# Levels 9/10 Visual Communication Design Activity

## Perspective Drawing: My Bedroom

### Introduction to Numeracy in Visual Communication Design

In Visual Communication Design (VCD), students demonstrate many numeracy skills specifically related to geometry, proportion, scale, ratio, and measurement. The visual designer’s world, consisting of a desire for constructing spaces, shapes, structures, and patterns, is only possible through using numbers, shapes, and measurements.

VCD students are engaged in authentic and creative construction tasks in which they are able to convey information and ideas to an audience through visual language, using symbolic and spatial reasoning. Visual, verbal, and analogue quantity coding pursued in VCD are essentially mathematics in action, as visuospatial reasoning is required (Grushka & Curtis, 2018). In VCD, students develop design thinking processes linked to mathematics that they use to apply solutions to real-world problems. In this way, VCD is ultimately structured through the application of mathematical concepts as a process to interpret designs from ideation to realisation. Students engage in understanding of symmetry, shapes (geometric and organic), and angles whilst designing solutions to real-world problems that require considerations of geometry and other mathematical concepts.

Students create visual ideations involving measurement, calculation, and estimation skills in order to develop spatial knowledge. By invoking spatial awareness, students are enabled to render visual solutions such as observational, pictorial, and technical drawings, as well as 3D models, through numerical calculations. Visual communications are often constructed to explicit industry regulatory requirements and exact formulae, which are also expressed in numbers. VCD students use spatial reasoning to visualise and create drawings of both 2D shapes and 3D objects, and also translate these drawings using scale to create 3D representations. Whilst creating drawings, students also use fractions, decimals, percentages, ratios, and rates.

Students develop numeracy skills that allow them to use VCD practices, processes, and technologies, including understanding and skill in using measuring and drawing tools, both digital and analogue, to create design solutions. In using graphics software, materials, tools, and equipment, students work with the concepts of number, geometry, scale, proportion, measurement, and volume. They use three-dimensional models, create accurate technical drawings, work with digital models, and use computational thinking in decision-making processes when designing and creating solutions to specific design problems. Students measure, record, and evaluate the processes of creating visual design ideas, including testing the visual outcomes of their calculations in order to refine their design concepts.

VCD students learn to research, read, and create graphical representations of statistics utilising scales, legends, and directional language to share information. Students recognise and read prescriptive and regulative calculations required by industry standards and render these using measuring tools such as rulers, protractors, and compasses. Understanding industry standards includes rendering scale and proportion through graphing and the creation of timetables and budgets for design projects.

### Developing Numeracy Understanding in Visual Communication Design

VCD is underpinned by a mathematical framework. Designers use a mathematical articulation of imagery to render designs to be imagined and applied in the real world through a design process. An understanding of the relationship between mathematics and VCD should be explicitly encouraged through the teaching and learning process to assist VCD students’ confidence in understanding the importance of numeracy in amplifying their creative lives. The relationship of mathematics to VCD should be recorded and assessed through the deep learning involved through the creation of a record of all processes and decision-making using a visual diary (Wolfe, 2011).

Developing numeracy by explicitly explaining the many ways that mathematical concepts relate to creativity demonstrates links that can help students to develop both enjoyment and confidence in mathematics. Students will also develop an appreciation of the nature and history of mathematics (Goos et al., 2014) and its longstanding significance for understanding the development of design practices. Students should be able to make the link between organising and creating regulated visual representations, such as pictorial and technical drawing rules and symbols, such as first angle projection and third angle projection, as a visual language that is based on mathematics. Students explicitly use spatial reasoning to create multiple design options that involve utilising and manipulating space, patterns, symmetry, 2D shapes, and 3D objects. Different design outcomes are produced for a single design problem through the student manipulating measurements, scale, and proportion, and evaluating placements. The development of design thinking allows opportunities for students to refine, test, cost, and create sequences for design solutions to an array of real-world problems.

Students explicitly use calculations of scale and positioning within standardised layouts in their creation of drawings and models, which also includes detailed examinations of concepts such as length, area, volume, capacity, mass, and angles. Students are asked to firstly estimate and then collect statistics from various sources for use in their own visual communications whilst interpreting, and evaluating statistics from a wide range of commercial produced visual communications. Students use representational (graphs, maps, drawings, etc.), physical (set-squares, rulers, T-squares, protractors, compasses, etc.), and digital (computers and software) tools (Goos et al., 2014). Students learn how to both read and create digital and graphic representations of statistics, such as bar graphs, line graphs, pie charts, statistical maps, and pictorial statistical diagrams. Students use sequencing and scale to produce explanatory and pictorial diagrams. Students use specialised software to render 2D and 3D visual communications such as posters, advertisements, websites, games, architectural drawings, product designs, and animations. Computer-generated visual communications involve students learning to manipulate images, aesthetics, and movement through numbers and translate computer-generated designs into printed, digital, and physical outcomes.

## Lesson Plan: Perspective Drawing – My Bedroom

One-point perspective drawing is a straightforward pictorial drawing technique that is useful as an introductory technique prior to teaching students the more complex two-point perspective drawing process. Perspective drawing evolved during the Renaissance (15th century) as a system of drawing. One-point parallel perspective is a drawing technique that is used to produce a realistic perspective and create the illusion of space. Two-point perspective drawing (otherwise known as angular perspective drawing) was developed by Flemish artists in the 16th century. In 1525, German artist Albrecht Dürer published a handbook called *Instruction of Measurement* in which he discussed perspective (Striegel, 1994). Samuel Marolois (1572–1627), a Dutch mathematician, established the geometric basis of perspective drawing that is used by artists and visual communication designers today to create the illusion of realistic depth in their works.

By learning to create a one-point perspective drawing, students will develop 3D drawing skills by learning how to use shape and line to create the illusion of depth in a scene. Using these techniques, students can create drawings that convincingly represent the 3D world. Student confidence in drawing will increase as they learn that there exist explicit rules of geometry that underpin perspective drawing techniques. In this lesson, each student will produce an A3-sized one-point perspective drawing of their bedroom. The number of lessons needed will depend on the duration of the lessons and the level of the students.

### Prerequisite/Corequisite Knowledge: Visual Communication and Design

Students need to have and/or develop the ability to:

* Create a one-point perspective drawing from a plan drawing and photograph
* Draw 2D shapes and convergent and parallel lines
* Understand the use of Stand Point and Vanishing Point
* Measure objects and space, and estimate the comparative sizes of objects for drawing purposes
* Use drawing techniques to render 3D objects as 3D shapes (knowledge of height, width, and depth)
* Employ aesthetic principles of colour, tone, line, and texture
* Use rulers, set-squares, T-squares, protractors, 2H pencils, coloured pencils, and fine liners

### Background Mathematical Skills and Understandings

Teachers of Visual Communication Design are not expected to teach the mathematical knowledge and skills that students will draw on when engaging with this activity. The students will have learnt and should be adept with the required mathematical knowledge and skills to complete the activity. According to the Victorian Curriculum: Mathematics, the required mathematical knowledge and skills should have been developed in earlier years of schooling, that is, by the end of Level 8.

For this activity, the background mathematical skills and knowledge are:

* Knowledge of the concepts of line and space, and the associated and directional terminology, including: vertical, horizontal, angled (oblique), and intersecting (converging)
* Knowledge of parallel lines
* Knowledge of the properties of two-dimensional shapes and three-dimensional objects, and the differences between 2D shapes and 3D objects
* Knowledge of the names and properties of common 2D shapes and 3D objects
* Ability to use appropriate instruments (and technology) to draw, and measure, lines
* Ability to estimate lengths/distances in metric units
* Knowledge of angles, types of angles (acute, right, obtuse, straight), and measures of angles in degrees
* Familiarity with grids (and grid references), and ability to recognise and create a squared grid of a given size (with border)
* Knowledge of enlargement/diminution and scaling of dimensions (or measurements)
* Ability to accurately divide a regular shape (e.g., square) into equal parts using rulers to make relevant measurements

## Lesson Description

By the end of this lesson, students will understand how pictorial drawing techniques such as one-point perspective are used to communicate design objectives to the general public, who might have difficulty understanding orthogonal drawings. Students will also understand one-point perspective drawing conventions that create an illusion of three-dimensional (3D) items on a two-dimensional (2D) drawing plane. Each student will produce an A3-sized fully rendered one-point perspective drawing of their bedroom.

One-point perspective drawing is similar to oblique drawing because the front of the object is drawn as a true shape front on and parallel to the viewer. Two horizontal parallel lines are established on the A3 paper to begin to create perspective. The higher line is the Horizon Line (or eyeline of the spectator) and the lower line is the Ground Line. The Ground Line represents the plane where the viewer is standing, whereas the Horizon Line represents the furthest distance plane visible in the drawing. The accentuation of perspective is governed by the choice of Horizon Line (high or low). For this activity, it is advised to centre the Horizon Line on the page.

Using students’ bedrooms as the object of rendering is suitable for this activity as this environmental space relates directly to their immediate teenage world, where their bedroom is both their personal domain and refuge. To ensure inclusivity and privacy, magazine examples of bedrooms can also be used as a starting point, and to spur students’ imaginations. Students should enjoy rendering a realistic drawing of their bedroom to share with their classmates and should be encouraged to add any desired imagined changes to their bedroom. They are also encouraged to use their creative licences when incorporating their bedroom furniture and furnishings, assisting them to create a ‘dream’ bedroom. Students will be expected to estimate the size of furniture and furnishings in relation to their bedroom. Students can also simplify furniture and other objects that they wish to include for expedience or if they are struggling with the task.

Students will complete a colourful pencil rendering of their bedroom for an inspiring exhibition in the classroom. They could also render the finished drawing using watercolour pencils for a new experience. This one-point drawing lesson could be further extended in another project in which students create a comparative two-point perspective drawing of their homes.

### Resources Required

A3 cartridge paper, drawing board, 30/60-degree and/or 45-degree set-squares, T-squares, rulers, compass, tape, pencils, fine liners, photographs of bedrooms from magazines, samples of one-perspective drawings, student A3 visual diary [Note: The visual diary is a record of process for all work. This ‘record of process’ should also form part of the assessment (Wolfe, 2011).]

### Teacher Introduction

The teacher should introduce the topic by showing various one-point perspective drawing examples and explaining their purpose to students. It is a good idea to source some examples from art history. Including examples from the Renaissance to present-day advertising will illustrate the longevity of one-point perspective drawing. For comparison, the teacher should show some plan views and some 2D drawings. Doing so should help students to understand the different renderings of the visualisation of space, perspective, and dimension in visual communications. This discussion should include reference to mathematical relationships used in creating visual communications [2D and 3D shapes, types of positioning of lines (converging, parallel), and use of angles].

### Teacher-Led Discussion

The teacher should develop questions and lead a discussion such as the following whilst also illustrating the terms and concepts on the whiteboard:

* What is a three-dimensional object? How does it differ from a two-dimensional shape?
* What are the three dimensions?
* Discuss and draw parallel, perpendicular, oblique, horizontal, vertical, and convergent lines. Discuss Ground Line and Horizon Line.
* Discuss the use of point. What is a Stand Point on a line? What is a Vanishing Point? Note that a point represents a position, not a size.
* All drawings are actually two dimensional, but we create the illusion of three dimensions. Why do designers create pictorial drawings? When and why would you use a one-point perspective drawing technique?
* The teacher will demonstrate the use of the T-square and set-square to create lines and 90-degree angles in order to create a one-point perspective ‘flying cube.’

### Student Activity

1. Students are asked to bring a photograph of their bedroom, or they can find a ‘dream bedroom’ in a magazine. They should secure this image in their visual diary. Students will create a pencil and ruler sketch (also in their visual diary), drawn as a basic bird’s eye view plan of their bedroom, including the placement of furniture, with annotations of estimated measurements as a starting point and inspiration for discussion. This is not a final drawing but a reference drawing for estimating the size of objects in the one-point perspective final drawing. The teacher should measure the classroom, window, and class furniture dimensions to assist students with their estimation of measurements. In groups of four, students can discuss their estimates to ensure that they are realistic.
2. Students will source three one-point perspective sample drawings from the internet, magazines, and/or instruction manuals, and secure them in their visual diaries. Students should label the sample drawings regarding their visual communication purpose. Students should add the Ground Line and Horizon Line (labelled as GL and HL), and label both the Vanishing Point and Stand Point (as VP and SP) on these sourced drawings, using a fine liner. Students will then use a ruler or set-square to add the diminishing lines (in fine liner) to show how perspective lines have been used in the sample drawings. By completing this practice activity, students’ confidence to create the Vanishing Point and Stand Point should be enhanced. Furthermore, students will increase their understanding of the uniformity of one-point perspective drawing rules. Students will share their findings within their groups of four and discuss difficulties, successes, and thoughts about the ‘rules’ used.
3. As a scaffolding exercise, students will then practise using the T-square with either a set-square or ruler to make a pencil sketch of a one-point perspective 5 cm flying cube in their visual diaries, as previously demonstrated by their teacher. Students will first create a Ground Line (marking a Standing Point) and Horizon Line (marking a Vanishing Point). Students will then add a 5 cm face-on square set on the Ground Line at the Standing Point. They will then draw projection lines (lightly) from each corner of the square back to the Vanishing Point. They will measure a 5 cm depth for their cube, along the projection lines, and mark with pencil the end of the cube. The back of the cube can now be added in pencil as a receding square. All perpendicular lines must be 180-degree horizontal and 90-degree vertical. The oblique projection lines that make up the cube can now be made more permanent using a heavy pencil line. The students can erase the rest of the projection lines. Students should compare and discuss the results of their flying boxes with each other. The teacher can point out that the squares used should be accurately measured and discuss the various types of lines used. Attention again can be drawn to the difference between students’ outcomes due to the differing placement of the Stand Point and Vanishing Point. This comparison will illustrate how the Vanishing Point position impacts the perspective view of the drawn ‘flying’ boxes.
4. Students are to ‘square’ their A3 paper (using T-squares) and tape it onto their drawing boards. Students are then required to measure their A3 paper and create a   
   10 mm border in pencil (No title strip is required unless the teacher would like students to do this). Students are to understand that they will be filling this space with their drawing. The base margin will represent the front wall and the Ground Line. When students have completed the one-point perspective drawing, they can go over the border in fine liner.
5. Students start by using a T-square to draw a Ground Line in pencil, which is on the base line perimeter of their paper. They are then to create a point on the Ground Line to establish the point of view. This is called the standing point. The viewpoint can be left up to the student, but it is recommended for this particular project to centre the Stand Point to avoid more extreme perspective outcomes that may prove difficult for the students. The Stand Point is inside the room and is on the base line of the drawing paper. Students can then draw a centred Horizon Line. Next, they need to mark the Vanishing Point directly above and parallel to the Stand Point that has already been marked on the Ground Line. Students need to remember that the perimeter of the drawing paper includes the facing bedroom wall, two side walls, ceiling, and floor. The objects represented in the drawing are not floating in space, as with the flying boxes, but are anchored with a floor/wall’s horizontal line (and side walls as projection oblique lines). All lines from the shapes drawn will recede back to the Vanishing Point.
6. Now, students are ready to create the facing 3D objects as 2D shapes. Students should include walls, windows, bed, dresser, rug, etc. Students should start by drawing a rectangle that represents the rear wall of the bedroom, in order to give them the space for all of their shapes to be contained. Students need to draw a line from the Vanishing Point through the rear bedroom wall corners to the front wall (page margin) corners. Doing so produces the three walls, roof, and floor of the bedroom. Students need to create 2D shape representations of the furnishings, using the T-square and set-square to ensure 90-degree angles on their facing shapes. All shapes need to be drawn as true to shape and in pencil. Students are to estimate the proportionate size and position of objects in relation to the plan view that they drew in their visual diary at the start of the project. At this stage, students should only draw the faces of the shapes. Shapes can be positioned around the room.
7. Using a ruler and pencil, students will draw projection lines (lightly) from each corner of their shapes back to the Vanishing Point. Students are to estimate the depth of the objects and measure the depth along the receding projection lines in order to contain their 3D objects. All other lines for the 3D objects can now be pencilled in. They are to be drawn true to shape using a T-square with either a set-square or ruler. All 3D shape rear lines must also be 180-degree horizontal and 90-degree vertical. The oblique projection lines that now make up the object can be made more permanent using a darker pencil line. Students should erase any unwanted projection lines.
8. The completed pencil one-point perspective drawings should now be reviewed in groups of four, in which students view and discuss the outcome of their drawings and encourage each other to make changes and corrections.
9. Students will next draw two quartered 12 cm squares in their visual diary. In each quarter of one square, students will experiment with creating appropriate texture using fine liners, creating a variety of dots and lines for visual effect to represent furnishings in their bedrooms. In the other quartered square, students will experiment with the coloured pencils. These exercises in colour, texture, and tone should be annotated, with students describing the aesthetic techniques used. Students will then be able to select their most successful renderings to complete their fully rendered drawing.
10. Students will add the selected details of colour, tone, and texture to their final artwork. They will use fine liners to finish the outline of the 3D objects drawn and also fine line the border margin.
11. Students will complete a self-reflection in their visual diaries. The self-reflection needs to include an evaluation of (a) the techniques that they have learnt and (b) the aesthetic qualities (i.e., design elements and principles) of their final visual communication.

## Table 1: Links to the Victorian Curriculum – Visual Communication Design

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| Strand and Sub-Strand  (if applicable) | Content Description (Code) | Elaboration(s) |
| * Visual Communication Design Practices | Use manual and digital drawing methods to create visual communications in the specific design fields of Environmental, Industrial and Communication Design  (VCAVCDV008) | Investigating the use of drawing systems to communicate ideas in different design fields, for example, manual, digital or technical drawing systems used in the different design fields of industrial, environmental and communication design  Selecting manual and technical drawing conventions relevant to different stages of the design process, for example, visualisation, development and refinement  Using paraline, orthogonal and perspective drawing systems to communicate concepts in the development and refinement of visual communications  Selecting and applying relevant manual and digital drawing methods conventions in the design process to communicate ideas  Investigating the history of drawing conventions in visual communication design, for example, how drawing conventions relevant to specific design fields have changed over time, considering the use of methods, materials and media  Evaluating the use of personal aesthetic, visual language and drawing conventions when creating visual communications |

## Table 2: Links to the 21st Century Numeracy Model (Goos et al., 2014)

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| Aspect of the Model | How This Aspect is Addressed by the Lesson |
| **Attention to Real-Life Contexts**   * Citizenship * Work * Personal and Social Life | In this lesson, students discuss the historical use of perspective drawing and the ways that it has been used to visually depict the three-dimensional world. Students will understand that there are historically-prescribed rules and regulations, developed through mathematics, to assist them in their drawing and/or that are required for a career as a visual communicator. Using students’ bedrooms, a personal context, as the object of rendering makes a connection directly with students’ immediate teenage world, where their bedroom is often both their personal domain and refuge. |
| **Application of Mathematical Knowledge**   * Problem Solving * Estimation * Concepts * Skills | Students problem solve by creating a visual representation of a 3D object on a 2D paper surface. They learn geometric drawing techniques relating to drawing lines, points, shapes, and planes. Students use terminology to describe various types of lines (e.g., parallel, oblique, perpendicular). Students measure and calculate (addition and subtraction) to estimate the placement and scale of elements within a drawn composition. Students are required to use estimations of length, height, and depth to establish a realistic position and proportion of 3D objects as 3D shapes in their one-point perspective drawing. Realistically rendering a 3D bedroom within the prescribed A3 paper also requires estimation and reasoning skills. |
| **Use of Tools**   * Physical * Representational * Digital | Students learn to measure using specific measuring tools of the graphic designer (ruler, T-square, and set-square), combined with aesthetic consideration of the design elements and principles relevant to rendering such as using colour, texture, and tone. |
| **Promotion of Positive Dispositions**   * Confidence * Flexibility * Initiative * Risk | Students gain confidence in numeracy by understanding that drawing is a learnt skill that involves mathematical concepts. Students come to understand that they can follow specific mathematical rules in order to render specific outcomes in visual communication and design. Students become aware of the ubiquitous presence of pictorial and technical drawings, both through history and in the everyday world around them, developed through the use of mathematics. They gain confidence through learning skills in using measuring tools and applying mathematical concepts to render a creative, personal, and realistic one-point perspective drawing. Students show initiative and imagination as they experiment and practice techniques with measurement tools to create different visual effects. Students take risks through experimenting with new techniques such as rendering objects through the use of shape and line. |
| **Critical Orientation**   * Interpreting Mathematical Results * Making Evidence-Based Judgements | Whilst planning and producing their one-point perspective drawings, students are continually reflecting on and evaluating the processes undertaken, which involve the mathematical concepts of estimation, measurement, proportion, and placement within the prescribed measurements and layout. All processes are recorded by students in their visual diaries as evidence of the calculations and estimations undertaken, including a final judgement as a self-reflection. By keeping a record of processes, estimations, and calculations that reflect a critical understanding of the processes followed, including mistakes made and skills learnt, students are making their learning processes visible. Students undertake teacher, peer, and personal review, including feedback on their mathematical calculations related to measurement and proportion, and they are expected to act on the feedback given to refine their calculations. |

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