TECHNOLOGY INDICATORS OF PROGRESSION

The Indicators of Progression, as presented in the matrices below, describe student competencies and the learning environment related to the Achievement Objectives of each strand of the technology curriculum within *The New Zealand Curriculum* (2007). The indicators associated with the learning environment provide opportunity to highlight the importance of teacher support of students at all levels. They also acknowledge how the nature of teaching needs to change, in order to ensure students are provided with authentic opportunities to take more responsibility for their learning in technology. As such, they recognise the importance of the learning environment and all its underpinning aspects, including the critical role of teacher action and interaction in student learning.

Taken together, the progression matrices allow teachers and students to develop a sense of how technological literacy progresses through technology education. The indicators provided in the matrices do not define specific knowledge and skills, but rather focus on generic understandings and capabilities that will be developed through working across a range of different contexts.
The Indicators of Progression provide a mechanism for managing multilevel teaching that supports individual student learning needs.

The indicators for the Components of Technological Practice (Brief Development, Planning for Practice and Outcome Development and Evaluation) have been developed through classroom research and refined through subsequent triallng. These indicators are therefore ready to be used to guide formative and summative assessment practices, planning decisions and the development of effective and efficient reporting mechanisms for multiple audiences, including the students, their caregivers, and future teachers both within and across schools.

The indicators for the Components of Technological Knowledge and the Nature of Technology (Technological Modelling, Technological Products and Technological Systems; and Characteristics of Technology and Characteristics of Technological Outcomes) are currently in draft form as they are still in their developmental stage. They have been developed to sit under the completed Achievement Objectives for the two new strands, but are yet to be validated by classroom research. It is expected these indicators will be refined over the next two years as student data becomes available. Indicators at Emergent, Level 1, 2 and 3 for Characteristics of Technological Outcomes and Technological Products have already begun to be refined, as based on findings from initial research. These indicators are therefore NOT ready to be used for summative assessment practices and or reporting purposes. They are being made available for teachers to use as discussion tools that may increase understandings of the two new strands; they also provide support for formative interactions between teachers and students when developing knowledge and skills inherent in the two new strands, for the purpose of enhancing student technological practice.

Components of Technological Practice: Indicators of Progression — **EMERGENT**

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:
- establishes an environment that encourages and supports student innovation
- establishes the need or opportunity and defines the conceptual statement through negotiation with the students
- guides students to identify attributes for an appropriate outcome
- structures students' technological practice through a series of linked learning experiences (both pre-planned and responsive) to provide opportunity for knowledge and skill development
- provides resources, to support student's in developing their outcome
- provides students with an overview of the key stages they will undertake during their technological practice

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE No Aos for emergent.	**ACHIEVEMENT OBJECTIVE** No Aos for emergent.	**ACHIEVEMENT OBJECTIVE** No Aos for emergent.
INDICATORS OF PROGRESSION Communicate the outcome they are going to produce. Identify attributes for their outcome.	**INDICATORS OF PROGRESSION** Explain what they have done already. Suggest what they might do next. Suggest resources they might use next.	**INDICATORS OF PROGRESSION** Develop an outcome. Discuss their own and others' outcomes.

Components of Technological Practice: Indicators of Progression — **LEVEL ONE**

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:
- establishes an environment that encourages and supports student innovation
- establishes the need or opportunity, and defines the conceptual statement through negotiation with the students
- guides students to identify attributes for an appropriate outcome
- structures students' technological practice through a series of linked learning experiences (both pre-planned and responsive) to provide opportunity for knowledge and skill development
- provides resources, that support students in developing their outcome
- provides students with an overview of the key stages they will undertake during their technological practice

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Describe the outcome they are developing and identify the attributes it should have, taking account of the need or opportunity and available resources.	**ACHIEVEMENT OBJECTIVE** Outline a general plan to support the development of an outcome, identifying appropriate steps and resources.	**ACHIEVEMENT OBJECTIVE** Investigate a context to communicate potential outcomes. Evaluate these against attributes; select and develop an outcome in keeping with the identified attributes.
INDICATORS OF PROGRESSION Describe the outcome they are going to produce, Identify attributes for their outcome that reflect the need or opportunity to be addressed,	**INDICATORS OF PROGRESSION** Describe what they have done already and the resources they have used so far. Describe steps they have to do to complete their outcome. Identify the resources they could/will use to complete their outcome.	**INDICATORS OF PROGRESSION** Provide (either through drawing, models or verbally) conceptual ideas that communicate possible outcomes. Evaluate possible outcomes in terms of identified attributes and select an outcome to develop. Develop an outcome in keeping with identified attributes.

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Components of Technological Practice: Indicators of Progression	**LEVEL TWO**

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- establishes the need or opportunity, and defines the conceptual statement through negotiation with the students
- guides students to identify attributes for an appropriate outcome
- structures students' technological practice through a series of linked learning experiences (both pre-planned and responsive) to provide opportunity for knowledge and skill development, and to encourage student trialling and refinement of skills and understandings
- provides a selection of resources, to support students in developing their outcome
- provides students with an overview of the key stages they will undertake during their technological practice

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Explain the outcome they are developing and describe the attributes it should have, taking account of the need or opportunity and the resources available.	**ACHIEVEMENT OBJECTIVE** Develop a plan that identifies the key stages and the resources available.	**ACHIEVEMENT OBJECTIVE** Investigate a context to develop potential outcomes. Evaluate these against identified attributes; select and develop an outcome. Evaluate the outcome in terms of the need/ opportunity.
INDICATORS OF PROGRESSION Explain the outcome they are going to produce. Describe attributes for their outcome that reflect the need or opportunity to be addressed, and their developing skills and knowledge. Describe attributes that allow them and their teacher to evaluate their outcome.	**INDICATORS OF PROGRESSION** Identify and record (in a way others can interact with) the next key stages, explaining their role to complete their outcome. Identify the resources that would be suitable to complete their outcome.	**INDICATORS OF PROGRESSION** Develop (through research, discussion, etc.) Conceptual ideas that communicate possible outcomes. Evaluate possible outcomes in terms of identified attributes and select an outcome to develop. Trial materials for the production of an outcome. Develop an outcome in keeping with the identified need or opportunity. Evaluate their final outcome in terms of how it addresses the need or opportunity.

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Components of Technological Practice: Indicators of Progression LEVEL THREE

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- establishes the need or opportunity
- guides students to define conceptual statement
- guides students to identify key attributes for an appropriate outcome
- supports students' technological practice through a series of negotiated learning experiences (both pre-planned and responsive) to provide opportunity for knowledge and skill development, and encourage student trialling and refinement of skills and understandings
- provides a selection of resources, to support the students development of an outcome

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Describe the nature of an intended outcome, explaining how it addresses the need or opportunity. Describe the key attributes that enable development and evaluation of an outcome.	**ACHIEVEMENT OBJECTIVE** Undertake planning to identify the key stages and resources required to develop an outcome. Revisit planning to include reviews of progress and identify implications for subsequent decision making.	**ACHIEVEMENT OBJECTIVE** Investigate a context to develop ideas for potential outcomes. Trial and evaluate these against key attributes to select and develop an outcome to address the need or opportunity. Evaluate this outcome against the key attributes and how it addresses the need or opportunity.
INDICATORS OF PROGRESSION Define a conceptual statement that communicates what they are developing and why. Describe key attributes for their outcome. Undertake refinement and/or modification of their conceptual statement and key attributes based on their developing knowledge and skills, including understandings of the context and issue. Describe key attributes that allow them and their teacher to evaluate their outcome.	**INDICATORS OF PROGRESSION** Explain the importance of key stages and the reason specific resources were used in their development work to date. Identify and explain links between past and current activities and identify implications for future planning decisions. Plan, explain and record ideas for future activities to support the completion of their outcome. Identify key resources suitable to complete their outcome.	**INDICATORS OF PROGRESSION** Develop (through research and functional modelling) conceptual ideas that communicate possible outcomes that incorporate identified key attributes and address the need or opportunity. Trial materials for the development of an outcome. Carry out technological modelling to evaluate the outcome's ability to address the need or opportunity. Develop an outcome that addresses the identified need or opportunity. Evaluate their final outcome against the key attributes, and in terms of it addressing the need or opportunity.

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Components of Technological Practice: Indicators of Progression — LEVEL FOUR

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:
- establishes an environment that encourages and supports student innovation
- establishes the context and issue for students to undertake technological practice
- provides learning experiences to enable students to successfully structure their own practice in order to develop an appropriate outcome
- supports students in accessing resources
- provides opportunities for ongoing stakeholder/s feedback to students

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Justify the nature of an intended outcome in relation to the need or opportunity. Describe the key attributes identified in stakeholder feedback, which will inform the development of an outcome and its evaluation.	**ACHIEVEMENT OBJECTIVE** Undertake planning that includes reviewing the effectiveness of past actions and resourcing, exploring implications for future actions and accessing of resources, and consideration of stakeholder feedback, to enable the development of an outcome.	**ACHIEVEMENT OBJECTIVE** Investigate a context to develop ideas for feasible outcomes. Undertake functional modelling that takes account of stakeholder feedback, in order to select and develop the outcome that best addresses the key attributes. Incorporating stakeholder feedback, evaluate the outcome's fitness for purpose in terms of how well it addresses the need or opportunity.
INDICATORS OF PROGRESSION Identify a need or opportunity appropriate to the established context and issue, and develop a conceptual statement to justify what they are developing and why. Establish key attributes from initial information. Undertake refinement and/or modification of their conceptual statement and key attributes as based on their developing knowledge and skills, including understandings of the context/issue and feedback from stakeholders. Define key attributes that allow them, their teacher and stakeholders to evaluate the fitness for purpose of their outcome.	**INDICATORS OF PROGRESSION** Explain and reflect on key stages and critical resources from their previous practice, and evaluate this in order to identify implications for future activities within their current practice. Identify and explain links between their past and current practice, in terms of how they could impact on (either to assist or impair) the development of an outcome that reflects the brief requirements. Plan to ensure stakeholder feedback is accessed and used to inform development work – particularly material selection. Plan ahead to ensure completion of outcome, and undertake effective documentation to support their practice. Select and access the key resources (including knowledge and skills) required to complete their outcome.	**INDICATORS OF PROGRESSION** Determine suitability of initial resources to enable the development of their outcome. Develop (through research and functional modeling that includes feedback from stakeholders) conceptual ideas that communicate feasible outcomes that incorporate the established key attributes required to address the need or opportunity showing consideration of material availability and suitability. Carry out ongoing reflection and functional modelling to test, evaluate and refine potential outcomes. Develop an outcome, that incorporates all key attributes established and addresses the identified need or opportunity using prototyping as appropriate. Use stakeholder feedback as evidence to support the evaluation of their final outcome's fitness for purpose in terms of how it well it addresses the need or opportunity.

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Components of Technological Practice: Indicators of Progression — LEVEL FIVE

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- establishes the context and issue from which students can identify a need or opportunity
- provides learning experiences to enable students to successfully structure their own practice, in order to develop an appropriate outcome
- supports students in accessing resources
- provides opportunities for students to access key stakeholders in a safe and appropriate manner

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Justify the nature of an intended outcome in relation to the need or opportunity. Describe specifications that reflect key stakeholder feedback and that will inform the development of an outcome and its evaluation.	**ACHIEVEMENT OBJECTIVE** Analyse their own and others' planning practices to inform the selection and use of planning tools. Use these to support and justify planning decisions (including those relating to the management of resources) that will see the development of an outcome through to completion.	**ACHIEVEMENT OBJECTIVE** Analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing functional modelling and evaluation that takes account of key stakeholder feedback and trialling in the physical and social environments. Use the information gained to select and develop the outcome that best addresses the specifications. Evaluate the final outcome's fitness for purpose against the brief.
INDICATORS OF PROGRESSION Identify a need or opportunity appropriate to the provided context and issue and develop a conceptual statement to justify what they are developing and why. Draft specifications for their outcome that are justified in terms of the context or issue. Undertake brief refinement and/or modification as based on their developing skills and knowledge, including understandings of the context/issue and feedback from key stakeholders. Develop specifications that allow them, their teacher and key stakeholders to evaluate the fitness for purpose of their outcome.	**INDICATORS OF PROGRESSION** Analyse their previous practice and the planning and organisational practices of others. Make informed projections about future activities and explore implications for planning and the selection of planning tools. Use planning tools to support, document and justify ongoing planning decisions in terms of the need or opportunity their brief is being developed to address. Select and manage resources required for specific activities within their practice to complete their outcome.	**INDICATORS OF PROGRESSION** Carry out analyses of their own and others' previous outcomes, to inform the development of ideas for feasible outcomes Develop (through research and functional modelling that includes feedback from key stakeholders) conceptual ideas to communicate feasible outcomes that are justifiable in terms of the brief (conceptual statement and specifications). Determine suitability of materials justified by evaluation against the specifications for the development of their outcome. Develop an outcome through: • functional modelling (based on developing knowledge and skills) that test, evaluate and refine their evolving outcome; • prototyping to trial and evaluate their outcome within the physical and social environment in which it will be placed. Use key stakeholder feedback to evaluate the fitness for purpose of their developing and final outcome against the brief.

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Components of Technological Practice: Indicators of Progression — LEVEL SIX

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- provides a context and issue for the students to undertake technological practice
- provides learning experiences to enable students to successfully structure their own practice in order to develop an appropriate outcome
- supports students in accessing resources
- provides opportunities for students to access key and the wider community stakeholders in a safe and appropriate manner

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Justify the nature of an intended outcome in relation to the need or opportunity and justify specifications in terms of key stakeholder feedback and wider community considerations.	**ACHIEVEMENT OBJECTIVE** Critically analyse their own and others' past and current planning practices in order to make informed selection and effective use of planning tools. Use these to support and justify ongoing planning that will see the development of an outcome through to completion.	**ACHIEVEMENT OBJECTIVE** Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialling in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation using feedback from stakeholders.
INDICATORS OF PROGRESSION Explore the provided context and issue in order to identify and justify a need or opportunity Develop a brief that: • clearly communicates and justifies an outcome that allows for the resolution or realisation of the need or opportunity; • reflects the opportunities and constraints on both the outcome and the practice to be undertaken. Undertake brief refinement and/or modification as based on their developing skills and knowledge, including understandings of physical and social environment and feedback from key and wider community stakeholders. Develop specifications that allow them, their teacher, and key and wider community stakeholders to evaluate the fitness for purpose of their outcome.	**INDICATORS OF PROGRESSION** Carry out ongoing critical analyses and evaluation of their own and others' past and current planning and organisational practices Make informed projections about future activities that are supported by dynamic planning tools in order to document and justify planning decisions, in terms of the physical and social environment in which their brief is embedded Justify the management of resources to undertake technological practice, in terms of the physical and social environment in which their practice is occurring, as well as the opportunities and/or constraints resulting from the specific practice they undertake	**INDICATORS OF PROGRESSION** Carry out ongoing critical analyses of their own and others' outcomes, to inform the development of ideas for feasible outcomes Develop (through research and functional modelling that includes feedback from key and wider community stakeholders) conceptual ideas to communicate feasible outcomes that are justifiable in terms of the brief (conceptual statement and specifications) and the physical and social environment in which their outcome is to be developed and finally placed. Justify the suitability of materials selected to enable the development of an outcome that meets the speci-cations and is appropriate to the physical and social environment in which it will be developed and placed. Develop an outcome & justify key decisions through: • informed functional modelling (based on developing knowledge and skills) that test, evaluate and refine their evolving outcome • prototyping to trial and evaluate their outcome within the physical and social environment in which it will be placed. Evaluate their developing and final outcome's fitness for purpose against the brief using key and wider community stakeholder feedback to justify its suitability for the physical and social environment in which it will be placed.

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Components of Technological Practice: Indicators of Progression — LEVEL SEVEN

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- provides a context for students to undertake technological practice
- supports student learning as they structure and plan activities as required to enable them to undertake their technological practice to develop an appropriate outcome
- supports students in accessing resources
- provides opportunities for students to access key and wider community stakeholders in a safe and appropriate manner

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Justify the nature of an intended outcome in relation to the issue to be resolved and justify specifications in terms of key stakeholder feedback and wider community considerations.	**ACHIEVEMENT OBJECTIVE** Critically analyse their own and others' past and current planning and management practices in order to develop and employ project management practices that will ensure the effective development of an outcome to completion.	**ACHIEVEMENT OBJECTIVE** Critically analyse their own and others' outcomes and evaluative practices to inform the development of ideas for feasible outcomes. Undertake a critical evaluation that is informed by ongoing experimentation and functional modelling, stakeholder feedback, and trialling in the physical and social environments. Use the information gained to select, justify, and develop an outcome. Evaluate this outcome's fitness for purpose against the brief. Justify the evaluation using feedback from stakeholders and demonstrating a critical understanding of the issue.
INDICATORS OF PROGRESSION explore the provided context in order to establish an issue and identify a need or opportunity that can be justified in terms of the physical and social environment develop a brief that: • clearly communicates an outcome that allows for the resolution or realisation of the need or opportunity and justifies this in terms of the selected issue • reflects the opportunities and constraints on both the outcome and the practice to be undertaken undertake brief refinement and/ or modification as based on their developing skills and knowledge, including understandings of physical and social environment and feedback from key and wider community stakeholders develop specifications that allow them, their teacher and key and wider community stakeholders to evaluate the fitness for purpose of their outcome	**INDICATORS OF PROGRESSION** Carry out ongoing critical analyses and evaluation of their own and others' past and current planning, and self and team management practices. Make informed projections about future activities that are supported by dynamic planning tools developed to manage, document and justify planning decisions in terms of the physical and social environment in which their brief is embedded Organise learning experiences to gain new knowledge and skills identified in planning as being needed to develop their outcome Justify the management of resources to undertake technological practice in terms of the physical and social environment in which their practice is occurring, as well as the opportunities and/or constraints resulting from the specific practice they undertake	**INDICATORS OF PROGRESSION** Carry out ongoing critical analyses of their own and others' outcomes, with particular regard to each outcome's fitness for purpose, to inform their outcome's development Develop (through research and functional modelling that incorporates feedback from discussions with key and wider community stakeholders) conceptual ideas that communicate feasible outcomes that are justifiable in terms of the brief, and the physical and social environment in which the outcome is to be developed and finally situated Justify the suitability of materials to enable the development and of outcome appropriate to the physical and social environment in which it will be developed and placed Develop an outcome and justify key decisions through: • informed functional modelling (based on developing knowledge and skills) that test, evaluate and refine their evolving outcome • prototyping to trial and evaluate their outcome within the physical and social environment in which it will be placed Evaluate their developing and final outcome's fitness for purpose against the brief, using key and wider community stakeholder feedback to justify its suitability to address the issue

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Components of Technological Practice: Indicators of Progression — LEVEL EIGHT

SUPPORTING LEARNING ENVIRONMENT – THE TEACHER:

- establishes an environment that encourages and supports student innovation
- supports students as they undertake initial research to establish an appropriate context and issue
- supports student learning as they structure and plan activities as required to enable them to undertake their technological practice to develop an appropriate outcome
- supports students in accessing resources
- provides opportunities for students to access key and wider community stakeholders in a safe and appropriate manner

Brief Development	Planning for Practice	Outcome Development & Evaluation
ACHIEVEMENT OBJECTIVE Justify the nature of an intended outcome in relation to the context and the issue to be resolved. Justify specifications in terms of key stakeholder feedback and wider community considerations.	**ACHIEVEMENT OBJECTIVE** Achievement ObjectiveCritically analyse their own and others' past and current planning and management practices, in order to develop and employ project management practices that will ensure the efficient development of an outcome to completion.	**ACHIEVEMENT OBJECTIVE** Critically analyse their own and others' outcomes and their determination of fitness for purpose in order to inform the development of ideas for feasible outcomes. Undertake a critical evaluation that is informed by ongoing experimentation and functional modelling, stakeholder feedback, trialling in the physical and social environments, and an understanding of the issue as it relates to the wider context. Use the information gained to select, justify, and develop an outcome. Evaluate this outcome's fitness for purpose against the brief. Justify the evaluation using feedback from stakeholders and demonstrating a critical understanding of the issue that takes account of all contextual dimensions.
INDICATORS OF PROGRESSION Critically evaluate a range of contexts and associated issues to establish a feasible context and issue suitable for technological practice. Explore the established issue to identify a need or opportunity that can be justified in terms of the physical and social environment of the context. Develop a brief that: • clearly communicates an outcome that allows for the resolution or realisation of the need or opportunity and justifies this in terms of the wider context in which the issue sits • reflects the opportunities and constraints on both the outcome and the practice to be undertaken. Undertake brief refinement and/or modification as based on their developing skills and knowledge, including understandings of physical and social environment and feedback from key and wider community stakeholders. Develop specifications that allow them, their teacher, and key and wider community stakeholders to evaluate the fitness for purpose of their outcome in its broadest sense.	**INDICATORS OF PROGRESSION** Develop an initial plan that allows for extensive exploratory work to establish a suitable context and issue, and subsequent need or opportunity to be determined and evaluated. Carry out ongoing critical analyses and evaluation of their own and others' past and current planning, and self and team management practices . Make informed projections about future activities that are supported by use of dynamic planning tools developed to manage, document and justify planning decisions in terms of the physical and social environment in which their brief is embedded. Organise and evaluate learning experiences to gain new knowledge and skills identified in planning as being needed to develop their outcome. Critically evaluate the management of learning activities, opportunities and/or constraints resulting from specific practices undertaken, and the management of resources in an ongoing manner through-out technological practice, and justify these in terms of the physical and social environment, in which their practice is occurring to address the context and issue.	**INDICATORS OF PROGRESSION** Carry out ongoing critical analyses of their own and others' outcomes, with particular regard to each outcome's fitness for purpose in the broadest sense, to inform their outcome's development. Develop (through research and functional modelling justified by key, wider community stakeholders' feedback and historical and contemporary issues related to the context) conceptual ideas that communicate outcomes that are justifiable in terms of its fitness for purpose in the broadest sense. Justify the suitability of materials to enable the development and production of an outcome appropriate to the physical and social environment in which it will be developed and placed, and clearly explaining the contribution selected resources make to their outcome's fitness for purpose (in the broadest sense). Develop an outcome and justify key decisions through: • informed functional modelling (based on developing knowledge and skills) that test, evaluate and refine their evolving outcome • prototyping to trial and evaluate their outcome within the physical and social environment in which it will be placed. Critically evaluate their developing and final outcome's fitness for purpose against the brief, issue and context, using key and wider community stakeholder feedback to justify its fitness for purpose in the broadest sense.

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Components of Nature of Technology: Draft Indicators of Progression	EMERGENT

SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged, to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop technological knowledge – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should select examples of technologies/technological development that allow for the meeting of AOs and are reflective of student interests.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE No AO for emergent	**ACHIEVEMENT OBJECTIVE** No AO for emergent
INDICATORS OF PROGRESSION Yet to be developed.	**INDICATORS OF PROGRESSION** Identify the obvious physical attributes of technological outcomes; for example, shape, size, colour, component interconnections, etc. Identify the obvious functional attributes of technological outcomes; for example, what the object does/can do.

Components of Nature of Technology: Draft Indicators of Progression	LEVEL ONE

SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged, to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop technological knowledge – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should select examples of technologies/technological development that allow for the meeting of AOs and are reflective of student interests.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand that technology is purposeful intervention through design.	**ACHIEVEMENT OBJECTIVE** Understand that technological outcomes are products or systems developed by people and have a physical nature and a functional nature.
INDICATORS OF PROGRESSION Understand the purpose of technology is to meet people's needs and or desires in ways which intervene in the world. Understand the nature of this intervention is to 'improve' life by addressing people's needs or providing new opportunities, while also understanding that what may improve one person's, or group of people's, life may negatively impact on others. Understand the intentional nature of technology where technological outcomes are designed through planned and purposeful practices.	**INDICATORS OF PROGRESSION** Explain that technological outcomes are things that are designed and made by people and therefore are different to other material things that exist in the world. Describe technological outcomes in terms of their physical attributes; for example, shape, size, colour, material composition, component interconnections, etc.. Describe technological outcomes in terms of their functional attributes; for example, what the outcome can do and/or provides, or cannot do and/or provide.

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Components of Nature of Technology: Draft Indicators of Progression   LEVEL TWO

SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop technological knowledge – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should negotiate the selection of examples of technologies/ technological development with the students to allow for the meeting of AOs.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand that technology both reflects and changes society and the environment and increases people's capability.	**ACHIEVEMENT OBJECTIVE** Understand that technological outcomes are developed through technological practice and have related physical and functional natures.
INDICATORS OF PROGRESSION Understand that technology reflects society, with people in differing societies and/or global locations developing technologies according to varying needs and desires. Understand that technologies of the past and present impact on people at an individual and collective level, and both constrain and enable what future technologies can be developed. Uunderstand that technology can enable and/or enhance people's abilities/possibilities. That is, it can enhance their capability to manipulate, store, transport, and control things. Understand that informed creativity and critical reflection are required by technologists, in order to design technological outcomes within boundaries and constraints of the context of their development and/or place of function.	**INDICATORS OF PROGRESSION** Explain that technological outcomes exist because people have undertaken technological practice to determine what is needed/ wanted, explored ways in which solutions/resolutions may be arrived at, and proceeded to create outcomes as deemed appropriate. Describe technological outcomes as technological products or systems. Describe the interrelationship between the physical attributes of a technological outcome and its functional attributes. Describe how technological outcomes both enhance and limit (often at the same time) our ability to 'see' things, and can result in fundamentally different ways of viewing and/or thinking about the world and ourselves.

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Components of Nature of Technology: Draft Indicators of Progression LEVEL THREE

SUPPORTING LEARNING ENVIRONMENT

Teacher to encourage students to create opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical to ensure they move towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop technological knowledge – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should guide students in selecting examples of technologies/technological development to ensure opportunity for the meeting of AOs.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts, and that technological knowledge is validated by successful function.	**ACHIEVEMENT OBJECTIVE** Understand that technological outcomes are recognisable as fit for purpose by the relationship between their physical and functional natures.
INDICATORS OF PROGRESSION Understand how historical contexts and environmental locations have impacted on technological development. Understand how social influences have impacted on technological development. Understand how technological developments have impacted on people and social and physical environments, in the past and present. Understand that technological knowledge is judged to be useful knowledge if it allows for a technological outcome to function as intended.	**INDICATORS OF PROGRESSION** Explain that the level of fitness for purpose of a technological outcome is determined by the success (or otherwise) of the relationship between its physical and functional nature, and the context in which it is situated. Explain that the nature of this relationship is complex and rarely 1-1; that is, for any function there may be a range of physical attributes that are suitable, and that physical attributes may support a range of different functions. Explain that technological products and systems are not always exclusive categories but often relate to the way in which we view the technological outcome itself.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to encourage students to create opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical to ensure they move towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop technological knowledge – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should require students to explain their selection of examples of technologies/technological development as providing opportunity for meeting task requirements, and provide input as necessary.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand how technological development expands human possibilities and how technology draws on knowledge from a wide range of disciplines.	**ACHIEVEMENT OBJECTIVE** Understand that technological outcomes can be interpreted in terms of how they might be used and by whom and that each has a proper function as well as possible alternative functions.
INDICATORS OF PROGRESSION Understand how technology transforms, transports, controls and/or stores energy, material and/or information in order to expand human capability Understand that expanding human capability results in new possibilities (both positive and negative) for humanity, and this brings with it complex and often unanticipated social and environmental impacts Understand the range of knowledge underpinning technological developments, and how the context of the development determines what knowledge is given most value Understand the increasingly multidisciplinary basis of contemporary technology, and the role and value of tacit knowledge gained from past practices/experiences in translating new knowledge into informed and technological practice	**INDICATORS OF PROGRESSION** Understand how the physical nature of technological outcomes provides clues to interpret their possible purpose, function, and target user Understand that the term 'proper function' refers to the function for which the technological outcome was designed Understand that technological outcomes may be used successfully by end-users for purposes other than what they were originally designed

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical to ensure they move towards deeper more sophisticated understandings. Teacher encourages students to make links to past experiences and consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity for meeting task requirements.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE	**ACHIEVEMENT OBJECTIVE**
Understand how people's perceptions and acceptance of technology impact on technological developments and how and why technological knowledge becomes codified.	Understand that technological outcomes are fit for purpose in terms of time and context. Understand the concept of malfunction and how "failure" can inform future outcomes.
INDICATORS OF PROGRESSION	**INDICATORS OF PROGRESSION**
Understand how context influences people's perception and acceptance of technological developments (both in terms of practice and technological outcomes) and how this in turn impacts on future developments; for example, past 'solutions' often become future 'problems'.	Understand that the fitness for purpose of technological outcomes is judged according to its appropriateness (or not) in time and context.
Understand why and how technological knowledge can be coded (for example, codes of practice, codes of ethics, codes of standards, reference tolerances, etc.) For others, to ensure consistency, accuracy and efficiency.	Understand the idea of malfunction (single event failure) of technological outcomes, and how this differs to reduced functioning of technological outcomes due to use and levels of outcome reliability, efficiency, durability, etc..
Understand how codified knowledge exists to remind technologists of their responsibilities, including procedures they must follow to fulfill constructional, ethical and/or legal compliance requirements.	Understand the concept of risk as it relates to reducing instances of mal-functioning technological outcomes, and/or increasing levels of outcome robustness.
Understand how new materials/tools/techniques and processes, and social/political/environmental shifts challenge past codes, and the role and social responsibility technologists have in ensuring these are continually reviewed and updated as appropriate.	Understand that 'failures' provide opportunity for deep insights that can greatly benefit future developments and deepen technological knowledge.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with a range of others inside and outside of the school environment. Teacher should focus formative interactions on encouraging students to be self reflective and critical to ensure they move towards deeper more sophisticated understandings. Teacher supports students as they make links to past experiences and consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity for meeting task requirements, and encourage links between other related curriculum areas to support deeper understandings.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand the interdisciplinary nature of technology and the implications of this for maximising possibilities through collaborative practice.	**ACHIEVEMENT OBJECTIVE** Understand that some technological outcomes can be perceived as both product and system. Understand how these outcomes impact on other outcomes and practices and on people's views of themselves and possible futures.
INDICATORS OF PROGRESSION Understand the reasons for the interdisciplinary nature of knowledge underpinning technology – both within and across technology/other disciplines. Understand the implications of the interdisciplinary base of technology for establishing collaborative practice, which can capitalise on difference to support innovative and increasingly sustainable technological developments. Understand intellectual property in the context of technological development and how this is worked through, (or not), in collaborative ventures to enhance or stifle technological development.	**INDICATORS OF PROGRESSION** Understand the interconnectedness of some technological products and systems and the often fluid boundaries between them. Understand that no technological outcome operates in isolation from other technologies and/or aspects of society, and developing an understanding of how things interconnect allows the development of a holistic rather than reductionist view of the world. Understand the implications of previous technological outcomes on technology and society, for example, public perception and acceptance of linked or perceived-to-be similar technological outcomes.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with a range of others inside and outside of the school environment. Teacher should focus formative interactions on encouraging students to be self reflective and critical to ensure they move towards deeper more sophisticated understandings. Teacher challenges students as they make links to past experiences and as they critically consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/ technological development as providing opportunity for meeting task requirements and ensure student's choice of other learning during the year will allow them to achieve in technology at this level For example, specific sciences and arts subjects are chosen as relevant to their technology programme focus.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand the implications of ongoing contestation and competing priorities for complex and innovative decision making in technological development.	**ACHIEVEMENT OBJECTIVE** Understand that technological outcomes are a resolution of form and function priorities and that malfunction affects how people view and accept outcomes.
INDICATORS OF PROGRESSION Understand technology as a field of on-going contestation and competing priorities, that require resolution through complex decision making and balancing of resources. Understand the effects of critical evaluation, informed creativity and boundary pushing on innovation and 'alternative' technological developments.	**INDICATORS OF PROGRESSION** Understand technological outcomes are the result of design prioritisation decisions, as based on what is deemed of most value and/or perceived to be acceptable for the target market; these priorities are enacted through embedding them in the brief specifications that drive the development. Understand that many contemporary design decisions are 'hidden' from users and therefore difficult to establish without an informed and critical analysis. Understand the implications of malfunctioning technological outcomes on technology and society (for example, public perception and acceptance of linked, perceived-to-be similar, or innovative technological outcomes and how these impact on perceptions of risk).

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SUPPORTING LEARNING ENVIRONMENT

Teacher to challenge students to ensure they access diverse and critical feedback throughout their learning experiences. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Teacher challenges students as they critically critique their past experiences and as they critically consider the implications for their future learning in ways which support increasingly innovative practices. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity to surpass and/or extend the requirements of the set task, and ensure students' choice of other learning during the year will allow them to achieve in technology at this level. For example, specific sciences and arts subjects are chosen as relevant to their technology programme focus.

Characteristics of Technology	Characteristics of Technological Outcomes
ACHIEVEMENT OBJECTIVE Understand the implications of technology as intervention by design and how interventions have consequences, known and unknown, intended and unintended.	**ACHIEVEMENT OBJECTIVE** Understand how technological outcomes can be interpreted and justified as fit for purpose in their historical, cultural, social, and geographical locations.
INDICATORS OF PROGRESSION Understand how technological outcomes can 'challenge' people's views of what it is to be 'human'; for example, the current challenges of artificial intelligence developments. Understand the consequences on society of unknown and unintended consequences of technological developments, and how this relates to risk mitigation and risk management. Understand technological knowledge as a social construct with a functional epistemology.	**INDICATORS OF PROGRESSION** Understand technological outcomes as socio-cultural artefacts; that is, entities reflective of a specific time, place and social location. Understand how technological outcomes can be interpreted and justified, and/or critiqued, in terms of their historical, cultural, social, and geographical location. Understand the implications for technological outcomes of probable and possible futures.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged, to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop understandings of the nature of technology – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should select examples of technologies/ technological development that allow for the meeting of AOs and are reflective of student interests.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE	**ACHIEVEMENT OBJECTIVE**	**ACHIEVEMENT OBJECTIVE**
No AO for emergent.	No AO for emergent.	No AO for emergent.
INDICATORS OF PROGRESSION	**INDICATORS OF PROGRESSION**	**INDICATORS OF PROGRESSION**
Yet to be developed.	Identify the main materials from which simple products are made.	Yet to be developed.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged, to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop understandings of the nature of technology – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should select examples of technologies/ technological development that allow for the meeting of AOs and are reflective of student interests.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE	**ACHIEVEMENT OBJECTIVE**	**ACHIEVEMENT OBJECTIVE**
Understand that functional models are used to represent reality and test design concepts, and that prototypes are used to test technological outcomes.	Understand that technological products are made from materials that have performance properties.	Understand that technological systems have inputs, controlled transformations, and outputs.
INDICATORS OF PROGRESSION	**INDICATORS OF PROGRESSION**	**INDICATORS OF PROGRESSION**
Understand the difference between 'reality' and representations of reality.	Identify the materials from which simple products are made.	Understand technological systems as distinct from the steps people carry out in everyday life.
Understand models as representations of reality.	Identify the performance requirements of materials used in simple products.	Understand components of simple systems (eg, inputs, outputs and transformation processes) and the connections between them.
Understand the purpose of functional modelling in terms of testing design concepts.		Understand the purpose of simple systems.
Understand the purpose of prototyping in terms of testing technological outcomes.		

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SUPPORTING LEARNING ENVIRONMENT

Teacher to provide opportunities throughout learning experiences for the students' ideas to be shared as a group and challenged, to ensure they are guided towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop understandings of the nature of technology – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should negotiate the selection of examples of technologies/technological development with the students to allow for the meeting of AOs.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand that functional models are used to explore, test, and evaluate design concepts for potential outcomes and that prototyping is used to test a technological outcome for fitness of purpose.	**ACHIEVEMENT OBJECTIVE** Understand that there is a relationship between a material used and its performance properties in a technological product.	**ACHIEVEMENT OBJECTIVE** Understand that there are relationships between the inputs, controlled transformations, and outputs occurring within simple technological systems.
INDICATORS OF PROGRESSION Understand the limitations of using models as representations of 'part' or the 'whole' of reality. Understand that functional modelling is used to explore possible and probable implications of design concepts if they were to become technological outcomes. Understand how functional models can be used to gather evidence for and against design concepts. Understand that prototyping is used to gather evidence of a technological outcome's fitness for purpose. Understand how prototyping can be used to enhance the fitness for purpose through further development of technological outcomes.	**INDICATORS OF PROGRESSION** Describe the properties of the materials from which simple products are made. Explain that the materials in simple product are used because of specific performance properties.	**INDICATORS OF PROGRESSION** Understand the nature of the inputs within simple technological systems. Understand how the inputs and the nature of the transformation process enables the creation of the desired outputs.

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Components of Technological Knowledge: Draft Indicators of Progression LEVEL THREE

SUPPORTING LEARNING ENVIRONMENT

Teacher to encourage students to create opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop understandings of the nature of technology – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should guide students in selecting examples of technologies/technological development to ensure opportunity for the meeting of AOs.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand that different forms of functional modelling are used to inform decision making in the development of technological possibilities and that prototypes can be used to evaluate the fitness of technological outcomes for further development.	**ACHIEVEMENT OBJECTIVE** Understand the relationship between the materials used and their performance properties in technological products.	**ACHIEVEMENT OBJECTIVE** Understand that technological systems are represented by symbolic language tools and understand the role played by the 'black box' in technological systems.
INDICATORS OF PROGRESSION Understand different forms that functional modelling can take; for example, thinking, talking, drawing, simulations, physical mock-ups, etc. Understand that different media used in modelling provide different types of evidence. Understand what evidence is required to evaluate fitness for purpose and how prototyping can best ensure evaluations are robust.	**INDICATORS OF PROGRESSION** Explain how the properties of materials used in products relate to the performance requirements of the product. Suggest possible performance properties as based on the materials used in a product. Suggest possible materials suitable for use in a product as based on proposed performance requirements.	**INDICATORS OF PROGRESSION** Understand representations of simple systems that use appropriate language tools. Understand a 'black box' as a means of representation that makes visible the inputs and outputs of a system, without showing any of that system's inner workings. Understand the role of black boxes in systems, and advantages and disadvantages associated with their use.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to encourage students to create opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Links should also be made to student opportunities to undertake technological practice and develop understandings of the nature of technology – both those in the past and future opportunities. That is, the understandings being developed should be used to reflect on past experiences and consider the implications for their future learning in technology. Teacher should require students to explain their selection of examples of technologies/technological development as providing opportunity for meeting task requirements, and provide input as necessary.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand how different forms of functional modelling are used to explore possibilities and to justify decision making and how prototyping can be used to justify refinement of technological outcomes.	**ACHIEVEMENT OBJECTIVE** Understand that materials can be formed, manipulated, and/or transformed to enhance the fitness for purpose of a technological product.	**ACHIEVEMENT OBJECTIVE** Understand how technological systems employ control to allow for the transformation of inputs to outputs.
INDICATORS OF PROGRESSION Understand the role of functional modelling in making informed predictions. Understand that it is necessary to consider both what 'can' be done, and what 'should' be done, when undertaking functional modelling to justify decision making. Understand how prototyping can be used to justify the refinement of technological outcomes.	**INDICATORS OF PROGRESSION** Understand that materials can be formed, manipulated and transformed in varying ways, as dependent on their properties. Understand how a product's fitness for purpose can be enhanced by material selection, refinement and/or development.	**INDICATORS OF PROGRESSION** Understand control mechanisms and explain how these increase in sophistication as systems become more self-regulatory. Understand the role of feedback in allowing the successful transformation of input to output in complex systems.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with others. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Teacher encourages students to make links to past experiences and consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity for meeting task requirements.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand how evidence, reasoning, and decision making in functional modelling contribute to the development of design concepts, and how prototyping can be used to justify ongoing refinement of technological outcomes.	**ACHIEVEMENT OBJECTIVE** Understand how materials are selected, based on desired performance criteria.	**ACHIEVEMENT OBJECTIVE** Understand the properties of subsystems within technological systems.
INDICATORS OF PROGRESSION Understand the role of evidence in justifying decisions made from functional modelling. Understand decision making strategies that employ reasoning, focused on whether outcomes can be realized, alongside whether they should be realised. Understand how prototyping can be used to justify on-going refinement/optimization of technological outcomes	**INDICATORS OF PROGRESSION** Understand how materials are evaluated against performance criteria in order to select possible resources for product development. Understand how materials change in processing and production and how this impacts on selection criteria. Understand the concept of minimal engineering and how this informs material selection and the design of products.	**INDICATORS OF PROGRESSION** Understand the generic and specialized properties of sub-systems as they serve to function within more complex technological systems. Understand how sub-systems allow for the protection of system malfunction or the damage of parts, through such things as back up subsystems or shutdown options.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with a range of others inside and outside of the school environment. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Teacher supports students as they make links to past experiences and consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity for meeting task requirements, and encourage links between other related curriculum areas to support deeper understandings.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand the role and nature of evidence and reasoning when managing risk through technological modelling.	**ACHIEVEMENT OBJECTIVE** Understand how materials are formed, manipulated, and transformed in different ways, depending on their properties, and understand the role of material evaluation in determining suitability for use in product development.	**ACHIEVEMENT OBJECTIVE** Understand the implications of subsystems for the design, development, and maintenance of technological systems.
INDICATORS OF PROGRESSION Understand different forms of reasoning and how these provide for an understanding of risk. Understand the difference between possibility and probability, and their role in risk exploration and management. Understand the strengths and weaknesses of more and less accurate model representations, in terms of accuracy of prediction, error propagation, and robustness across contexts. Understand the limitations imposed on modelling from resources – particularly time and money.	**INDICATORS OF PROGRESSION** Understand the implications of new material formulation possibilities, such as nanotechnologies, on future technological products. Understand how materials are manipulated and transformed to increase suitability for use in particular contexts. Understand how potential materials are evaluated to determine suitability for a products development.	**INDICATORS OF PROGRESSION** Understand the purpose of sub-systems in the development and communication of complex systems. Understand the advantages and disadvantages of sub-system use in system design, development and maintenance.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to support students to create informal and formal opportunities throughout learning experiences to share and challenge ideas with a range of others inside and outside of the school environment. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Teacher challenges students as they make links to past experiences and as they critically consider the implications for their future learning in technology. Teacher should challenge students to justify their selection of examples of technologies/ technological development as providing opportunity for meeting task requirements, and ensure students' choice of other learning during the year will allow them to achieve in technology at this level; for example, specific sciences and arts subjects are chosen as relevant to their technology programme focus.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand how the 'should' and 'could' decisions in technological modelling rely on an understanding of how evidence can change in value across contexts, and how different tools are used to ascertain and mitigate risk.	**ACHIEVEMENT OBJECTIVE** Understand the concepts and processes employed in materials evaluation and the implications of these for design, development, maintenance, and disposal of technological products.	**ACHIEVEMENT OBJECTIVE** Understand the concepts of redundancy and reliability and their implications for the design, development, and maintenance of technological systems.
INDICATORS OF PROGRESSION Understand why it is necessary to critically explore what 'can' be done and what 'should ' be done, when making justifiable decisions. Understand that different communities accept different types of evidence as dependent on a range of factors (such as ethics, purpose, perceived authority of people involved in evidence presentation, etc.) And why this must be taken into account in constructive argumentation about 'should' and 'could' decisions. Understand how different risks can be ascertained prior to their realization, and what strategies can be employed to mitigate these.	**INDICATORS OF PROGRESSION** Understand key concepts and processes that underpin material evaluation, such as chemical standards to compare physical properties, to identify methods of detection and evaluation. Understand how these concepts and processes interact in the design, development, maintenance and disposal of technological products.	**INDICATORS OF PROGRESSION** Understand the concept of reliability and the implications for the design, development and maintenance of technological systems. Understand the concept of redundancy and the implications for the design, development, and maintenance of technological systems.

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SUPPORTING LEARNING ENVIRONMENT

Teacher to challenge students to ensure they access diverse and critical feedback throughout their learning experiences. Teacher should focus formative interactions on encouraging students to be self reflective and critical, to ensure they move towards deeper more sophisticated understandings. Teacher challenges students as they critically critique their past experiences and as they critically consider the implications for their future learning in ways which support increasingly innovative practices. Teacher should challenge students to justify their selection of examples of technologies/technological development as providing opportunity to surpass and/or extend the requirements of the set task, and ensure students' choice of other learning during the year will allow them to achieve in technology at this level. For example, specific sciences and arts subjects are chosen as relevant to their technology programme focus.

Technological Modelling	Technological Products	Technological Systems
ACHIEVEMENT OBJECTIVE Understand the role of technological modelling as a key part of technological development, justifying its importance on moral, ethical, sustainable, cultural, political, economic, and historical grounds.	**ACHIEVEMENT OBJECTIVE** Understand the concepts and processes employed in materials development and evaluation, and the implications of these for design, development, maintenance, and disposal of technological products.	**ACHIEVEMENT OBJECTIVE** Understand operational parameters and their role in the design, development, and maintenance of technological systems.
INDICATORS OF PROGRESSION Understand the critical role of technological modelling in making informed, responsive and defensible decisions about technological developments. Understand how different tools are used in ascertaining and mitigating risk, as based on a deep understanding of historical antecedents and the interactions between often competing and contestable factors (for example, factors arising from differing moral, ethical, cultural, and/or political views; the way in which people adhere to and understand issues such as sustainability, globalisation, democracy, global warming, etc.).	**INDICATORS OF PROGRESSION** Understand key concepts and processes that underpin material development, (such as chemical stability and fitness for purpose; means of matter generation, means of separation and purification, comparison of alternative production for economic advantage). Understand how these concepts and processes interact in the design, development, maintenance and ultimate disposal of technological products.	**INDICATORS OF PROGRESSION** Understand key concepts and processes that underpin the operational parameters of technological systems, (such as energy efficiency, fail-safe, back up, redundancy, and performance tolerances). Understand the complex interactions leading to the development of safe and reliable operational parameters for the design and development of systems. Understand how ongoing maintenance interacts with and supports the operational parameters of technological systems.

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