# Outcome Development and Education

The development of a technological outcome (product or system) starts with the generation of design ideas and ends when the realised outcome (completed prototype) is evaluated prior to use in situ (the predetermined context).

This complex process requires a wide range of constructive skills and knowledge; for example, to communicate design concepts and work with materials and components.

Data obtained from functional modelling and prototyping provide a basis for justifiable decision making, ensuring that the final outcome, when produced, should be fit for purpose as described in the brief.

Outcome development and evaluation can be thought of as the design, production, and evaluative practices of technological practice.

## Indicators of progression

Level 1

**Achievement objective**

Students will:

Investigate a context to communicate potential outcomes. Evaluate these against attributes; select and develop an outcome in keeping with the identified attributes.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level one teachers could:

* ensure that there is a brief with attributes against which a developed outcome can be evaluated
* establish an environment that encourages and supports student innovation when generating design ideas
* provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and using manipulative media such as modelling clay, wire, card etc.
* provide opportunities to develop skills required to produce their outcome.

**Indicators**

Students can:

* describe potential outcomes, through drawing, models and/or verbally.
* identify potential outcomes that are in keeping with the attributes, and selects one to produce
* produce an outcome in keeping with identified attributes.

Level 2

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level two teachers could:

* ensure that there is a brief with attributes against which a developed outcome can be evaluated
* establish an environment that encourages and supports student innovation when generating design ideas
* provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and using manipulative media such as modelling clay, wire, card etc.
* provide opportunities to develop skills required to produce their outcome
* guide students to evaluate their outcome against the brief.

**Indicators**

Students can:

* describe potential outcomes, through drawing, models and/or verbally
* evaluate potential outcomes in terms of identified attributes to select the outcome to produce
* produce an outcome in keeping with the brief
* evaluate the final outcome in terms of how successfully it addresses the brief.

Level 3

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level three teachers could:

* ensure that there is a brief with attributes against which a developed outcome can be evaluated
* establish an environment that encourages and supports student innovation when generating design ideas
* provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and using manipulative media such as modelling clay, wire, card etc
* provide opportunity to develop knowledge and skills related to the performance properties of the materials/components students could use
* support students to evaluate their outcome against the brief.

**Indicators**

Students can:

* describe design ideas (either through drawing, models and/or verbally) for potential outcomes
* evaluate design ideas in terms of key attributes to develop a conceptual design for the outcome
* select materials/components, based on their performance properties, for use in the production of the outcome
* produce an outcome that addresses the brief
* evaluate the final outcome against the key
* attributes to determine how well it met the need or opportunity.

Level 4

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level four teachers could:

* ensure that there is a brief with attributes against which a developed outcome can be evaluated
* establish an environment that encourages and supports student innovation when generating design ideas
* provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling
* provide a range of materials/components and support students to develop the necessary knowledge and skills to test and use them
* guide students to evaluate outcomes in situ against key attributes.

**Indicators**

Students can:

* describe design ideas (either through drawing, models and/or verbally) or potential outcomes
* undertake functional modelling to develop design ideas into a conceptual design that addresses the key attributes
* test the key performance properties of materials/ components to select those appropriate for use in the production of a feasible outcome
* produce and trial a prototype of the outcome
* evaluate the fitness for purpose of the final outcome against the key attributes.

Level 5

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level five teachers could:

* ensure that there is a brief with clear specifications against which a developed outcome can be evaluated
* establish an environment that supports student innovation and encourages analysis of existing outcomes
* provide opportunities to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling
* provide a range of materials/components and support students to develop the necessary knowledge and skills to evaluate and use them
* guide students to evaluate outcomes in situ against brief specifications.

**Indicators**

Students can:

* generate design ideas that are informed by research and analysis of existing outcomes
* undertake functional modelling to develop design ideas into a conceptual design that addresses the specifications
* evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome
* produce and trial a prototype of the outcome
* evaluate the fitness for purpose of the final outcome against the specifications.

Level 6

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level six teachers could:

* ensure that there is a brief with clear specifications against which a developed outcome can be evaluated
* establish an environment that supports student innovation and encourages critical analysis of existing outcomes
* support students to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling
* support students to explore a range of materials/ components and to develop the necessary knowledge and skills to evaluate and use them
* support students to undertake prototyping to evaluate the outcome’s fitness for purpose and identify any further development requirements
* support students to gain targeted stakeholder feedback.

**Indicators**

Students can:

* generate design ideas that are informed by research and the critical analysis of existing outcomes
* undertake functional modelling to refine design ideas and enhance their ability to address the specifications
* evaluate design ideas in terms of their ability to support the development of a conceptual design for a feasible outcome
* evaluate the conceptual design against the specifications to determine the proposed outcomes potential fitness for purpose
* evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome
* produce and trial a prototype of the outcome to evaluate its fitness for purpose and identify any changes that would enhance the outcome
* use stakeholder feedback to support and justify key design decisions and evaluations of fitness for purpose.

Level 7

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level seven teachers could:

* ensure that there is a brief with clear specifications against which a developed outcome can be evaluated
* establish an environment that supports student innovation and encourages critical analysis of existing outcomes
* support students to critically analyse evaluative practices used within functional modelling
* support students to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling
* support students to explore a range of materials/ components, and to develop the necessary knowledge and skills to evaluate and make effective use of them
* support students to undertake prototyping to gain evidence that enables clear judgments regarding the outcome’s fitness for purpose and determine the need for any changes to enhance the outcome
* support students to gain targeted stakeholder feedback and understand the implications of the physical and social environment in which the outcome is to be located.

**Indicators**

Students can:

* generate design ideas that are informed by research and critical analysis of existing outcomes
* develop design ideas for outcomes that are justified as feasible with evidence gained through functional modelling
* critically analyse evaluative practices used when functional modelling to inform own functional modelling
* undertake functional modelling to evaluate design ideas and develop and test a conceptual design to provide evidence of the proposed outcome’s ability to be fit for purpose
* evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome
* undertake prototyping to gain specific evidence of an outcome’s fitness for purpose and use this to justify any decisions to refine, modify and/or accept the outcome as final
* use stakeholder feedback and an understanding of the physical and social requirements of where the outcome will be situated to support and justify key design decisions and evaluations of fitness for purpose.

Level 8

**Achievement objective**

Students will:

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.

**Teacher guidance**

To support students to undertake outcome development and evaluation at level eight teachers could:

* ensure that there is a brief with clear specifications against which a developed outcome can be evaluated
* establish an environment that supports student innovation and encourages critical analysis of existing outcomes and knowledge of material innovations
* support students to critically analyse the ways in which the fitness for purpose of existing outcomes have been determined, and how appropriate development practices were established
* support students to develop drawing and modelling skills to communicate and explore design ideas. Emphasis should be on progressing 2D and 3D drawing skills and increasing the range and complexity of functional modelling
* support students to explore a range of materials/components and to develop the necessary knowledge and skills to evaluate and make effective use of them.
* support students to establish which materials/components would be optimal for use when taking into account all contextual dimensions
* support students to undertake prototyping to gain evidence that enables clear judgments regarding the outcome’s fitness for purpose and determine the need for any changes to enhance the outcome
* support students to gain targeted stakeholder feedback and understand the implications of the physical and social environment in which the outcome is to be located.

**Indicators**

Students can:

* generate design ideas that are informed by research and critical analysis of existing outcomes and knowledge of material innovations
* develop design ideas for feasible outcomes that are justified with evidence gained through functional modelling that serves to gather evidence from multiple stakeholders and test designs ideas from a range of perspectives
* undertake evaluation of design ideas informed by critical analysis of evaluative practices to support the development of a conceptual design for an outcome that optimises resources and takes into account maintenance and disposal implications
* undertake functional modelling of the conceptual design to provide evidence that the proposed outcome has the potential to be fit for purpose
* evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome that optimises resources and takes into account maintenance and disposal implications
* undertake prototyping to gain specific evidence of an outcome’s fitness for purpose and use this to justify any decisions to refine, modify and/ or accept the outcome as final
* use stakeholder feedback and an understanding of the physical and social requirements of where the outcome will be situated to support and justify an evaluation of the outcome and development practices as fit for purpose.