National Certificate of Educational Achievement

2014 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

Candidates with authentic stakeholder situations tended to do better as they were able to provide a named technological outcome and follow that through with clear links to the evidence gained and the decision made. Candidates, in this case, showed a clear understanding of the purpose of technological modelling and were able to articulate the results specific to the outcome.

Generally reports were submitted in a suitable manner and within the 14 A4 page limit. Fold down pages were counted as pages towards the total of 14. Only the first 14 pages of a large submission were marked. The use of small fonts (less than12pt) became an issue, as did illegible scans or illegible copies of student work that may have supported the written report.

Those reports with only a pre-writing template usually did not do as well, as the key headings or the space allowed restricted the candidate responses. Where the template had been used to help structure a subsequent report, there was more success.

ACHIEVEMENT

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

- used their own words
- identified a technological outcome that was being developed by the student
- identified aspects of functional modelling and/or prototyping they had used
- identified, as a result of modelling, specific evidence relative to the developing outcome
- showed their understanding of the clear relationship between the method of modelling, the evidence gained and the subsequent decisions for the developing outcome
- provided evidence that technical feasibility and/or social acceptability of the developing outcome had been considered
- supported their report on how technological modelling supports decision making by including legible extracts from their portfolios showing the modelling and the developing outcome.

NOT ACHIEVED

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

- provided a commentary of their product development process without identifying the modelling
- identified/explained/discussed generic technological modelling without any linking to a developing technological outcome
- identified the advantages/disadvantages of different modelling methods in general terms
- provided illegible extracts from the student portfolio

- identified relevant modelling without identifying the evidence gained as a result of the modelling
- identified relevant modelling and evidence without reference to the key decisions or next steps to inform the developing outcome
- carried out unrelated trialling, for example, trialled three recipes for three different products with no evidence of a developing technological outcome
- used a case study without demonstrating any understanding of the technological modelling that had been undertaken.

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 the particular method of either functional modelling or prototyping had been selected
- showed clear evidence of the results of the modelling either in the report or the supporting student work
- explained the decisions made to influence the development of the technological outcome based on the evidence from the modelling
- considered the technical feasibility by modelling throughout the development of the technological outcome
- explained the technical feasibility in terms of ‘how to make it happen’
- used modelling to consider the social acceptability in terms of the end use and who would be using the outcome
- explained the social acceptability of the technological outcome as a result of modelling
- explained how the technological modelling had informed their practice.

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 why each form of modelling (functional modelling or prototyping) had been selected
- included why there was a need for the modelling to take place in relation to the developing outcome
- referred to a case study as a model of good practice and reflected this example in their own work
- discussed the potential risks that had been identified as a result of the modelling
- discussed how the subsequent decisions had enabled the risks to be managed as the outcome was developed
- discussed the technical feasibility by comparing modelling results and justifying decisions or by comparing industry practices in a similar situation
- discussed throughout the report as to whether the developing outcome would be physically and socially acceptable for the user in the intended environment
- considered factors such as ethics, values, aesthetics and environmental factors
- used practical and functional reasoning in considering their product to be fit for purpose.

91049 Demonstrate understanding of how materials enable technological products to function

COMMENTARY

Many scripts began with unnecessary information about the history of a material, production methods (e.g. plywood veneer slicing or cotton harvesting), and stakeholder analysis.

Teachers are encouraged to interact with the candidates as they are writing their reports to ensure the candidates are covering the standard. The bullet points in the Explanatory Notes will assist candidates in understanding what is required to gain Achieved, Merit and Excellence.

ACHIEVEMENT

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

- described the composition of at least one material which made up a technological product, using a diagram, list or written description
- described the structure of at least one material which made up a technological product, through atomic structure, molecular structure, visual aides to demonstrate structure or written description
- identified the performance properties of at least one material which made up a technological product
- explained how the structure and/or performance properties of the material influenced their decisions when making a product.

NOT ACHIEVED

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

- presented information which did not demonstrate understanding, e.g. information in the report was in isolation from the candidate's technological experiences and did not show student interaction with the information researched
- presented information which did not clearly identify the composition and/or structure of any materials, e.g. students had listed or had a diagram of parts of a tree, but did not list the composition
- focused on the making of their project and very little on materials
- provided insufficient description of the impact of the composition and structure of materials on material manipulation, e.g. did not explain/describe how the cross graining of plywood reduces the chance of splitting when nailed near edges, or how the egg yolk acts as an emulsifier etc.
- provided insufficient explanation of how the manipulation of materials allows technological products to 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 from resources OR from trials OR from using the material to the making of their technological product
- presented evidence of them interacting with the material/materials they were writing their report around, e.g. different types of flour used in making cakes etc.
- were able to explain in simple terms how the material/materials structure and composition determined the performance properties
- related their comments about composition and structure to their own projects.

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:

- based their whole report around their own experiences, discussing how materials used have helped their project to function in the intended way
- presented evidence that compared and contrasted materials to predict changes to products as a result of composition/ structure and manipulation of materials
- presented evidence that compared and contrasted their material or materials
- focused on how the structure of their chosen material(s) and how the material(s) dictated how they could be correctly manipulated, e.g. with a loose weave fabric, students explained and justified the use of overlocking, and then compared this with tighter weaved fabrics and not needing to overlock, etc.

91050 Demonstrate understanding of the role of subsystems in technological systems

COMMENTARY

Candidates were required to demonstrate their understanding 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.

Where candidates used their own electronic circuits as the basis for their report, in many cases, their circuits contained no feedback path and so the candidate could gain no higher than an achieved.

A significant number of candidates limited their report to only the achieved criteria and did not attempt to explain feedback or control within a technological system.

A significant number of candidates failed to gain merit or higher grades as they incorrectly referred to looping constructs within their program code as feedback paths in a system.

A 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.

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 assessed as 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, resistors and capacitors
- submitted lengthy explanations of how their own circuit worked at a component level but did not identify the subsystems within their system
- identified subsystems but did not describe the roles of the subsystems
- did not relate how the various subsystems they described worked together to achieve the objective of the system
- gave inaccurate, vague or general descriptions of subsystems within a systems
- often used incorrect terminology about systems
- described non-technological systems such as biological, 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.

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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

The evidence submitted for this Standard is increasingly being integrated into Technological Practice rather than evidence derived from a teacher led, whole class and/or standalone activity. This has resulted in a greater diversity of submissions and increased authenticity and personal voice within the student generated evidence.

Candidates 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, continued to be more successful and were significantly more likely to gain Merit and Excellence grades. It was also evident that those students who analysed existing products during brief development and/or conceptual design stages of their Technological Practice, then used this knowledge to inform their own practice, were further advantaged due to the increased presence of personal voice and more opportunities for reflection and evaluation of their own practice and outcomes.

A number of candidates who were awarded a Not Achieved grade limited their critique to identifying the existence of an element(s) within a design rather than how the design elements were applied, and did not comment on the impact (both positive and negative) that the application of design elements had on the outcome. The requirement to describe the ‘quality’ of an outcome is clearly stated within Explanatory Note 2. In addition, some candidates achievement was restricted due to different products being used to identify/describe the application of each design element. These candidates were unlikely to advance beyond an Achieved grade due to a lack of explanation and the use of a less robust compare/contrast model.

Candidates who utilised templates and teacher led activities often produced repetitive text and many duplicated the same content and level of evidence for different products. In addition, it was often difficult to differentiate between information provided by the teacher, downloaded, group work and that produced by individual candidates. In cases where a candidate’s own work could not be ‘clearly recognised’ candidates seldom gained grades higher than Achieved.

An inability to identify ‘candidate voice’ and the information not being contextualised nor used to inform ‘candidate opinion’ within their own Technological practice in later sections of the report restricted candidates from accessing higher grades. These submissions were often template based with limited scope for divergent thought and regularly repetitive.

Students often duplicated evidence at an Achieve level rather than providing additional evidence to support achievement progression to meet the requirements of Merit and Excellence. (Candidates said the same thing four times at an Achieve level).

Achievement at the higher levels continues to be categorised by the ability to clearly identify candidate voice and opinion within an in-depth discussion (often in the form of summary, conclusion, evaluation and/or comparison) 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 the relevant design elements within a simple outcome they had designed
- included some personal voice. Mostly their evidence was concise and comments showed a low level of detail
- described design elements appropriate to the outcome and how they affected the quality of the outcome(s)
- selected simplistic outcomes such as a basic web home page, banner advertisement or magazine covers which restricted their opportunity to explain the considerations used to decide the design quality of an outcome
- limited their analysis to the aesthetic elements of design and did not fully explore the functional considerations
- identified and described design elements within a chosen context which demonstrated an understanding of design elements.

NOT ACHIEVED

Candidates who were assessed as 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. Or, to a lesser extent, provided black and white images when colour was being discussed
- described poorly designed outcomes which did not give them enough scope to demonstrate understanding of design elements
- described the design element and how the outcome demonstrated the design element, but did not explain how it improved the outcome's quality
- used bullet points to convey the use of design elements (reflects 'identify' rather than 'describe')
- reproduced information in a cut and paste form and did not relate design elements to their own technological practice
- presented evidence that did not reflect any of the historic exemplars for this standard.

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 which 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 outcomes)

- often compared and contrasted existing products with their own outcomes which enabled in-depth discussion on the quality of the design(s) and underpinning design elements
- explained the 'how' and 'why' of the design elements considered in relation to the design quality within the chosen context.

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:

- demonstrated independent research, design, and on-going and reflective analysis within their practice
- compared, contrasted and evaluated the application of design elements, either within their own practice or the practices and outcomes of others and often discussed how the interaction of different design elements impacted on the quality of the design
- showed accurate and comprehensive understanding of design elements and how and why they contributed to the quality of outcome/s in their specified context
- discussed how and why design elements contributed to their own outcome.

91070 Demonstrate understanding of basic concepts of information management

COMMENTARY

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. A list of the standards assessed together with the software used is not required.

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 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. Some candidates provided a well-referenced report based on internet resources in the manner of a university essay. This style of report often did not allow the student to demonstrate their understanding. In contrast reports that contained brief internet based quotes, appropriately referenced, that went on to discuss those quotes and additionally link these to their own practice were often very successful.

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, teacher supplied, 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. There was a notable increase in the number of students using poorly constructed templates in the 2014 submissions. Some of these templates did not contain all of the criteria of the standard making it impossible for the student to achieve.

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 this 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. Features including, logon/security, saving, printing, multitasking, management of input and output, explorer/finder, GUI's, linking/opening files in the appropriate application are all everyday features of an operating system that students can discuss with regard to their own practise. This list should not been seen as a definitive list – merely a list of easily accessible everyday OS features. The differing types of operating systems, listed in the explanatory notes of the standard, was sometimes useful but not essential.

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. It is sufficient to select 2-3 software applications and to describe, discuss, compare the features in the context of a task the student has work on. An example could be Adobe Photoshop, features could be the layers palate, adjustment layers, selection tools, gradient fills, i.e. tools used in the execution of a project. To describe a tool is sufficient for achieved, to discuss the features and how they make a task possible or efficient is usually a merit grade.

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 practise 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. Screen grabs need to be well cropped and as small as possible, while remaining legible, given the reduced number of pages available in 2015 submissions.

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. To describe a threat, for example a virus, generally equated to an achieved grade. To discuss how a virus threat might be mitigated together with the social and technical issues around that was likely to be a merit grade.

With regard to file management, structuring and naming, it was not purposeful to give step by step instructions for the saving, renaming or opening of files. The standard requires the 'why' of file management rather than a 'how to'.

Candidates who did not address all of the four 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.

Some candidates did not adhere to the specifications set by NZQA for this standard – particularly font, font size and number of pages. These submissions will be marked OS meaning 'over specification'. This will become increasingly important in 2015 when the maximum number of pages will be 10.

In general, the quality of the reports was of a good standard. However, there was a wide range of reports marked at the Achieved Level from very low Achieved (borderline Not Achieved) to very high Achieved (close to Merit)
The range for Merit and Excellence reports was narrower.

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 in their day to day computer use
- identified at least two common software applications and provided a description of several key features 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 several ethical issues 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. These screen grabs were legible in that all significant text in the screen grab was legible
- 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 assessed as 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 discussion of the key features to the operating system's purpose to their everyday computer use
- 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, protect files, compress both files and folders into a single file.
- 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.
- may have included one or more of the excellence criteria but shown weakness in other sections of the report and thus gained a "holistic" grade.

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

The algorithm concept was generally well done. The main problem was that candidates did not describe algorithms, programs, and informal instructions. Most candidates had looked at an appropriate example of an algorithm. However, some students had been too closely directed by their teacher and as a result struggled to show their own understanding.

The programming language concept is a hard one for candidates to show their own understanding and was the least convincing of the three across the reports. Candidates often do not have sufficient experience of programming to really understand the differences between interpreting and compiling and most work was very teacher-directed.

Neilsen's Heuristics are not required at this level but had been used to structure candidate responses. This was a useful way of generating evidence of understanding especially when candidates selected three heuristics to discuss. Simply listing the ten heuristics does not constitute a demonstration of understanding.

Teacher guidance via template, provided questions or obvious teacher direction often prevented the “candidate voice” from being evident.

Candidates make assumptions that the marker will ‘know’ the question they are answering. Candidates need to tell the marker the information if they are to demonstrate their understanding and not assume the marker already knows.

Showing a screen capture but NOT referring to it in the text is of little use in demonstrating understanding.

As an exercise in communication candidates are expected to have proofread and spell checked their reports.

The use of small font sizes (7pt) with 5 mm margins all around the page, graphics which were too small to read (especially coding examples) and not referred to in the text, together with graphs which did not match the data presented or lacked labels all made some reports difficult to assess. These are fundamental report writing skills, which need to be discussed with students. Where it is not possible to mark work it achieves no credit.

Candidates are encouraged to have as much evidence of practical experience as possible – not just repeating what the teacher has told them.

With so many resources available to candidates, the personal voice and evidence of own applications becomes very important.

Candidates are requested to staple pages, and to staple in the correct order, and to number pages. Formatting of documents was very poor for some candidates, but on the whole the standard of report submitted was good.

If colour is important in the discussion – please print in colour. Some candidates referred to coloured sections in their explanations, and it was all black and white.

Candidates are reminded to reference at point of insertion.
If images containing text are too small for the text to be read, the image is of little benefit to the explanation. Particularly with images of code.

Candidates who used online resources had some understanding, but need to work through a practical application of the concepts themselves.

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 but did not always make the clear distinction that algorithms are program language independent and that programs are applying the algorithm with the syntax appropriate to the language
- 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 and avoiding using the specific data given by their teacher
- avoided quoting verbatim from the internet or their teaching/learning notes
- acknowledged algorithms and programs they had used from the internet
- used their own words to describe how they had determined the cost of an algorithm by commenting on the time taken or the number of comparisons and/or swaps made
- demonstrated understanding of a programing language by describing in their own words the role and characteristics programming languages
- used sentences and relevant examples to describe the characteristics of high level and low level language to demonstrate a clear understanding of the difference between a high level and low level language
- described the function of a compiler by describing examples in their own words.
- 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 factors that contribute to its usability and not just features of the system or device
- used personal comment to describe how the factors improved the user experience.

NOT ACHIEVED

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

- gave insufficient evidence to demonstrate understanding of the basic concepts of computer science
- discussed algorithms that were not computational and in a computer science context
- lacked detail and the student voice in their descriptions
- paraphrased without understanding
- gave inappropriate/inadequate examples to describe concepts and demonstrated a lack 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 in their own words how computer science algorithms (steps to solve a problem) are distinct from related concepts such as informal instructions(description of a problem) and computer programs(applied algorithm with the syntax of a suitable programming language)
- 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 with more than trivial inputs
- clearly identified the control structures in their described algorithm
- determined the cost for a particular iterative algorithm and described in their own words how this cost could vary for different inputs; for example why searching or sorting takes more time or comparisons if there are more items to search/sort.
- explained in their own words the different characteristics and roles of high level and low level languages
- explained the need for a compiler
- explained how different factors of the user interface of a computer or electronic system contributed to its usability and contributed to the ease of use of the computer or electronic device/system by the user.

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:

- provided appropriate comparisons in their ‘compare and contrast’ evaluations
- used their own words and personal experience to compare and contrast the concepts of algorithms, programs and informal instructions by correctly discussing their similarities and differences
- used their own words to determine and compare the costs of two different iterative algorithms for the same computational task
- ensured that if graphs were used to demonstrate the cost of an algorithm, they were suitably labelled and they described their correct conclusions 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
- demonstrated candidate voice by discussing the similarities and differences of two devices relating to ease of use.