

National Certificate of Educational Achievement

2013 Assessment Report

Technology Level 1

- 91048 Demonstrate understanding of how technological modelling supports decision-making**
- 91049 Demonstrate understanding of how materials enable technological products to function**
- 91050 Demonstrate understanding of the role of subsystems in technological systems**
- 91053 Demonstrate understanding of design elements**
- 91070 Demonstrate understanding of basic concepts of information management**
- 91074 Demonstrate understanding of basic concepts from computer science**

STANDARD REPORTS

91048 Demonstrate understanding of how technological modelling supports decision-making

COMMENTARY

The standard requires a demonstration of understanding.

Candidates must demonstrate understanding of the information they present. Candidate reports that reproduced exemplars, struggled to demonstrate understanding. Far too many candidates presented information that they clearly did not understand. Too many candidates presented information from sources that they did not relate to their technological experiences. Information presented by itself often did not demonstrate the candidate's own understanding.

Generally, candidates presented their work in a suitable manner. Most candidates provided submissions on A4 pages within the 14-page limit. Some schools still used A3 paper – it should be noted that A3 paper should still be within the 14 × A4 paper limitations. Only the first 14 pages of evidence of a large submission can be marked. A3 provides no advantages to candidates.

Candidates who submitted less than 14 pages were not disadvantaged. Reports on grade boundaries were often not improved by using 14 pages. Generally, the reverse was true with candidates presenting material they did not understand in an attempt to fill up the report. This frequently worked against the candidate.

Candidates should restrict their report to what they actually understand.

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- used their own words
- described the sequence of technological specific modelling steps undertaken in their own practice and the specific information gained that lead to the development of a specific technological outcome
- established that the functional modelling and prototyping undertaken was relevant to the progression of their development process
- considered the technical feasibility and social acceptability of their finished prototype
- presented their information in a way that demonstrated they individually understood what they were presenting
- wrote their report on an example of real life product development providing accurate references to the any source material used to develop the individual report.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- copied material from sources without acknowledging or using the material to demonstrate that they understood it
- provided detail of the overall practice carried out without identifying the specific functional modelling aspects of that practice that had informed the development of a technological outcome

- did not establish a convincing link between the information gained from specific functional modelling techniques and decisions made in the progressing of their development work
- were limited by constraints when presenting their evidence in a templated tabulated format
- provided evidence of modelling that was not relevant to the developing technological outcome – either their own outcome or that of a practising technologist
- based their report on an example of product development by a Technologist (not the candidate) but did not provide references to the source of material used to develop the individual report
- did not address functional modelling and prototyping in sufficient detail to clearly demonstrate the required level of understanding
- wrote generically about functional modelling and prototyping without relating it to the development of a specific technological outcome
- misunderstood the concept of “what could happen” and “what should happen”, giving examples that did not address technical feasibility and environmental or ethical considerations
- incorporated material photocopied from their folio which was illegible or had been reduced in size to enable it to fit within the overall size constraints of the report, but was then too small to be accurately read and not able to be considered as evidence of a higher level of understanding.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- explained why specific technological modelling techniques were chosen, what information was gained and how this helped in making decisions about the nature of the final outcome and how it was to be produced
- made effective use of annotation of photos and diagrams from their folio to explain the breadth and detail of the information gained from modelling
- showed their deeper understanding by explaining relevant links between their own practice in developing one or more technological outcomes and the functional modelling and prototyping practices of other related technologists
- explained how the decisions made were linked to the evidence from modelling and how potential risks were managed
- explored the technical feasibility of the outcome and how the outcome could be realised
- considered and explained the social and environmental acceptability of the outcome in its intended environment.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- used functional and practical reasoning in an ongoing manner to justify changes made and/or decisions to continue with the development work as originally planned
- evaluated their own technological outcome to optimise its fitness for purpose or to justify it as fit for purpose in the intended social/physical environment
- used functional and practical reasoning to compare and contrast the acceptability of their own and other related technological outcomes for implementation

- discussed unintended negative consequences identified during the modelling of design ideas and discussed how this impacted on the final conceptual design and the ongoing development process
- discussed why a particular form of modelling had been selected and the need for that modelling to take place
- compared and contrasted the modelling practices evidenced in more than one technological practice case study with the original resource material clearly referenced.

91049 Demonstrate understanding of how materials enable technological products to function

COMMENTARY

The standard requires a demonstration of understanding.

Candidates must demonstrate understanding of the information they present. Candidate reports that reproduced exemplars, struggled to demonstrate understanding. Far too many candidates presented information that they clearly did not understand. Too many candidates presented information from sources that they did not relate to their technological experiences. Information presented by itself often did not demonstrate the candidate's own understanding.

Candidates need to demonstrate that they understand how a material allows a product function as intended. Too many candidates focused on the making or growing process of the material e.g. cotton, plywood in a way that was not related to the standard. Too many candidates focused upon what the product could do without reference to how the materials enabled the product to function. Candidates who achieved understood the properties of a material and understood how these could be manipulated in a product that functioned to specifications.

Candidates often demonstrated their understanding in a straightforward manner by using their own words to describe their own work.

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Candidates should restrict their report to what they actually understand.

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- used their own words
- identified the brief and project the student has addressed, including the identified material/materials that created the reason for the report within the context of a brief addressed in a project

- described the composition and structure of their chosen material/materials using both diagrams and written descriptions
- they identified performance properties of their chosen material
- explained how the structure and or performance properties of the material influenced students' decisions when making a product
- Identified how they have manipulated their material to allow their product to function
- showed evidence through photographs of their final outcome.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- did not identify product through a brief and or specifications and therefore lacked a description of the products function
- presented information in the report in isolated from the candidate's Technological experiences so that it was difficult to establish ownership of the information
- did not clearly identify the composition and or structure of any materials
- listed a group of materials combined would make a product, but failed to identify individual materials
- focused on making or describing their product and did not focus upon on the materials
- focused on how the material was made, grown, etc. but little on how the composition and structure affected the manipulation of the material, and how the manipulation allows the product, they are researching, to function
- focused on products and function e.g. school furniture, motor bikes, steering systems, however did not focus on a specific material related to the product and therefore couldn't explain how the materials composition and structure impact on manipulation, and function.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- related the information found in written resources, or from trials, or from using the material to the make their technological product
- presented evidence of manipulating the material/materials e.g. different types of flour used in making cakes etc.
- explained in simple terms how the material/materials structure and composition determined the performance properties
- related their explanation of composition/structure/properties to their own project.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- described the relationship between the composition structure of a material and their own manipulation the material in the development of a product that functioned to specifications
- presented evidence that compared and contrasted materials to predict changes to a product's function as a result the materials' composition/ structure/properties and manipulation.

91050 Demonstrate understanding of the role of subsystems in technological systems

COMMENTARY

Candidates were required to demonstrate their understandings of the role of subsystems in technological systems. Candidates chose from a number of alternatives and wrote reports that communicated their understanding often using diagrams or pictures to assist their explanations.

Candidates who based their reports upon existing, rather than their own electronic, systems generally did better because many candidates own practice seldom included the aspects of systems required to meet the standard.

A significant number of candidates used their own electronic circuits as the basis for their report. In many cases, this circuit contained no feedback path and so the candidate could gain no higher than an achieved.

A significant number of candidates failed to gain merit or excellence grades as their explanations of feedback, and in some cases control, were incorrect. Feedback in technological systems does not include how the system gives information about its operation to users of the system; feedback is a self-regulating feature of technological systems and occurs without human interaction. In addition, a significant number of candidates incorrectly referred to loops within program code as feedback paths.

Generally, candidates presented their work in a suitable manner. Most candidates provided submissions on A4 pages within the 14-page limit. Some schools still used A3 paper – it should be noted that A3 paper should still be within the 14 × A4 paper limitations. Only the first 14 pages of evidence of a large submission can be marked. A3 provides no advantages to candidates.

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Candidates should restrict their report to what they actually understand.

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- selected at least one technological system
- identified at least two subsystems within the technological system
- described the roles of at least two subsystems within a system
- described using accurate technical terms how these subsystems worked together to make the overall system function.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- misunderstood what a subsystem is referring to components as subsystems e.g. LEDs
- used their own electronic circuits as the basis for the report and submitted lengthy explanations of how the circuit worked at a component level but did not identify or describe the roles of the subsystems within their circuit

- did not communicate how various subsystems worked together to achieve the objective of the system
- gave inaccurate, vague or general descriptions
- often used incorrect terminology
- described non-technological systems such as managerial or organisational systems.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- explained how specific control functions were performed between various subsystems in a technological system
- had a correct understanding of feedback and explained how control information was taken from an output subsystem back to an input subsystem to control, adjust or regulate the behaviour of the system
- explained at least two advantages and two disadvantages of at least one subsystem within the technological system.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- discussed both advantages and disadvantages of at least one subsystem within a particular technological system through comparisons or by evaluating specific decisions made by technologists
- discussed all three aspects of design, development, and maintenance decisions made by technologists regarding subsystems and their implications on a particular technological system.

91053 Demonstrate understanding of design elements

COMMENTARY

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The two common methods that allowed candidates to achieve the standard continued to be:

- A separate and standalone, and often templated activity that was often conducted as a class activity. Candidates often selected images/products from a range provided by the Teacher.

- Evidence from a candidate's technological practice. This was often edited extracts from a larger folio and/or programme of work.

More candidate reports were further integrated into Technological Practice rather than arising from a standalone activity.

Students who critiqued the application of design elements within existing products and outcomes relevant to their own Technological Practice, and then applied this knowledge within the development and evaluation of their own outcomes were significantly more likely to gain Merit and Excellence grades.

In order to achieve candidates needed to demonstrate an understanding of design elements. To do so candidates were required to go beyond identifying the existence of an element(s) within a design. In many cases a student concentrated on describing the design elements themselves rather than how the design elements were applied, and the impact (both positive and negative) that it had on the outcome. The requirement to describe the 'quality' of an outcome is clearly stated within Explanatory Note 2.

Listing and describing the nature of each design element prior to commenting on how they were applied within a design may assist student learning but should not be the focus of the submission. Some less successful candidates carried out a lot of in-depth research of design elements and included a large amount of 'reference material' but did not personalise, interpret and/or apply this material to their specific context(s) in sufficient depth. These students may have had an understanding of the content but they did not 'demonstrate'. In order to do so students need to use and apply the knowledge.

A growing number of submissions are interpreting the subjective and objective aspects and considerations as aesthetics and function. Many students appear to have a clearer understanding of the requirements of the standard if these headings are utilised used within a student submission.

It was often difficult to differentiate between provided information provided, downloaded, and student produced evidence within templates recounts of directed activities. Templates often restricted individual demonstrations of understanding. These submissions were often regularly repetitive.

Achievement at the higher levels was often categorised by the ability to clearly identify student voice and opinion within an in-depth summary/conclusion/evaluation of their technological outcome at the end of the report.

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- described a reasonable number of design elements relevant to a design
- restricted their analysis to the subjective (aesthetic) elements of design
- identified and described how design elements had been applied within their own practice or the practice of others
- described how the design elements contributed to the quality of a product.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- did not provide an image, screen dump or printout of the outcome they were describing
- selected unsuitable outcomes/images that did not give them enough scope to demonstrate understanding of design elements
- described the design element and identified the element within an outcome, but did not describe its effect on the outcome's quality (EN2)
- showed some in-depth research but did not relate this to a specific context
- copied and pasted generic design element 'information' which did not relate to their specific context
- provided repetitive comments to "flesh" out their report.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- identified, described and explained design elements within the chosen context that demonstrated an in-depth understanding
- supported discussion with imagery and/or screen snips of their developing ideas (often with arrows and text boxes highlighting aspects of concepts or outcome)
- 'compared and contrasted' which enabled in-depth discussion on the quality of the design/s and the impact of underpinning elements
- explained the 'how and why' of the application of design elements and considered the impact on design quality within the chosen context
- showed an in depth knowledge of relevant design elements and how and why they contributed to the quality of outcome/s
- compared and contrasted design elements within other similar existing products and then compared it to their own technological outcome/practice
- critiqued elements thoroughly and in depth within a specified context
- used their own words
- compared and contrasted a product to their own work including design elements, objective/subjective considerations using explanations. This was often successfully interpreted as aspects relating to aesthetics and function
- commented on the impact of using the design elements within the development of a product, analysing the application of design elements was evident in high merits.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- comprehensive discussion on the quality of the design/s and underpinning design elements
- students drew on naturally occurring evidence of their own technological practice which enabled them to demonstrate clear and comprehensive understanding of design elements
- presented a logical and high quality report which was easy to interpret and clearly showed how their Technological Practice benefitted from an understanding of design elements and assisted in validating the outcomes 'fitness for purpose'
- demonstrated an independent voice and discussed research, ideas and conclusions

- showed accurate and comprehensive understanding of design elements and how and why they contributed to the quality of outcome/s
- showed their own voice and gave strong evidence of this which in turn demonstrated comprehensive understanding
- used an essay style of writing that allowed for discussion of design elements that reflected student voice and the evolution of their ideas and understanding in the development of an outcome rather than being restricted by templates
- included all considerations in the discussion with possible and actual consequences noted or predicted as a result of their research and practice
- selected suitable products and contexts. For example within a textiles submission, the candidate used images of an actual garment that could be modelled and de-constructed. This allowed the student to comment on a larger number of considerations and identify compromises and aspects related to fitness for purpose. These included the selection of manufacturing processes and materials as well as suitability for various body types and/or occasions.

91070 Demonstrate understanding of basic concepts of information management

COMMENTARY

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Candidates should restrict their report to what they actually understand.

Candidates who wrote using specific examples of their own practice, provided evidence from their own work and experience generally attained Achieved or better grades. Successful candidates often developed their report based upon internally assessed units of work completed throughout the year. This practice provided a rich, personal context for the candidate to discuss information management without having to rely on print, teacher or internet based resources. Reports that were less successful were often based upon a one-off research assessment task. Reports generated in this manner rarely achieved Merit or Excellence grades.

Candidates who relied heavily on NZQA exemplars, Internet sites, commercially available resources or teachers notes, often did not relate their information to their own practice nor provide evidence based on their own work throughout the year. Reports that contained a significant proportion of referenced material without subsequent discussion or relating of the referenced material to their own practice, often did not demonstrate understanding.

Candidates who plagiarised did not demonstrate their own understanding and earned Not Achieved grades. Candidates must understand that nominally changing sourced material using synonyms for key words or re-ordering the sentence structure does not constitute presenting their own work. Many candidates did not provide references for sourced material. Work presented as if it was the candidate's work when it was clearly not the candidate's did not demonstrate understanding.

Submissions developed using prescriptive templates often did not demonstrate in-depth or comprehensive understanding and rarely earned Achievement with Merit or Excellence. Templates that provided too much pre-generated or supplied content, limited the candidate's ability to demonstrate their own understanding or provide their own relevant examples.

Effective reports focused on describing the key features and explaining the purpose of the operating system(s) that the candidates were familiar with using in their classwork or at home. Candidates who discussed all of the operating systems provided as examples in the standard's explanatory notes disadvantaged themselves. Candidates who defined each type of operating system often relied heavily on Internet sources and tended to provide verbatim definitions with no attempt at describing an operating system's key features or explaining the purpose in their own words.

Effective reports focused on the specific software applications and file types that candidates utilised to produce projects during their years' work in a Digital Technology course. Candidates were not advantaged by providing the purpose and key features of every software application they are familiar with or every file type in existence.

Annotated screen grabs were an effective means of demonstrating understanding. These needed to be cropped to show the features being discussed and be of sufficient clarity that the marker could easily interpret the content. For example, screen grabs showing file management practice where the file names could not be read were not beneficial. Effective screen captures were the candidate's own and not sourced from the Internet or provided by the teacher.

Threats to data and ethical issues are best described in terms of how they relate to the candidate's experiences in creating their own digital information outcomes. Verbatim definitions of copyright law, privacy principals, viruses, spyware, etc. without discussion in relation to the candidate's own practice did not provide evidence of understanding.

Candidates who did not address all of the elements in the standard were disadvantaged. While there is some leeway to mark in a holistic manner, where a report was completely missing an element the grade was Not Achieved.

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- identified an operating system and provided a general description of 2–3 key features of the operating system that they had utilised
- identified at least two common software applications and provided a description of one or more key feature of each software application that they had used
- described logical procedures for structuring and naming files and folders with reference to their own file management procedures
- described a common technique used for compressing files
- described procedures to manage threats to data such as installing virus protection software or performing regular back ups
- described more than one ethical issue related to information management such as piracy, privacy, or plagiarism
- provided some annotated screen captures as evidence of their understanding of operating system key features, application software key features and/or file management procedures

- wrote the report in their own words and provided inline references or a simple reference list for information retrieved from outside sources.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- used information directly from Internet sites, commercially produced resources, NZQA exemplars or teacher notes without processing the information into their own words or referencing sources
- completed teacher provided templates but did not demonstrate their own understanding
- omitted one or more of the standard criteria (operating system key features, application software key features, file management procedures, ethical issues related to information management)
- provided lists of key features of application software or operating systems with no related descriptions
- provided a rote definition of an operating system without related descriptions of the key features
- provided verbatim definitions of copyright law and the privacy act with no demonstration of understanding of the concepts
- provided step-by-step procedures relating to file management or use of application software without a purpose for performing the steps or descriptions of the key features
- submitted evidence which was unrelated to the standard such as detailed computer hardware comparisons or computer hardware purchasing recommendations
- did not relate the information presented in the report to their own work either through descriptive examples or annotations
- provided overly referenced reports without interpretation or explanation of the referenced material.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- explained the purpose of an operating system and related their descriptions of the key features to the operating system's purpose
- explained how they utilised an operating system's key features in their daily work by providing descriptive examples or annotated screen captures
- explained the purpose of a range of software applications and related their descriptions of the key features to the application's purpose
- explained how they used the key features of application software to enhance, create or edit their own outcomes by providing descriptive examples or annotated screen captures
- explained the purpose and importance of adhering to good file management procedures with reference to procedures and conventions they applied in their own work
- explained the purpose of file compression and how they utilised file compression techniques to facilitate exchanging files, enhance an outcome or protect files
- explained a range of threats to data and how to manage the threats, including reference to storage devices or drives they used for backing up important data

- described the concepts of privacy, file security, copyright or appropriateness of material in relation to their own work
- demonstrated clear candidate voice throughout the report and provided references for material used from outside sources.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- addressed all of the requirements of the Achieved and Merit grades
- comprehensively explained a range of examples which demonstrated how the operating system and the application software interacted whilst they were creating an outcome or performing a task
- justified why they chose a software application to perform a task or complete project, linking the justification to the explanations of the key features of the application
- justified the selection of a software application to perform a task by comparing their choice with alternative options, linking the justification to the key features available in each application
- provided justification for use of a particular file type for a specific purpose, by comparing and contrasting related file types which could have been utilised, most often in relation to projects they had completed.

91074 Demonstrate understanding of basic concepts from computer science

COMMENTARY

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ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They commonly:

- described in their own words the key characteristics and roles of algorithms, programs and informal instructions
- described in their own words an algorithm for a suitable computational task in the computer science context
- showed understanding of the kinds steps that can be in an algorithm by providing evidence of their own practical application of the algorithm described
- acknowledged programs they had used from the internet and used their own words to describe how they had determined the cost of an algorithm
- demonstrated understanding of a programming language by describing in their own words the role and characteristics of a programming language
- demonstrated in their own words a clear understanding of the difference between a high level and low-level language and the function of a compiler by describing examples
- described in their own words the part of a computer or an electronic system that a human user interacts with to control the system
- identified in their own words factors that contribute to a systems or device's usability.

NOT ACHIEVED

Candidates who were awarded Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They commonly:

- did not demonstrate understanding of the basic concepts of computer science
- lacked detail and student voice in their descriptions
- paraphrased without understanding
- gave inappropriate/inadequate examples to describe concepts
- reproduced information from the internet or their notes without using these resources
- focused on the features of a system or device not on the factors that contribute to the usability of the device.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit commonly:

- explained in their own words how computer science algorithms are distinct from related concepts such as informal instructions and computer programs
- showed clear understanding of the way an algorithm for a computational task can be combined in sequential, conditional and iterative structures by describing their own practical application of an algorithm for a task
- determined the cost for a particular iterative algorithm and described in their own words how this cost could vary
- explained in their own words the different characteristics of high level and low level languages and the need for a compiler
- explained how factors of a computer or electronic system contributed to its usability.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence commonly:

- used their own words and personal experience to compare and contrast the concepts of algorithms, programs and informal instructions
- used their own words to determine and compare the costs of two different iterative algorithms for the same computational task
- suitably labelled graphs used to demonstrate the cost of an algorithm, and described correct conclusions drawn from the graphs in their own words
- used their own words and personal experience about compilers and interpreters to explain the different ways in which computer programs in a high level language are translated to a machine language
- used their own words and examples to discuss how different factors of a user interface contribute to its usability by comparing and contrasting related interfaces.

OTHER COMMENTS

Candidates who wrote in response to leading or closed questions often found it impossible to demonstrate their understanding.

Where colour codes were important in a discussion –printing in colour was an advantage. Images too small to read were of NO benefit to the candidate. Images of code were often too small to read.

Candidates who relied upon source material, succeeded when the referenced at point in the report where they inserted the information.