L-Università ta' Malta

MATSEC
Examinations Board

School-based Assessment Exemplars

SEC 29 Graphical Communication

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School-Based Assessment Mode 1: Portfolio

Portfolio	
100 marks	**Defining a Portfolio** A portfolio can be described as the "purposeful collection of student work that exhibits the student's efforts, progress and achievements" (Paulson, Paulson, & Meyer, 1991, p.60). The use of portfolios is being recommended as an authentic and formative assessment strategy where the assessment is used to aid and support the learning process (Chetcuti & Grima, 2001). It is envisaged that while the students are involved in the assessment process, they will develop metacognitive (Gencel, 2017) and self-regulating skills (Romero, Saucedo, Caliusco, & Gutiérrez, 2019) that lead to positive attitudes towards self-directed learning (Gresham, 2019). Through this educational tool, students assume ownership of their own learning and understand the educational process on a personal level. **The aim of a portfolio** At face value, the aim of building up a portfolio is to train students keep a record of their learning and document their educational journey. Portfolio assessment requires students to collect evidence of their work and demonstrate achievement of learning outcomes. Portfolios should also be used to "help students think and reflect critically about their work, as a tool for dialogue between student and teacher, and as a means of developing targets for future learning" (Chetcuti & Grima, 2003, p.91). Portfolios must be aligned with the curriculum and target specific learning outcomes and assessment criteria. A portfolio in Graphical Communication should include evidence of selecting contents, the criteria for selection, success, progress (Chetcuti & Grima, 2001) and evidence of student self-reflection (Jones, 2010). **The Portfolio** A portfolio is a personal educational tool, thus it is expected to reveal "individuality" (Farr, 1994, p.60) and students' progress. Although the starting point and targeted learning outcomes are often common to the whole classroom, each student is expected to produce a separate and different portfolio folder. This should convey students' activities, intents, contents and judgements. A final project defines the whole portfolio's identity and sets an end-goal for students to strive for. The teacher selects a syllabus focus and presents a number of related areas/themes to the students. The students are set to choose their own area/theme and decide on a personal style to build up the portfolio. The teacher is expected to provide guidelines throughout the whole process, so that the students can improve their portfolio. A portfolio is expected to be compiled both in class and at home, and completed throughout the period in which the respective learning outcome is being covered in class. **Examples of areas/themes related to a portfolio based project.** ● A design using quadrilaterals, triangles and/or circles (e.g. Tangram); ● Design a toy, house or a face using basic shapes and constructions; ● A design using a selection of regular polygons; ● A series of 3 photo manipulations; ● A series of projections created using CAD. **A portfolio should include the following four components:** 1) front page & research; 2) selection of drawings; 3) a final drawing; 4) a self-evaluation sheet. It is suggested that all the four components are compiled in one folder.

Front page & research.
For a start, the teacher needs to provide the students with the description and aims of a portfolio. The learning outcomes covered during a particular portfolio assessment should be discussed in class, as well as the final project as an end-goal target. A portfolio's first section includes a front page and some research material.

The front page should include:

- The title of the area/theme and the syllabus focus that the portfolio will cover.
- The related learning outcomes that students are expected to cover in their coursework.
- The success criteria of the final project.

Following an explanation of the required portfolio components by the teacher, the students should start researching their chosen area/theme. Exemplars of similar/past/existing work that serve as a starting point for students, are provided by the teacher.

Selection of drawings.
Students are expected to generate many drawings while covering the learning outcomes in class. These drawings may include any homework or focused tasks that the teacher sets out. Students should record information that shows growth and development and include a selection of these in their portfolio, along with their best drawings. It is expected that a student presents between 6 to 9 A3 drawings in this section.

Final drawing.
The final project is the finished product that a student will aspire to and include at the end of the portfolio. This design, presented on an A3 sheet, should reflect and show a clear understanding of the learning outcomes presented on the front page. The final project should portray the skills obtained by the student while conforming to the success criteria outlined on the front page.

Self-evaluation sheet.
The portfolio should also include evidence of self-evaluation and self-reflection carried out by the student.

Portfolio content guideline.

Section	Details
Front page and research	This section should include: ● the following information which was provided by the teacher: ○ The title of the area/theme. ○ The related learning outcomes. ○ The success criteria of the final project. ● research information related to their final project which explores more than one possible outcome.
Selection of drawings	This section should contain: ● between 6 - 9 A3 drawings, sketches, etc. ● step by step instructions and/or any other information that helped the student achieve the learning outcomes indicated on the front page.
Final drawing	This section should contain the student's final drawing showcased as best as possible on an A3 sheet. The final drawing should be defined by a number of success criteria and reflect the skills acquired by the student.
Self-evaluation sheet	This section should list the success criteria alongside a level grade (e.g. Very happy – Happy – Sad – Very sad) with which students assess their own work. A short comment about their overall portfolio is also required from the students. This comment should indicate any strengths/weaknesses and targets for future learning.

Marking the Portfolio.

Marks (100 marks) are assigned as follows:

- The front page & research, selection of drawings, final drawing and the self-evaluation sheet are assessed by means of a rubric.

References

Chetcuti, D., & Grima, G. (2001). *Portfolio assessment*. Floriana: Ministry of Education.

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Farr, R. C. (1994). In Tone B. (Ed.), *Portfolio and performance assessment: helping students evaluate their progress as readers and writers* Harcourt Brace College.

Gencel, I. (2017). The Effect of Portfolio Assessments on Metacognitive Skills and on Attitudes toward a Course *. *Kuram Ve Uygulamada Egitim Bilimleri, 17*(1), 293-319. doi:10.12738/estp.2017.1.0378

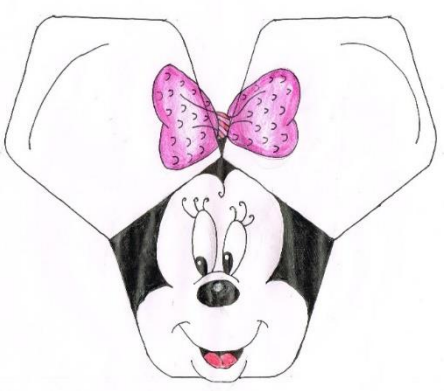
Gresham, J. (2019). In Raffanti M., Allerdyce P.,Diane and Gozawa P.,Joanne(Eds.), *Self-Directed Learning: Empowering Authentic Learner Autonomy Through Self-Agency in the Secondary School Learning Environment* ProQuest Dissertations Publishing.

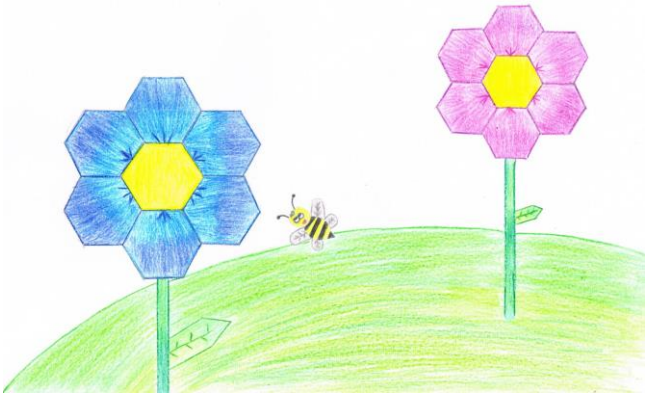
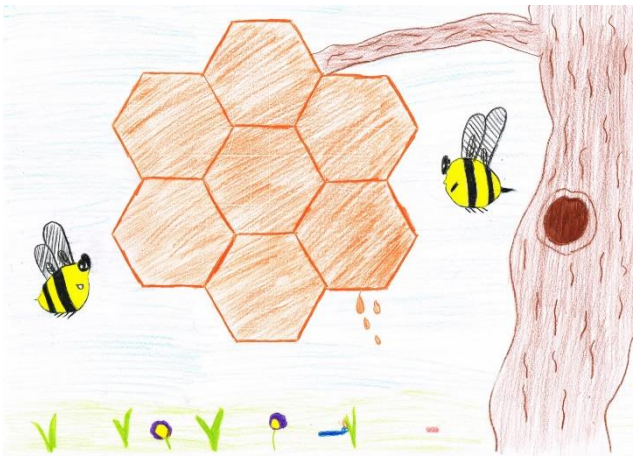
Jones, E. (2010). Personal theory and reflection in a professional practice portfolio. *Assessment & Evaluation in Higher Education, 35*(6), 699-710. doi:10.1080/02602930902977731

Paulson, F., Paulson, P., & Meyer, C. (1991). What Makes a Portfolio a Portfolio? *Educational Leadership, 48*(5), 60.

Romero, L., Saucedo, C., Caliusco, M. L., & Gutiérrez, M. (2019). Supporting self-regulated learning and personalization using ePortfolios: a semantic approach based on learning paths. *International Journal of Educational Technology in Higher Education, 16*(1), 1-16. doi:10.1186/s41239-019-0146-1

Portfolio exemplar: Geometry

Section	Details
Front page and research	**Area/theme title**: Create a design made up of regular polygons. **Related LO's.** By the end of this assignment I will be able to: 1) identify regular polygons and recall their properties (LO 1); 2) construct regular polygons with drawing instruments (LO 1); 3) render my pictorial views effectively (LO 4); 4) use colour effectively and distinguish between cool and warm colours (LO 6). **Success criteria.** The final drawings should; 1) include one or more polygon types; 2) be drawn in full colour using pencil colours; 3) be an original design. **Examples of final drawings:**  

	  **Research:** The student is expected to carry out research and gather enough information about at least 2 different ideas.
Selection of drawings	The student is expected to Include between 6 - 9 drawings showing different polygon construction techniques.
Final drawing	The student is expected to produce one final project on an A3 sheet according to the success criteria listed on the front page.
Self-evaluation sheet	The student is expected to: ● list the success criteria and grade his/her level of achievement in each one; ● write down a short comment on the overall quality of the portfolio; ● indicate any strengths/weaknesses that you feel about your portfolio; ● write down at least 2 specific targets for future learning.

School-Based Assessment Mode 2: Pictorial Projection

Pictorial Projection	
100 marks	**Defining pictorial projection.** A pictorial projection is the act of describing the information of a living, recreational or static workspace pictorially, as opposed to oral or written format. The nature of the information can vary, but the presentation must always convey clear and detailed representational view of the subject. Pictorial projections are drawn in 3D with the help of drawing instruments and techniques. As such, pictorial drawings give "an overall impression of what an object looks like which is easy to visualise" (O' Sullivan & O' Sullivan, 2006, p. 61). Pictorial projections are mainly intended to "communicate ideas to anybody" (Morling, 2012, p. 31), because they are easier to understand than detail drawings (Chirone & Perotti, 1991). This is mostly due to the nature of visual signs, which may be considered as a form of common language across cultures (Akyuz, 2017). **The aim of pictorial projection.** The manipulation of technical drawings enables students to develop their spatial skills. Understanding spatial forms and representing them in a 2D format is considered an indispensable skill (Corsiuc, Marza, & Graur, 2019) for students in Graphical Communication. A pictorial projection aids student's spatial visualisation (Marunic & Glazar, 2014; Twissel, 2014) when the students mentally manipulate "pictorially presented stimuli" (Marunic & Glazar, 2013, p. 704). During pictorial projection assignments, students are encouraged to apply the concepts and skills introduced in the classroom (Yue, 2006) to prepare their pictorial illustrations. A pictorial projection assignment presents an added opportunity for students to venture outside the Graphical Communication classroom in order to explore, discover and integrate their academic learning. **The pictorial projection assignment.** A pictorial projection assignment in Graphical Communication is set by the teacher, worked out in class and may be finalized at home. Using any method of "graphical representation" (Bland, 1986, p. 60), or pictorial projection, students are set to conceptualise and draw an existing space in 3D including a number of objects. Research on an existing living space is carried out by students. They are expected to internalise both the space by sketching it and drawing a plan of its layout and the object by sketching and drawing it. A 3D pictorial projection of the space and objects is finally produced by the students as a means to visually communicate their ideas to anybody. **Examples of pictorial projection assignments.** ● The production of a pictorial illustration of an area inside the school (foyer, grounds, etc.) which students must survey, measure and/or scale. Information such as safety exits, emergency doors and stair/gangways must be included in the pictorial projection. ● The production of a pictorial illustration of an existing room (bedroom, kitchen, study etc.) in either isometric or oblique detailing the contents inside. The drawing must include sketches, a plan, and rendering to make it visually true to the materials. ● The production of a detailed pictorial illustration of an existing exterior space (garden, playgrounds, landscaping) in any pictorial projection. The drawing must include sketches, a plan, and the rendering of elements to embellish the projection.

- The production of a pictorial illustration of a place of work (shops, factory, youth centres, architect's drafting office, designer's office etc.) in any pictorial projection. The assignment must include preparatory research, sketches of the workplace, and a plan of the workplace. Additional information (e.g. safety measures, workflow setups etc.) regarding the place of work as notations are also required.

A pictorial projection assignment should include the following four components:

1) front page;
2) research;
3) sketches and a plan;
4) a pictorial illustration.

All four components must be compiled in one folder.

Front page.

The teacher selects a pictorial assignment and provides the students with the details needed to complete the assignment.

The front page should include:

- The title of the pictorial assignment.
- The related learning outcomes that students are expected to cover.
- The success criteria of the final illustration.

Following an explanation of the required assignment by the teacher, the students are expected to prepare a well laid-out A3 front page with the details listed above. Exemplars of similar/past/existing work are provided by the teacher to serve as an inspiration to the students.

Research.

Students are expected to collect information related to their assignment. These should include both overview and detail aspects. A typical research may include any or a combination of existing architectural plans, notes, pictures, textile samples, material renderings, safety considerations, ergonomics, etc. Students are expected to present ample information which describes the details needed to produce the final product.

Sketches and plan.

The students explore their out-of-class experiences in this section, using multiple approaches. The sketches in this section must reflect well the assignment choice while leaving enough leeway for changes and/or amendments. Students are required to present between 3 to 5 A3 sketches complete with annotations and details.

A plan of the final product must also be included in this section. The plan must be drawn to scale (scaled down) and feature measurements and dimensions while also conforming to orthographic projection conventions.

Final pictorial illustration.

The final product should reflect the student's grasp of the learning outcomes as best as possible. This product must be presented in A3 format. Effort should be made to produce a presentable, well-scaled, neat and accurate drawing. This drawing should be presented in full colour, and include aspects of rendering textures and/or symbols.

Pictorial projection content guidelines.

Section	Details
Front page	This section should include: ● the following information, which was provided by the teacher, on an A3 paper: ○ The title of the area/theme. ○ The related learning outcomes. ○ The success criteria of the final project.
Research	This section should contain: ● two A4 sheets containing information about the final product; ● any or a combination of: ○ existing architectural plans; ○ notes, pictures; ○ textile samples; ○ material renderings; ○ safety considerations, ○ ergonomics, etc.
Sketches and plan	Freehand sketches are required to be presented in this section to feature students' developmental process. In this section students must include: ● Between 3 – 5 sketches in A3 showing the plan and/or projection of the space and objects ● A plan of the final projection with all the details necessary to produce it ● All the necessary notes taken during the preparations of the drawing
Final pictorial illustration	This section should contain the student's final product showcased as best as possible on an A3 sheet. The final product should adhere to a number of success criteria and reflect the skills acquired by the student. The final pictorial illustration should also be presented in colour and fully rendered.

Marking the pictorial projection assignment.

A total of 100 marks are assigned as follows:

- The front page, research, sketches & plan, and the final pictorial illustration are assessed by means of a rubric.

References:

Akyuz, U. (2017). Visual signs as a cross-cultural language. *Ponte, 73*(4), 170-179. doi: 10.21506/j.ponte.2017.4.14.

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Chirone, E. P., & Perotti, G. (1991). Drafting and Design: a Point of View on a Traditional Subject in Engineering Education. *European Journal of Engineering Education, 16*(1), 37-40. doi:10.1080/03043799108939502

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Marunic, G., & Glazar, V. (2014). IMPROVEMENT AND ASSESSMENT OF SPATIAL ABILITY IN ENGINEERING EDUCATION. *Engineering Review, 34*(2), 139-150.

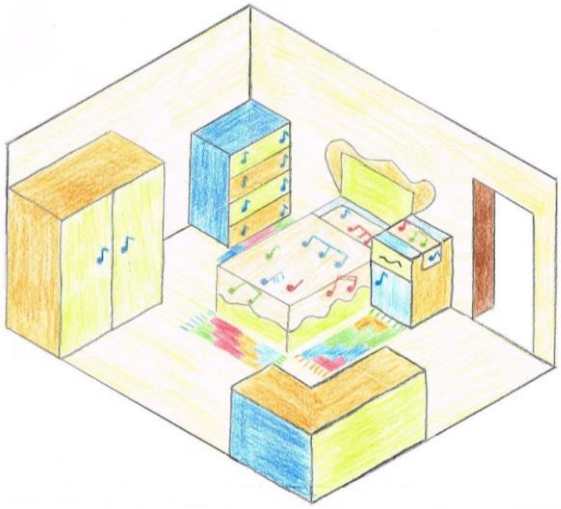
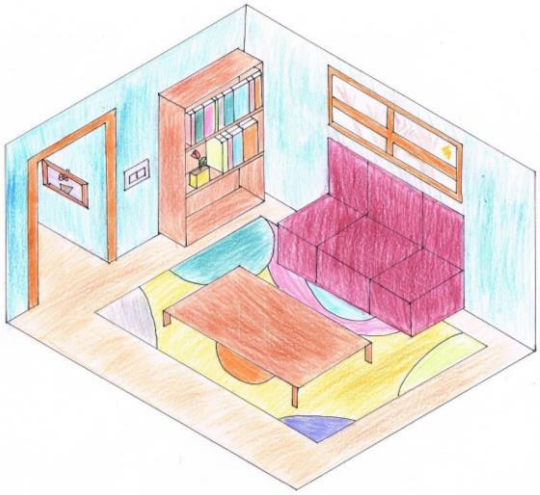
Morling, K. (2012). *Geometric and Engineering drawing* (3 rd ed.). New York: Routledge.

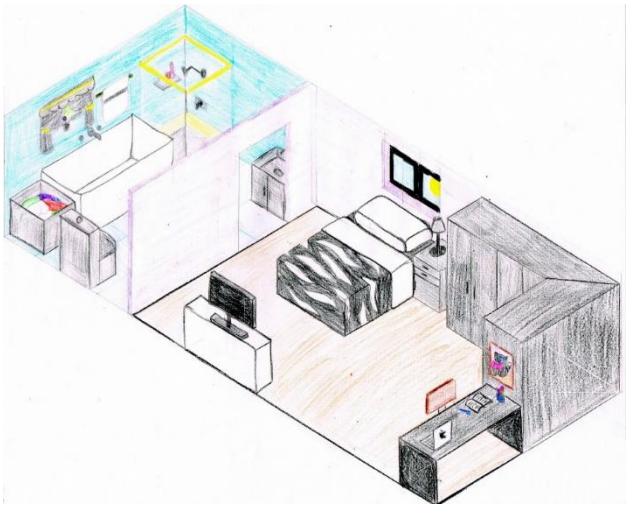
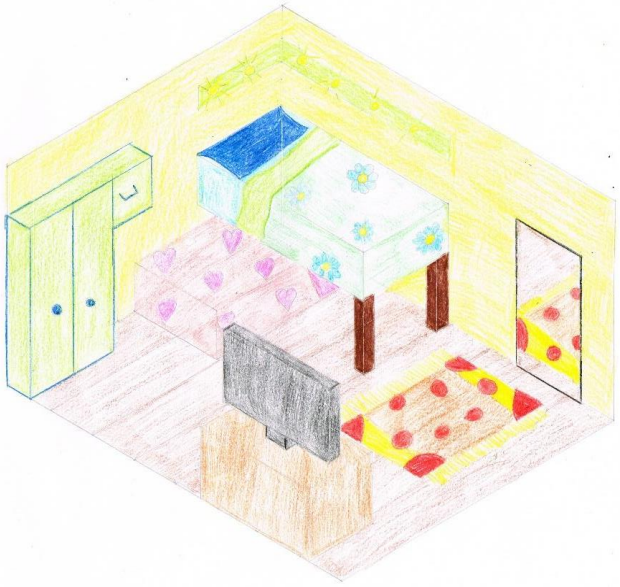
O' Sullivan, J., & O' Sullivan, T. (2006). *Understanding Technical Graphics*. Dublin: Gill & Macmillan.

Twissel, A. (2014). Visualisation in applied learning contexts: A review. *Educational Technology and Society, 17*(3), 180-191.

Yue, Y. (2006). Spatial Visualization by Isometric Drawing. Paper presented at the *Proceedings of the IJME,* INTERTECH Conference. (Session IT 302-031)

Pictorial Projection exemplar: Interior Design

Section	Details
Front page	**Area/theme title**: A pictorial illustration of an existing interior space in isometric. **Related LO's.** By the end of this assignment I will be able to: 1) Draw lines, circles and curves in isometric (LO 4); 2) Render my pictorial views effectively (LO 4); 3) handle my drawing instruments correctly and use them to recreate given geometrical figures and patterns (LO 1); 4) select colours from the colour wheel to suit my designs (LO 6). **Success criteria.** The final product should: 1) feature one or more existing adjacent rooms; 2) include at least 3 objects (furniture, decoration, wardrobe, curtains, appliances, etc.) 3) be drawn in full colour/rendered. **Examples of final projects:**  

			 
		Research	The student is expected to research ample information related to the features of the interior space. These will be included in this section along with some notes and/or details (e.g. furniture, room layout, apertures and dimensions).
		Sketches and plan	The student is expected to: ● draw using freehand the interior space at different angles; ● produce a well scaled plan including dimensions; ● record and present all the details necessary to produce the final pictorial illustration.
		Final pictorial illustration	The student is expected to: ● draw the interior space in isometric projection using instruments; ● render the interior room according to the furniture material and/or room decoration; ● show a high level of neatness and accuracy when drawing the interior space.

School-Based Assessment Mode 3: Computer-aided Drafting

Computer-aided Drafting	
100 marks	**Defining a Computer aided drafting project** Computer aided drafting in Graphical Communication is defined as the "process of [re]creating a technical drawing with the use of computer software" (Madsen, 2012). To achieve this goal, several drafting software packages have been developed which facilitate the process of digitising a traditional hand-drawn technical drawing. The content of graphics curricula has changed over the years with a shift towards computer-aided drafting, which is regarded as a very important part of a student's skill-set for today's reality (Seyeon, 2018). **The aim of a CAD project.** Without lessening the importance of traditional hand-drawn technical drawings (McLaren, 2008), the exposure to, and training in computer-aided drafting software is beneficial to students in many ways. This approach "guarantees multiple cascading advantages of improved understanding and enhanced spatial visualisation amongst students" and "tests the students for the understanding of the topic and not for their artistic [and in our case psychomotor] skills" (Babu, Suman, & Srinivasa Rao, 2019, p.119). It is expected that through this process, students realise the potential of computer-aided drafting (Bhavnani & John, 1996) that comply with standards and international conventions (Ozkan & Yildirim, 2016). **The CAD project.** A CAD project focuses on the re-creation of a detail drawing with the help of drafting software. To reach this goal, students need to familiarise themselves and use the software. This can be achieved through instructions and short tasks set out by the teacher. The preliminary work leading up to the final CAD project is led by the teacher, but students are encouraged to follow up their lessons with online instructional videos and tutorials. These videos can range in context, from instructions to install a CAD program to learn the tools and procedures. It is being recommended that the teacher directs the students' further learning by providing some links to these resources. This research forms part of the supporting documentation that goes along the CAD project. It is very important to stress that provided the learning outcomes are reached, the brand of CAD program used is irrelevant. Students can choose from a vast array of CAD programs as most of these provide a free or a student version. No student is expected to pay for a professional CAD program to carry out the CAD project. Teachers are expected to carry out lessons over a number of weeks in a computer lab to cover the CAD software. These should cover the software's interface, file operations, the use of layers, object properties, editing commands, etc. Students should be given the opportunity to explore additional functions on their own.

Examples of CAD projects.

By using the principles of 2D drafting, produce one of the following projects using CAD;

- A 2D geometric design made up of elements that can be carried out using the following basic commands: line, circle, ellipse and polygon. The design must feature different line types.
- Three orthographic views of a simple solid using CAD. The drawing must follow the standard conventions with regard to line types (e.g. construction line, centre line, hidden line).
- An architectural drawing of an interior residential unit that includes at least 4 different types of living areas (e.g. drawing the plan of a 1-bedroom apartment featuring an open plan, bedroom, bathroom, en-suite, stairs, shafts, corridors and/or balconies/terraces). The drawing must feature architectural symbols like doors, windows, archways etc.
- An architectural design of a sustainable recreational area (e.g. garden / patio / playing field or landscape) which may include elements of geometry like ellipses, circles in contact and tangential lines. The design must be embellished by using architectural symbols.

A CAD project should include the following four components:

1) Project information and supporting material;
2) Detail drawings (hand-drawn designs) of the project;
3) Hands on practice on a CAD program;
4) CAD design plot/print.

Project information and supporting material.

This section should include the CAD project's details and some supporting material compiled by students, including;

- The title of the CAD project (provided by the teacher).
- The related learning outcomes (provided by the teacher).
- The success criteria of the final project (provided by the teacher).

Following the teacher's directions, the student is expected to include supporting material related to the title of the CAD project. This material can be recorded as notes, images, screenshots and links to web resources. It is expected that students encounter several obstacles during their CAD project, and the solutions should be recorded in the supporting material section (e.g. students encounter a difficulty with drawing a polygon, they search the appropriate tool/command and document it in the supporting material section for future use). The student is free to use any paper size and format to present this section.

Exemplars of similar/past CAD projects are provided by the teacher.

Detail drawings.

The students are expected to compile a set of 3-4 detail drawings that cover all the learning outcomes required for their CAD project. These detail drawings are to be hand-drawn and must provide all the information needed to carry out the project. The amount and items required are set by the teacher when the task is presented to the students. The detail drawings can be drawn either using instruments or freehand.

Hands on practice on a CAD program.

Students will digitize and save their detail drawings using the software in class. They will be assessed by the teacher according to their proficiency in the use of the software.

CAD design plot/print.

The final output should be plotted/printed according to the success criteria outlined in the front page on an A3 or A4 sheet. Final plot is expected to be well presented in a layout with a border line and a personalized name block. Appropriate line types and lettering are also required.

CAD Project content guidelines.

Section	Details
Project information and supporting material	This section should include: ● the following information which was provided by the teacher: ○ The title of the CAD project; ○ The related learning outcomes; ○ The success criteria of the final project. ● multiple examples of CAD projects provided by the teacher. ● a record of how challenges encountered were overcome including any supporting material. (This would serve as a reference for future CAD designs.)
Detail drawings	This section should contain: ● the hand-drawn preparatory material/sketches for the CAD project; ● chosen drawings reflecting the success criteria; ● all the relevant details and information.
Hands-on practice	The students are assessed by the teacher while digitizing and saving their drawings in class.
CAD design plot/print	This section should contain the student's re-creation and printout of the CAD project on a sheet size as specified in the success criteria. The plot should be well presented and include appropriate line types and lettering. The layout should have a borderline and custom letter block.

Marking the CAD project.

A total of 100 marks are assigned as follows:

A total of 10 marks are assigned to the hands-on practice in class.
A total of 90 marks are assigned to the other three sections:

- The project information & supporting material, detail drawings and the CAD design plot are assessed through a rubric.

References

Babu, M., Suman, K., & Srinivasa Rao, P. (2019). Drafting software as a practicing tool for engineering drawing-based courses: Content planning to its evaluation in client–server environment. *International Journal of Mechanical Engineering Education, 47*(2), 118-134. doi:10.1177/0306419017754226

Bhavnani, S. K., & John, B. E. (1996). Exploring the unrealized potential of computer-aided drafting. Paper presented at the *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 332-339.

Madsen, D. A. (2012). In Madsen D. P., Turpin J. L. (Eds.), *Engineering drawing and design* (6th ed. ed.) Delmar Gengage Learning.

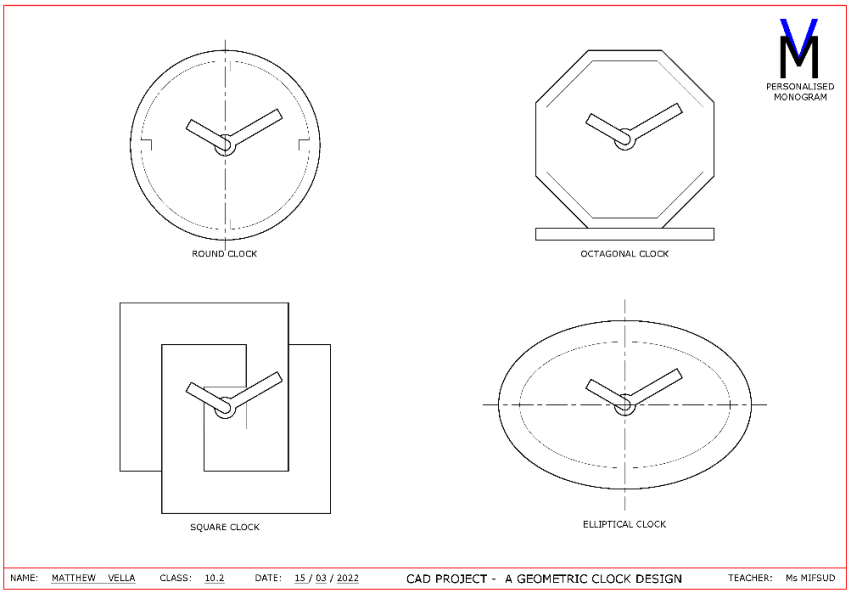
McLaren, S. (2008). Exploring perceptions and attitudes towards teaching and learning manual technical drawing in a digital age. *International Journal of Technology and Design Education, 18*(2), 167-188. doi:10.1007/s10798-006-9020-2

Ozkan, A., & Yildirim, K. (2016). Comparison of Conventional and Computer-aided Drafring Methods from the View of Time and Drafting Quality. *Eurasian Journal of Educational Research, 62*, 239-254. doi:http://dx.doi.org/10.14689/ejer.2105.58.2

Seyeon, L. (2018). Impacts of Computer-aided Software on Introducing Architectural Drafting to Beginning Design Students. *The 34th National Conference on the Beginning Design Student, (NCBDS), 34*(1)

Computer-aided Drafting exemplar

2D Geometric Drawing

Section	Details
Project information and supporting material	**Title**: A geometric clock design using CAD software. **Related LO's.** By the end of this task I will be able to: 1) perform basic operations and use basic design software tools (LO 10); 2) produce 2D drawings by using computer design software (LO 10); 3) identify the properties of an ellipse (LO 2); 4) draw stylised pictograms to convey an idea (LO 6). **Success criteria.** The final project should; 1) include different line types; 2) be well-presented, laid out and plotted/printed on an A3 sheet; 3) be plotted/printed in landscape layout; 4) be saved in pdf format.  **Example of a final project:** **Supporting material:** The student is expected to compile at least 3 A4 sheets of supporting material that may include: ● step by step instructions; ● examples of frequently used commands; ● examples of online tutorials.
Detail drawings	The student is expected to present at least 2 detail drawings/sketches showing a number of different designs.
Final project	The student is expected to: 1. Recreate (digitize) the 2D detail drawing using the CAD software. 2. Plot/print the CAD project on an A3 sheet in landscape layout. 3. Save a soft copy of the CAD project as specified.

School-Based Assessment Mode 4: Graphic Design Project

Graphic Design Project	
100 marks	**Defining a Graphic Design Project.** Although the majority of the content described in this syllabus is intended to be presented in a somewhat linear fashion, this approach ultimately focuses on learning skills in isolation (Gonzalez, n.d., as cited in Weegar & Pacis 2012). According to Piaget's theory of cognitive development, students cannot understand and use any given information without "constructing" their own interpretation of that knowledge through prior personal experiences (Learning-Theories, 2015). A Graphic Design Project offers students the opportunity to internalise the information communicated in class over the course of a practical project with the teacher acting as "*a guide, facilitator, and co-explorer who actively encourages learners to question, challenge, and formulate their own ideas, opinions, and conclusions"* (Weegar & Pacis 2012). **The Aim of a Graphic Design Project.** The aim of a Graphic Design Project is to provide students with a practical context to test the skills they have learnt in the classroom. Applying Graphical Communication skills to solve design-oriented problems allows students to continue expanding their knowledge, understanding, skills and competencies. This eventually leads to the development of critical thinking and decision making skills. In order to successfully complete a Graphic Design Project, students will have to brainstorm, research and develop a Graphical Communication design outcome independently. Graphic Design Projects have to be aligned with the curriculum and target specific learning outcomes and assessment criteria. They should explore a context that is relevant to the subject content and/or processes being assessed. **The Graphic Design Project.** The Graphic Design Project presents students with a hypothetical scenario, or design brief, which they will need to analyse and interpret in order to create a specific outcome, *e.g. a poster, infographic, logo, etc.* The Graphic Design Project should be guided and consequently take place in class over the course of 6 to 8, preferably, consecutive lessons. **Examples of Graphic Design Projects:** ● Design a packaging net for a box of chocolates; ● Design a pop-up greeting card; ● Design a set of 5 or more wayfinding signs for a public space and build a small model; ● Design a poster on a promotional stand for a film (see exemplar below); ● Design a health and safety brochure using appropriate ideograms (incorporating cut-out elements).

A Graphic Design Project has four phases: Scenario and Research, Ideas Generation & Development, Final Outcome and Presentation.

Scenario and Research.
Before the students start working on the Graphic Design Project, the teacher needs to provide them with all the necessary information regarding the given scenario via a design brief. This design brief should describe:

- the context and nature of the Graphic Design Project *(e.g. a re-imaging of an existing film poster);*
- the expected final outcome of the Graphic Design Project *(e.g. a poster, infographic, logo, etc.)*, and provide visual examples of similar existing designs as scaffolding;
- any specifications or constraints the final outcome should follow *(e.g. size, colour,* orientation, etc.).

Following an explanation of the design brief by the teacher, the students should begin carrying out some research on similar scenarios and Graphic Design Projects. This research should include 4 – 6 images of existing design outcomes relevant to the given project scenario (e.g. a poster, infographic, logo, etc.).

Ideas Generation and Development.
Students are expected to generate and consider multiple different ideas before working on the final outcome itself. This process takes place over the course of mind maps, thumbnail sketches, collages, reflective annotations and/or test pieces using different software, tools, and techniques. The teacher should provide formative feedback throughout this process and guide students in the direction of their most effective and realistic ideas.

Final Output.
The final output refers to the finished outcome designed by the student *(e.g. a poster, infographic, logo, etc.)*, created according to the specifications set by the teacher in the design brief.

The Graphic Design Project Presentation.
At the end of the Graphic Design Project, each student should prepare a presentation showcasing their creative process and final outcome.

Graphic Design Project Presentation Guidelines.

Section	Details
Scenario and Research	This section should include the following information which was provided by the teacher: ● The title of the Graphic Design Project ● The context and nature of the Graphic Design Project ● The expected final outcome of the Graphic Design Project *(e.g. a poster, infographic, logo, etc.)*, and provide visual examples of similar existing designs as scaffolding ● Any specifications or constraints the final outcome should follow *(e.g. size, colour,* orientation, etc.).
	This section should include a variety of examples of scenarios and Graphic Design Projects similar to the one described by the teacher in the design brief, gathered by the student.

Ideas Generation and Development	This section should contain a record of the student's creative process throughout the Graphic Design Project, including: ● Thumbnail sketches, detailed drawings, and /or collages; ● Reflective annotations; ● Digital test pieces created using appropriate software; ● A mock-up of the solid model that will support the design.
Final Output	This section should contain the student's final outcome showcased in an appropriate manner *(e.g. mock-ups, sample spreads, logo proofs, etc.).*
Graphic Design Project Presentation	Each student should prepare a short presentation (3 – 5 minutes) showcasing their creative process and final outcome. This presentation should also include visuals related to the Graphic Design Project (E.g. visual research, sketches, test pieces, final outcomes, etc.). The teacher can ask questions to confirm authentication of the work presented and to consolidate skills acquired.

Marking the Graphic Design Project.

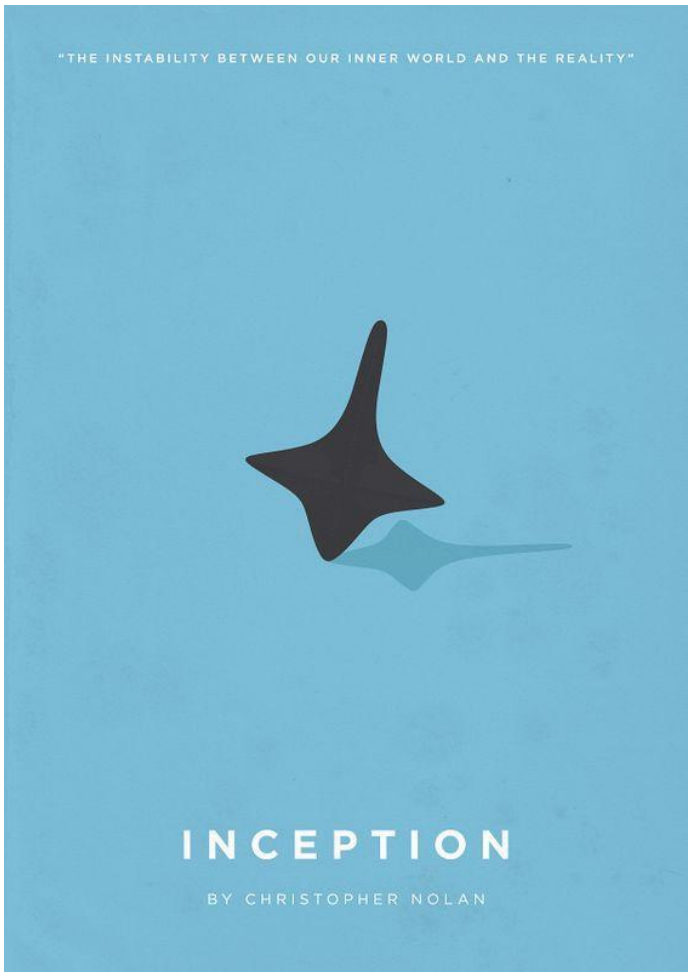
Marks (100 marks) are assigned as follows:

- Research, Ideas Generation and Development process, Final Output, and Graphic Design Project presentation are assessed through a rubric (90 marks).
- The Graphic Design Project Presentation's delivery in class is assessed through the same rubric (10 marks).

References:

LEARNING-THEORIES. (2015) Constructivism. [Online] Available from: http://www.learning-theories.com/constructivism.html [accessed on: June 26, 2019].

WEEGAR, M. A. and PACIS, D. (2012) A Comparison of Two Theories of Learning - Behaviorism and Constructivism as applied to Face-to-Face and Online Learning. [Online] p. 2-12. Available from: http://www.g-casa.com/conferences/manila/papers/Weegar.pdf [accessed on: June 26, 2019].

Graphic Design Project Exemplar	**Graphic Design Project** Design an A4 poster for an existing film and a promotional stand for it. **Related LO's.** By the end of this assignment I will be able to: 1) Understand and use basic computer tools associated with desktop publishing and image editing software (LO 8); 2) Present my design ideas using appropriate tools and media (LO 8); 3) Construct the developments of intersecting solids (LO14); 4) Select colours from the colour wheel to suit my designs (LO 6). **Background / Scenario** Your objective for this Graphic Design Project is to create an alternative A4 poster artwork for an existing film of your choice and a promotional stand that goes with it. You are free to choose whichever approach and techniques *(e.g. photo manipulation, vector illustration, collage, hand-drawn illustration, etc.)* you think is the best fit for your chosen film.  **Final Outcome Specifications** Your final outcome poster should be A4 and in addition to any visuals should at least include, the following information: ● The film's title ● The name of the director and/or at least one actor/actress ● A quote from or about the film.

The promotional stand development should have the following specifications:

- Be sturdy and stable;
- Be safe for passers-by;
- Be made up of prisms and/or cylinders.

Research

Look up a minimum of 3 examples of other film posters and promotional stands. These examples should include as much variety as possible in terms of techniques and genres, and stand shapes.

Ideas Generation and Development

Follow these steps in order to generate and develop your ideas for this Graphic Design Project:

- Use one or more of the ideas generation techniques covered in class *(i.e. mind mapping, reverse thinking and/or SCAMPER)* to devise ideas for your film poster.

- Produce a minimum of 3 sketches/visuals showing different ideas for your film poster and include short notes on why you think each concept is effective.

- Select your best sketches/ideas and produce a minimum of 3 test pieces using the tools and techniques of your choice. These test pieces should be different from one another and experiment with different parts of your poster's design *(e.g. colour, composition, font, etc.)*.

- Produce a minimum of 2 visuals (e.g. freehand sketches, CAD drawings, 3D models, etc.) of a promotional stand showing different shapes and positions.

Final Outcome

Create the A4 film poster using the tools and techniques of your choice and present it appropriately along with the preferred promotional stand model. (e.g. trim and mount hand-drawn illustrations, export and print digital outcomes, build the promotional stand, etc.)

Graphic Design Project Presentation

Prepare a short presentation showcasing your creative process and final outcome in an appropriate manner. Be sure to include the following in your presentation:

- a summary of your objective during this Graphic Design Project *(E.g. I aimed to create a minimal style poster of the film Inception and a promotional stand for it)*;
- examples of your research which influenced your final outcome;
- any sketches and test pieces which you made before producing the final outcome;
- the final outcome itself.

School-Based Assessment Mode 5: Solid Modelling

Solid Modelling	
100 marks	**Defining solid modelling** Solid Modelling in Graphical Communication is the process of developing solid 3-D tangible models of objects or designs. The focus in the classroom is shifted towards a 'learning by doing' (Hedrick, 2011) and experiential (Roberts, 2002) approaches where students are led to build models of their ideas in an inclusive education pedagogy (Biggs, 1999; Florian & Linklater, 2010). **The aim of solid modelling.** It is claimed that solid modelling helps students acquire spatial reasoning (Hallowell, Okamoto, Romo, & La Joy, 2015) and the development of spatial cognitive skills (Contero, Naya, Company, Saorin, & Conesa, 2005) such as spatial visualisation, spatial temporal abilities and mental transitioning (Brannon, 2008). Spatial visualisation is the ability to process spatial information to understand the geometry of a solid and the shape its development produces when cut and folded. Such skill is heavily employed in the intersection of solids and developments. Katsioloudis, Jovanovic, & Jones (2014) indicate that students comprehend better visual data from 3-D solid models than from other types, such as computer generated models. Spatial temporal ability is the judgement of moving objects in space in steps of temporal periods, that in Graphical Communication we refer to as loci. In this topic, which is often attributed to problem-solving, teachers often use solid models as exemplars to help students understand fundamental mechanics. Mental transitioning is the skill employed by students to mentally move objects in space parallel or relative to an axis system. In Graphical Communication this ability comes into play mostly in assemblies, where students need to mentally assemble an object in order to understand how the disassembled components interact and interlock with one another. Carrying out a solid model assignment in this area will facilitate students' learning and understanding processes. **The solid modelling assignment** A solid modelling assignment is aligned to a set of learning outcomes and success criteria. The modelling assignment must include enough information to convey the student's developmental process of grasping the concepts defined in the learning outcomes. It is expected that it takes several attempts for students to produce a model, and that generally very rarely they will 'get it right' at their first attempt. This should not be seen as a drawback, but instead celebrated in class, as it follows the normal cyclical models that explain how people learn from experience (Webb, 2006). These attempts and modifications should be recorded in the assignment as they are proof that the student went through a rigorous problem-solving process. It is suggested that the solid modelling assignment is made from recycled materials as much as possible. **Examples of solid modelling assignments.** ● A model of a real-life object that features intersection of solids (e.g. a lantern, a lighthouse or a rocket) and decorative graphical elements. The object should be made up of one or a combination of these solids (Prisms and/or cylinders).

- A model of a mechanism. The mechanism should feature a combination of any of the following components (pivot, slider, crank, linkage, follower) which may be drawn using vector software;
- A simple assembled toy/gadget featuring decorative graphical elements. The assembly must include at least 3 solid parts. The assignment must include freehand sketches, a detailed bill of materials, a final assembly drawing and a solid model of the toy/gadget.

A solid modelling assignment should include the following four components:

1) front page & research;
2) detail drawings;
3) a final model;
4) a reflective journal.

It is suggested that all the four components are compiled in one folder.

Front page & research

The teacher selects an assignment and provides details to the students. The learning outcomes covered during the assignment and the success criteria should be provided by the teacher. Following an explanation of the required assignment components by the teacher, the students should start preparing the first section. This should include a front page and research.

The front page should include:

- The title of the area/theme and the syllabus focus that the assignment will cover;
- The related learning outcomes that students are expected to cover in their coursework;
- The success criteria of the final model.

The research should include:

- information about existing examples related to the chosen models/loci/assemblies;
- freehand sketches of the proposed model by the student;
- a list of resources needed to produce the assignment and a timeline plan.

Exemplars of similar/past/existing work that serve as a starting point for students, are provided by the teacher.

Detail drawings

In this section, the students are expected to plan and produce the drawings needed for their solid model. These detail drawings can include orthographic projections, multi-view drawings, developments, pictorial projections, mechanism notes, mechanism movement stages, bill of materials, assembly drawings etc. These detail drawings should include all the details/instructions/plans to produce the solid model. It is expected that each student produces between 3 – 5 A3 sheets that feature detail drawings for their assignment. Detail drawings can be drawn using instruments, computer software, or a combination of both. The teacher decides which software to use in class, but each student is free to use any software s/he likes.

Final model

The final model is the product and execution of the previous stages. The model can be made from cardboard, wood, plastic, clay, polystyrene or any other solid material according to the criteria set by the teacher. It is important to note that effort should be made to use recycled materials, especially in the planning stages. Computer aided manufacturing equipment like 3D printers can also be used to produce the final model, but these assignments should be accompanied by screenshots portraying the 3D model and the software used.

Reflective Journal.

The student should submit a short self-evaluation regarding their project. In order to support this evaluation, the student is required to keep evidence of the process leading up to the final model such as a few pictures / photos / notes / sketches / plans / developments taken while building the model.

Solid modelling content guidelines.

Section	Details
Front page and research	This section should include: ● the following information which is provided by the teacher: ○ The title of the area/theme. ○ The related learning outcomes. ○ The success criteria of the final project. ● research related to their final project which includes information, a good number of sketches and a list of resources needed to produce the solid model. A simple timeline plan of the solid model process is required.
Detail drawings	This section should contain: ● between three and five A3 drawings that can include a number or combination of the following; ○ orthographic projections, ○ multi-view drawings, ○ developments, ○ pictorial projections, ○ mechanism notes, ○ mechanism movement stages, ○ bill of material, ○ assembly drawings.
Final model	The final solid model should be built according to the success criteria, and where possible using recycled material. The final model should show very good effort towards accuracy and craftsmanship. If a solid model is produced mechanically (e.g. 3D printed), screenshots of the model and the software used must be presented with the final solid model.
Reflective Journal	The reflective journal should include a short self-evaluation addressing the following questions: 1. How does your solution address the given brief? 2. Why do you believe your solution is the most effective? 3. What could you improve given additional time? The reflective journal should also include a record of the stages necessary to build the final model in the form of photographic evidence, notes, sketches and developments.

Marking the solid model.

A total of 100 marks are assigned as follows:

- The front page & research, detail drawings, final model and the learning journal are assessed by means of a rubric.

References

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Florian, L., & Linklater, H. (2010). Preparing teachers for inclusive education: using inclusive pedagogy to enhance teaching and learning for all. *Cambridge Journal of Education, 40*(4), 369-386. doi:10.1080/0305764X.2010.526588

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Katsioloudis, P., Jovanovic, V., & Jones, M. (2014). A Comparative Analysis of Spatial Visualization Ability and Drafting Models for Industrial and Technology Education Students. *Journal of Technology Education, 26*(1), 88-101. doi:10.21061/jte. v26i1. a.6

Roberts, J. W. (2002). Beyond Learning by Doing: The Brain Compatible Approach. *Journal of Experiential Education, 25*(2), 281-285. doi:10.1177/105382590202500206

Webb, L. (2006). Learning by doing. *Training Journal,* 36-39,41.

Solid Modelling exemplars

Intersection of Solids

Section	Details
Front page and research	**Area/theme title**: Create a solid model of a real life object that features intersection of solids. **Related LO's.** By the end of this assignment I will be able to: 1) Construct the seam of intersection between a prism and a cylinder whose axis are perpendicular or offset (LO 14); 2) construct the development of intersecting solids (LO 14); 3) propose and produce good quality 2D and 3D preparatory freehand sketches and drawings to communicate my ideas (LO 8); 4) use a variety of software tools to communicate design ideas graphically (LO 8). **Success criteria.** The final model should; 1) include a combination of prisms and/or cylinders; 2) be constructed using recycled material (e.g. cardboard); 3) be suitable to use as a functional or decorative element. **Examples of final projects:**  **Research:** The student is expected to carry out research and include the following: ● two A4 sheets related to the solid model geometry; ● at least three to five sketches portraying the whole and/or details of the solid model; ● a list of all the resources required to produce the solid model; ● a timeline plan detailing the different stages and allocated time periods.
Detail drawings	The student is expected to Include between three to five A3 drawings showing the model, including at least one of the following: ● orthographic projection ● development ● pictorial projection

Final model	The student is expected to produce one final solid model according to the detail drawings. The solid model should be produced using recycled material as much as possible. The solid model should exhibit a high level of craftsmanship and accuracy, and it should be suitable to be used as a functional or ornamental artefact.
Reflective Journal	The student is expected to: i) include a reflective journal answering: 1. How does your solution address the given brief? 2. Why do you believe your solution is the most effective? 3. What could you improve given additional time? ii) present a record of the stages necessary (example below).