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Curriculum  
Council

# CERAMICS

(Year 11 and Year 12 Art and Art & Design)

*Art Studio Support Document*



# CERAMICS



# *Ceramics*

This document is part of a series of documents developed to assist teachers with the delivery of a range of studio areas.

The materials presented are adapted for use in Art and Art & Design from documents developed by the Education Department for Unit Curriculum.

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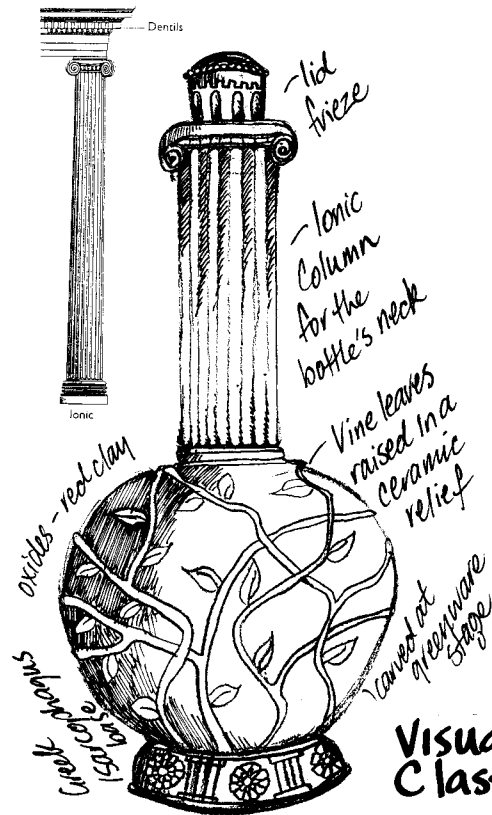
Special thanks to Robin Pascoe, Senior Curriculum Officer at the Education Department for facilitating use of the materials and members of the Art syllabus committee for assistance in developing the documents.

It is hoped that teachers will find the information on the particular studio area and associated briefs of use in the delivery of both Art and Art & Design.

# WHAT IS CERAMICS

Ceramics in Year Eleven and Twelve TEE classes is based upon either a sculptural or functional basis for studio work. Students can work in a variety of clays and styles and use many decorative techniques and glazing applications. Students should be encouraged to try an array of techniques when constructing their work. Ideas and sources of inspirations should be varied and rely on drawings and designs acquired at the inquiry stage of development.

*Ceramics* is the art of forming plastic clay into permanent objects. To render the clay form permanent, it must be physically changed through intense heat treatment. The fact that we refer to ceramics as an art process suggests that there are a number of stages in the development of a ceramic object which require creative action and craftsmanship. Clay is the basic material used in this metamorphosis.



**Visual Research  
Classical Greek Forms.**

The art of ceramics is very old and is intimately related to the growth of civilization. Early hunter-gatherers, because of their nomadic way of life, would have had little use for clay as a ceramic medium, although it was most likely used for painting and body adornment.

As a result of early agricultural progress, nomadic life styles gave way to more sedentary and stable societies. It is probable that during these early stages of prehistoric civilization the need for more durable containers led to the lining of baskets with clay and eventually, through control over the technology of fire, modelled forms were transformed into permanent objects for both utilitarian and spiritual purposes. The magic of the ceramic process, evidenced by figurines used for religious ceremonies and rituals more than 10,000 years ago, persists today.

Much of our knowledge of prehistoric cultures is based upon archaeological analysis of ceramic objects, which have endured the passage of time. Pottery shards and ceramic artefacts from early civilizations in all parts of the world provide us with valuable information about our cultural roots.

It is believed wheel-thrown pottery was being produced in large quantities in Egypt at least four to five thousand years ago - much of it decorated with low-fire glazes.

As skills and ceramic technology evolved, manufacture and subsequent trading developed around the Mediterranean. The ceramic forms created in Crete between 1500 and 1000 BC influenced the ripening of classical ceramic design and technology in Greece from 700 to 300 BC. In turn, the Romans spread advanced ceramic technology throughout the European empire.

While the influence of the Roman Empire was declining in Europe, Ceramic arts and crafts flourished. The Tang and Sung dynasties produced high-fired stoneware and porcelain of great beauty. Regular trade between China and the Middle East influenced the unique development of meticulously crafted and glazed ceramic cladding of buildings in Islamic society. Islamic influence spread through Europe via Byzantium and the Moors in Spain. Both the Spanish and the Portuguese took their knowledge of ceramics to South America. In Italy during the early Renaissance great interest had developed in a wide variety of glazing and decorating techniques, while German potters had perfected the art of salt-glazing.

By the seventeenth century, fine Chinese porcelain was very popular among those who could afford it in Europe. As the Industrial Revolution steamed along, resultant urban concentrations provided a ready market for the products of ceramic industries. In Britain cheap mass-produced ceramic ware was cast from plaster moulds and decorated with printed designs for home consumption and export.

British industry dominated the ceramic market place for some time, resulting in designs became dull, repetitive and often vulgar. As a consequence of industrialisation, many cottage crafts all but disappeared in England. Mass production decimated the traditional craft guilds and foreign designers were employed by many industries. After the Great Exhibition of 1851 and the revival of Government Schools of Design from 1847, interest in the ideal of 'the expression of Man's pleasure in labour' developed (Ruskin). In an attempt to improve both design and society, the 'Arts and Crafts Movement' was founded by William Morris in 1861. Morris, one of the founders of organized socialism in Britain, advocated a return to medieval workshop principles as a strategy to create a 'happy society'. This revival of the craft tradition sought to enlighten the general public through setting new standards in the quality of industrial design.

The Arts and Crafts Movement provided the foundations for twentieth century practice of design for industry and mass production. The movement's full impact was felt in the 1870s, when designs for furniture, carpets, textiles, stained glass, wallpaper, household appliances, ceramic tableware and many other mass produced goods showed the influence of Celtic relief's and medieval manuscripts. Flat overall patterns based on flowers, birds and dragons were common.

The Art Nouveau movement during the 1890s was an extension of many of the ideas of the Arts and Crafts Movement. Classic historical styles were rejected and asymmetric designs based on naturalistic plant form, and sinuous line gained prominence. Studio potters and ceramic artists, like painters and printmakers, were influenced by Japanese art and culture, which arrived in Europe during the late nineteenth century. Today, individual ceramists are able to draw on a vast range of cultural influences in their work, including the discoveries and innovations of high-tech industry, engineering and electronics.

In school ceramic courses it is important that we acknowledge, and help students to understand, the place of ceramics in our own culture and that of others. Mere manipulation of materials is not enough. A knowledge and sympathy based on discipline and experience should be developed with clay and the ceramic process. Experimentation with researched traditional techniques can lead to the development of individual, expressive and contemporary ceramic design.

### ***The nature of clay***

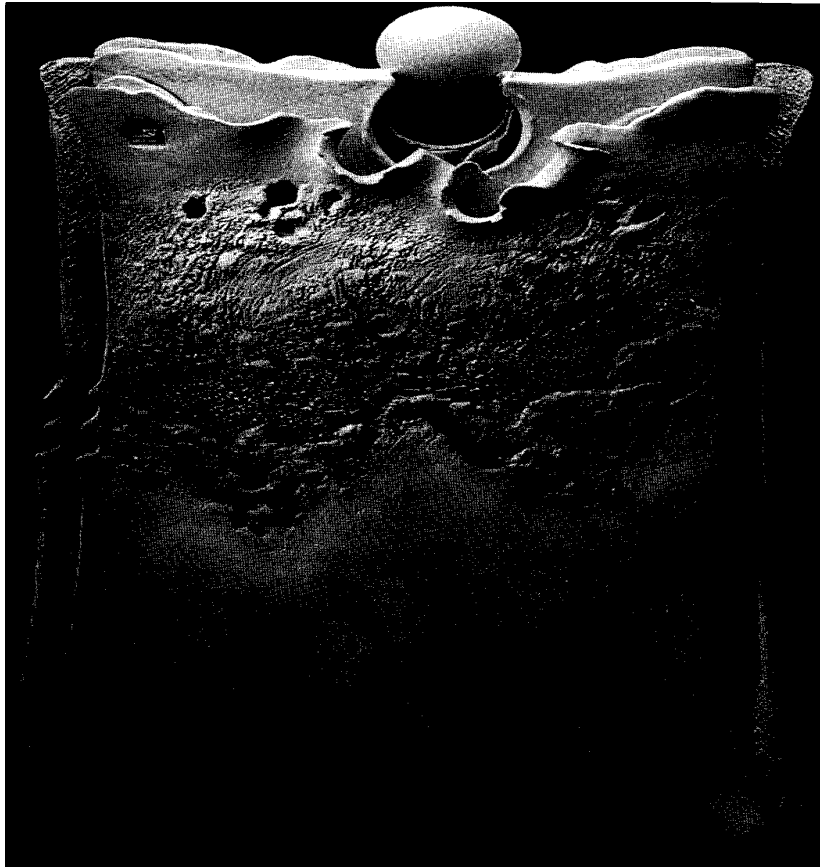
Clay is a fine-grained rock which, when suitably crushed and pulverised, becomes plastic when wet, leather-hard during drying, and on firing is converted to a permanent rock-like mass. For most of us, moist clay is an inviting material to manipulate, responding instantly to the range of physical pressures to which we subject it. Its pliancy and texture appeal to our senses and encourage us to explore its possibilities in describing form. Clay is an abundant natural material, which contains a wide variety of elements in different proportions, depending upon its source.

## ***WORDS ASSOCIATED WITH CERAMICS***

<b>Avanturine</b>	a crystalline glaze that depends on its low alumina/high iron content/high flux properties to provide characteristic 'spangles'
<b>Bat</b>	kiln shelf ware board. A pot may be thrown on a bat attached to the wheelhead.
<b>Bisque Ware</b>	unglazed ceramic ware which has had a preliminary firing and has thereby been freed of chemically combined water and some carbonaceous matter
<b>Blistering</b>	unwanted gassing of a glaze resulting in bubbles and the craters of burst bubbles; blistering occurs where the glaze has not had time to smooth out before it sets. The bubbles are gases originating in the glaze or in the body underneath
<b>Bloating</b>	unwanted blistering of the body caused by trapped bases; usually resulting from an unsatisfactory bisque-firing
<b>Blunging</b>	thoroughly mixing body materials with water
<b>Body</b>	a mixture of clays and non-plastics to form a satisfactory combination of working and firing
<b>Cones</b>	heat gauges in the form of small cones made of mixtures of ceramic materials carefully balanced to soften and bend at definite temperatures during firing
<b>Crackling</b>	crazing which has been sought intentionally
<b>Crawling</b>	occurs when the glaze is fired and retracts to expose the bare body. Crawling may be used decoratively, e.g. a glaze which crawls may be used over an attractive body or over another non-crawling glaze
<b>Crazing</b>	a glaze defect characterized by a network of fine cracks.
<b>Devitrification</b>	a discolouration of the glaze generally caused by crystallisation.
<b>Dunting</b>	cracking of ware caused by stresses which occur during cooling
<b>Earthenware</b>	glazed porous ware fired below 1200°C
<b>Earthenware</b>	soft, porous, glazed pottery fired to a temperature of 1000 - 11000C.
<b>Engobes</b>	see 'slip.'
<b>Feting</b>	smoothing or trimming the surface of a hardening pot in preparation for firing.
<b>Filler</b>	a non-plastic ingredient in clay to control shrinkage and drying
<b>Flux</b>	a material which promotes fusion and melts in glazes or bodies
<b>Frit</b>	calcined mixture of sand and fluxes as material for glass making
<b>Glaze</b>	a coating of glass applied to the surface of a pot, as a means of decoration.
<b>Glaze</b>	a layer of glass which is fused into place on a pottery body. It provides a hygienic covering on pottery and a decorative and textural contrast with the body, and it increases the strength of the ware by the creation of a body-glaze layer
<b>Glost-Firing</b>	a glaze firing

<b>Grog</b>	ground-fired body added to clays to provide a proportion of already fired and often refractory material. Grog provides texture and gives better control in forming
<b>Kidney</b>	kidney-shaped metal or rubber tool used for smoothing or cutting into a pot before they are dried.
<b>Kneading</b>	preparing clay by hand, using a rolling and spreading action
<b>Leatherhard</b>	a term for clay ware that has dried to a state suitable for handling and turning
<b>Lustre</b>	a metallic surface on a glaze. The pure metal is deposited on the glaze surface by many different methods, but all involve reduction from an oxide or a resinate to the pure metal
<b>Maturity</b>	the point at which clay hardens to its maximum strength and the point at which glaze achieves complete fusion
<b>Neriage</b>	using one or more coloured clays to create a pattern in the body
<b>Ochres</b>	crumbly earth ores. These are fine clays with a very high iron oxide content. They are useful as colouring for slips, bodies and glazes
<b>On-glazing</b>	decoration applied on top of an unfired glaze using metal oxides or prepared colorants.
<b>Openers</b>	added to a body to give texture and workability. They include grog, fireclay and organic matter
<b>Oxidisation</b>	a form of firing in which a balance is attempted between the combustion material and the supply of oxygen, the result being a neutral atmosphere
<b>Plasticity</b>	the condition which allows clay to be formed without cracking
<b>Pug-mill</b>	apparatus for the mixing of body ingredients
<b>Raku</b>	term derived from the Chinese character meaning enjoyment, pleasure and contentment. Raku is an attitude more than a technique or process, the central tradition being formulated through the work of Japanese potters over fourteen generations
<b>Raw glaze</b>	a glaze put on leatherhard ware which is packed into the kiln when bone dry (not all glazes may be used as raw glazes without sceptic recipe adjustment
<b>Raw-firing</b>	firing once only
<b>Reduction</b>	a form of firing which results when a shortage of oxygen is created
<b>Refractory</b>	materials having a high heat resistance
<b>Scumming</b>	light marks which appear along edges and as fingerprints on unglazed and bisqued ware
<b>Sgraffito</b>	a decorative technique in which a sharp tool is used to scratch through a slip to the clay below. The same technique is applied to glazed pottery when designs are scratched through an unfired glaze to show a fired glaze below.
<b>Sinter</b>	the beginning of cohesion within the glaze film
<b>Slips</b>	a homogenous mixture of clay and water. It may be coloured by the addition of oxides
<b>(or engobes)</b>	

<b>Slip-trailing</b>	applying designs by passing clay through a nozzle attached to a small rubber bag, like cake decorating.
<b>Slurry</b>	clay in a very wet condition
<b>Spluttering</b>	a glaze defect in which small pieces of glaze fall from the ware during fusion and are found fused to the shelf or pot base after firing
<b>Stoneware</b>	glazed pottery fired to a temperature above 1200 C.
<b>Stoneware</b>	glazed, hard, strong ware, fired above 1200C, in which the body and glaze mature at the same time and form an integrated body-glaze layer
<b>Thermal shock</b>	severe stresses caused in a ceramic form by sudden temperature changes
<b>Throwing</b>	making pots by hand on the wheel.
<b>Transmutation</b>	the act of a glaze changing colour, usually in reduction
<b>Turning</b>	trimming thrown pots when they are leather-hard, using metal tools on a wheel.
<b>Vitrification</b>	the furthest stage to which the body can be taken without deformation
<b>Washes</b>	colouring oxides mixed with water over the (or stains) slip or glaze
<b>Wedging</b>	first stage of mixing clay by hand
<b>Wedging</b>	the kneading process of preparing the clay which eliminates any air bubbles.



<b>DRYING STAGES OF CLAY PURPOSE</b>		
<b>STAGE</b>	<b>DESCRIPTION</b>	<b>PURPOSE</b>
<b>Slip</b>	Water and clay mixed together. Very runny.	Joining. Slip body colours.
<b>Cottage cheese</b>	Looks like cottage cheese Chunks up together.	Reprocessing stage. Useful for joining large pieces.
<b>Plastic</b>	Ideal working stage Clay is flexible, cold to touch.	Making studio works. Press moulds. Wheel work.
<b>Leather hard</b>	Feels like leather. Hard to bend. Starting to dry out.	Good to apply Slips and body stains Ideal sgraffito stage. Good for burnishing.
<b>Greenware Bone dry</b>	Very brittle, feels like old bones and breaks easily. The moisture in the clay has gone.	At this stage clay is placed in the kiln for first firing- BISQUE firing. Can apply body stains.
<b>BEFORE THIS STAGE THE CLAY CAN BE RECYCLED TO ANY STAGE. AFTER THE BISQUE STAGE THE CLAY CAN NOT BE RECYCLED.</b>		
<b>Bisque</b>	All moisture is gone from clay.  Clay has been fired to anywhere between 900' - 1200'  Terra-cotta = red Earthenware = white  Stoneware = cream/white	Glazes can be applied and clay can be refired at a slightly higher temperature.  Clay can be painted and decorated.  Glazing will make the clay waterproof.
<b>Vitrified</b>	Like rock. Clay is at melting point.	Will not take glaze. Not much good for anything except snails.

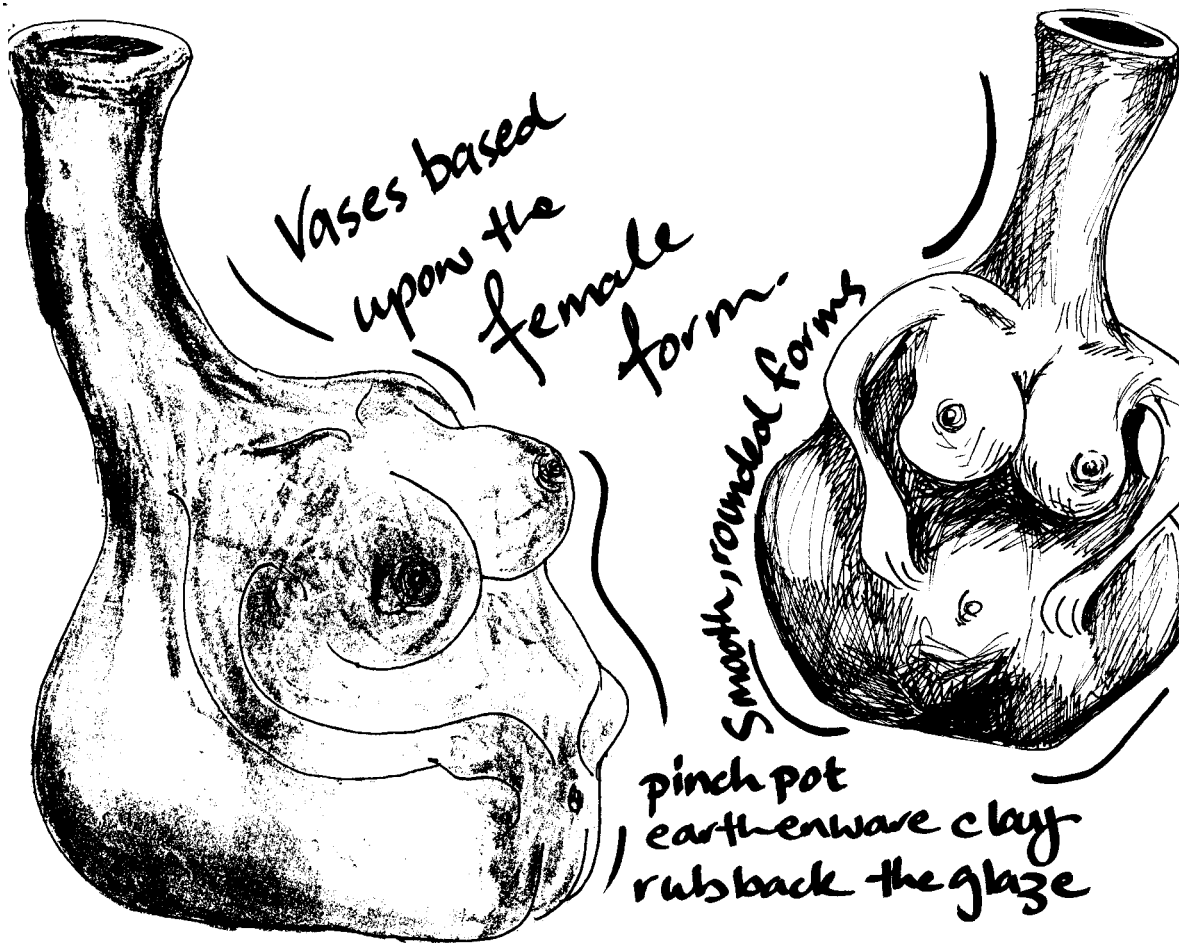
# IDEAS FOR CERAMICS

## THEMES AND VARIATIONS

There are many sources of inspiration for a ceramics program. Selecting a theme can often be a good starting point. Ideas for projects can range from - people, places, building, the environment, seaforms, plants, animals, insects, birds, religion, social comment to more bizarre titles like, Something's Knocking at My Door, Time Passages, Life in the Fast Lane, Furry Follies, Outback Lizards and a Kangaroo, Water Water Everywhere, On Top of the Hill, Slimy Stuff, There's an Elephant in my Soup, the ideas are endless.

## KNOW YOUR TECHNIQUES

Once there is a starting point many drawings and designs have to be developed in order to create the best possible constructions. Students should be familiar with as many methods and techniques as is possible. This will aid in creating and selecting the best methods for building a masterpiece. Students can work in a variety of methods ranging from slab, coil, wheel, mould making, pinch and cylinder forms. If a student is familiar with these techniques they will be able to build upon what they know and apply these techniques easily to their studio work.

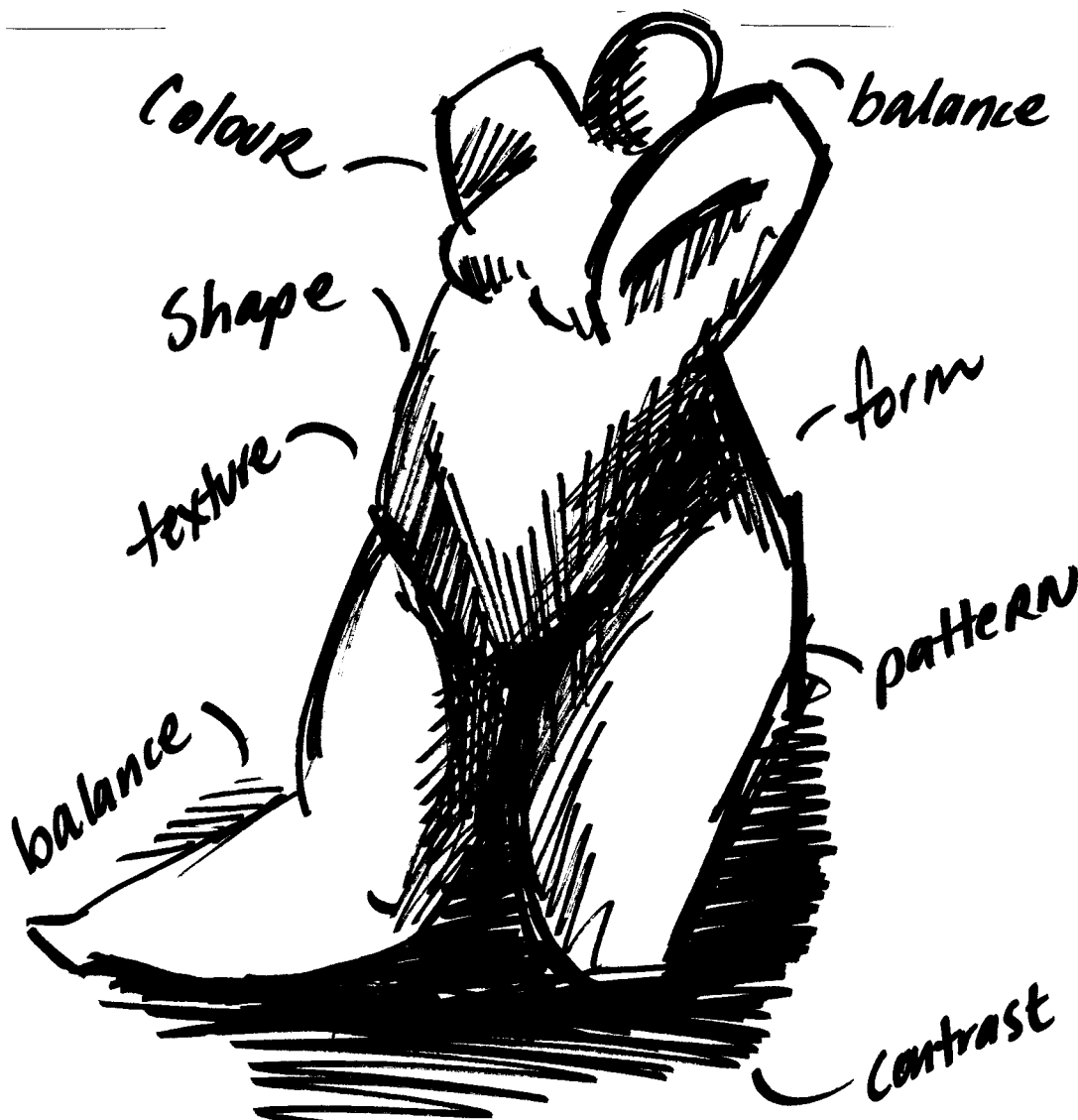


## EXPERIMENT

Working with clay can be an exciting and rewarding experience, not only can students work with a variety of clay bodies but the decoration techniques they use will stimulate and develop their work even further. Allow students to experiment with decorative techniques that range from slip trailing, glazing, oxide effects, lustre glazes, underglazes, creating surface textures and patterns. This area of the ceramic process can often be the most rewarding, Encourage students to make testers and designs similar to their drawings and visual inquiry. Students should be encouraged to show the work that they do in the inquiry section replicated and developed further in the studio process. Encourage students to take photos as their work develops and include these with the drawing and design development work.

## DESIGN ELEMENTS AND PRINCIPLES

Look closely at design elements and principles to help stimulate student's ideas in the construction of ceramic pieces. Form, texture, pattern, contrast, balance, colour and shape are important to help students be aware of the processes involved in developing a ceramic piece. Offer students projects which help broaden their understanding of these elements and others.



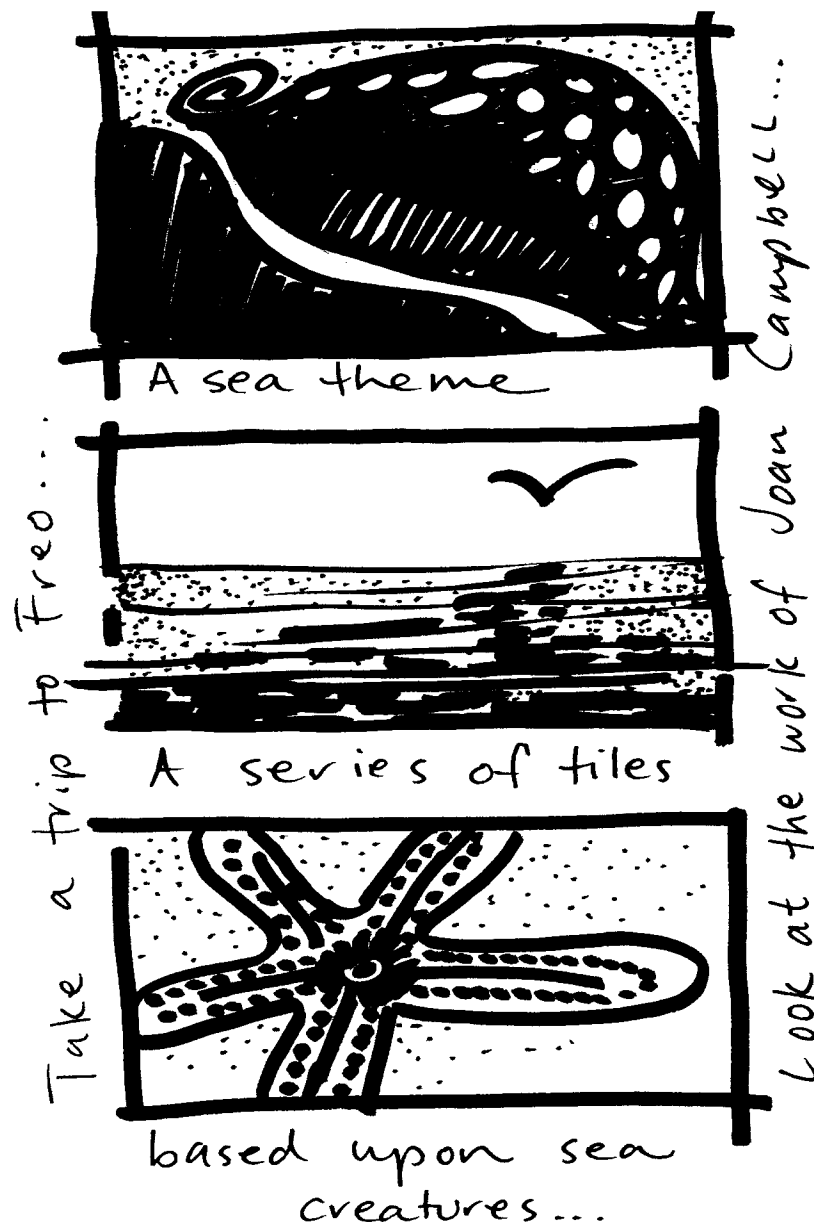
## MAKE LINKS

Most importantly ceramics is a tactile process that can allow for highly imaginative and expressive work whether it be functional or sculptural. Encourage students to develop their skills in construction and decoration. Show them how to link ideas in the inquiry stage by looking at artists and potters. There is an abundance of resources on ceramics. Students need to use these resources and develop their ideas upon new and learnt experiences.

## ARTISTIC INSPIRATION

Looking at what inspires other artists is an excellent way to motivate and create stimulating possibilities for students. Joan Campbell in her pursuit of nature and her special affinity with the sea once said

*"I enjoy working in an exploratory way. My work is essentially about recycling energy, how we expend our energy and if we expend it, how it renews itself. I see this in the ocean all the time, where the waves roll in expending energy and recycle back, returning to the ocean. The tides come and go. I think the sea is one of the greatest sources of energy on the earth."*



# ***MATERIAL AND TECHNIQUES IN CERAMICS***

There are two basic types of clay:

**Primary clays** are those that are found naturally in their original sites. As a result they are reasonably pure and free from contamination. They are sometimes called residual or china clays (kaolin) and are generally coarse, highly refractory and pure white.

**Secondary clays** are those that have become plastic through the effect of water movement in the journey from the place where they were originally formed. They generally contain a range of impurities which colour the clay, such as the iron which gives terra cotta clay its red colour.

Clays can be classified according to the firing temperatures at which they mature, and broadly fall into two main groups:

**Earthenware** clays are relatively **low-firing**, between 950 and 1120 degrees Centigrade. They usually contain a relatively high proportion of **iron** oxide, remain quite porous after firing and are the most widely used clays in schools because of the simple kiln technology generally available at reasonable cost and convenience.

**Stoneware** clays are less commonly used in schools, as the high temperatures, between 1200 and 1300 degrees Centigrade, required for maturation and vitrification cannot normally be achieved with standard electric kilns.

The degree of plasticity of clay can be controlled by the addition of materials to the clay body, such as ball clay or bentonite to make it more plastic, and kaolin or grog (previously fired clay that has been crushed and ground) to reduce its fattiness. Fluxes such as feldspar and limestone (whiting) can also be added to clay bodies to increase the bonding quality of clay when fired.

Most general-purpose clay supplies commercially available to schools have already been prepared to a satisfactory state of plasticity for modelling but are usually characterless as a result of this. Using clay straight from its plastic bag is similar to using paint straight from a tube. Students should be encouraged to experiment with mixing their own clay bodies and, if possible, be provided with opportunities to discover and use natural clay deposits in their environment. Clay can be found relatively easily, particularly in country areas where there are creek beds and dams. Collecting various sorts of clay, preparing, testing and trialling them is an absorbing and exciting educational activity in itself and greatly enhances understandings of the ceramic process at the personal level.

In his book *Pottery* Michael Cardew discusses the ceramic craft in relation to education through art and emphasises the need for it to begin with.

# ***THE CERAMIC PROCESS***

## ***Clay preparation***

Cleaning and recycling clay.

Clay found in natural locations may contain all sorts of materials such as twigs, stones and leaves, which will need to be removed before use.

Simply putting small pieces of the clay in a bucket or plastic bin and mixing it with water to a slurry will, after a few days, make it possible to sieve through a coarse mesh such as flywire. This will separate most of the foreign bodies, but progressively finer meshes, available from ceramics suppliers, should be used to refine the liquid clay further.

Previously used, hardened, unfired clay can be reconstituted in a similar way. If the clay to be recycled has been used in conjunction with plaster for modelling and casting, ensure that there are no pieces of plaster mixed with the clay, as this can cause havoc during firing. It is often best to set aside clay of this sort to be reused for modelling and casting only.

After the clay has been cleaned, the slurry should be left to settle for a week or so until the excess water separates and can be siphoned off.

There are several ways to remove further excess water from the clay:

If the clay is required urgently, it can be poured or spread thickly onto a slab of plaster and covered with damp hessian. The plaster absorbs moisture quickly and normally the clay can be ready for wedging the next day. Although not as efficient, common concrete paving slabs can be substituted for the plaster slab.

Alternatively, the wet clay can be wrapped in hessian, canvas or calico and suspended to allow excess water to drip through and evaporate. Atmospheric conditions will dominate the drying out process.

## ***Storage***

Even if the clay was thoroughly sieved and mixed at the slurry stage, it is still likely that, through the settling process, its texture will be inconsistent. When the excess water has been removed, the clay will need to be mixed further and stored away for some weeks to mature.

The clay will mature better and be more manageable if it is kneaded into balls about the size of a large grapefruit and stored in a plastic bin with a lid. The bottom of the bin should be lined with common bricks and a small quantity of water added to provide a dank atmosphere. Before fitting the lid, some damp hessian can be draped over the clay. Bacterial action will set in which will help to expel air from the clay and cause it to become more plastic. Some schools have access to a pug-mill. A pug-mill is simply a machine like a mincer which will mix the clay to a more even and plastic quality. Pugging should be done before the clay is kneaded into balls for storage.

## ***Wedging***

When the clay is taken from storage to be used, it should be wedged to achieve an even consistency and improve its plasticity.

To wedge a pug of clay, it should first be beaten into a flattened disc on a firm surface such as a heavy table covered with canvas, hessian or hardboard (rough surface uppermost). Concrete slabs can also be used.

A piece of wire or nylon fishing-line is drawn up through the middle of the clay and the two halves separated. One half is lifted high and swung down forcibly on top of the other. The mass is then turned through 90 degrees horizontally and the process repeated. After it has been wedged 21 times, it will have had more than a million cuts through it and will be very even in texture. Commercially supplied clays do not normally need to be wedged.

## ***Kneading***

Kneading is required to freshen up a piece of clay before it is used. It can be a laborious process for the novice until the secret of using body weight is discovered.

1. A firm stance with one foot forward (left foot if right-handed) and knees slightly bent should be adopted when 'addressing' the ball of clay.
2. With hands on the sides of the ball of clay and thumbs on top, body weight should be sharply leaned forward and down. The clay will be pushed forward at the sides more than in the middle.
3. Without taking hands off the clay, lift it forward to stand on the protruding tongue of clay between the hands. Once again, rock the body weight forward and down. When performed rhythmically, this will produce a shape similar to a 'ram's head' and has the effect of mixing the clay spirally.

Plastics such as bentonite or ball clay, fillers such as grog, sand and silica, and fluxes such as feldspar and whiting can be sprinkled on the wedging table during kneading and incorporated into the clay body. After several minutes of kneading the clay will be ready for use.

## ***Testing***

Clay can be *short, plastic or fatty* in its raw state. By kneading it into a thick sausage, then bending it until it cracks, some idea can be gained as to its state of plasticity. During the wedging and kneading stages its state can be altered by adding fillers or plastics.

When clay dries, it shrinks. To test its shrinkage rate, a bar of clay about 150 mm x 30 mm x 10 mm can be made to receive the impression of an embossed 100 mm ruler.

When the bar is dry, its percentage of shrinkage can be easily determined by remeasuring against the ruler. After firing, it can be re-measured again to discover approximate shrinkage rates. Normally shrinkage during drying should be approximately 6 per cent to 7 per cent or less and about the same when fired.

Highly plastic clays tend to slump and may need fillers to add strength. Fine, dense clays are often difficult to dry and susceptible to cracking and warping. The addition of fillers will open the clay body, allow it to dry and reduce warping and shrinkage.

## *Drying*

Excessive use of water during the forming of a ceramic piece will almost certainly result in the form cracking during the drying process. Overly plastic clays, because of the fineness of the particles, tend to dry on the outside but remain wet on the inside. The strain set up through different shrinkage rates causes cracking to occur.

The drying process should be as slow and as careful as possible. Normally, once a form has been completed it should be stored in a relatively humid environment, then moved to progressively drier environments over a week or so. Finally it can be stored adjacent to the kiln, where it can become thoroughly dry. Mesh shelving which allows air circulation around all surfaces of the form will help to reduce warping.

Forms such as tiles should be turned over periodically during drying to help prevent warping. Spouts and handles can be lightly wrapped in plastic to slow down drying. Circular rims often warp during drying, although this can be controlled to some degree by turning them upside-down when leather-hard.

Great care should be taken to ensure that work in progress, or greenware, be prevented from drying by careful mummification in plastic. During summer months, it may be advisable to spray the greenware with a light mist of water before wrapping to ensure that clay can be worked at a later date. Joining freshly prepared clay to clay forms that have been stored for some days is always likely to end in disappointment, as the clays will be at different stages of shrinkage.



## **FORMING**

There are basically three ways to form clay:

- Handbuilding**
- Wheel throwing**
- Moulding**

The most widely used of these in schools is handbuilding. While some mention will be made of wheel throwing and moulding, it is suggested that other resources be used to supplement the brief technique outlines given here. Indeed, it is highly recommended that further information regarding techniques be sought to supplement all the information given here as this booklet is intended only as an introduction to studio ceramics in schools. A list of recommended references appears at the back of this booklet.

### ***Handbuilding techniques***

Handbuilt forms can be made by pinching, pulling and subtracting shapes from a ball of clay or by joining pieces of clay together.

While objects formed through manipulation of a single piece of clay normally survive the drying and firing process intact, those that are formed through joining clay together are sometimes at great risk, depending on how well the pieces are joined. Because of this, simple pinched forms are recommended as a starting-point for the novice, so that the chances of success and consequent self-confidence and satisfaction are maximized. It can be soul-destroying to labour for hours on a form only to see it fall apart during the drying and firing process.

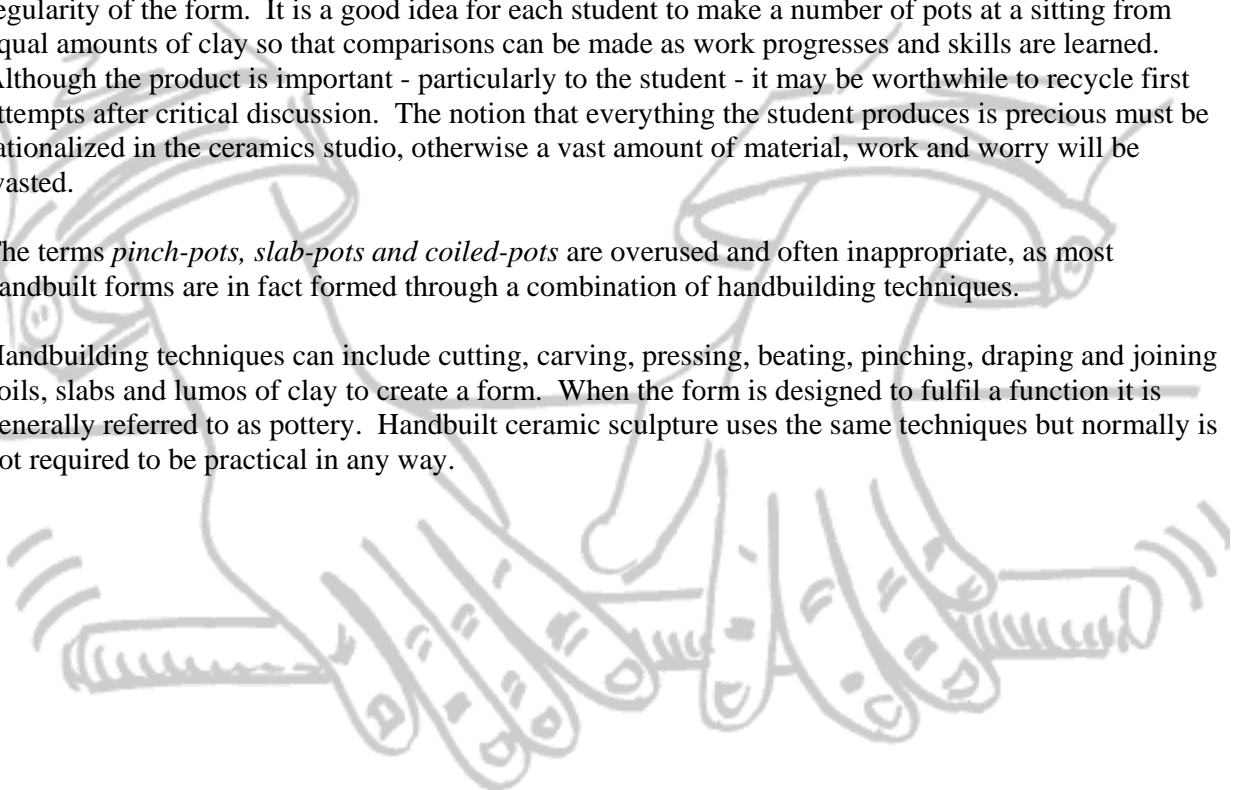
The ubiquitous 'pinch-pot', although the simplest of forms, has played a central role in Japanese culture and aesthetics for centuries. However, the philosophy of Zen Buddhism, the tea ceremony and Raku are profound. As in things, simplicity is the basis of all good ceramic design.

Pinching clay to form a simple semi-spherical pot appears to be an easy task and one that can be rushed through in a few minutes. However, there is much to be learned about the nature of clay through such a seemingly mundane project as forming a container through pinching.

Novices will often overlook aspects such as even thickness of the clay, smoothness, roundness and regularity of the form. It is a good idea for each student to make a number of pots at a sitting from equal amounts of clay so that comparisons can be made as work progresses and skills are learned. Although the product is important - particularly to the student - it may be worthwhile to recycle first attempts after critical discussion. The notion that everything the student produces is precious must be rationalized in the ceramics studio, otherwise a vast amount of material, work and worry will be wasted.

The terms *pinch-pots*, *slab-pots* and *coiled-pots* are overused and often inappropriate, as most handbuilt forms are in fact formed through a combination of handbuilding techniques.

Handbuilding techniques can include cutting, carving, pressing, beating, pinching, draping and joining coils, slabs and lumos of clay to create a form. When the form is designed to fulfil a function it is generally referred to as pottery. Handbuilt ceramic sculpture uses the same techniques but normally is not required to be practical in any way.



## ***Pinching***

Prepare a Piece of clay into a ball to sit comfortably in the palm of the hand.

1. Press the thumb of the free hand into the ball of clay and turn the form continually with the other hand.
2. Continue pinching with the thumb inside against the fingers outside until the base of the form feels to be about 10-15 mm thick. The wall should be much thicker towards the top at this stage and the form should still be roughly spherical.
3. Thin the wall, continually rotating the form, from the base upwards by pinching between thumb and fingers. Ensure that no cracks appear. The 'well' inside the form should be starting to become spherical. Do not open out the rim yet, but keep the clay thicker toward the top.
4. As the wall is thinned, the form will become bigger and the rim uneven. Cupping the form in the hand and gently tapping the rim on the table will level the rim. **Pinch** the resulting irregularities back down the inside of the wall of the pot away from the rim. Continue until an even thickness is achieved together with a level rim. The pot should be roughly semi-spherical when complete.

Semi-spherical hollow forms of different sizes can be combined in a multitude of ways to create new and exciting forms of a functional or sculptural nature. The pinched form can provide a basis for the addition of slabs and coils of clay.

## ***Slab-draping***

Simple slab forms can be made by draping a slab of clay over a smooth object such as a hubcap, shallow dish or a purpose-built form of plaster, clay or wood. Some plastic containers may also be useful but always the forms should be smooth and gently curved rather than jagged, pitted or angular. Press-moulding can be used in these cases.

1. Roll out a slab of clay on a piece of calico or canvas to an even thickness of between 10 and 20 mm- (Roller guides consisting of two 500 mm lengths of wood of the same thickness - between 10 and 20 mm - are useful for achieving an even thickness.)
2. Cheesecloth should be wrapped over the form to prevent the clay slab sticking to it.
3. The slab is lifted with the material on which it was rolled and gently flipped over the wrapped form.
4. Peel off the material and smooth the slab, if required, with a damp rubber kidney. Avoid excessive wetting, as this weakens the clay and increases shrinkage problems during drying stages.
5. Trim the rim with a needle or sharp instrument.
6. A base or feet can be joined to the slab if desired. Ensure they are level by placing a flat bat on them.
7. Allow to become leather-hard, then remove from form and finish rim surface.

## ***Joining clay***

There are few more frustrating experiences in ceramics than spending hours of studio time developing a form, only to see it disintegrate at the joints during the drying process. Slab-built and coiled forms are particularly prone to this.

To minimize the chances of forms cracking at the joints, the clay being used should always be at the same consistency and degree of maturity. Attempts to join fatty plastic clay to near-dry forms will almost certainly fail.

When joining two pieces of clay together, the following steps should be observed to ensure that the pieces are *welded* together.

1. Lightly score both surfaces to be joined.
2. Apply slurry to both surfaces.
3. Slide the surfaces firmly together.
4. Alternatively pinch clay from one piece to the other ('stitch' it together).
5. Smooth the joint.

NOTE. *When joining slabs together (e.g. wall to base), it is often appropriate to include a coil of clay along the inside join for reinforcement.*

## ***Coiling***

A *coil* is normally a sausage of clay that has been rolled out on board or table. Alternatively, coils can be extruded through dies on a special machine or squeezed into shape by hand. Coils need not be long and continuous.

In many parts of the world, coils of clay are used to handbuild pots. Some of these pots stand higher than people and are very strong.

It is important students understand that a pot made with coils need not look like a 'coiled-pot'. There is a popular misconception that the coils should sit on top of one another, giving a ribbed appearance. This is functionally unsound practice, as the clay must be joined effectively to survive drying and firing. If a ribbed appearance is desired, it is vital that the inside surface of the pot is welded thoroughly and smoothed.

Coil building is best done with well prepared plastic clay, in one sitting if possible. The clay can be easily pinched together and it is unlikely that slurry and Scoring will be required.

Coils can be quickly joined to the top edge of a pinched base by pressing the coil down with the thumb on the inside of the form and the forefinger on the outside.

Once a coiled form has been built, it can be beaten with a paddle (flat stick or wooden spoon) into planes, giving more interest and strengthening the construction. By wrapping string around the paddle,

a textured surface can be created during the paddling. Textures can be highlighted by applying oxides to the bisqued form then wiping the surface with a damp sponge before applying glaze.

## ***Moulding***

When repetitive shapes are required, moulds are very useful. Clay can be pressed into moulds, over moulds and between moulds. Liquid clay or 'slip' can be poured into plaster moulds.

Simple press moulds are easy to make or find, whereas multi-piece moulds for casting forms can be complex and difficult to create. commercially produced plaster moulds for slip-casting are not normally recommended for use in schools as they offer little opportunity for creative growth. Other resources should be researched for more information on moulding.

## ***Wheel throwing***

There will be no attempt here to discuss throwing techniques. At present senior high schools have a number of electric pottery wheels, whereas in district high schools they are rarely available. Where Craft Design units with a focus on ceramics are being offered from stages I to 6 it is recommended that students experience wheel throwing at some time. There is no substitute for regular practical experience to gain competence in throwing techniques.



## ***DECORATION***

The Oxford Dictionary defines *decorate as to furnish with adornments*. In ceramics, rarely is decoration merely an adornment. Decorative effects can be achieved from the clay preparation stage onwards. Various materials can be added to the clay - coarse grog, oxides, fluxes and so on - which may not strictly be adornments but serve to alter the clay body in functional terms. Glazes, though often highly decorative when fired, are usually functional in sealing the surface of a vessel to make it impermeable. A rough texture applied to a surface may, as well as being decorative, provide better grip; smooth textures, as well as providing visual and tactile pleasure, can also be hygienically functional.

During forming, decoration can be incorporated by adding pieces of clay to the form, impressing shapes and textures and colouring with slip or liquid clay. If a slip or engobe is used, incisions can be made in it to reveal the clay underneath. This technique, called *sgraffito*, is normally done at the leather-hard stage. At this stage the form can also be carved or incised, paddled and burnished.

Once the clay is dry, it can be filed and sandpapered, although attempts to join fresh clay to the form at this stage will be unsuccessful. After bisque-firing, underglazes and glazes can be applied by brushing, dipping, pouring, trailing or spraying. Wax resist techniques can be used and stencils employed if desired. The form can be glaze-fired any number of times in different kiln environments to produce different effects. There is no limit to the possible variation in ceramic decoration.

## ***GLAZING***

Glaze acts as a hard, waterproof protection for the normally porous clay body after bisque firing.

Not all ceramic forms will require glazing. Bisque fired clay can be waxed and polished, or painted with acrylic or oil-based paints. Found materials can be attached to its surface. However, glazes properly applied and fired are permanently bonded with the clay body and provide it with strength and lasting beauty.

Glaze consists of finely ground minerals suspended in water. The different combinations and proportions of minerals and chemicals in various glazes give them individuality. Basically, a glaze needs three elements:

silica - the glass former  
alumina - for strength, hardness and flow of the glaze  
flux - lowering the melting-point of silica and alumina

A glaze is usually categorised by its melting or maturing temperature. In schools we are normally concerned only with the earthenware and Raku categories. Advice on preparing glazes can be found in the GLAZE RECIPE section in this booklet.

Glazing can be the most fascinating and exciting aspect of the ceramic process. Unpredictable results occur frequently and unique effects can be achieved. The transformation of a chalky-looking coating into a rich glassy sheen is almost magical.

Sadly, commercially prepared and bottled liquid glazes are all too often the only glazes available to some students. These are usually relatively expensive and packaged in small containers.

Consequently, in an attempt for economy, the glaze is invariably brushed on sparsely, resulting in a patchy and disappointing product.

Occasional use of commercial glazes can be advantageous for special effects, but generally students should be encouraged to use glazes prepared in bulk in the studio.

Bulk glaze ingredients are available through State Supplies Division at reasonable cost (yellow pages of SSD catalogue - Art and Crafts listing), as well as from ceramics suppliers.

## ***Application***

Perhaps the most versatile method of applying glaze is to pour it. If the article to be glazed is a container of some sort, it will probably require glazing inside. Glaze can simply be poured into the vessel, swilled around to cover the clay surface and the surplus poured back into the glaze container. When glazing the outside of the vessel, you should put it on a stand inside a larger container, such as a plastic bowl or ice-cream container, and pour glaze evenly over the form. This operation may be made easier if the collecting bowl is on a turntable or a banding wheel that can be slowly rotated during pouring. Excess glaze collected in the bowl can be returned to the glaze container.

When the application is complete, the base or foot of the glazed vessel should be wiped with a damp sponge to remove all glaze. This prevents bonding to the kiln shelf or stilt when firing.

Alternatively, if sufficient quantity of glaze is available, the article can be *dipped*. This will usually give a much more even coating.

Glaze can also be *brushed* onto the article or *sprayed*. Spraying is not recommended unless special ventilation facilities are available, as the dust from most glaze ingredients can be damaging to health if inhaled.

Further coats of glaze can be added to an already glaze-fired article, although it may be necessary to add some glue (gum arabic) to the glaze recipe for it to adhere to the glossy surface.

## ***Bisque firing***

This is sometimes called the 'first' or 'biscuit' firing and is characterized by a temperature range of between 890 and 1030C. The bisque firing burns out all the organic materials, dries out chemically-combined water and irreversibly changes the composition of clay, while still leaving the ware porous enough to accept glaze for the second, or glaze, firing.

Normally, a bisque firing proceeds relatively slowly. The kiln should be packed during the morning of one day, turned to a low setting and allowed to reach 100-150C before being shut down at the end of the day to give the ware a chance to dry thoroughly before pre-heating the kiln for an early start the following morning. All vents should be open to allow moisture to escape. This initial heating dries the physical water from the ware and could be thought of as a super-drying stage. After two to three hours, the temperature should be around 250C and can be stepped up more quickly from now on.

Early next day the kiln can be turned to a low setting and temperatures allowed to gradually climb to around 250-300C over approximately three hours. A more rapid temperature gain can then be achieved by increasing the setting progressively over the next hour or so. The kiln can be turned full on, with the vents closed, once 600C is reached, to complete the firing by the end of the day. The vents can be re-opened to help cooling overnight. It is dangerous to leave kilns unattended. **KILNS SHOULD NOT BE LEFT ON OVERNIGHT.**

The kiln should be allowed to cool during the next day if possible. When the ware is cool enough to handle, it can be removed, the kiln cleaned and another firing commenced.

## ***Glost firing***

Higher temperatures than bisque firings are normally achieved in a glost, glaze or second firing, to mature the glaze.

In a glost firing, glazed articles will stick together if allowed to touch. Consequently, the kiln must be stacked with particular care to ensure that this does not occur. **Kiln furniture** is usually required to make this task easier and to enable the kiln to be stacked as densely as possible. There are basically three types of kiln furniture - shelves, props and stilts.

**Shelves** are delicate and expensive items, which should be handled with great care. The top surface of each shelf should be kiln washed to prevent glaze drips adhering. Failure to do this causes serious deterioration to the usefulness of the shelf, as with each firing the glaze drips melt and bond to furniture and pots.

**Props** are column supports for the kiln shelves. It is desirable to have props in a range of sizes so that some flexibility in spacing between the shelves can be achieved.

**Stilts** are low three-legged stands, which can be used to separate the base of a pot from the shelf surface. When a pot has glaze on its base, the stilts will bond to it. As there are only three small points of contact, the stilt can usually be broken off after firing, but this will leave sharp points that are dangerous and should be ground off with a grinding wheel.

When stacking the kiln, follow the steps outlined below.

1. A shelf should always be put on the kiln floor and kiln washed.
2. One column of props should be stood centrally at the back of the floor shelf. Two identical columns should be stood at the front corners of the floor shelf.
3. Stack pots on stilts on the floor shelf, below the height of the columns. Articles should not touch each other.
4. Place another shelf (kiln washed on top) on supporting columns and repeat steps until firing chamber is full.

A glaze firing can be done at a firing rate of about 150-200C an hour - much faster than a bisque firing, as the clay has already changed chemically. When close to the maturing temperature of the glaze, the firing should be slowed to allow all the volatile materials to escape and the glazes to smooth out.

After the desired temperature has been reached, the firing should be maintained at the same heat for another half hour or so - called a 'soaking period' - to allow the whole kiln to reach an even temperature. The kiln should then be shut off, with vents closed, and cooled slowly to allow the glazes to stiffen and the clay to contract evenly. Rapid cooling can prevent the glazes from smoothing out, leaving pinholes and cracks in both the glaze and the clay.

# ***Working with stains and slips on earthenware clay and porcelain.***

## ***What are stains?***

Stains are prepared by combining oxides and other ceramic materials. The mixtures are prepared in factories where they are heated until melting point. When cooled the glass like mass is crushed into a fine coloured powder. This can then be mixed into clay bodies, slips, glazes or water and other mixing mediums to give the potter a wide palette of colours. Stains can be applied onto the surface of a damp, leatherhard, dry or bisqued pot. Stains are added in percentages to bodies or slips etc. i.e. 100gms slip dryweight add 10gms stain.

To apply colour over red earthenware you will need to make up a white slip. Here is a recipe that fits earthenware:

FX Ball Clay	500gms
Potash Feldspar	300gms
Silica	200gms

Add the dry powder to water to make a creamy mixture. Sieve through an 80 mesh screen. Add stains to get required density of colour. Mix stains with a little bit of water first before adding to slip. To make up slips for porcelain use your porcelain body. Dry out the required amount of porcelain clay then add water and stain. Again sieve to remove larger particles.

## ***Applying slips***

Some care needs to be taken using slip. Too much slip on a pot that's too thin or damp can cause it to collapse or crack. Slip that is applied too thickly may crack or peel off. Slip may be applied by brushing it on or by spraying on with an air brush.

You may apply slip at different stages on damp pots, leatherhand, dry or after the bisque firing. If applying to bisque ware make sure the surface is free of dust and slightly damp to help adherence.

## ***Decorative Techniques with Slip***

Slip can be applied in a variety of ways and the results depend very much on your ability to experiment and innovate. Various techniques can be used on their own or combined with one another. The following are some for you to try out.

### ***Shellac resist***

This technique must be used on dry pots. Brush shellac/french polish onto a painted surface in the pattern you require. Let it dry then use a damp sponge to wash away the surrounding areas to leave the shellaced area raised above the surface. The pot may be bisque fired then and the shellac will burn away. This technique may also be used in reverse onto the uncoloured clay. Once the clay is sponged away slip can be brushed on leaving raised white areas. This technique is best used on fine clays.

### ***Latex Resist***

For this technique latex is brushed onto a leather hard, dry or bisque surface. Colour can be applied by brushing or spraying. The latex must be dry before the coloured slip is applied. Several layers of colour and latex can be built up. When finished the latex may be peeled off before firing.

\*Note – care of brushes. Latex can be very quickly destroy brushes as it dries very rapidly clogging the bristles. Make a mix in a small jar of 50/50 detergent and water, soak brushes in this before dipping into latex squeeze most of the detergent out, dip into latex, paint and then wash brush immediately in water. Soak again in detergent before re-use.

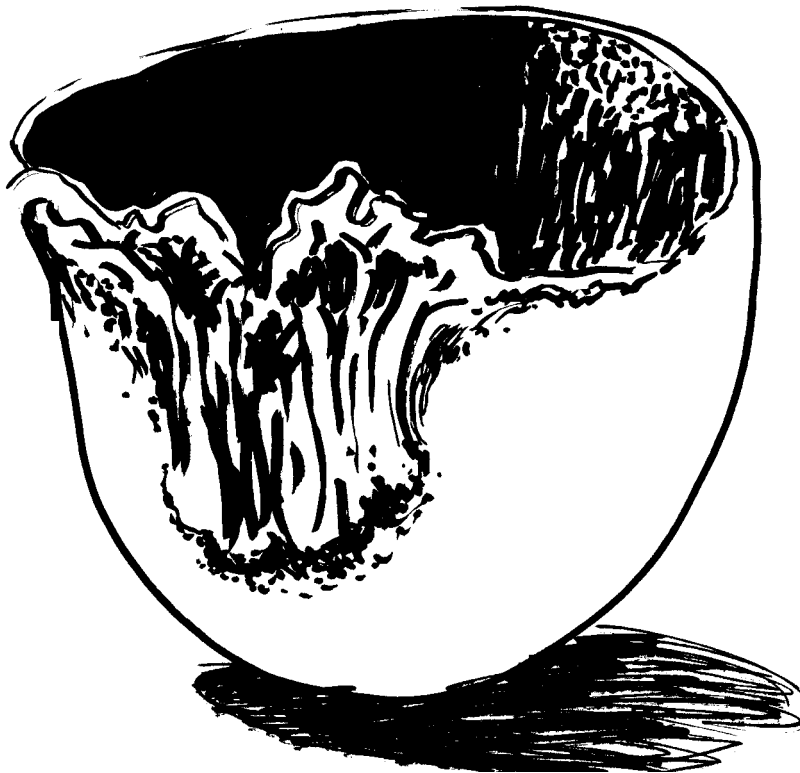
**Glazing Earthenware and Porcelain.**

When using coloured slips to seal the colour and bring it up to maximum brightness you need to apply a clear glaze. The glaze recipe below is suitable for earthenware.

**Clear Earthenware Glaze**

Fritt 4124	50	Fires to 1120°c – cone
Fritt 4064	35	Mix with water to a thin cream consistency then apply by dipping, pouring or spraying.
BB Ball Clay	10	
Silica	5	
Bentonite	3	

A commercial glaze that can be bought from “The Potters Market” for Earthenware is Duncans GL611 Ultra Clear firing at cone 05 or 1000°c. For porcelain Duncans GL618 Blue white clear brushing can be used. This glaze fires also to 05 – 6 or 1000°c – 1200°c. Both glazes are brush on glazes.



# ***STUDENT BRIEF***

## ***CERAMICS***

**THEME:** Yanchep National Park.

**PROJECT DESCRIPTION:** **Textured plate series.**

Produce a series of plates that depict the textual and patterned shapes found in the Yanchep bushland areas.

The plates should reflect and show how you have interpreted the environment using texture and pattern as your main focus. The plates should show a relationship with one another. Work in earthenware. Use appliqué and impressing techniques. Experiment with moulds for the plate support and explore glazing effects. Select appropriate techniques according to your needs. Look at the work of contemporary ceramists and the techniques and design constraints they have explored and developed. Refer to their work in your own developments.

### **VISUAL INQUIRY**

Go on the Yanchep drawing excursion. Draw selected images and scenes.

Take photographs for reference.

Collect textures and objects from the surroundings.

Do rubbings that could be repeated in clay.

Work in a variety of drawing media exploring what effects each can create when drawing from the environment.

Select a special area of focus and do several analytical drawings.

When back in the classroom, develop and explore your drawings and textures further. Explore ways of reproducing textures and patterns in clay.

Explore shapes and forms that fit with your experiments.

Draw out final designs and textures. Take photographs of the work in progress.

### **STUDIO**

Explore plate shapes and textures. Wedge clay and construct plate.

Apply textures and patterns using appliqué and impressing techniques.

Create a series of plates using similar style and techniques.

Record your ideas and developments of form and texture as you work.

Bisque fire plates.

Experiment with glazing and surface decoration techniques.

Select final effects of glazing and apply. Glaze fire.

### **APPRECIATION**

Look at the work of twentieth century ceramic artists and designers.

Refer to artists who use texture, patterns and the environment in their work.

Explore how they have used these design elements in their work.

Experiment with and develop techniques that you particularly like.

Refer to the work of at least one artist in your developmental work and in your studio work.

# ***STUDENT BRIEF CERAMICS***

## DUE DATE:

Project Description: Relief platter. Theme: Human form.

Create a large ceramic platter in earthenware clay using appliqué and relief techniques. The style of the work should reflect the Cubist period and the way in which pattern, line and colour are used by these artists. The theme is to show an aspect of human form using emotional poses as the key link to expression in the final work.

### ***VISUAL INQUIRY***

Draw an array of studies depicting the human form.

Develop the studies and ways of arranging them in the picture plane.

Select a focus area re: emotion sadness, loneliness, love, anger....

Draw poses and collect images that display this emotion.

Develop ideas for realistic study.

Look at the work of the Cubist artists. Focus on their use of pattern, line and colour.

Select a small area of one painting and reproduce this in clay using appliqué and relief techniques.

Experiment with style and using clay in a two dimensional manner.

### ***STUDIO***

Develop studies for final layout based upon your visual inquiry studies. Experiment with ways of representing texture, pattern, line and colour in clay using a stylized composition.

Select shape of platter. The shape should reflect the ideas represented in the final image.

Draw image directly onto the clay surface.

Raise and pattern areas selected.

Develop your design onto the clay surface.

Use body stains for adding any areas of colour before firing.

Smooth final surfaces. Bisque fire.

Add glazes in selected areas. Glaze fire.

### ***APPRECIATION/HISTORY.***

Look at Cubism and the various phases in its development, Analytical, Facet, Cofiage and Synthetic Cubism.

Look at the artists associated with this period and the styles developed. Apply these characteristics to your own designs.

# ***STUDENT BRIEF***

**STUDIO AREA:**

**CERAMICS**

**NAME:**

**PROJECT LENGTH:**

**DATE:**

## ***PROJECT DESCRIPTION:***

Based upon the Sorrento Quay Underwater World excursion create a series of platters/small too large derived from the images, patterns and shapes explored on the excursion. Each platter should interrelate with the next. Hand or wheel techniques can be used.

## ***VISUAL INQUIRY:***

Draw various aspects of the quay/Underwater World: concentrating on objects, space, shapes and found patterns. Select to work on man-made or naturally occurring images.

Experiment with shapes and patterns - apply colour to show patterns. Develop test tiles to look at decorating techniques that could be used.

Experiment with building and techniques.

## ***STUDIO:***

Based upon original drawings develop final ideas for basic shape/form of platter. Show the, variation in each besides size.

Wedge clay - use white earthenware. Prepare slabs. Apply decoration technique at plastic stage using any or all of the following, incision, impressing appliqué or body stains.

Create support for shape using either: sling, niold or wheel methods.

Add final details - dry to leatherhard stage, add any incisions required. Dry to bone dry stage - sand

Edges Bisque fire 1000.

Glazing create test tile for glazing method/colour/oxide transparent gloss or matt.

Glaze application Glaze fire 1100

## ***APPRECIATION:***

Look at the work of contemporary Australian potters. Develop experiments and building methods based on their techniques. Explore decorating techniques and firing processes. Select one artist to look at in detail. How has their work influenced your work.

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