2021 Design, Technology and Engineering Subject Assessment Advice

Design, Technology and Engineering comprises of the following codes:

* Digital Communications Solutions (DCS)
* Industry and Entrepreneurial Solutions (IES)
* Materials Solutions (MRS)
* Robotics and Electrical Systems (RES)

Overview

Subject assessment advice, based on the 2021 assessment cycle, gives an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, and the quality of student performance.

Teachers should refer to the subject outline for specifications on content and learning requirements, and to the subject operational information for operational matters and key dates.

School Assessment

Assessment Type 1: Specialised Skills Task

Students complete two specialised skills tasks. They demonstrate skills and knowledge that will be required for the realisation of their solution. They apply the skills, processes, and techniques in the chosen context. This informs the design development for a solution in Assessment Type 2. Students evaluate and assess the development of their own skills in this assessment task. They review how these processes and techniques may influence their solution.

The more successful responses commonly:

* showed skill levels of highly developed and comprehensive production techniques
* included pertinent and appropriate reflective comments that were both comprehensive, insightful, and inclusive of the depth and rigor needed at this level
* used multimedia responses to respond to the criteria effectively
* displayed confidence and ability with a range of processes and equipment which then directly informed their choice for AT2 Production
* reflected on the direct application of these skills to the manufacturing of the product
* allowed students to go outside their comfort zone and encouraged exploration of more challenging aspects of the subject area
* used the Skills Task as an opportunity to demonstrate confidence and ability with a range of processes and equipment which then directly informed their choice for AT2 Production
* demonstrated high order personal critiquing and evaluation of skills developed, then reflecting on its application in the final product outcome
* have a clear statement of purpose and relevance to AT2, most impactful in the evaluation
* indicated how important both skills tasks would be for the success of AT2
* provided specific, targeted, and relevant information concisely in dot points or annotations
* demonstrated a logical sequence of steps using clear photographic evidence
* clearly documented production skills in written form or by using multimodal evidence
* used terminology most relevant with specific data, features and or skills
* provided evidence that ‘illustrated’ clearly the sophistication of the skill through well considered screen shots or short videos
* identified problems and highlighted the best ‘resolve’ for their situation, not generic solutions
* used annotations appropriately
* clearly reflected on the results of their skills development, e.g., rather than simply describing what was done in the skills task, the student explained why and the effect the result has on their decisions.

The less successful responses commonly:

* undertook large projects that limited the time for AT2 Design Process and Solution
* showed little or no command in the use of equipment and techniques
* showed little personal involvement in work
* used simplistic editing skills or cad drawing skills
* did not evaluate the specialised skill
* provided few evaluative comments and reflective evidence
* were heavily scaffolded that did not enable students to achieve at the highest level
* used tasks that provided limited opportunity for differentiation in assessing skills e.g., following a CAD skills tutorial where following steps resulted in a common outcome for all students
* requested students present evidence for Investigation I1 which was not required for this assessment tasks
* made limited connections with AT2 task
* generic teacher directed tasks rather than those negotiated by students
* did not use specific and relevant terminology or annotations
* provided poor visuals or too many unnecessary visuals
* did not document the resolutions of issues that occurred
* evaluation was a recount of the processes undertaken
* showed little or no understanding of the purpose of the skills task
* provided low level responses or demonstrated little insight to the processes or task.

Assessment Type 2: Design Process and Solution

Students produce one task in the design process and solution assessment type that together provide evidence of the stages of the design and realisation process. The task must showcase and evaluate the solution or product.

The more successful responses commonly:

* clearly linked the design and planning with product development and outcomes
* presented evidence of their thinking and planning
* included preliminary sketches clearly annotated with technical language describing concepts and possible procedures
* had a clear design sequence, i.e., beginning with a concise and targeted design brief/statement of intent, and working through the investigation and analysis, design development and planning, through to realisation and evaluation
* acknowledged and ‘published’ their design brief and referenced it often in their folios
* recorded evaluative comments/observations that were authentic and targeted throughout the entire process
* used multimedia responses to the design process, to provide evidence of work
* included a strong evaluation that explains the student’s decision in detail and depth
* were well organised, with unified meaning that was both interesting and or unique in the approach to the task
* supplied visual evidence of materials in the design process and annotated it’s use and relevance to the aims identified in the brief
* identified and illustrated changes or decisions they made to their solution
* demonstrated a high level of construction techniques and integrated different materials into their finished product
* finished off the finer details to their project and applied quality finishes which matched their success criteria
* provided evidence to show the effort, planning or conceptualizing of the idea as well as showcasing good skill development to create a product/solution
* showed an in-depth analysis of existing products using correct technical language
* used authentic design sketches and included CAD for final drawings
* presented a thoughtful and comprehensive design brief, that was used as the ‘basis’ for the whole design process, for example, the evaluative comments reflected observations relating to the original design intentions and outcomes
* resolutions of issues were clearly addressed
* references formatted correctly
* evaluation analysed the solution features and processes undertaken
* used clear planning that results in confident approaches to application and high order production outcomes
* presented the full evidence of their thinking and planning including preliminary sketches clearly annotated with technical language describing concepts and possible procedures
* used sketches, drawings and CAD or similar tools to communicate their solution
* tested their solution against the brief in a real-life situation.
* identified a clear need statement, design brief, constraints with pictures of how or where the solution would be used
* used the technologies available to them — traditional and contemporary
* showed more than one design solution and refined and problem-solved to develop a final design concept
* demonstrated design changes throughout manufacturing process and provided reasons and justification for changes
* product demonstrated innovation and highly proficient technical skills
* thorough testing and planning of components that influenced product features
* adhered to word count and references were formatted correctly
* investigated many options for their product and included a summary of their findings
* included video of their product to highlight elements or selected images and drawings to showcase their product
* evaluation analysed the solution features and processes undertaken.

The less successful responses commonly:

* provided a recount of what the student did
* did not use the design model as outlined in the subject outline
* showed little evidence of the use of a design model being used, which provided a foundation for the student’s investigations and subsequent decision making
* produced a design brief that was too vague or broad
* barely referred to the design brief
* lacked structure and purpose in their response to the design process
* did not use a comprehensive and targeted design brief/statement of intent
* lacked depth in the evidence for Investigation and Analysis
* did not have the depth and rigor in design and skill development needed at this level
* did not use correct technical language
* did not demonstrate a comprehensive understanding of materials and techniques that the student was exploring or in showing their planning toward their solution
* used irrelevant testing or findings from the internet to support their design process
* were heavily structured projects whereby all the student design work was similar
* showed limited testing or planning of product
* where a separate Product Record was included with P1 evidence many students failed to address problem solving P2 or E1 evaluating within the document
* used a template to fill in the blanks, limiting creativity
* were well over the word count mainly due to a long recount of the product solution.
* quality of product did not reflect year 12 standard
* did not included a justification for their final design or any discussion about why the key features/elements were included
* evaluation did not refer to the design brief (including constraints/criteria) and whether their product met this
* superficial analysis of existing products i.e., just saying what I like and don’t like – no reasons why?

External Assessment

Assessment Type 3: Resource Study

Students undertake one resource study comprising two parts.

Part One: Resource Investigation

Students investigate and analyse the functional characteristics and properties of two or more materials or components that they are considering for use in the creation of their solution. They report on how their research into and testing of the functional characteristics and properties of these materials or components will affect the student selection for use in the realisation of their solution.

Part Two: Issue Exploration

Students investigate and analyse ethical, legal, economic, and/or sustainability issues related to their solution.

Resource Study Part One: Resource Investigation

The more successful responses commonly:

* provided clear and concise introduction explaining the purpose of the investigation
* began with a brief and clear introduction to the report identifying the rationale and application of the testing in planning for the Product
* clearly linked the Investigation to the planning and product realisation aspects of the course. It provides context and application to the research, testing and evaluating and this enabled meaningful communication in student’s responses
* clearly contextualised the relevance of the investigation to the student’s AT2 Project and provided very purposeful, relevant, and well targeted testing
* used a scientific report approach to provide a hypothesis and an outline of the purpose and procedure to be used and why
* made specific and relevant comments that were ‘on point’ as to how the specific result(s) would impact on the final intended solution
* selected and clearly identified two or more materials or components that were going to be investigated
* made direct links to the product
* had good depth of discussion backed up by references
* used well thought-out tests that incorporated both qualitative and quantitative data that were clearly analysed and represented with the use of charts or images
* showed clear linking of project idea with reasoning for required investigation and experiments
* used clear sequential report including effective photos which highlighted experiment/testing
* provided evidence of data sets, graphing, and reflection of data along with impact of choices
* reflected on results of experiments and made comparisons to hypothesis, resulting in concluding judgements towards the project development for AT2
* explained the specific purpose for testing and justified why it should be done
* used current and relevant research information from Australia or local business group
* showed the method of testing the results and could prove why the resources were suitable for the product
* discussed what the product was and directly linked the testing
* provided clear description of the testing process and then provided evidence of the testing
* showed both qualitative and quantitative data using where applicable, graphs/tables to result each test
* explained the nature of the tests was relevant to how and the environment where the AT2 product would typically be intended to be used
* discussed the validity of results obtained, including limitations, trends and outliers in data obtained
* highlighted the key characteristics of materials, processes, or products, while avoiding dedicating too much time to pure research
* gathered information from relevant, and where possible local sources of information to ensure relevance to Australia context
* provided concise research into the materials that were going to be tested
* included evidence through annotated photographs or video demonstrating testing procedures and the equipment used
* investigated procedures that included a ‘Risk Assessment’ of potential hazards demonstrated thoughtfulness and insight by students considering a range of issues arising from their learning
* clearly linked the testing regime to the functional requirements of their product
* detailed conclusions that not only summarised results, but also informed modifications/improvements in materials and production processes for product
* explained the specific purpose for testing and justified why it should be done.

The less successful responses commonly:

* provided no context as to why the investigation was chosen or it was far too generic or simply not relevant to the student negotiated AT2 solution
* made ‘sweeping’ statements that were in many cases unchecked, false and misleading
* used poor or no referencing
* provided no testing of the components
* focused on too many components to test with any rigor
* did not draw conclusions or evaluate results of testing that is completed
* had testing that was incongruent with the intend use, or design of solution. i.e., soaking timber in water to gauge water absorption or damage for timber that was to be used for indoor furniture solution — very unlikely for this damage to occur
* lacked adequate testing and qualitative results that included data represented in charts
* chose to describe processes rather than testing materials or components
* selected too many processes or materials making the investigation too general and lacking in specific depth and detail
* no clear process of testing/experiments
* no data sets or evidence of testing (photos, screen captures, etc.)
* over word count
* did not discuss why the testing needed to be done and for what purpose
* used a generic test, sometimes completed by all class members which did not relate to their product
* lacked depth of investigation/testing as too many materials were included
* had little or no links to the AT2 Product
* used no references/sources or included incorrect formatting of references
* described processes rather than testing materials
* did not draw an overall conclusion
* did not provide a clear process on what and how the testing was conducted
* did not provide analysis of results to draw conclusions or make predictions
* did not clearly establish a relevant purpose for the testing undertaken
* did not provide sufficient evidence of testing, such as results and photos to substantiate that this did occur
* provided very little evidence and detail about the processes undertaken, with results being vague or dubious and conclusions unclear
* had minimal detail about what the student had learnt and how they had applied this to their major project (solution)
* did not draw conclusions that were linked to informing decisions for their product
* lacked any evidence of research and substantiation.

Resource Study Part Two: Issues Exploration

The more successful responses commonly:

* selected an issue that was well thought out and clearly identified
* linked the issue to the product being developed
* included a depth of investigation with referenced sources
* focused on issues that were carefully considered and related very specifically to HOW the solution was to be designed and made, WHY the intended solution can ‘disrupt’ or challenge existing ‘stereotypes or ‘clichés’ or WHAT impact future versions of similar solution would have
* provided or cited very pertinent and current references using both local and national perspectives
* developed a convincing argument rather than just giving information
* used in-text referencing
* used relevant information and data
* gave personal opinions and analysis
* included referencing to cite facts, studies, and statistics to strengthen the research
* discussed and analysed with detail, relevant, local, and emerging issues relative to the design solution
* discussed ethical, legal, economic or sustainability issues that were directly relevant to the project being undertaken, and the student was able to comment on the effect these considerations might have on the choices they made regarding the design or fabrication of their major project
* referenced sources of information about the identified issue, with the best examples using a combination of secondary sources, and primary information gained from actual businesses, suppliers, or organisations
* validated opinions against research/evidence
* clearly stated the issue that was going to be discussed and why
* included a clear evaluation of the issue that had been researched and a conclusion that highlighted the student response to their findings
* introduced/concluded their topic with clear links to their AT2 Product
* demonstrated academic rigor within their research, including in-text referencing and correct formatting of these references
* explored a relevant issue (or issues) related with the use of that AT2 project at any or multiple phases in its lifecycle. This could be in design, manufacture, use or disposal phases
* considers more than one perspective or opinion to issues, i.e., highlighting both pros and cons
* showed awareness of issues occurring now, in the past or potential future impacts of the product or related components (materials, processes, waste, etc.)
* connected strongly both the issues and the testing to the product they were developing.

The less successful responses commonly:

* were a whole class did the same issue or similar investigations
* tried to cover too much using sub-headings (sustainable, legal, economic, ethical) hence discussion lacked depth
* did not define an issue
* provided a discussion of issues rather than analysis, and opinions stated rather than in-depth, supported research into the issue
* relied on unsubstantiated personal views and opinions rather than constructing a sound point of view based on the data or information discovered
* used a limited range of websites, and were limited to statements of fact/procedure rather than a critical evaluation of the information
* were brief and used little or no sources/references/in-text references/bibliography
* discussed more than one topic which did not allow for depth of discussion
* included discussion that was not relevant to the topic
* selected a topic/issue with no clear links to AT2 Product.