



# SHOBNALL PRIMARY & NURSERY SCHOOL

## APPROACH TO THE TEACHING OF DESIGN & TECHNOLOGY



*"Technology makes what was once impossible possible. The design makes it real."-  
Michael Gagliano*

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## INTRODUCTION

This approach outlines the teaching, organisation and management of design & technology taught and learnt at Shobnall Primary & Nursery School.

The approach has been drawn up as a result of staff discussion and its implementation is the responsibility of all teaching staff. The responsibility for monitoring and review rests with the design and technology subject leader.

The main purposes of this approach are:

- To establish an entitlement for all pupils.
- To establish expectations for teachers of this subject.
- To promote continuity and coherence across the school.

## VISION

*“At Shobnall Primary School, our philosophy is to enable children to master practical skills in order to make high quality products. We promote designing, making, evaluating and improving to support our pupils with seeing design as a process. Our children will take inspiration from design throughout history to appreciate the design process that has influenced the products we use in everyday life. Pupils have a passion for the subject and knowledge of, up-to-date technological innovations in materials, products and systems.”*

## PRINCIPLES

<b>ORIGINALITY</b>	We allow our pupils to show significant levels of originality and the willingness to take creative risks to produce innovation ideas and prototypes. They have the ability to carry out thorough research, show initiative and ask questions to develop an exceptionally detailed knowledge of users' needs.
<b>OBLIGATION</b>	We responsibly ensure children use time efficiently, work ethically, constructively and productively with others, act as responsible designers and makers and manage risks well to manufacture products safely and hygienically.
<b>OUTLOOK</b>	Our pupils will have a thorough knowledge of which tools, equipment and materials to use to make their products, apply mathematical knowledge and have an excellent attitude to learning and independent working as a result.

## THEORY UNDERPINNING OUR PRACTICE AND PRINCIPLES

Design and technology education is about children validating the quality of their decision making. The validation mechanism is one in which creative cognitive processes are made manifest and the consequences of judgements tested through discussion, the production of drawings and, ultimately, physical objects. It is important that the process are the concepts of meeting practical human needs, being constrained by materials and appreciating that potentially all knowledge has relevance to any given designing and making activity.

We delivery our design and technology lessons in an active, practical and kinaesthetic way.

*“Tell me and I forget, teach me and I may remember, involve me and I will learn”- Benjamin Franklin.*

In design and technology children construct their own understanding and knowledge of the world by physically experiencing things, working collaboratively, trial and error and then reflecting on those experiences; focusing on the process of the project, as well as the finished product. Constructivist Learning theories (Piaget,1936; Vygotsky,1978) and The Learning Pyramid (National Training Laboratory Institute of Applied Behavioural Science,1960) support this notion.

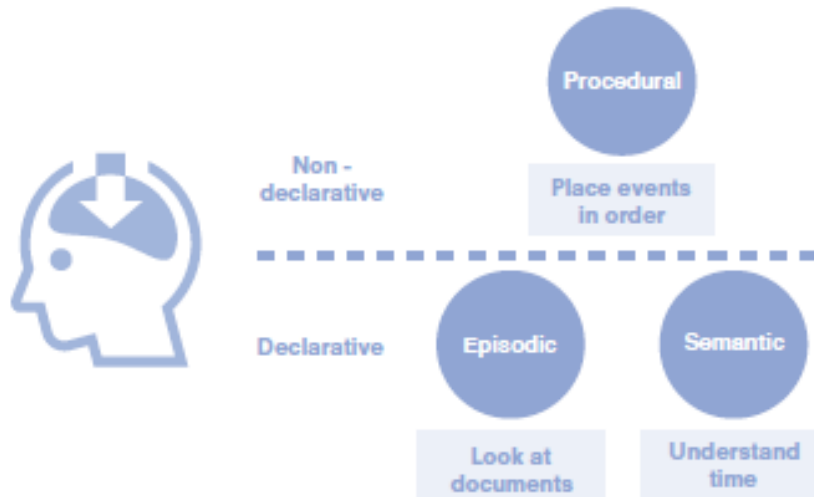
Demonstration and modelling by the teacher in Design and technology are an essential first step in learning by-doing (Dewey,1916; Petrina,2007) and this pedagogical approach is supported by behaviourist approaches (Pavlov,1927; Skinner,1957; Bandura,1977). As children engage in focussed tasks in which skills are carefully demonstrated and modelled first, then with encouragement, scaffolds and peer-collaboration, children can successively explore and practice this themselves (Zone of Proximal Development, Vygotsky 1978). It is hoped that children can then independently and confidently use these skills when designing, making and evaluating their own product.

As a school we scrutinised the best research available and we have determined that our **definition of learning** is a **change to the long-term memory**. This means that the way we implement our curriculum maps involves repetitive teaching of the key concepts or the ‘big’ ideas. Each unit has built in practise, retrieval and reinforcement of the key concepts to ensure knowledge sticks in the long-term memory. For learning to stick in the **long-term memory** we teach historical knowledge in meaningful contexts and in a connected way.

Long-term memory involves three main areas:

1. Procedural memory where procedures such as placing events in order and other skills are stored. Procedures, once fluent, become automatic and are referred to as non-declarative.
2. Semantic memory where facts and their meaning is stored.
3. Episodic memory where the activities to learn the processes and facts are remembered and act as memory cues.

Both semantic and episodic memory involve conscious thought and are therefore referred to as declarative.



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We have used the research around **cognitive load** and how children learn most effectively, to determine our approach to implementing the curriculum. Research has shown that if you teach children too many new concepts at once their short-term memory becomes overloaded and none of the knowledge will stick and move into the long term. We take an approach of **spacing** out new knowledge combined with interleaving and plenty of retrieval practice to ensure learning sticks. With **repetition, interleaving and retrieval**, research we use suggests that the more often children have to remember knowledge the more likely it just to be cemented into the long-term memory.

## INTENT

Curriculum drivers shape our curriculum breadth. They are derived from an exploration of the backgrounds of our pupils, our beliefs about high-quality education and our values. They are used to ensure we give our pupils appropriate and ambitious curriculum opportunities:

- Diversity – We believe in developing pupils' understanding of British values and celebrating our unique and diverse community.
- Dreams – We promote ambition, high aspirations and foster pupils' capacity to see the possibilities within the world today.
- Decisions – We encourage our pupils to make the right choices in order to stay safe, healthy and happy.

At Shobnall Primary and Nursery School, we intend that children should master Design and Technology to such an extent that they can go on to have careers within Design and Technology and make use of design and technology effectively in their everyday lives.

Cultural capital gives our pupils the vital background knowledge required to be informed and thoughtful members of our community who understand and believe in British values.

Curriculum breadth is shaped by our curriculum drivers, cultural capital, subject topics and our ambition for pupils to study the best of what has been thought and said by many generations of academics and scholars.

Knowledge webs help pupils to relate each topic to previously studied topics and to form strong, meaningful schema. Cognitive science tells us that working memory is limited and that cognitive load is too high if pupils are rushed through content. This limits the acquisition of long-term memory. Cognitive science also tells us that in order for pupils to become creative thinkers, or have a greater depth of understanding, they must first master the basics, which takes time.

Our children are taught Design and Technology in a way that ensures progression of skills, and follows a sequence to build on previous learning.

## **IMPLEMENTATION**

Our curriculum design is based on evidence from cognitive science; three main principles underpin it:

- Learning is most effective with spaced repetition.
- Interleaving helps pupils to discriminate between topics and aids long-term retention.
- Retrieval of previously learned content is frequent and regular, which increases both storage and retrieval strength.

In addition to the three principles, we also understand that learning is invisible in the short term and that sustained mastery takes time.

Our content is subject specific. We make intra-curricular links to strengthen schema. Continuous provision, in the form of daily routines, replaces the teaching of some aspects of the curriculum and, in other cases, provides retrieval practice for previously learned content.

Cross curricular outcomes in design and technology are specifically planned for and outlined on the medium term plan for each year group. Planning is informed by and aligned with the national curriculum, using the Kapow scheme of work to support staff's planning and teaching. However, teachers lesson design is not limited by this and is informed by national agencies, including content based on the Design and Technology Association's 'Projects on a Page' and beyond.

## **IMPACT**

Our children enjoy and value Design and Technology and know why they are doing things, not just how. Children will understand and appreciate the value of Design and Technology in the context of their personal wellbeing and the creative and cultural industries and their many career opportunities.

Progress in Design and Technology is demonstrated through regularly reviewing and scrutinising children's work, in accordance with our Design and Technology assessment policy to ensure that progression of skills is taking place. Namely through:

- Looking at pupils' work, especially over time as they gain skills and knowledge
- Observing how they perform in lessons
- Talking to them about what they know.

The Design and Technology curriculum will contribute to children's personal development in creativity, independence, judgement and self-reflection. This would be seen in them being able to talk confidently about their work, and sharing their work with others.

Progress will be shown through outcomes and through the important record of the process leading to them.

In the EYFS Seesaw is used to inform parents of Independent Learning projects. It can also be used for the subject lead to see the varied DT being completed and monitor progression.

### EFFECTIVE TEACHING AND LEARNING IN DESIGN & TECHNOLOGY

Effective teaching ensures that pupils retain knowledge they have learned in the long term. This is supported by opportunities to revisit and practise with prior knowledge. Pupils are more likely to retain knowledge when they have engaged analytically with the content they study.

- **Teaching for memory** - evidence suggests that teachers can support pupils' long-term learning by drawing attention to particularly important terms and expressions, precise phenomena and broader frameworks in their teaching.
- **Creativity and imagination**- design and technology should be an opportunity for children to demonstrate creativity and imagination. We encourage the use of this throughout units of work and account for the children's individuality through ongoing formative assessments. This in turn will allow for an array of differences in final pieces rather than planning for all children to reach the end of a half term all having made an identical product.
- **Recall** - recalling previously taught content (retrieval practice) and revisiting content in lessons (spaced practice) have also been shown to be effective in securing pupils' knowledge over time.
- **Effective scaffolding** - this is carried out in a variety of ways and is dependent on the context. Allowing children to develop techniques
- **Clear exposition that considers pupils' prior knowledge** - teachers' exposition is likely to be most effective when it is clear and carefully designed to account for pupils' existing knowledge.
- **Narrative and story** - storytelling is a powerful vehicle for learning. It is likely that stories are an effective way of teaching new content in art & design. Stories are likely to be particularly effective when teachers draw pupils' attention to particularly important content within them.
- **Developing pupils' knowledge of Famous Designers** –The exploration of focus designers allows children to recognise the importance of and develop an appreciation for design and technology.

### SUPPORTING PUPILS IN DESIGN & TECHNOLOGY, INCLUDING PUPILS WITH SPECIAL EDUCATIONAL NEEDS AND/OR DISABILITIES (SEND)

We recognise that in all classes children have a wide range of ability in design and technology, and we seek to provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. There is a lack of specific research on pupils with special educational needs and/or disability (SEND) and design and technology education. However, findings into what makes an effective design and technology curriculum provides some suggestions regarding effective support for pupils with SEND.

All pupils are entitled to a broad design & technology curriculum. Any adaptations made to support pupils' learning in design & technology usually should not be to the overall curriculum content but rather to how the content is taught. In the case of pupils with the most complex learning needs, there may be occasions when it is appropriate to modify the curriculum. However, this will be the exception.

Wherever practicable, provision will be made for pupils with special educational needs, where it affects their ability to take part in art and designs lessons. This may include children with sensory difficulties, physical difficulties, cognitive limitations and/or emotional and behavioural disorders. It is the responsibility of the Class Teacher to ensure that any special equipment needed for a lesson is available. If teachers require any special design & technology

equipment other than left handed scissors they must bring this to the attention of the art subject lead and the SENCO.

### PROMOTING KEY SKILLS IN DESIGN & TECHNOLOGY

Through our teaching of design & technology, we provide opportunities for pupils to develop key skills in the following areas:

- Food (Year 1, 2, 3 and 5)
- Structures (Year 1, 2, 4 and 6)
- Textiles (Year 1, 3 and 5)
- Mechanisms (Year 2)
- Mechanical systems (Year 3 and 5)
- Digital world (Year 4 and 6)
- Electrical systems (Year 4 and 6)

### EARLY YEARS FOUNDATION STAGE

Early years explore design & technology content through the 'Expressive Arts and Design, Understanding the World and Physical Development,' strands of the EYFS curriculum.

This involves guiding children to make sense of their physical world and their community through opportunities to:

- develop a curiosity and interest in the world through investigating, talking and asking questions about familiar products.
- develop confidence and enthusiasm through continuous exploration.
- develop construction skills to build and construct objects, and provide activities for exploring joining, assembling and shaping materials to make products.
- extend their vocabulary through talking about and explaining their designing and completed pieces of work.
- recognising the difference between natural and man-made, materials.
- recognising that a range of technology is used in places such as homes and schools and select and use technology for particular purposes.
- safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.
- use what they have learnt about media and materials in original ways, thinking about uses and purposes; represent their own ideas, thoughts and feelings.

Design & Technology is also encouraged through the 'Characteristics of Learning' specified in the EYFS framework– playing and exploring, active learning, creating and thinking critically.

### KEY STAGE 1

Through a variety of creative and practical activities children are taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They work in a range of relevant contexts [for example, the home and school, gardens and playgrounds, the local community, industry and the wider environment].

When designing and making, pupils are taught to:

#### **Design**

Design purposeful, functional, appealing products for themselves and other users based on design criteria

Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology



### **Make**

Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]

Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics

### **Evaluate**

Explore and evaluate a range of existing products

Evaluate their ideas and products against design criteria.

### **Technical knowledge**

Build structures, exploring how they can be made stronger, stiffer and more stable

Explore and use mechanisms [for example, levers, sliders, wheels and axles] in their products

## **KEY STAGE 2**

Through a variety of creative and practical activities, pupils are taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

When designing and making, pupils are taught to:

### **Design**

Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups  
generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

### **Make**

Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately

Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities

### **Evaluate**

Investigate and analyse a range of existing products

Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work

Understand how key events and individuals in design and technology have helped shape the world

### **Technical knowledge**

Apply their understanding of how to strengthen, stiffen and reinforce more complex structures  
Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]

Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]

Apply their understanding of computing to program, monitor and control their products

## **COOKING AND NUTRITION**

As part of their work with food, pupils are taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life.

Pupils are taught to:

**EYFS Framework:**

Children are taught about healthy eating habits, and dental hygiene.

**PSED:**

Children make healthy choices about food, drink. They know and talk about the different factors that support their overall health and wellbeing including healthy eating and toothbrushing.

**Curricular Goals:**

**Nursery**

Organise a teddy bears picnic- Children plan and organise a teddy bears picnic in a small group, deciding what they need to take and what they want to eat and drink.

**Reception**

Follow a recipe to bake a cake- Under adult supervision, children follow the steps of a recipe independently. They measure ingredients, mix them and create their own cake by placing the mixture into a container ready to be baked.

**Key stage 1:**

- use the basic principles of a healthy and varied diet to prepare dishes
- understand where food comes from.
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**Key stage 2**

- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques
- understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.

## PLANNING AND RESOURCES

Planning is informed by and aligned with the national curriculum, using the Kapow scheme of work to support staff's planning and teaching. However, teachers lesson design is not limited by this and is informed by national agencies, including content based on the Design and Technology Association's 'Projects on a Page' and beyond.

We ensure that there are opportunities for children of all abilities to develop their skills and knowledge in each unit, and we plan progression into the scheme of work, so that the children are increasingly challenged as they move through the school. We carry out curriculum planning in design & technology in three phases (long term, medium term and short term).

The long-term plan maps the design and technology units studied in each term during each key stage. We teach the knowledge, skills and understanding set out in the National Curriculum through the corresponding programme of study.

The class teacher uses the planning and resources from the Kapow scheme of work for their short-term plans and use the presentations and activities available through this scheme to support their teaching. The class teacher keeps these individual plans, although he/she and the subject leader often discuss them on an informal basis

There are sufficient resources for teaching all design & technology units in the school. They are located in the D&T cupboard and any items that are not available can be ordered in advance. iPads are also available to support learning in this subject.

## **CROSS-CURRICULAR OPPORTUNITIES**

Staff are encouraged to develop cross-curricular links with design & technology and other subjects to provide a relevant and meaningful curriculum for pupils.

### **English**

Design and Technology contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. Children are encouraged to ask and answer questions about the starting points for their work. They have the opportunity to compare ideas, methods and approaches in their own work and that of other children, and to say what they think and feel about them. This is also developed through art appreciation which allows them to research and present their findings to the rest of the class. They develop their writing by composing facts about designers, artworks and evaluation skills throughout a unit of work.

### **Mathematics**

The teaching of design and technology contributes to children's mathematical understanding in a variety of ways. These include measurements, ratio, symmetry, reflection, shape, perspective, parallel, tessellation, angles, horizontal and vertical lines, geometrical patterns.

### **Personal, Social and Health Education (PSHE) and Citizenship**

Design and technology contributes to the teaching of elements of personal, social and health education and citizenship. The children discuss how they feel about their own work and the methods and approaches used by others. Design and technology has strong links with well-being and encourages children to complete art and design activities to support this. They have the opportunity to meet and talk with designers and other talented adults whilst undertaking their work.

### **Spiritual, moral, social and cultural development (SMSC)**

The teaching of art and design offers opportunities to support the social development of our children through the way we expect them to work with each other in lessons. Groupings allow children to work together and give them the chance to discuss their ideas and feelings about their own work and the work of others. Their work in general helps them to develop a respect for the abilities of other children and encourages them to collaborate and co-operate across a range of activities and experiences. The children learn to respect and work with each other and with adults, thus developing a better understanding of themselves. They also develop an understanding of different times, cultures and religions through their work on famous artists, designers and craftspeople.

### **Computing**

We use computing to support art and design teaching when appropriate. Children use software to explore shape, colour and pattern in their work. Children collect visual information to help them develop their ideas by using iPads, and use digital media to record their observations. Children use the internet to research famous designers and pieces of work.

### **History**

Children study a variety of designs and items from the past and reflect on various time periods. This is closely linked with art and the use way visual art recounts stories of our past, it gives an account of past events.

## **ASSESSMENT**

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Assessment in design and technology takes account of all aspects of pupils' learning and achievement. This includes, not only what pupils create, but also how they create it, what skills they acquire and what they know about the tools and materials they use. Assessment also takes account of what they know about the world of art and design which places their own work in the wider cultural context. Finished products are a measure of learning, but it's not the only one. We also look at process: how children develop ideas, solve problems, organise concepts, and make decisions.

- Observing children at work, individually, in pairs, in a group and in class during whole class teaching.
- Using differentiated, open-ended questions that require children to explain and unpick their understanding.
- Providing effective feedback verbally and positive praise.
- Peer and self-assessment of work. Children evaluate at the end of the unit upon completion of a final piece of work.
- At the end of each unit, pupils will complete a unit quiz, recording scores on their pupil answer sheet and store this in their D&T folder, giving an indication towards their understanding of the unit as a whole.

Children in the EYFS are also assessed according to our schools EYFS curricular goals and EYFS frameworks ELGs.

### **HEALTH AND SAFETY**

The safety of the children is the responsibility of the teacher. It is paramount that other school staff and voluntary helpers are confident and knowledgeable in the appropriate and correct use of tools and equipment. A risk assessment in line with the Kapow scheme of work for design and technology is available for teachers' use.

When planning and delivering a design & technology lesson teachers take into account the following:

- Teachers and teaching assistants always give a clear demonstration of how to use a tool safely and how it should be transported around the room in a safe manner.
- Children are encouraged to become more responsible for preparing themselves for design & technology lessons e.g. hair tied back, clean hands and sleeves rolled up.
- Electrical equipment will only be used from the site and not be brought in from home.
- Craft knives will only be used by Year 5 and Year 6 children under direct supervision.
- Craft knives and rotary cutters will only be used with a safety ruler.
- Children will be taught to work safely and to understand that their actions can affect others.
- Only small, lightweight hammers will be used and checked regularly that the heads are securely attached to the shaft
- Hand drills can be used in KS2. It is the responsibility of the teacher to ensure that the work surface is clear and the material being drilled should be secured using a vice or clamp.
- Junior hacksaws may be used by the children, under supervision from an adult. The blades must be checked by the teacher (planning on using them) and the subject lead.
- All potentially risky tools and equipment (glue guns, junior hacksaws, craft knives, vegetable knives, sewing needles, fabric scissors, vegetable peelers and graters) before the lesson and again when they have been handed in.
- Even if children have used them before, lessons always begin with a reminder of how to use the tools and equipment safely.
- Children are encouraged to keep their work area organised and to collect and return tools safely and systematically.
- Clearly identified workstations are set up for the use of tools such as glue guns, craft knives and junior hacksaws.
- All teachers and staff must be familiar with the school Health and Safety approach.

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- A first aid box/bag is kept in each classroom, relevant to the needs of the class.

### **FOOD TECHNOLOGY**

- Children and staff will wear protective clothing during activities.
- Food will be bought fresh and used on the same day unless correct storage is maintained.
- Teachers' awareness of individual children's allergies are given appropriate consideration.
- Letters are sent home at the beginning of each year to ask parents to inform the school of any known food allergies.
- We know that pathogenic bacteria can easily be spread around the food preparation area, via our hands, chopping boards, dishcloths, tea towels, utensils and equipment, so when working with food we reflect the highest standards of domestic practise and hygiene.
- Work surfaces are cleaned before, during and after food activities as well as a, "clean as you go" routine which is used and taught to the children.
- After use, all equipment and utensils are washed with hot water and washing up liquid.
- We use disposable cloths and paper towels and they are discarded after use.
- The cleaning spray that we used to prepare our tables for cooking lessons, before and after use, is provided by the school's cleaning supervisor.

### **SAFEGUARDING AND CHILD PROTECTION**

We seek to safeguard children and young people by:

- valuing them, listening to them and respecting them;
- adopting child protection guidelines through procedures and a code of conduct for staff and volunteers;
- recruiting staff and volunteers safely, ensuring all necessary checks are made;
- sharing information about child protection and good practice with children, parents, staff and volunteers;
- sharing information about concerns, with agencies who need to know, and involving parents and children appropriately;
- providing effective management for staff and volunteers through supervision, support and training.

See Safeguarding and Child Protection Approach for further information.

### **MONITORING AND REVIEW**

It is the responsibility of the design and technology subject leader:

- supports colleagues in their teaching, by keeping informed about current developments in design and technology and by providing a strategic lead and direction for this subject;
- to develop, implement and review an action plan for design and technology;
- to monitor design and technology throughout the school;
- to encourage staff to provide effective learning opportunities for all pupils;
- to develop valid activities, appropriate for children at different stages of development, which enable pupils to progress in the subject.

Monitoring of the standards of children's work and of the quality of teaching in design and technology is the responsibility of the design and technology subject leader. The work of the subject leader also involves supporting colleagues in their teaching, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school.

This approach will be reviewed at least every three years.