THE PROCUREMENT 0F TECHNOLOGY IN EDUCATION

Value, relevance & sustainability

Purpose

This paper examines the procurement of technology in education. It emphasises the need to ensure that the way the technology will be used is fully considered prior to creating a technical specification.

Author

This paper has been prepared for MirandaNet by Malcolm Payton, a consultant who has been engaged in digital content as a teacher, a Director of Education, a consultant and a Professional Advisor to Government. As well as leading digital content procurement in Scotland and Qatar, Malcolm has led the development of change management programmes for schools including the Strategic Leadership of ICT programme that has been used in a dozen countries. This paper has been adapted from a workshop on procurement commissioned by a national agency.

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The importance of the Procurement Process

It is generally accepted the use of technology is important in education. It is very likely that every country in the world has an aspiration to increase the use of technology in schools. Many reasons for this are cited, from improved attainment in the current examination system to disrupting education and creating a new more egalitarian meritocracy that is based on results rather than qualifications. While elements of these arguments can appear contradictory, the conclusions are generally in agreement - the world is changing and greater use of technology in life and work creates a need for greater use of technology in schools.

The question of how to procure this technology then arises. As creating a technology base accessible by all requires significant expenditure, it is clearly important to obtain value for money, and many different means are deployed to ensure this.

For any large procurement, the approach invariably includes a tendering process that is designed to ensure value for money. This process involves drawing up a specification and inviting bids from different companies. As all companies are bidding to provide similar resources, the purchasing agency can obtain the best possible price.

Adopting a tendering approach is not always sufficient to ensure value for money however. As the World Bank has indicated,

> "Despite evidence of increasingly widespread use of ICT in education initiatives around the world, there is little guidance available for policy makers specifically targeted at countries contemplating the use of ICT to help countries meet the education-related development goals."

Similarly, UNESCO's review of the use of ICT in Education suggests,

> "While it is often noted that ICT can only have educational benefits in certain situations and under certain conditions, there is insufficient empirical evidence to demonstrate how, where and when ICT can bring benefits to education, particularly in the Asia-Pacific region."

Most recently, the U.S. Department of Education observed (January 2015)

> "The Los Angeles Unified School District's $1.3 billion *'iPad-for-all'* education initiative, announced in the summer of 2013, has been plagued by lack of resources and *inadequate planning for how the devices would be used in classrooms*"

The limited success of even the highest profile raises questions about the nature of the procurement process that is being adopted.

A clue to the issues can perhaps be found in the last phrase of the above quotation however –

"*inadequate planning for how the devices would be used in classrooms*". Perhaps it is not so much the procurement of hardware that is the issue, but the stages *before* the tendering document is issued – the planning and the educational considerations.

The premise of this paper is that the reason most "ICT in Education" projects fail to fully meet their objectives is that they are primarily seen as the procurement of hardware rather than part of a larger process of change management.

Determine the Purpose of the Initiative

The reason for the introduction of ICT in schools is to bring about change. The actual change desired will be dependent on local policy, circumstances and need, but there will in every case be a need for change.

The first question to ask is not therefore "what should we procure" or "how will we procure it", the first question is "why do we want to procure anything – what is the change we hope to achieve?"

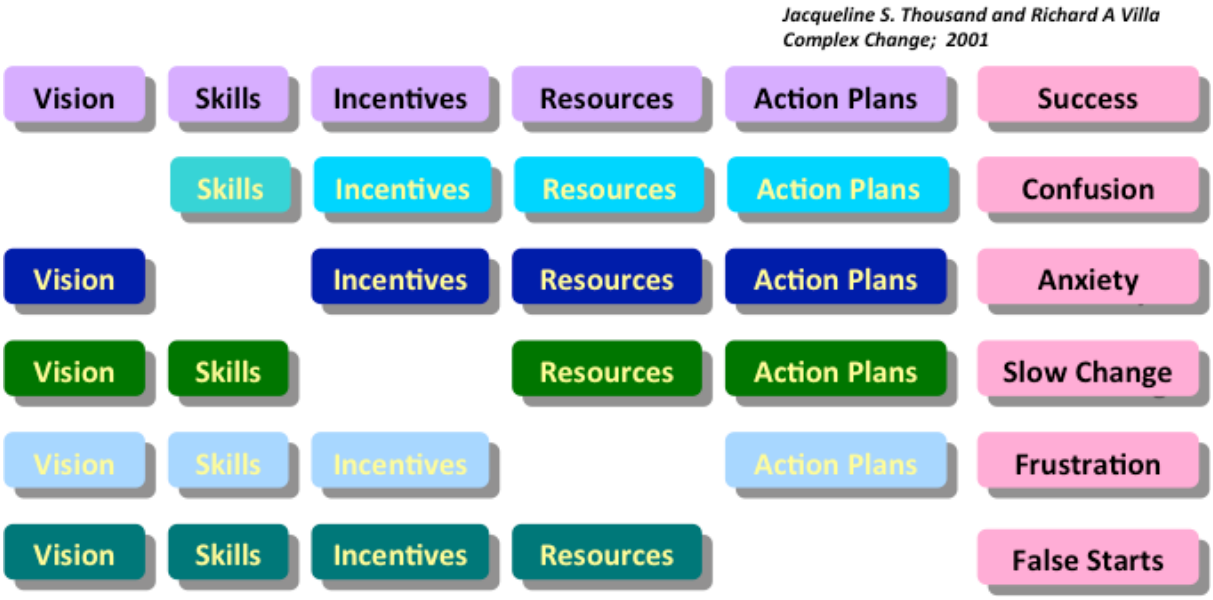
One of the most popular business books ever has been "The Seven Habits of Successful people" by Stephen Covey. Covey and his colleagues spent many years researching the habits that distinguished successful people and, from this, developed a number of principles that led to success.

The first of these is, "begin with the end in mind". What is true for successful people is equally true for successful ICT projects in Education - "begin with the end in mind". It is only when we know what we are trying to achieve that we can begin to plan how to achieve it.

The first stage is therefore to ask a number of questions about the purpose of the procurement. For example:

- Why is it needed?
- How is it going to be used?
- Who is going to introduce it?
- Will those using it have the same priorities as those ordering it?
- Will this change "business as usual" – how teachers or others go about their work?
- What sort of change programme is needed?

Change is a complex business, with multiple possible sources of failure. One well-known model that outlines some of the requirements and risks of change is the model developed by Thousand and Villa and exemplified in this diagram:



- Who is going to use it?
- What is the purpose?
    - ❑ Motivation of students?
    - ❑ improved attainment?
    - ❑ new pedagogy?
    - ❑ the development of digital literacy?

The actual goods purchased will of course depend on the purpose, but it has to be remembered that this will ultimately be a change management programme. It will not just be the technical specification that is determined by the decisions about the purpose of the programme, it will be all of the factors required to deliver change.

But why is change so complex? Keith Grint defines three types of problems:

1 Problems as Crises

- Portrayed as self-evident crisis; often at tactical level
- There is general uncertainty – though not ostensibly by commander who provides 'answer'
- No time for discussion or dissent
- Legitimizes coercion as necessary in the circumstances for public good
- Associated with Command
- Solving encouraged through reward

In a crisis, the commander's role is to take the required decisive - to provide the answer to the problem.

2 Problems as PUZZLES

- If a problem is a puzzle, there is a solution
- Can be complicated but there is a unilinear solution to them –
- these are problems that management can (& has previously) solved
- The problem of heart surgery is a Tame problem
- It's complicated but there is a process for solving it
- & therefore it has a Managerial Solution/Answer
- Launching a(nother) new product is a tame problem
- Moving house or moving a business is a tame problem

Seeing problems as a puzzle leads to seeing management as a science. For example, F W Taylor's engineering approach was, "The application of science to achieve the one best solution."

3 Wicked Problems

- Have no simple solution
- The problems are either novel or recalcitrant
- Complex rather than complicated (cannot be solved in isolation)
- Sit outside single hierarchy and across systems – 'solution' creates another problem
- They often have no stopping rule – thus no definition of success
- Sometimes the solution precedes the problem analysis
- May be intransigent problems that we have to learn to live with
- Symptoms of deep divisions – contradictory certitudes
- Have no right or wrong solutions but better or worse developments
- Uncertainty & Ambiguity inevitable and cannot be deleted through correct analysis (Keat's "Negative Capability")

Wicked Problems are problems for leadership not management. They require political collaboration not scientific processes. The role is to ask the appropriate question & to engage collaboration. A simple example of a wicked problem is the UK Fireman's strike in 2003, when the number of fires reduced (presumably because people were taking more care). Similarly, a number of city planners have found that improving traffic flows leads to more congestion.

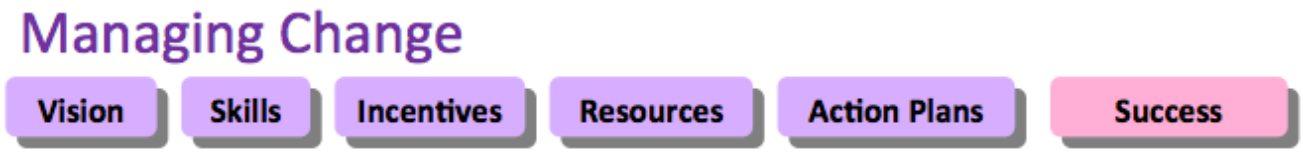
Procurement of hardware is a puzzle – a problem that has a process and an accepted means of solution. Changing education to take account of the power of technology is a wicked problem that requires collaboration and an ongoing process of refinement and capacity building.

Procuring Technology as Change Management

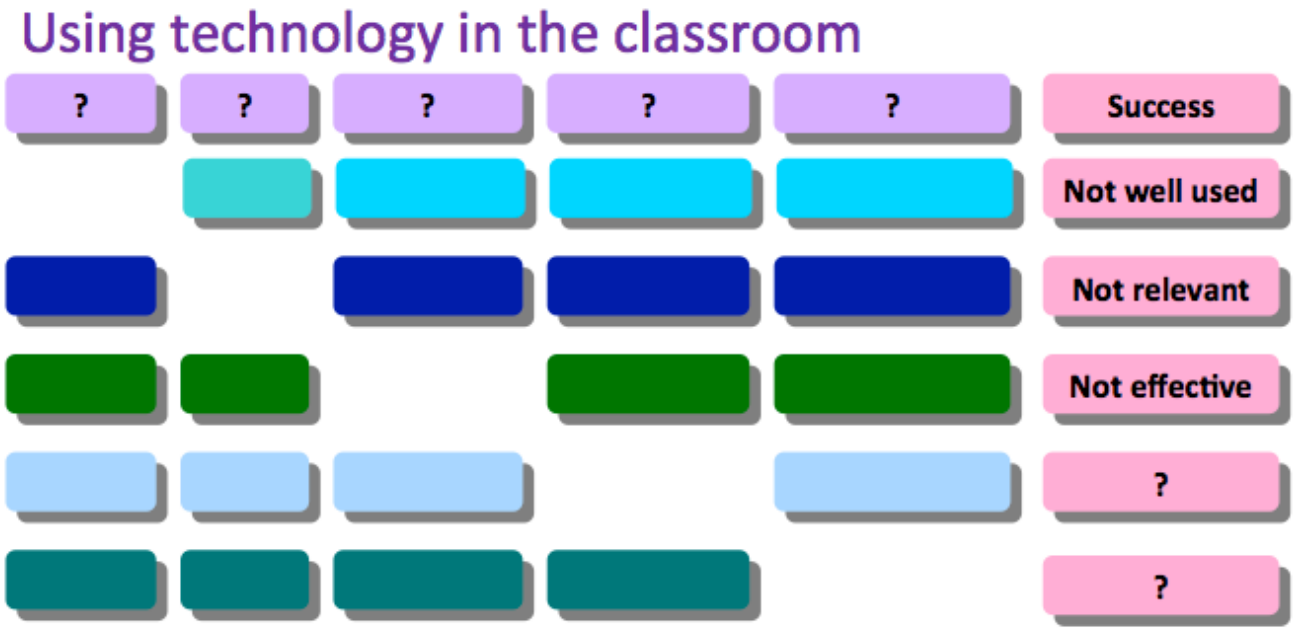
The main reason that most ICT in education initiatives have failed - or at least not fully succeeded - is that they have been seen as *Puzzles* – problems that have a process-driven solution rather than a complex process of change. To achieve an effective impact and true value for money requires consideration of the range of inter-related factors and a process of change that includes feedback

loops and building the capacity of staff to solve local problems.

So, could the Thousand and Villa model - that has been recognised as a useful framework for managing change - be helpful here? In other words, could we take this:

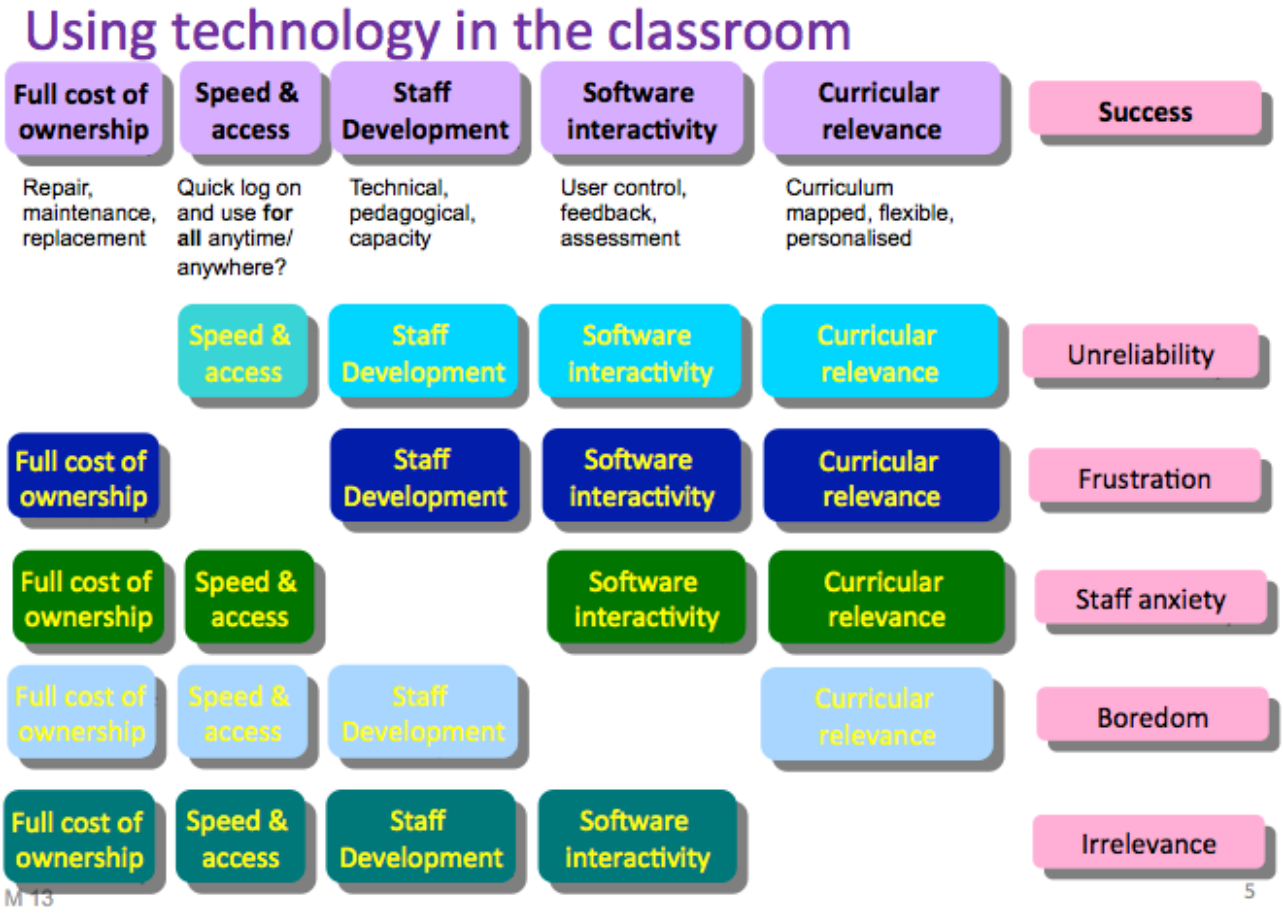


and create a grid that looks something like this?



This is the very question that has been asked to participants in the highly successful Strategic Leadership of ICT Programme (which has now been delivered in a dozen countries across the world). Each group undertaking the programme is invited to determine its own grid as part of the development of their own thoughts about the issue. As it is not possible to do this in such an interactive way in this paper, a possible set of answers is however given in the next diagram:

One possible set of answers



Taking this sort of change management model instead of the technical specification as the starting point allows a number of aspects to be examined in detail.

Before we consider the requirements of the change management process, we need to answer the very first question however – what are we trying to achieve? Change management is a means to an end, and we have already argued that we need to "begin with the end in mind". The first question to answer is therefore "what is the end we have in mind?" – what are we trying to achieve?

Considering this question is very important and, because it is a "wicked problem" it does not work if a "Commander" decides what is required, nor does it work if a "Manager" determines a process. What is needed is to gather a range of key stakeholders and develop an understanding of the problem that takes into account the knowledge of practitioners.

The reason for this is that a simple change will often have complex effects. Bringing together a range of stakeholders allows potential solutions to be aired and the impact on different parts of the system to be considered.

Physicists recognise that measuring something changes it. For example, measuring the amount of light from an object requires light to be absorbed – but absorbing the light is changing the

environment so influences the results. In everyday life, these effects are of course small but the same principle applies to wicked problems. Creating a change at one place distorts the web and creates unexpected changes elsewhere. One way to prepare for this is to rehearse the issues in a representative group of stakeholders.

Creating a Functional Specification

Once the complexity of change has been accepted and some mechanisms of managing the change process (what might traditionally be thought of as the project governance, although it is better to think of a programme management which focuses on *realising benefits*) have been created, the next stage is to draw up a functional specification.

This is very different form a technical specification, which describes the required equipment. A functional specification outlines how the equipment will be used, and that is primarily about software, not hardware.

A typical functional specification might for example consider whether resources are:

Interactive
Does the resource (including any assessment) provide feedback that supports the learning process?

Differentiated
Does the resource take allow for different levels of difficulty, including additional support and extension?

Educational
Does the resource provide a valid and valuable learning experience through the clear presentation of relevant factually correct data, the opportunity to experience new concepts or the requirement to undertake tasks that require new skills?

Engaging
Does the resource engage students through interesting presentations, simple interfaces and interaction and is it suitably challenging, leading students to enjoy learning?

Ease of Use
All materials should be intuitive, with little requirement for additional instruction.

Relevance to Standards
Are the resources closely linked to the curriculum and the Curriculum Standards?

Appropriate
Is the resource appropriate in terms of culture and use of age-appropriate language?

Flexible
Does the resource take account of different learning styles, and approaches?

Only once the purpose of the initiative, the change management process and the functional specification have been confirmed should the final step being considered. This final step – often mistakenly considered as the first step – it to draw up a technical specification.

Will all content be accessible on any device including mobile phones, iPads and other portable technologies?

Are processor, disk capacity and memory highly specified?

Are all connections a minimum of 100 Mb/s and upgradable?

Does the proposed solution meet the WCAG 2 level A Accessibility requirements (see http://www.w3.org/WAI/WCAG20/glance/)?

Do all web pages conform to XHTML 1.0 Transitional http://www.w3.org/TR/xhtml1/?

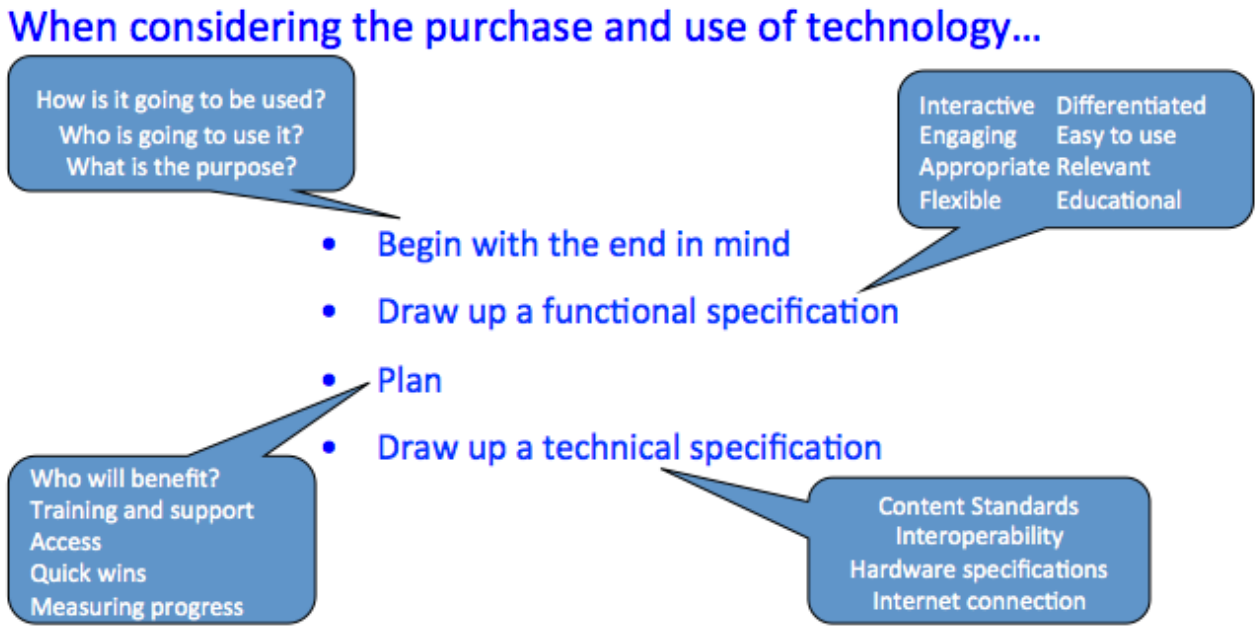
Will all Digital Content provided meet the IMS Content Packaging v1.2 Public Draft v2.0 specification (see http://www.imsproject.org/content/packaging/)

Will all Assessment Objects provided meet QTI Version 1.2 (see http://www.imsproject.org/question/)

Will all Digital Content provided meet SCORM 2004 4th Edition Version 1.1 standard? (see http://www.adlnet.gov/Technologies/scorm/SCORMSDocuments/2004%204th%20Edition/Documentation.aspx)

A technical specification is the document that allows the procurement to proceed. It will typically contain details of CPU speed, memory capacity, secondary storage, networking, screen size and resolution and other factors that relate to the hardware. It should also include details of any software requirements and specifications, for example:

In summary:



And remember: