There are many paths to success

University Technical Colleges

The Royal Academy of Engineering

Respected: technical qualifications selected for use in University Technical Colleges

Overview

In March 2011, the Baker Dearing Educational Trust, in conjunction with Edge, asked the Royal Academy of Engineering (RAEng) to identify technical qualifications in science, technology, engineering and mathematics (STEM) that would be respected by the STEM community:

- alongside a suite of GCSEs as the technical component of the University Technical College (UTC) curriculum at Level 2
- in combinations to form the core of the UTC curriculum at Level 3
- individually and in combinations in other schools and colleges.

Method

First, a six-stage process was co-developed by RAEng and the STEM community through a series of meetings involving more than 50 stakeholders. The aim of the process was to establish a robust method for reviewing individual STEM qualifications, taking account of factors including -

- indicators of STEM community respect
- current levels of take-up
- ethos (eg whether qualifications encourage and support practical, hands-on learning)
- how STEM qualifications are (or could be) combined with other qualifications such as GCSEs and A levels.

Next, candidate qualifications were identified (1) by reviewing lists of STEM qualifications drawn up as part of a Further Education STEM Data Project also managed by RAEng and (2) through discussions with members of the STEM community and Awarding Bodies. The resulting list of candidate qualifications was reviewed by stakeholders.

Finally, using the six-stage process, the team examined all the candidate qualifications in order to identify those which could be considered for use by UTCs.

The full report includes lists of level 2 and 3 qualifications recommended for consideration by UTCs. Both lists are quite short: although many qualifications are available for consideration, relatively few fulfil all the criteria to be recognised as *respected* qualifications.

The six-stage process could be used to assess new or further candidate STEM qualifications in the future. Just as importantly, the process could also be adapted to help UTCs, schools and colleges decide which practical, technical and vocational qualifications should be offered in other (non-STEM) subjects.

About the research

The Baker Dearing Educational Trust and the Edge Foundation asked the Royal Academy of Engineering (RAEng) to identify technical qualifications in science, technology, engineering and mathematics (STEM) that would be respected by the STEM community. The aim was to help Principals and governors of University Technical Colleges to select the qualifications best suited to their needs.

The project was led by Professor Matthew Harrison, Director, Education at the Royal Academy of Engineering, supported by an advisory group and a panel of school leaders. RAEng, BDET and Edge are extremely grateful to everyone who gave time and energy to this project.

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Published by Edge and BDET, 4 Millbank, London SW1P 3JA, 020 7960 1555

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www.utcolleges.org.uk

The Edge Foundation is a registered charity and company limited by guarantee. Registered in England. Charity number: 286621.

The six-stage process

STAGE 1: Set indicators of STEM community respect.

Level 1 qualifications must:

- Set foundations for progression beyond Level 1
- Support maths and English (eg through the use of Free Standing Mathematics qualifications)
- Provide progression to further STEM study at L2
- Prepare learners for STEM-based apprenticeships

Level 2 qualifications must:

- Fit the UTC vision
- Prepare learners for STEM-based apprenticeships
- Support 'practical' delivery (ie learning by doing)

Level 3 qualifications must:

- Link to and build on prior subject knowledge and attainment
- Support progression to Higher Education
- Prepare learners for Level 3 and 4/5 apprenticeships

Note: at all levels, consideration should also given to information about relative economic returns from the qualifications under consideration (where such information exists).

STAGE 2: Apply filtering criteria to the qualifications listed by the FE STEM Data Project to produce lists for S, T, E and M. Augment the lists in partnership working with the Awarding Bodies to ensure that the most comprehensive as practicable set of candidate qualifications are considered and inspected.

Qualifications must –

- be publicly funded for, and legally available to, the 14-19 age group
- be S, T, E or M qualifications (or related)
- be at an appropriate level
- have a reasonable national community of practice (eg more than 300 achievements in a typical year with more than 20 centres offering the qualification)
- fit into the required guided learning hours for UTCs

STAGE 3: Apply further detailed filtering by reviewing the specifications of candidate qualifications, sample assessment materials and other evidence.

Qualifications must –

- fit the UTC vision
- distinguish between paper qualifications and real skills
- accommodate a 'practical identity' as well as a 'technical identity'
- encourage creativity and ingenuity
- encourage experience-led approaches
- be future-proof
- encourage independent learning
- encourage co-development by employers and HE
- at Level 2, provide credible progression opportunities when taken alongside core GCSEs in academic subjects
- at Level 3, must provide credible progression opportunities, potentially taken alongside GCE A Levels in particular subjects
- be a 'portable qualification' – that is, must include a significant transferable knowledge core
- employ a variety of rigorous assessment methods, including assessment of practical/technical skills

Ideally, qualifications should also be endorsed by the relevant professional body.

STAGE 4: Apply combinations criteria to identify combinations of qualifications with particular national or local progression value and any qualifications that should only be included under restricted local circumstances.

No single qualification can guarantee good progression to further study or to employment for every learner but the risk of generally poor progression can be mitigated through careful assembly of combinations of qualifications taking national data and local context into account.

When planning combinations of qualifications, particularly for lower attaining learners, the following criteria for combinations should be followed:

- S,T,E and M learning outcomes of technical qualifications should be assessed in conjunction with the learning outcomes from other science and mathematics qualifications taken at the same time.
- If an NVQ is to be included then it must be clearly in support of or combined with one or more vocationally related qualifications (VRQs) to promote general (non-occupationally specific) progression beyond Level 2
- Learners working towards Level 1 should be encouraged to concentrate on attaining in mathematics and English GCSE or equivalents

In addition, some qualifications may have a particular local significance: this should not be overlooked.

STAGE 5: Gap analysis – discussion with Awarding Bodies, Sector Skills Councils, schools, employers and others to identify any omissions and gaps in the qualifications lists.

The qualifications offered to schools and colleges will change over time. The Principal and Governors of a new UTC should undertake discussion with schools that have a technical specialism, Awarding Bodies and Sector Skills Councils to identify any potential gaps and/or innovations that need to be considered.

STAGE 6: Check that all recommended qualifications meet the set indicators of respect in the STEM community.

Final checks will be undertaken by individual UTCs, taking account of –

- The availability of specialist teachers and instructors
- The availability of specialist technicians and support staff
- The availability of specialist equipment
- Learning spaces
- Timetabling issues
- Access to authentic learning opportunities