



Using meta analysis to develop an evidence base to inform educational policy-making

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Abstract

In 2005 the British Government published proposals for a radical reform of the education system for 14-19 year olds - the 14-19 Reform. The Qualifications and Curriculum Authority (QCA) is the public body tasked with this redevelopment of the curriculum, qualifications and their assessment. The Reforms are being introduced into schools, colleges and training centres between 2008 and 2013.

REMS is a Research Evidence Management System designed to make strategic use of the evidence produced on the 14-19 Reform, to influence and inform policy development and ensure it is evidence-based. REMS is a qualitative meta-analysis project supported by the use of NVivo8. Secondary data consisting of policy documents, monitoring, research and evaluation reports and commentary and media articles is classified and coded to form an evidence base. The analysis tools in NVivo8 are used to produce briefing papers on urgent issues, identify emergent trends and develop evidence-informed policy as the reforms are implemented and evaluated.

The size and longitudinal nature of the project requires a disciplined team approach to the use of software. The nature of the data and the requirements of the stakeholders led to a stylised but effective use of NVivo8.

1. Introduction

The Qualifications and Curriculum Authority (QCA) is a non-departmental public body accountable to the Secretary of State for Children, Schools and Families. They develop the school curriculum and its assessment and support the development of vocational learning. In addition, QCA fund occupational standards, support learning at work and regularly review the suitability and availability of qualifications, to ensure that the needs of learners, employers and the economy are met.

One of QCA's aim is to take forward proposals from the DfES – '14-19 Education and Skills White paper' published in February 2005 to support the following key aim:
"The purpose of the education system is to help each and every individual reach their potential...[and] the key to doing that is to design a system around [young people] based on high standards, on choice and on meeting individuals' needs and aspirations...This White Paper sets out how we will build a system of 14 to 19 education that will do just that." (DfES 2005)

QCA's objective is to develop the components for the qualifications and curriculum offer to support the reforms of the education system. The work to achieve this involves 9 key strands which are led by teams within QCA but which also involve a range of other Government agencies (e.g. DCSF, DIUS, Ofqual, TDA, Ofsted, LSC). The timetable for the reforms runs from 2005 -2013 requiring a system capable of handling all the information generated in this period. Each of the 14-19 Reform strands has established research, evaluation and monitoring activities which define the extent to which the work is meeting their individual aims. However, it would be equally important to evaluate the overall impact of the Reform programme as a whole and to understand how decisions in one area influence other strands across this timescale. There are also areas of research from one strand where the findings or evidence will be of wider interest to other strand teams in QCA.

In order, to manage and engage effectively, efficiently and in a timely manner with the high volume of emerging issues about the impact of the 14-19 Reforms, QCA commissioned the development of a new Research Evidence Management System (REMS). REMS is a complete process where evidence data sources are collected, classified, coded and analysed and finally, the trends and key messages generated from the evidence reported to colleagues (as illustrated in Figure 1).

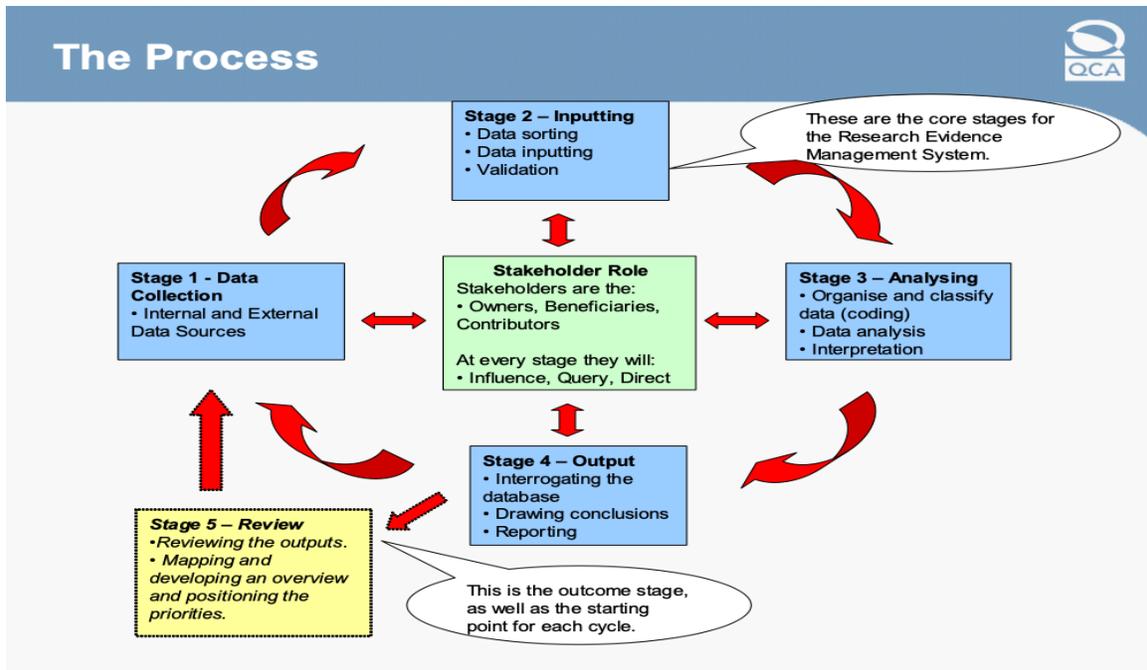


Figure 1: REMS Process

This ambitious and innovative project makes use of NVivo to allow data to be stored, classified, coded and analyzed in one place. However the size of the project, its high visibility and longitudinal nature bring a series of technical and methodological challenges.

This paper discusses these challenges in greater detail, and describes the journey and decisions QCA made along the way. The discussion section reflects on and assesses the choices made in the design and development of REMS. Finally the paper focuses on the reviewing the future advancements and areas for improvement.

2. Literature review

2.1 Transition

QCA is currently going through a major transition phase; the organisation has been split into two, to form OfQual the regulator for qualifications, exams and tests and the Qualification and Curriculum Development Agency (QCDA) who are assigned with the remit of looking after qualifications, curriculum and assessment. This separation is coming at a time when both organisations are relocating to Coventry, and as a result there is high staff turnover and intake of new staff. This has resulted in major restructuring of work practices, styles and standards, both organisations are changing the way they do things.

2.2. The Concept

In this landscape of major change, one of the areas the Research and Evaluation Team is reviewing is the way in which evidence and data, can be better managed and utilized. The idea is to make evidence and research not just useful but useable, exploiting fully existing data or evidence, and hence make use of secondary literature, to inform policy decisions (Solesbury 2001). Overall, the intention of REMS database is to make strategic use of the evidence produced on the 14-19 Reform, to influence or inform, strand and policy development and ensure that QCA's policy and practice is evidence-based (Cabinet Office 1999). This is not a new concept but has been born of the machinery of government changes set out in June 2007 and the DCSF drive and commitment to be more evidence based (DCSF 2008 & Cabinet Office 1999). Therefore, as a Government agency managing the development of qualification, curriculum and assessment, evidence-based policy is crucial. The Cabinet Office (1999) in 'Modernising Governance' iterates and outlines the significance of evidence and research based policy. *"This Government expects more of policy makers. More new ideas, more willingness to question inherited ways of doing things, better use of evidence and research in policy making and better focus on policies that will deliver long term goals"*. As a result, a system that enables this will be a valuable tool for QCA.

In this domain evidence is broader than research data and includes a range of sources of data and research. The OED offers a simple definition of evidence, *'the available body of facts or information indicating whether a belief or proposition is true or valid'*(Cabinet Office 1999). So essentially knowledge an individual has regarding a subject matter, pressure groups' view points, media and commentary is also important, as well as published research, evaluation, policy and monitoring reports, opinion leaders; all the information from this constituents as evidence (Davis 2004). With a range of evidence considered, the thinking is that well informed educational policy making can develop. By no means is this taking the value of primary research and evaluation away, the argument is that the results of these as well as existing information from both internal and external

sources provide much richer and more robust evidence on which to base vital educational policy decisions (DCSF 2008).

Considering a range of evidence sources is crucial for all organisations to capture and understand the knowledge on a subject matter or area of work. Therefore the ability to capture the evidence and use that knowledge is crucial, in particular, for QCA who are going through a major transition. Having the evidence or knowledge base concept is all very well, but evidence based policy is not possible unless the appropriate mechanisms are in place. A process that is not just about data collection and usage, the system must encompass a storage facility, a data management and analysis device, be accessible and not time bound. Therefore an analysis methodology and IT software are needed to make the system a reality.

2.3 Making it Happen

The statistical technique of meta-analysis is a well-established approach for drawing conclusions from a number of statistical studies (Glass 2000). Similarly, meta-ethnography is used for combining the results of qualitative studies, particularly ethnographies (Noblit & Hare 1997). When seeking evidence to support policy decisions, the term systematic review has been used to describe the formal synthesis of research findings (EPPI-Centre March 2007). Although such synthesis often uses a single approach, such as meta-analysis, a number of studies have successfully combined research from different traditions. For example, Thomas et al (2004) used a thematic analysis of qualitative studies conducted in NVivo combined with a meta-analysis of quantitative studies.

This research differs from systematic review in two important ways. Firstly, systematic review is normally focused upon a particular research question and this research aims to provide an evidence base which can be used in the future to address research or policy questions. Secondly, systematic review is normally restricted to research reports and includes an assessment of the quality of each report and this research includes a wide variety of secondary data.

Qualitative data analysis provides techniques for making sense of a variety of data (Richards 2005) and software for qualitative data analysis provides the tools for effectively handling large volumes of textual data (Lewins & Silver 2007). NVivo (Bazeley 2007) is used to store a thematic analysis of all reports in REMS.

2.4 REMS Objectives

The objectives of the REMS project are to:

- Develop an evidence database, to store and manage the huge quantities of evidence generated on educational reform: 14-19 Reform, Qualifications & Credit Framework, Adult Skills and Lifelong Learning & Skills programmes;
- Use data analysis software such as NVivo, to provide a system which enables exploratory and thematic interrogation and querying of the evidence.

In order to make informed and evidence based decisions and policy, QCA ultimately want to:

- Manage and use evidence more effectively;
- Meet corporate knowledge transfer requirements.

REMS is therefore seen as a tool to provide evidence on subject matter, so that the evidence and research becomes demand led and not supply driven, in order to inform strategic policy on education. Overall, the intention of REMS database is to make strategic use of the evidence produced on the 14-19 Reform, to influence or inform, strand and policy development and ensure that QCA's policy and practice is evidence-based. (Cabinet Office 1999, DCSF 2008).

3. Research Method

3.1 Planning the project and establishing the team

In the initial exploratory phase of the development, three things became apparent. Firstly, colleagues at QCA were unsure what was required in terms of system design, operation and functionality. Second, there was no previous 'road map' covering an initiative of this nature and finally, many staff outside of the Research & Evaluation Team felt the scope of the project was probably unrealistic and difficult to achieve based on earlier experiences with Nudist 6. So the first step was to work with operational teams in QCA as the primary clients to develop a detailed project specification, clarify their needs and achieve full support or buy-in. In doing this the design team were able to develop in a reflective way the research objectives, key functionalities of the system, risks and issues, capacity and resources needed. This exploration period lasting 2 months proved to be essential foundation in setting out the planned steps as part of a comprehensive project plan.

Devising the system included thinking strategically about how evidence would be used in the short and longer term, both to support operational decisions and providing the basis for a strategic evaluation of the whole 14-19 Reform programme. An overall project plan was put together which incorporated the following sub-strategies:

- Data collection and sorting
- Piloting REMS
- Stakeholder and communications
- Analysis and reporting
- Maintenance and development

Figure 2 shows the critical stages of the set up of the REMS project for January to September 2008.

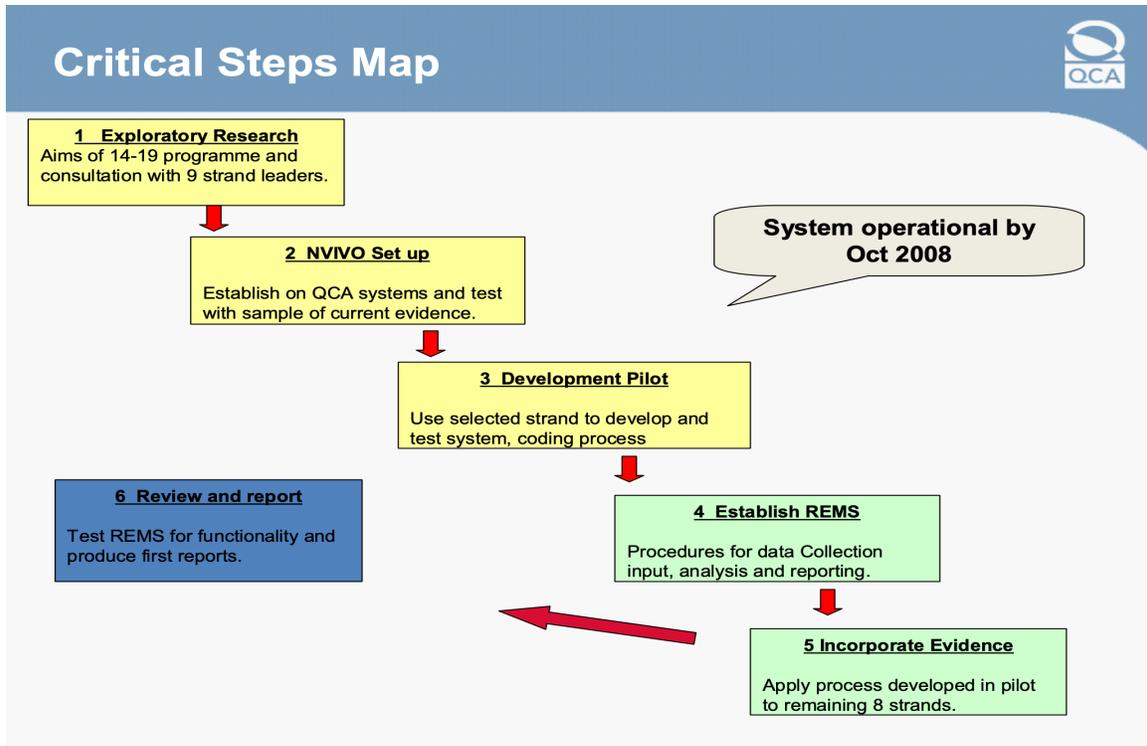


Figure 2: Critical steps map.

The project specification and plan were presented to the Senior Management Team for their agreement before any system development commenced. This also addressed key concerns especially about the impact and additional work load on operational teams in relation to coding or analysis.

Assigning a committed design and development team was a critical element in the project. It was clear that past attempts to develop something similar in QCA had failed partly because there was no dedicated post to direct or manage the process and this led to QCA appointing a Research Data Manager, (Somia Nasim) supported by an experienced researcher in the 14-19 education field (Peter Goff). The development team also required an NVivo expert (Clare Tagg) as this system had not been used by QCA previously. Finally the resource plan anticipated the need for coding volumes once the system was in place and this was initially addressed by recruiting two full time coders on a temporary contract. It has now become apparent that further resource is needed with analysis and the team is currently working with a pool of contractors bringing different areas of expertise, who are able to undertake both coding and analysis.

3.2 Development of a comprehensive library of current and background evidence on 14-19 Reforms

As part of the 14-19 Reform Programme, substantial primary research and evaluation projects had already been commissioned by QCA linked to specific aspects of the

qualification or curriculum development in the reforms. The content and focus of this work is directed by 9 separate operational strand teams and it became clear there was considerable overlap of focus and evidence collected by one team which would be applicable to other strands. In addition other government agencies and external independent organisations have commissioned research activities including qualitative and quantitative studies covering baseline, longitudinal and evaluation studies. Finally there are a very wide range of policy documents, monitoring reports, commentaries and media articles on the 14-19 field which taken together provide the complete picture of progress and developments in the Reform Programme. All of this information is potentially within the scope of REMS as relevant evidence.

A variety of software options were considered for the storage of this evidence including database, CAQDAS and document management systems. Of these three, CAQDAS was considered most appropriate because of its facility to handle a very diverse range of data, its capability to develop a flexible indexing system and the option to search both the text and the index. Of current CAQDAS, NVivo was selected because QCA had a long history of using QSR software and because NVivo7 allows formatted documents to be stored and manipulated. While NVivo is used extensively for primary qualitative research the team could find few precedents for using it to archive code and store a library of published reports as the basis for a meta evaluation of the nature that QCA required. Two key questions were raised. Could this system handle a large volume of documents (some of which had 150 pages) and could it import materials stored as PDF ? It was estimated that the completed system would need to store up to 2000 documents and so performance tests were undertaken which indicated that NVivo7 would be able to handle this volume of data. NVivo 7 clearly had limitations for using PDF but from the specification for NVivo 8 it appeared this was designed to cover this.

In considering the types of research data that should be included in REMS, both primary and secondary data was considered. The decision was taken that only secondary evidence from published reports was to be loaded into the system, with a view to exploring the potential of having primary data once the system had been established. There were four reasons for this:

- the volume of information available and in production raised manageability concerns;
- inclusion of primary data may increase the complexity of the coding and classification frameworks;
- it would be more difficult to meet requirements of the Data Protection Act and QCA's own research Code of Practice which covers the use of primary data;
- merging primary data derived from different studies could pose significant analysis challenges or undermine overall research validity.

A comprehensive library of current and background evidence on the 14-19 Reforms has been established by collecting reports from colleagues, partners and stakeholders, searching databases and stakeholder websites, reviewing relevant journals and monitoring news feeds. The evidence sources vary considerably in size and content ranging from short media reports of 1 or 2 pages, summaries of published studies, full research reports of 100 or more pages to policy documents of 150 pages.

One of the key justifications for the resources needed to establish this system was on the basis of the Knowledge Business Transfer (KBT) advantages at a time when QCA was being re-organized and relocated to a new operational base. The REMS system would provide a comprehensive knowledge store to enable new staff to easily review a critical audit trail of research sources underpinning key qualification or curriculum decisions. These sources in their original state have a variety of layouts, tables and graphics and the REMS team as part of their KBT remit wished to retain the original look and layout of the documents in the database. The decision to upgrade to NVivo8 was taken very early because it allowed the import of Word and PDF documents with virtually all of the formatting in place, however in practice it was found that highly formatted PDFs do not always convert well and can cause performance degradation in NVivo8 without full preparation beforehand.

3.3 Developing a classification and coding schema

Within REMS each document is named, summarised, classified and coded to facilitate the retrieval of evidence. A range of NVivo functions have been used to achieve this.

The naming of sources in NVivo reflects the importance of viewing evidence chronologically but the structured names (eg **Year-month-strand-author-title-plus rating**) also contain elements to aid searching on name, an indication of public domain status, the strand of work which it relates to and a simple rating of research reliability. The structured names provide some context when viewing evidence. Sources are also classified in REMS using NVivo attributes which are single-valued variables associated with cases (each source is a case in REMS).

All databases apply tags or classifications, but REMS uses qualitative research techniques to apply coding to the content of each source. Passages are selected that represent potentially useful evidence and coded to reflect its content. The conventional approaches to the development of a coding framework appeared inapplicable for a range of reasons:

- The database would need to support work over an 8 year period during which priorities for research to support policy development may alter as policy itself develops (e.g. the policy of raising compulsory participation emerged 3 years after the original 14-19 White paper).

- Each of the 9 Strand teams in QCA has its own set of research and evaluation objectives specific to their area of work. The coding framework would need to support all of these.
- REMS itself as a project does not have defined research objectives which could be used as a starting point and although a grounded approach was applied in developing the initial coding tree the team anticipated this may not be practical to repeat each time as the volume of sources grew and many contain much that is interesting but not necessarily particularly relevant. ¹
- The system would need to store information allowing retrieval to support emerging hypotheses or provide evidence in response to research questions that would emerge in the analysis stage rather than be defined in advance.

Taking account of these issues 3 key starting points were taken for the development of the coding framework:

1. The 14-19 Reform policy objectives as set out in the 2005 White paper
2. QCA's remit in relation to Qualification and Curriculum to support these
3. The different stakeholder groups who would have a vested interest in the reforms.

In practical terms the individual nodes or categories were developed from open coding initially using 'free nodes' in NVIVO based on a sample of the published research. This sample included materials from QCA, Independent organisations, 14-19 White Paper, Media articles, and commentaries. The connections between these free nodes were analysed and shaped into a framework of generic relationships structured as a coding tree. This process was repeated and refined with two further samples of sources. A key decision was taken to limit the tree to 2 levels, 9 Parent nodes each with a range of child nodes. The intention was to review these as they developed to make decisions if a 3rd level would be required. The final tree had 96 nodes.

The coding framework that emerged (figure 3) was designed to be flexible enough to deal with short, medium and longer-term issues, comprehensive enough to deal with a range of queries and interrogation, and simple enough in structure to make coding easy for multiple coders.

3.4 The coding framework

The coding strategy adopted follows the 'divide and conquer' approach championed by Tom Richards and uses 'bucket' nodes rather than detailed coding. Thus each piece of evidence is coded to between 4-6 nodes based on a strategy to support both short and long term needs. It was envisaged that analysis could be undertaken from 3 different

¹ This is not to say that the later analysis work would not be 'grounded' on data but simply that the coding tree once established would remain relatively fixed.

starting points; in the short term the strand of work within QCA and in the longer term the overall reform aims and finally the impact on different stakeholders. To facilitate this the concept of ‘**Portal nodes**’ was developed to ensure all the evidence could be linked to:

- 'Qualifications or curriculum' (Diplomas, Apprenticeship, A levels etc).
- 14-19 policy objectives or 'Curriculum Aims'
- all key 'Stakeholders'. (Learners , Employers, HE, Schools etc)

A strategy was adopted of coding **all evidence extracts** to these 3 ‘portal nodes’. A series of nodes cover common topics around Delivery, Assessment, Pedagogy, Accountability and Reform process; **at least one must be selected** to code the extract. These ‘**topic nodes**’ are in effect an indexing system from which key themes could be developed during analysis.

Finally during the initial analysis of sources to develop the coding tree a series of significant cross-cutting issues or themes emerged which appeared to be important influences of the reform implementation (e.g. Academic vocational divide or Employer Engagement). These were developed as a set of ‘**Issues Nodes**

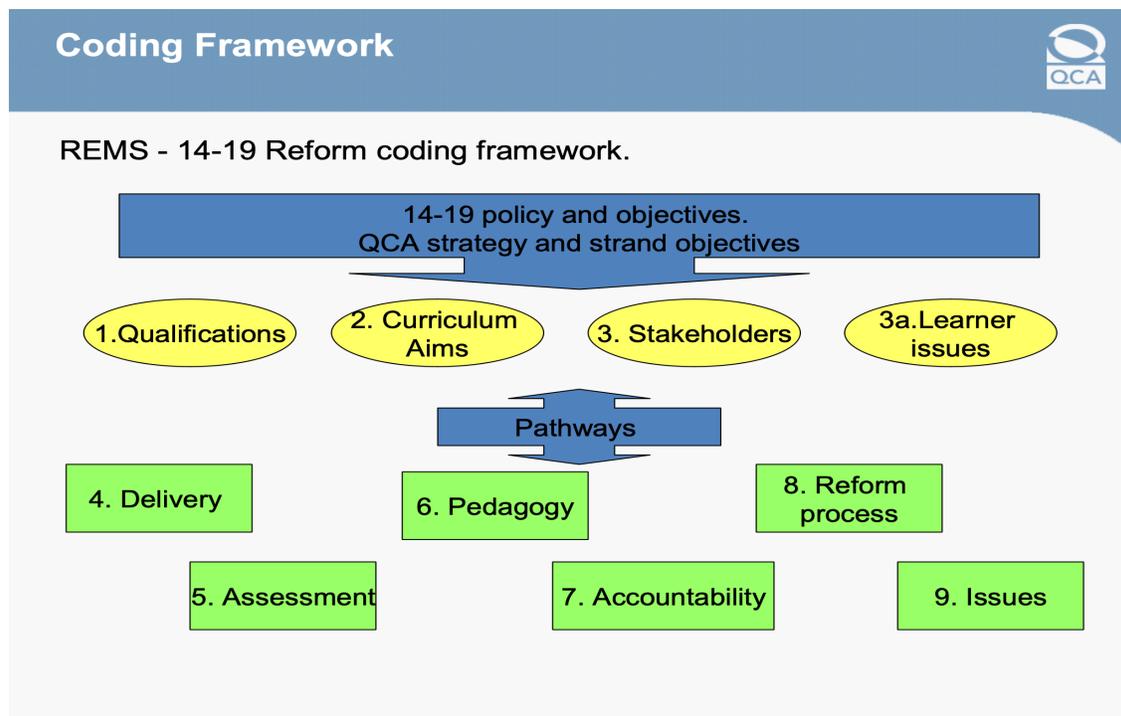


Figure 3: The REMS coding framework.

The concept of a 'portal' node was a significant breakthrough for this project as it allows a single framework to cover the 9 different strands of work in QCA. Through this device all the relevant evidence on a strand of work is initially located coded in a single node which then becomes the means to focus analysis and highlight all the relevant documents linked to this strand. As the reforms progress and we undertake more strategic evaluation the other portal nodes are likely to become more significant.

3.5 Achieving consistency in coding through systematic review.

When coding, careful consideration is given to the selection of a passage of a source to code:

- It needs to be useful as evidence and as such be worth coding to the nodes representing Delivery, Assessment, Pedagogy, Accountability and Reform process.
- It should not duplicate evidence coded in the same source; for this reason in general executive summaries, introductions and conclusion are not normally coded.
- Research method is not relevant as evidence so generally sections on methodology and appendices are not coded.
- The text selected for coding needs to be sufficient to convey meaning but as far as possible short enough to only refer to one idea; NVivo annotations are used to add context when this might not be obvious from the selection of a small item of evidence (such as a bullet point).

Once the coding framework had been trialed by the REMS team for the first 50 sources, 2 full time coders were recruited and trained to operate this. Each coder works on a batch of sources in a separate NVivo project that is merged into the master project on a quarterly basis. The coding framework itself is reviewed and revised on a quarterly basis. Before coding is merged a number of manual and automatic checks are made to ensure the coding meets the criteria developed in the coding manual.

Each coder's work is regularly reviewed by Peter Goff, who has taken on a role equivalent to a 'chief examiner' in national examinations to ensure consistency of interpretation of the coding framework. This involves reading a sample from each source, using NVivo's density bar to check which extracts have been coded, whether the selection is justified, if key evidence has been missed and the relevance of the coding. Key difficulties that have been encountered are:

- The range of different sources, authored and written in various styles sometimes makes coding problematic.
- Both the size of the passage and the coder's desire to record all aspects reflected in the extract, sometimes lead to over coding.

- The coders' knowledge and expertise of the education and skills sector affects the coding.

From the outset the team has had to recognize that qualitative coding is not an exact science and is always open to a degree of interpretation. It is also an iterative process which develops over time through feedback and discussion to develop shared understanding, expressed in the coding framework and most significantly the node definitions. The acid test of the process comes through thematic analysis as the coded extracts are retrieved in response to questions which then reveals the degree of relevance to that node.

Critical to achieving consistency has been the training and ongoing quality control by the team supplemented by reviewing the entire content of selected nodes on a quarterly basis to ensure each extract matches the node definitions.

3.6. Procedures for managing and interrogating the evidence base

While the management of evidence is a key component of REMS it is in the analysis process that the significance of the naming conventions, classification and coding of the evidence becomes apparent and the reason why the QCA team has taken a highly systematic and detailed approach in establishing these at the outset.

The system became operational in October 2008 during which the first quarterly analysis was produced for stakeholders. At this point the team posed itself some key questions:

- How do we analyse the evidence in a productive manner?
- What reporting is going to be useful for the stakeholders?
- How do we account for gaps in the evidence?
- How do we handle the high volumes of evidence?

To ensure buy-in and validation of the evidence in the system, an initial report was prepared for the relevant strand manager. This provided the opportunity to comment on the data in the system and any resulting emerging themes.

The main requirement for stakeholders in our context is to ensure the evidence is robust and analysis focused on relevant policy issues. Posing the right questions or hypothesis as a starting point for analysis has been one of the key challenges given that the database has such a wide volume of evidence and often the review of this is time limited. As part of the development work the REMS team experimented with a range of query functions. This exercise revealed that the query feature in NVivo8 makes the following possible:

- Searching a set of sources using the 'Find' function.
- Text searches, on a selection of all sources and/or coding.

- Using the coding framework to retrieve relevant evidence – using 'coding query' and coding tree.
- Making connections between sources, coding and attributes to equal qualitative cross-tab – using 'matrix' function.

In most cases the function of REMS is to provide access to relevant data as a starting point and the NVivo query tools provide this access. Once relevant evidence has been selected, this is then subjected to thematic analysis with 'coding-on' used to develop analysis node trees which either form the basis of the report or offer the option to use queries to test theories. In other words, each piece of analysis is a mini piece of research using data extracted from REMS. This in itself becomes a piece of 'grounded' research where the data determines the categories for analysis and conclusions.

3.7. Reporting

At this stage the experience of the project has been limited to interrogating the database and reporting to support QCA decisions in the development process. The procedures required for this have to take account of short turnaround times, a need to factor in the capability and restrictions of the software and most significantly the researcher time needed for conducting analysis on a regular and ongoing basis. There are four main requirements for analysis and reporting that REMS must enable and facilitate.

1. Fast and effective searching in a complex evidence environment

QCA are often asked to produce a quick briefing or snap shot on particular topic or issue. Colleagues want to know:

- What do we already know?
- What the current position is?
- What is all the evidence saying?

For these requests, time is the critical issue, as a response is required immediately or within days, but, at the same time a comprehensive response is called for; where Government, stakeholders, partners as well as QCA's perceptions and policy are all considered. The coding framework was developed from the 14-19 policy. As a result it is often fairly easy to select the theme from the coding tree and analyse the information using attributes and the query features of NVivo to limit the evidence to the appropriate context. An example issue: Raising the participation age to 18.

2. Identification of emerging themes and issues, including areas where evidence is scarce/missing

As the coding framework was constructed using QCA's strategic objectives, when the evidence is collated and coded, it becomes apparent where themes are emerging (e.g. Apprenticeships) or gaps (e.g. Pre-14 education impact on the reform) exist. Further detailed analysis establishes the exact themes and gaps in the data.

3. Development of evidence-informed policy during hectic period of early implementation/ evaluation

A key feature of the system is to ensure any strategic or policy decisions are based on evidence so, current, complete and reliable evidence must be in the system, to ensure implementation issues are considered and flagged at the earliest opportunity. Using published sources means there is a time lag of about 4 months from the completion of research to publication and loading into the database. In providing advice on key policy decisions REMS provides a fast summary of what the most current research is indicating. Example analysis: Functional Skills on hurdle and assessment.

4. Single evidence base which can be probed by different stakeholders to provide tailored perspectives

The system was designed to include not only QCA published evidence, but also relevant evidence produced by stakeholders and partners. As a result the evidence held in the system is of value to a range of stakeholders and partners and so they have been given the opportunity to use and query the database, for their work. Example : Learning Skills Council request for information on delivery issues and internal impact of the recession on education and skills.

A major influence on the reporting strategy has been the need to get buy-in from internal and external stakeholders. This has required a careful strategy To 'sell' REMS as a service for colleagues, including all the coding, data management and maintenance. The team also makes regular progress updates at communications events or for senior management. However one of the negative perceptions of 'qualitative research' in a development environment is that the apparent time lag from the commissioning work to reporting. To overcome this, the team have adopted 3 key approaches:

- Anticipating needs for evidence on 'hot' issues within the reform programme (eg. Hurdle for Functional Skills) to demonstrate the capability of the system.
- Proving through the report style that qualitative evidence can be analysed quickly and reported on as a brief summary of issues.
- Producing quarterly reports which are precise and not over burdensome for the group interested in the analysis area.

All reports are between 2-8 pages usually in the style of a briefing paper using plain language, with technical information kept to a minimum. Quarterly reports include a

'What's in REMS?' report and thematic reporting on emerging themes or core policy areas which the team have anticipated. This approach is being further developed through online web pages for the QCA intranet and website.

4. Discussion

In this section the discussion centres on some of the key components of REMS functionality and objectives. Reflecting on the lessons learnt and limitations of the system.

4.1 Perceptions of stakeholders

We have found that dealing with the perceptions of stakeholders requires an intense, targeted and ongoing reporting and communication strategy. Justifying continued support and resourcing depends on stakeholder (internal and external) buy-in, engagement and most importantly confidence that this system can be operated and maintained over the long term. In this respect initial perception of the REMS concept varied between:

- Skeptics - those who understood the need for an evidence base, but felt the remit difficult to achieve and maintain in the longer term.
- Supporters - those who value and see the benefits of the system, but had no time to devote to engaging with the process.
- Cynics - Most challenging of all those with reservations of the whole concept and limited understanding of the value or need for this approach.

To overcome such doubts has in itself been time consuming with regular updates and a road show of demonstrations. A very detailed pilot of REMS was conducted, to review and test every concept and most importantly produce examples of results which demonstrate the ability to identify the right issues and summarise the evidence to support managers in their work. The analysis example in the pilot responded to a widely reported concern in the media that schools were not well prepared to introduce the Diploma by reporting quickly what the published research revealed on this.

The initial assumption in setting up REMS was that this would be a system where operational managers could run their own queries. During the exploratory stage of the project, it quickly became apparent that along with the coding and preparation of published evidence, a service of analysis and reporting would also be needed. It was clear that it would not be practical for users to directly use the NVivo system because of the difficulties in providing appropriate access to the database and the technical skills needed to get the best out of the NVivo system.

This is a new and innovative way of managing and organising qualitative evidence and questions of validity of the data are a constant challenge. The more exposure the system has, illustrating how it functions and assists with strategic decision making, has helped stakeholders to understand how this is achieved. Crucial to maintaining confidence in the reliability of the analysis has been the way the documents are taken into the system and

maintained exactly as they were published so the full evidence in the reports is available for analysis. A content rating based on the degree of research rigour, sample size or independence is also applied, meaning that if needed we can limit analysis to those sources which provide the highest reliability in terms of 'education research'.

4.2 Coding and analysis - the case for connoisseurs

With any IT based system there is the need to manage expectations of many managers that answers can be achieved at the touch of a button. Qualitative analysis is a time consuming and highly developed skill and while NVivo allows evidence to be cut in a more sophisticated way, from a wide range of sources in a fast and effective way, the role of the analyst is critical. The evidence still has to be read and interpreted and in a typical analysis the first step is to organize, through queries a list of all the relevant sources on the issue. In NVivo the coding density bar indicates the degree of coding and prioritizes skim reading to gain an overview. The coded extracts themselves may have to be re-organized using a specific analysis tree developed through free nodes. Once the information is broken down under key themes a report can be generated. Managing stakeholder expectations around this is a key component of the REMS system. What has also emerged, more unconsciously than planned, is an approach to coding and analysis which bears some of the distinguishing features of 'connoisseurship' derived from the work of Elliot Eisner who describes this as:

Connoisseurship is the art of appreciation. It can be displayed in any realm in which the character, import, or value of objects, situations, and performances is distributed and variable, including educational practice. (Eisner 1998: 63)

In an article on this issue from 2005 M.K.Smith writes

The word connoisseurship comes from the Latin cognoscere, to know (Eisner 1998: 6). It involves the ability to see, not merely to look. To do this we have to develop the ability to name and appreciate the different dimensions of situations and experiences, and the way they relate one to another. We have to be able to draw upon, and make use of, a wide array of information. We also have to be able to place our experiences and understandings in a wider context, and connect them with our values and commitments. (M.K.Smith 2005)

In determining which extracts to code and more significantly in deciding the emphasis to give to these during analysis the key issue for us has been the need to recognize their significance, relevance and relative weight from a complex array of material on a very specialist area of policy work, curriculum and qualifications for the 14-19 sectors. Qualitative analysis differs in this respect from quantitative work in that the number of references may be less important than the nature of the evidence. (For example in analysing the impact of hurdles for functional skills there was only one reference out of 102 which described the attitude of the Welsh and Northern Ireland context but this may have a very powerful impact on policy decisions.) The practical implication of this has

been the need to involve an expert in 14-19 to undertake checking of coding and also to recruit analysts who are themselves experts in the different fields under investigation.

4.3 Extending the evidence base –The limits of a coding framework

The initial success of the 14-19 Reform REMS project has led to requests from other programme teams in QCA to devise similar systems covering work for the Qualifications & Credit Framework, Adult Skills and Lifelong Learning & Skills programmes. This has posed some crucial questions:

- Do we incorporate all QCA programme areas into a single database and have one REMS system?
- Will the coding framework and other functionalities work for these different programme areas?
- If the systems are kept separate how do we handle evidence sources that relate to more than one or all areas?

The initial challenge to develop a single coding framework for 9 strands of work on 14-19 in QCA has so far been justified but it is unlikely this can be extended to cover areas with very distinct issues and policy aims. At this stage a decision has been taken to use individual systems for each programme but to design coding frameworks in such a way as to provide the potential to merge in the future. If successful this will allow us to review and evaluate evidence across the whole scope of QCA's work on some strategic issues which are common (i.e. Assessment methodology, funding issues, employer engagement etc.)

4.4 Suitability of NVivo

The use of NVivo8 as a software tool for REMS has largely been successful but there are some useful lessons that have emerged during the first year of REMS relating to the organisation and design of the project and the capabilities of NVivo. The organisational aspects of the project have generally proved robust but have required considerable time and attention to detail. With a purpose-built database, the REMS conventions (such as naming conventions) could have been supported by software, but with NVivo it is necessary to manually maintain and check these. This requires a degree of structure that is not necessarily consistent with a qualitative researcher. On occasions when issues have arisen, it has always been possible to use NVivo to recover and fix problems largely because we have maintained a careful series of backups.

As this is a large project extending over several years involving many stakeholders with developing requirements, flexibility was a key aspect in the design of the project structure. The naming, classification and coding framework developed over the first six months of the project has proved to be very successful. It has been possible to use a small team of people to develop the system and subsequently to introduce new staff; particularly important in a project of this size and time frame. We have not found the

tools provided within NVivo for assessing intercoder reliability useful but have relied heavily on the NVivo8 feature of recording the user to distinguish and compare coders.

The coding strategy involving the concept of portal nodes multiple coding using 'bucket' nodes has proved effective and provides the necessary routes for analysts to easily select the evidence needed. We have found that the single-valued nature of attributes has made these more cumbersome to develop and use than expected and has led to a number of true/false attributes (e.g. which of the 9 key strand(s) the document is relevant to).

The functionality provided in NVivo8 has generally been effective and its applicability to the task has exceeded expectations. The main issues have been associated with PDFs, performance and the size of the project. While most PDFs do import directly into NVivo8 without any conversion, there are problems with highly formatted documents containing graphs and those with heavily formatted headers and footers. Sometimes these will not import, or they import with text or graphics missed or jumbled and of most concern the imported document causes NVivo to run slowly. This has required additional resources to ensure PDFs are fully prepared for loading into NVivo. The other performance issues relate to the size of the project and are most apparent when merging. Although QSR provide guidance on handling large projects and there are a range of techniques which can be used to improve performance, there are still occasions when the speed of REMS is a significant issue.

5. Conclusions

Developing a role to support policy decisions.

QCA itself is not primarily a research organisation. The main imperatives and priorities are development timetables based on fixed achievement points and driven by government policy. Working in this environment and culture involves overcoming the perception of 'research' as academic, long term and unconnected with the immediate development tasks. An equally significant challenge in this context is the temptation to view evidence as something to demonstrate to sponsoring departments that particular goals are being achieved. Researchers for their sins, are often the bearers of contrary messages, a more complex picture of the impact of development and often plain bad news.

The introduction of REMS however has made a significant impact in addressing these perceptions particularly in encouraging internal stakeholders to obtain evidence to inform their work. It is quite often the first port, used when colleagues are interested in – 'what do we already know about an issue?' including summarising the key factors around policy advice, emerging issues and gaps in evidence.

In the initial period of development the back-log of evidence has been coded and it is only in the last few months that different types of reports –quarterly, thematic and 'What's in REMS?' are now being produced on a regular basis. For the system to be effective in supporting development work, it relies on having the most current and up-to-date information. There have been times where, reports are coded into the system with a significant delay after the publication date, which means that subsequent analysis is based on information which may already have been overtaken by events or policy shifts. The core functionality and purpose will not be realised until all current evidence is received as soon as it is published. As the system produces more outputs REMS stakeholders are beginning to understand the impact of having gaps in the information; and as a result their own reports are arriving more speedily. The real potential of REMS in this respect still remains to be seen.

In terms of the success for REMS in ensuring advice from QCA to support policy decisions are based on the most reliable evidence available, is difficult for the team at this point to form a judgment. What is in our control is that REMS is one of the tools that colleagues regularly consult or utilise to assist them in making evidence based decisions in their development tasks. The other side of the REMS team work is to be proactive in highlighting issues or potential trends in the data, and by anticipating needs or predicting where the critical issues in the implementation of Reforms may arise. To ensure the evidence is being used to inform educational policy-making, the REMS needs to be reactive as well as proactive.

While the initial focus has been on current qualification development the team need to remain aware of the value such a comprehensive evidence base can provide in the strategic evaluation of the 14-19 Reforms. To realise this, the REMS team must continue to guarantee that the evidence has been classified and coded consistently over the full timescale so that information when retrieved via interrogation and querying is valid and reliable. The team believe that while the potential has now been recognized and the foundations established for this system to support future major reviews of the impact of education policy, further development work will be needed.

Success will require continued funding and support from both internal and external stakeholders, and this support will only be retained if they actively use and value REMS to set or answer relevant research questions. The REMS team have to keep a critical eye on the strengths and limitations of the NVivo software², the rapid development of new data search solutions and the need maintain a reputation for innovation in data management within QCA by using other qualitative IT based software as appropriate to work along side NVivo. The REMS approach also needs to extend the research methodology of knowledge transfer and evidence-based solutions beyond its roots in the 14-19 Reform Programme and to develop as a resource for QCA's external stakeholders in other government agencies. This involves two developments which are currently underway:

1. **Expanding REMS to other programmes** – As this paper highlights, the team are now in the process of developing similar systems for other key QCA programme areas including QCF, Adult Skills and Curriculum, and there is discussion on the potential of developing a research base for assessment methodology. Branching in this way ensures that REMS becomes a tool for the whole organization. It adds one further benefit, having systems for all work areas makes it easier to undertake cross analysis across programmes on key and emerging themes.
2. **A service for external partners** – the REMS team have made good progress by working with the DCSF 14-19 Reform Interagency Group which meets to discuss research, emerging themes and issues. The REMS project recently supported this group in reviewing Apprenticeships with a paper summarizing the key research evidence. As a result a REMS thematic report will be produced for every meeting. Some QCA partners who were initially skeptical on its value now have a vested interest in the system and are beginning to request data from it.

This signals the significant potential to extend the methodology across researchers from other agencies government and to use REMS as a common resource in supporting policy making and review. It also underpins the efficiency imperative of storage and coding of evidence by one agency for the benefit of all partners.

² Such as AMI software and text/ data mining software.

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