2023 NCEA Assessment Report

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Subject: Generic Technology

Level: Level 2

Achievement standards: 91358, 91359, 91360, 91363

General commentary

Responses that exceeded the recommended report length typically included a significant amount of information not relevant to the assessment. Candidates whose response demonstrated an authentic viewpoint or reflected their own technological practice were more likely to be awarded the higher grades.

Report on individual achievement standards

Achievement standard 91358: Demonstrate understanding of how technological modelling supports risk management

Assessment

The assessment was a digitally submitted report.

Commentary

Many candidates started the report by defining functional modelling, prototyping, and risk management. In some cases, candidates wrote far too much. More successful reports started with a brief introduction and definitions of modelling using examples of their own and others technological practice that illustrated the candidates' understanding. It was common to see candidates identify the severity of risk in their development work; there was less focus on acknowledging the probability of risk. Many reports included research as a form of modelling, and frequently candidates failed to communicate what opportunities they were deriving from their analysis ('could') and establishing which of the opportunities they should pursue ('should').

This year there was less reliance on third party case studies, which tend not to demonstrate a candidate's in-depth understanding of technological modelling. There was a significant improvement in candidates' ability to discuss their own practice. Candidates who based their reports on a number of different projects often did not achieve the Merit and Excellence grades, largely because the reports lacked sufficient detail. Where reports were structured without teacher-driven questions, which candidates simply answered, there was an increase in the candidate's ability to demonstrate a deeper understanding of their own technological practice. Also, candidates who had freedom to seek their own opportunities within a given context were more genuine in selecting and choosing particular modelling methods. This, in turn, was more likely to give a clear vision of what was feasible.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- made appropriate decisions as part of modelling exercises but with limited consideration of wider factors in their choices ('shoulds')
- identified risks directly related to the design and development of their concept
- identified and stated severity and probability of risk throughout the report but didn't explain what impacts the risks might have
- communicated the procedure carried out in their practice, but not the information gained through modelling and how this changed / influenced their concept
- made attempts to tackle the criteria for higher achievement levels such as the severity of risk but without sufficient explanations
- made frequent reference to consulting with stakeholders in general but were not explicit about which stakeholder.

Candidates who were awarded **Achievement with Merit** commonly:

- identified specific stakeholders and an end user
- selected stakeholder feedback specific to different forms of modelling
- explicitly described different risks and explained the impacts of them
- tended to establish early on in the report what specific wider factors (social, moral, and environmental) they were measuring their judgements against in making 'should' decisions
- displayed a strong understanding of the value of modelling to inform what could and should be done at various stages
- explored alternative feasible ways a particular functional or aesthetic element could be considered through different functional modelling activities
- chose relevant and appropriate modelling methods / resources that matched particular design elements that they wanted to trial and test.

Candidates who were awarded **Achievement with Excellence** commonly:

- were able to provide insight into why the evidence provided by modelling was valid and reliable by making links between different stages in their practice
- discussed and compared alternative ways the modelling could have been done and why the method and resources they chose were the most effective ones
- established who the end user was for their concept and sought opinions from their target audience
- frequently centred discussion around stakeholders and their credentials, including the reasoning as to why their opinion mattered
- discussed and compared different stakeholders and what impact their feedback had on the development of the concept
- provided evidence that they followed the advice and opinions of stakeholders.

Candidates who were awarded **Not Achieved** commonly:

- submitted an incomplete report
- used a limited range and forms of modelling
- misinterpreted 'could' and 'should' as thinking about past decisions
- struggled to identify and explain wider factors ('shoulds') and how modelling informed decisions
- used themselves as the primary stakeholder within their own practice and did not relate the modelling evidence to any other stakeholder groups
- provided explanations around product development that tended to be arbitrary rather than based on modelling evidence
- only identified risks related to their own project management rather than to specific elements of the design.

Achievement standard 91359: Demonstrate understanding of the role of material evaluation in product development

Assessment

The assessment was a digitally submitted report.

Commentary

Many students started the report by describing the technological practice undertaken and providing the design problem / brief that they were solving alongside the performance criteria for the product. In many instances, this also contained the performance properties of the material. Candidates should avoid this becoming the major focus of the report.

When the evaluation procedures were teacher-driven, rather than driven by the needs of product development, this impacted the candidate's ability to describe selection decisions, or resulted in the report being very procedural. Often, students presented their evaluation procedures in a scientific style with a method, hypothesis, observations, and the results of the evaluation procedure. Some candidates focused on the method (describing the procedures) and omitted the conclusions drawn from the test (determining suitability). Where this occurred, their achievement was limited.

Some reports were repetitious, presenting the same level of work in describing the material evaluation procedures or the underpinning knowledge and techniques. This resulted in lengthy reports with the later work adding little or no value to the report and not allowing the candidate to improve their grade. Many reports presented conceptual knowledge of materials that could be suitable for the development of the product. Students who simply presented this, without drawing links / conclusions relating to their own practice, struggled to show how this supported their decision making.

To assist teaching and learning, some centres appear to have guided students in the material evaluation procedures. Where this allowed students to engage in this process authentically, students were able to draw relevant and valid conclusions. Where this was undertaken on a class level, achievement was often limited. Some candidates attempted the Excellence criteria by including a maintenance and disposal section within the report. These reports often lacked the interplay between material selection and the design of the product. The candidates who successfully gained Excellence had clearly considered this throughout their technological practice and were able to discuss these factors.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- presented the design brief and performance specifications as an introduction to the report, which set up a process of inquiry around material selection
- established the performance criteria for their product and linked these to explain their relationship to the properties of the potential materials
- used the knowledge of material properties to develop a shortlist for material evaluation procedures (testing)
- described the material evaluation procedures undertaken, which helped them in developing their own product through making decisions based on the procedures
- included imagery of the evaluation procedures to support their description.

Candidates who were awarded **Achievement with Merit** commonly:

- explained, often in some detail, the evaluation procedures undertaken to inform material selection decisions
- engaged in authentic testing / materials evaluation that was clearly student driven or highly relevant to the student practice; this allowed the candidate to explain why the procedures were undertaken
- identified the maintenance and disposal considerations linked to a particular material or materials but did not discuss this in terms of the relationship between the materials and the design.

Candidates who were awarded **Achievement with Excellence** commonly:

- discussed the relationship between the evaluation of materials, material selection decisions, and the product's design
- embedded these considerations throughout the project as opposed to adding an Excellence section onto the end of the report
- undertook authentic practice in which material selection decisions were genuinely based on the results of the evaluation procedures and knowledge of material properties
- discussed the maintenance and disposal considerations for their product and the materials at an early stage in the project so they formed a natural part of further discussion in the report.

Candidates who were awarded **Not Achieved** commonly:

- submitted an incomplete report
- either did not identify performance specifications of a product or did not link these to material properties
- presented conceptual knowledge around materials or material processing without describing the decisions made
- described a process of manufacture or fabrication but did not undertake procedures which were evaluative or that assisted in decisions being made about their material selection
- described their final product framing the material evaluation as a material justification as the testing was to prove a pre-determined decision.

Achievement standard 91360: Demonstrate understanding of redundancy and reliability in technological systems

Assessment

The assessment was a digitally submitted report.

Commentary

Candidates must ensure the initial system chosen is advanced enough to be considered a 'technological system'. They must have sufficient knowledge of what reliability and redundancy are in a technological system to be able to clearly identify the key requirements of the assessment. The reasoning about why reliability and redundancy were addressed / applied in the technological system must be clearly described and / or explained, including the outcome of the inclusion of both. Candidates should be able to discuss their chosen system's reliability and redundancy features, the importance of these 'R&R' decisions in both the design and maintenance phases, and to have access to data on past examples of systems that design engineers used to guide any future system development.

Candidates must also understand the key social, cultural, and / or environmental factors that impact on a system's reliability through redundancy in design / development phases. Candidates should be aware that teaching material repeated across many similar submissions can jeopardise the chance of receiving a grade as can the use of material copied from other people's work and artificial intelligence (AI) material.

Grade awarding

Candidates who were awarded **Achieved** commonly:

- included diagrams or photos to aid their report; these often enhanced the clarity of the written descriptions
- identified most of the subsystems and described their roles in at least one technological system
- named the subsystems in a logical and consistent way, categorising them into input, processing, and output subsystems
- included a microcontroller to describe how subsystems work together, which meant descriptions were often clear in terms of electrical signal or information flow between subsystems.

Candidates who were assessed as **Achieved with Merit** commonly:

- showed an in-depth understanding of control and feedback concepts by accurately explaining the workings of those concepts within the identified microcontroller and subsystems
- included technical terminologies such as 'feedback control' in their explanations
- explained the advantages and disadvantages of subsystems in an in-depth manner; these explanations were not solely on component selections but clearly explained the reasons why the subsystems are advantages or disadvantages
- explained at least two advantages and two disadvantages of subsystems in technological systems.

Candidates who were assessed as **Achieved with Excellence** commonly:

- compared and contrasted their own and other existing technological outcomes and drew insightful conclusions
- showed a comprehensive understanding of the advantages and disadvantages when decomposing technological systems into subsystems
- specifically discussed those advantages and disadvantages, or pros and cons, in different technological stages including design, development, and maintenance
- used robust discussions of the implications at different stages of the technology project, including design, development, and maintenance.

Candidates who were assessed as **Not Achieved** commonly:

- identified their subsystems in an illogical and inconsistent manner
- showed a misunderstanding by identifying single electrical components as subsystems
- focused on the roles of each identified subsystem
- did not describe how those subsystems worked together, or did it poorly with little indication of how the electrical signals were sent or flowed between subsystems, and how this affected the relevant subsystem.

Achievement standard 91363: Demonstrate understanding of sustainability in design

Assessment

The assessment was a digitally submitted report.

Commentary

Successful reports showed a high level of independent voice, discussed life cycle analysis (LCA) and innovation in design, and emphasised competing priorities and compromises. The sustainability in design knowledge was stronger this year with a wider range of contexts and case studies. Fewer reports appeared to have been templated. There were more creative responses to sustainability in design through all aspects and subjects of technology.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- defined the three pillars of sustainability and the purpose of a lifecycle analysis in identifying areas for design intervention
- used a case study to help identify areas for intervention, although this may have lacked detail
- highlighted innovation as a method to improve an outcome's sustainability.

Candidates who were awarded **Achievement with Merit** commonly:

- clearly defined the three pillars of sustainability and demonstrated a strong understanding of the connections between them
- clearly defined a life cycle analysis and its purpose to make an outcome more sustainable
- used a case study or case studies to clearly identify areas for intervention and to highlight key innovations used
- applied a LCA to their own practice to identify areas for intervention and innovation.

Candidates who were awarded **Achievement with Excellence** commonly:

- demonstrated a clear understanding of sustainable design through an in-depth analysis of both a case study and their own practice
- defined and considered key competing priorities and compromises in their analysis
- showed an understanding that being sustainable is not as simple as using recycled materials or minimising waste
- provided reasons and justifications for each decision, linking their decision making to sustainable design practice as well as multiple pillars of sustainability.

Candidates who were awarded **Not Achieved** commonly:

- described the design process or explained decisions made without linking these to sustainability
- did not identify how the completion of a LCA enables designers to identify areas of the design cycle where they could intervene and make improvements
- appear to have used a teacher-designed template, which limited their ability to achieve
- did not describe the place of innovation in sustainable design.