in undergraduate science**
Leanne Rylands, Vilma Simbag, Kelly E Matthews, Carmel Coady, Shaun Belward
International Journal of Mathematical Education in Science and Technology, (2013)



[Quantitative Skills \(QS\) in Science](#) is a group in [Biological Sciences](#), [Education](#), [Mathematics](#) on [Mendeley](#).

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3rd level

2nd level

1st level

STAT1201 (compulsory)

SCIE1000 (recommended)

chemistry

BIOM2012

BIOM1200 (compulsory)

QS taught by maths or stats dept

QS taught by science dept

QS taught by maths & science depts (integrated)

QS components embedded, taught by maths dept


QS components embedded, taught by relevant science discipline

unit/course chosen by student

0:55 / 8:40

QS Curriculum Mapping Tool




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Group activity

**Vilma Amante Simbag** added a document to this group
 **Scientists and mathematicians collaborating to build quantitative skills in undergraduate science**
17th April


**Vilma Amante Simbag** added documents to this group
 **Impact of interdisciplinary undergraduate research in mathematics and biology on the development of a new course integrating five STEM disciplines**
 **Comprehensive curriculum reform in higher education: collaborative engagement of faculty and administrators**
 **Science and Mathematics: A relationship in need of counselling?**
 **A new professionalism for higher education? (**
 **Margaret L.**
16th April

**Vilma Amante Simbag** added a document to this group















About this group

**Owned by Kelly Matthews**
Lecturer
[Education](#)

sharing references on the integration of mathematics and statistics in undergraduate science education, in association with the QS in Science project.

 www.qsinscience.com.au

28 members



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Quantitative Skills in Science
*Curriculum models
for the future*

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QS Phase 2 Project
... advancing the QS agenda



[QS in Science Report](#)