working with the benefit of foresight

teacher guide
young foresight
The Young Foresight Promise to Teachers

Through the Young Foresight Programme your pupils will improve their design skills, become more creative, understand new technologies and develop their communication skills. They will learn to work well with one another and from one another. They will exceed your expectations of their achievement. And they will enjoy design & technology like no other subject in the curriculum.
young foresight

book one teacher guide

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Foreword

Our world is changing. In less than 20 years it will have changed in ways we can barely imagine. This new world will open the door to new opportunities and new ways to express our creativity and resourcefulness. Change is to be embraced, but to make sure we rise to the challenges of the future, we must prepare ourselves now.

The relationship between the economic well-being of our nation and the school curriculum is complex and subtle. The talent of our young people is the country’s most precious resource. It needs to be nurtured within the school curriculum so that the workforce of the future is in a strong position to respond in an energetic and resolute way to the demands of global markets. Whatever their future employment, it is likely that every individual will need to update their skills and knowledge quite radically several times during their career. Nowhere is this more apparent than in the worlds of industry and commerce. So it is important to provide our young people with creative and flexible learning skills to cope with their changing world.

The Young Foresight initiative develops creativity, enterprise and innovation among young people. The revised and new materials will add to its impact and effectiveness. These provide vital learning experiences by giving its participants an insight into the worlds of industry and commerce and so promote the skills and attitudes necessary to take a positive and active part in this future world.

Young Foresight also aims to give pupils direct experience in the skills needed to create a successful product or service - from concept to design to adaptability in the market. It encourages pupils to think about and anticipate future trends and consumer needs and then design products and services that will perform well in a world that has not yet arrived.

The pupils will be supported by ambassadors drawn from the local business community who will help them to think about the practical aspects of product design and changing market trends. This collaboration will take design & technology into the future and bring it to life in the classroom. The initiative works particularly well in Year 9 when all pupils are required to study design & technology as part of the National Curriculum.

Young Foresight is about taking action now to prepare our young people for the future. It is also about having fun. We hope that you will choose to participate and take full advantage of this important initiative.

Lord Sainsbury of Turville
Parliamentary Under Secretary for Science and Innovation

Baroness Ashton
Parliamentary Under Secretary for Early Years and Schools Standards
Introduction

Welcome to Young Foresight. This ‘teacher guide’ is the first of five short booklets designed to help you make the most of Young Foresight in your school. It describes how Young Foresight challenges orthodox practice and provides you with a range of teaching approaches and resources that will enable you to improve your pupils’ design skills, creativity, group working and communications skills. The second booklet, ‘toolkit teaching’, describes in detail how you can use each worksheet to good effect in providing the knowledge, understanding and skills that your pupils will need to design products and services for the future. The third booklet ‘toolkit worksheets’ contains the worksheet copy masters. The fourth booklet, ‘designing for the future’, describes flexible approaches to enabling your pupils to use what they have learned in the Young Foresight toolkit to develop innovative designs for products and services suitable for a world that has yet to arrive. The fifth booklet ‘young foresight guide to sketching’ provides activities to enhance pupils’ sketching ability.
1 Challenging the orthodox

Young Foresight is a design and technology experience for Year 9 pupils lasting about 12 weeks. It meets many of the requirements of the Key Stage 3 National Curriculum Programme of Study for design and technology, but it does this in an unconventional way.

Young Foresight challenges the orthodoxy of design and technology practice in seven important ways. It does not do this lightly. It takes this position because it believes current practice is limiting pupils’ achievements and experience of technology.

1 Young Foresight requires pupils to design but NOT make. If pupils always have to make what they design this will limit their ambition to that which can be achieved with the tools, equipment, materials and time available in school. Pupils will learn very little about modern technologies and the way they can be used if they can only engage with technologies available in school through designing AND making.

However, while pupils’ creativity will be severely constrained by the need to make what they have designed, it is still important that pupils experience the rigour and discipline of ‘designing what they are going to make and then making what they have designed’ for a significant part of their design and technology experience.

It is for this reason that the Young Foresight experience is limited to around 12 weeks in Year 9.

2 Young Foresight requires pupils to work as groups in which all members contribute to generating, developing and communicating design ideas. In the world outside school most complex products and services are designed by multidisciplinary teams and Young Foresight wants to put pupils in similar situations. A person is more likely to be creative as a member of a group than as a solitary individual. This is one of the reasons why industry operates through groups and teams rather than individuals.

3 Young Foresight requires pupils to design products and services for the future, not for themselves or members of their family now, nor for probable immediate markets. It does this because it wants to give young people a stake in the future; a view about what it could be like and the contribution they can make by having ideas.

4 Young Foresight does not expect the teacher to tackle this task alone. Young Foresight helps schools find ambassadors from industry who can work in a variety of ways to support pupils designing for the future. Young Foresight provides local and national networks so that teachers and industry can work together in developing models for best practice.

5 Young Foresight expects pupils to use new and emerging technologies as the basis for their design ideas. These are technologies that will not be available in school. Young Foresight does this because it believes the best way for young people to learn about technologies that will have a large effect on all our lives is for them to think about how they could be used.

6 Young Foresight requires pupils to present their ideas to their peers, their teacher and ambassador, and to audiences at conferences on innovation. These presentations can vary from the informal and spontaneous - commenting on a hand-written flip chart, to the formal and well rehearsed - using a data projector linked to a short documentary drama.

7 Young Foresight requires pupils to develop their own design briefs. This is a much more open approach to that usually taken with pupils of this age. As a result they have to consider the needs and wants of people in a future society and the markets that might exist or could be created.

Young Foresight prepares pupils to respond positively and effectively to this unorthodox approach to design and technology by providing them with the Young Foresight Toolkit. This teaches the concepts and processes the pupils will need to be successful at designing products and services for the future.

The Young Foresight Toolkit is described in detail in Chapter 2, pages 4-7.
2 The Young Foresight Toolkit

The Young Foresight Toolkit is a suite of activities that has been designed to teach pupils the concepts and processes they will need to be successful in designing products and services for the future. Activities are presented as worksheets like this.

**Title**
Indicating the nature of the activity

**Unit number**
Indicating where it comes in the toolkit sequence

**What to do**
Clear instructions

**You will learn**
Sharing learning intentions

**You will need**
Listing what pupils will need

**Information**
As text, diagrams and illustrations

**Page numbers**
Indicating which of how many pages

**For homework**
Activities to consolidate the learning

**What to discuss**
Questions to help pupils talk about their ideas

---

**Understanding needs and wants**

*You will need*

Your worksheet.

*You will learn*

About the difference between needs and wants, and how to get it right.

*What to do*

Imagine that you find yourself in an evergreen forest. It’s dark, cold and raining. You are a plumper of light sheet and you make your way towards it. But the going isn’t easy. The undergrowth is heavy and pulls at your clothes, making you feel trapped. A heavy branch is seen a few steps ahead. You have the need to find shelter, to avoid getting wet, but you also need to be careful not to disturb the animals that live here. What will you do?

---

**For homework**

Use these activities to explore the difference between needs and wants.

---

**Understanding needs and wants**

*You will need*

Your worksheet.

*You will learn*

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---

**For homework**

Use these activities to explore the difference between needs and wants.
The Young Foresight Toolkit

Worksheets to support pupils watching the Techno television programmes are like this.

Title
Telling you which programme the worksheet supports

Before
Use this part of the worksheet before watching the programme. It asks questions which will help your pupils understand the programme.

Worksheet

Getting the most from ‘Will it sell?’

11 17

Title

Before

Use this part of the worksheet before watching the programme. It asks questions which will help your pupils understand the programme.

Worksheet

Getting the most from ‘Will it sell?’

11 17

Before

Use this part of the worksheet before watching the programme. It asks questions which will help your pupils understand the programme.

Worksheet

Getting the most from ‘Will it sell?’

11 17

After

Use this part of the worksheet immediately after the programme to help your pupils record important details.

Worksheet

Getting the most from ‘Will it sell?’

11 17

After

Use this part of the worksheet immediately after the programme to help your pupils record important details.

Worksheet

Getting the most from ‘Will it sell?’

11 17

Later

Use this part of the worksheet a little later to help your pupils discuss key issues that emerge from the programme.

Worksheet

Getting the most from ‘Will it sell?’

For homework

Use this part of the worksheet to consolidate pupils’ learning.

Worksheet

shaping things to come
The Young Foresight Toolkit

There are 17 activities in total. You may find that your pupils are already familiar with some of the concepts and processes taught through some of the activities in which case you can omit these activities. If, when the pupils tackle designing products and services for the future, you find that some of them need a refresher it is a simple matter for them to use the appropriate worksheets on an individual basis.

Here is a brief synopsis of each of the activities in the Toolkit.

Giving an overview
Unit 1: Understanding the big picture gives pupils an overview of the Toolkit and provides them with a checklist so that they can monitor their progress. This is important, as without this overview it is all too easy for pupils to see each activity in isolation rather than as part of a set that will provide them with powerful tools for future work.

Starting with people
The next two activities teach pupils about needs and wants. This is important, as the products and services they design for the future should meet the needs and wants of real people.

Unit 2: Understanding needs through the PIES approach familiarises pupils with different sorts of needs and how these are met by products and services.
Unit 3: Understanding needs and wants teaches about the relationship between needs and wants and also about the way what we want to meet our needs is determined to a large extent by the nature of the society in which we live.

Future reality not fantasy
The next two activities teach pupils about trends and using trend data to imagine what the future will be like. This is important, as the products and services they design will need to be relevant to the lives of those living in the future. It is through using trend data that pupils will be able to explore the lives of people in the future.

Unit 4: Understanding trends teaches pupils what trends are, what they can tell us and how to use them to make predictions.
Unit 5: Future scenarios from trends helps pupils to use trends to think about how life expectancy and education might change in the future.

Genuine creativity
The next two activities teach pupils about strategies for being creative. This is important, as a key part in developing products and services for the future is creating a wide range of innovative ideas.

Unit 6: Getting the most from ‘Who needs what, where and when?’ helps pupils use a Young Foresight television programme to gain insight into different ways of being creative.
Unit 7: Using the 4Rs of creativity gives pupils the opportunity to try out four ways of improving the first ideas they get from brainstorming.

17 activities to empower your pupils
The Young Foresight Toolkit

Ensuring sustainability
The next three activities introduce pupils to ideas about sustainability and show how designers are already working hard to ensure that the products and services they design have as little impact as possible on the environment. This is important, as environmental considerations are likely to be more important in the future.

Unit 8: Getting the most from 'Bright ideas for a better world' helps pupils use a Young Foresight television programme to understand the idea of sustainability.
Unit 9: The story of a tin can introduces pupils to the idea of a product life cycle.
Unit 10: Product life cycles and sustainability uses the idea of product life cycle analysis to compare the environmental impact of different products.

Understanding products
The next three activities teach pupils to think about products from different perspectives. This is important, as it will enable them to be more creative in thinking up possibilities for products for the future.

Unit 11: Getting the most from 'Will it sell' helps pupils use a Young Foresight television programme to understand the way changes in technology can affect the development of products and their success in the market place.
Unit 12: Will these products last into the future? teaches pupils to think about the way a product might change in the future.
Unit 13: A matter of choice? teaches pupils to think about why manufacturers produce different versions of the same product.

Understanding services
The next two activities teach pupils about the services we use every day. This is important, as it will enable them to consider services as well as products when they are designing for the future.

Unit 14: Spot the service helps pupils see the wide range of services that we use and probably take for granted.

Unit 15: Improving services helps pupils identify local service providers and think about how the services might be improved.

Utilising new technology
The next activity introduces pupils to the new technologies that might affect our lives over the next 20 years or so. This is important, as pupils are required to consider the application of new technologies when they are designing products and services for the future. More detailed information is available from the three television programmes and associated activities which are part of the Designing for the future worksheets.

Unit 16: New technology just around the corner provides pupils with a framework for thinking about likely developments in technology with some predictions from professional futurologists.

Good communication
The next activity teaches pupils about different ways to present their design ideas. This is important, as pupils are required to present their ideas to the rest of the class, the teacher and the mentor, and may well have to make presentations in school assemblies and at conferences.

Unit 17: Presenting your ideas gives pupils information about five different presentation techniques and guidance on choosing which ones to use.

Exactly how to teach the Young Foresight Toolkit is described in detail in Young Foresight Book Two Toolkit Teaching.

The worksheets for the Young Foresight Toolkit are available as photocopy masters in Young Foresight Book Three Toolkit Worksheets.
3 Designing for the future

Once your pupils have acquired the Young Foresight Toolkit it is time for them to put it to good use in designing products and services for the future.

There are four factors that you should encourage your pupils to take into account. These are illustrated in Figure 3.1. Clearly these factors interact with one another and influence the sorts of products and services that can be developed and will be successful.

- **Technology**
  The technology that is available to be used. This should be a new and/or emerging technology. Pupils should consider how the technology will be used in the new product or service. Pupils should not concern themselves with manufacture. Pupils will be able to use the latest television programmes, the futures of materials technology, electronic and communication technology and food technology, and their work on new technologies here.

- **Society**
  The society in which the product or service will be used. This will be concerned with society's prevailing values, what is thought to be important and worthwhile. This will govern whether a particular application of technology will be welcomed and supported. Pupils will be able to use their work on trends and sustainability here.

- **People**
  The needs and wants of the people that might use the product or service. If these do not meet the needs and wants of a sufficiently large number of people they will not be successful. Pupils will be able to use their work on the PIES approach to needs and wants here.

- **Markets**
  The markets that might exist or could be created for the products or services. Ideally a market should be one with the potential to grow, one that will last, and one that adapts to engage with developments in technology and changes in society. Pupils will be able to use their work on products and services here.

Figure 3.1
An important decision for you is the order in which you ask your pupils to tackle a task. One way is to start with a particular new technology and ask a sequence of questions like this:

- What sorts of things can we use this technology for?
- For each of these, what needs will they meet?
- Will meeting these needs be seen as important and worthwhile in society in the future?
- Will people want products or services to meet these needs?
- What sort of market is there likely to be for these products and services?

If you adopt this approach it will be important to be wide-ranging in answering the first question. For example, in asking a question about the possible applications of QTC, a new material that can be used to make pressure sensitive conductors, a group of pupils identified the following areas in which this could have applications: sport and leisure, transport, medicine, environmental monitoring and aids for the handicapped. Eventually they focused on producing a range of sport and leisure goods and developed two ideas from this range: a device that could be used to help people recover from hand injuries and overcome arthritis and a textile product that could be used for step exercises and would keep an accurate record of exercises performed. They were able to justify both of these product ideas in their answers to the other questions. They were also able to explain how the technology they had started with would be utilised in their designs.

Another way to start is by asking your pupils to construct a scenario of what a future society will be like, and what life will be like for particular groups of people in that society.

Your pupils can then explore a sequence of questions like this:

- What needs will there be in that society?
- What products and services will people want to meet these needs?
- What sort of market is there likely to be for these products and services?
- What technology do I need to make the product or service work?

This is a much more demanding approach but it offers more scope for considering the nature of a future society and the impact of technology on that society. It is an approach that is more likely to stall as the starting point is much less concrete than a particular technology. However it does have the potential for developing some really big ideas. For example, a group of pupils constructed a scenario in which only the rich had access to anti-ageing technology through private medical care, and the government refused to make it available on the National Health Service because this would lead to an increase in demand for health and other social services that would be unsustainable. In this scenario there was considerable social unrest and action groups used the internet to mobilise opposition to the government.
Designing for the future

The pupils created another scenario in which this technology was available to all and explored ways in which the active elderly could make a financial contribution to society by means of limited home working using the internet. The limited home working involved a wide range of activities using the internet as follows:

◆ providing companionship for the lonely,
◆ providing tutorial support for those studying at school using e-learning,
◆ supporting a forum for the discussion of local issues to develop participation in local government,
◆ providing examples of oral history from their memories of times past,
◆ providing guidance to those involved in work similar to that which they used to do when in full-time employment.

The design that the pupils produced was a guide to anti-ageing services provided by new technology. A comparison of the two scenarios revealed that the way a society makes such technology available to its people has consequences, and showed how the same technology, in this case use of the internet, could be used for very different purposes.

It is of course possible to start with likely markets or with the needs and wants of particular sorts of people or individuals. Whichever starting point you choose it is important that all four features are considered in the overall process.

Detailed guidance for teaching Designing for the future is given in Young Foresight Book Four Designing For The Future.
4 Protecting intellectual property rights

Young Foresight is aimed at helping pupils become more creative and more entrepreneurial. Many of the design ideas they develop will have commercial potential so it is important to protect pupils’ intellectual property. It is equally important that an attitude of secrecy is not allowed to prevail, as this will be counterproductive to good teaching and learning.

In the areas of design, secrecy is not important. The originator will automatically acquire copyrights and (unregistered) design rights, and there is a one-year grace period during which a decision can be made whether or not to seek registered design protection (so you only need to protect what is going to become commercial).

The problems arise where a design idea developed by pupils contains an invention – a new and unobvious way of doing things that can be applied in many ways. In such cases – probably not too common – a patent application will be necessary to provide protection, so the problem of premature disclosure of the idea, which would prevent any subsequent patent being effective or useful, arises, and if any such case is identified it needs immediate and careful attention. If the idea does appear to have commercial potential, if there is no available patent protection it is less likely to be taken up by industrial champions.

Ambassadors and teachers have an important role to play in identifying those ideas that may be patentable and have commercial potential. Once identified, they can help the pupils who had the ideas to make contact with industrial champions who can take the ideas forward. Ambassadors and teachers need to make this judgement early, before any non-confidential disclosure has occurred. It is no good waiting until after pupils have made their final presentations at the end of Part 2 of the Young Foresight experience – by then too many people will know about the idea and the possibility of securing valid patent protection will be lost.

Industrial champions know how the system operates, and can work with pupils who have conceived inventions to ensure that early steps are taken to secure protection. They can then work together to develop the idea in confidence. This can be underpinned by a non-disclosure agreement or other arrangement to ensure that the intellectual property rights of the developing company are appropriately protected.

Teachers and ambassadors should contact their local SETPOINT, which will be able to provide details of local industrial contacts to champion and protect pupils’ intellectual property. You can find out about your SETPOINT by visiting the SETNET website [http://www.setnet.org.uk/](http://www.setnet.org.uk/).

You can find out more about patents, designs, copyright, trade marks, and protecting intellectual property generally, by visiting the Patent Office website [http://www.patent.gov.uk/](http://www.patent.gov.uk/) or the Intellectual Property portal site [http://www.intellectual-property.gov.uk/](http://www.intellectual-property.gov.uk/), including helpful guidance as to what sort of protection is appropriate for different types of ideas the pupils produce.

Mentors and teachers have an important role in identifying those ideas that may be patentable and have commercial potential.
5 Mentoring and ambassadors

The findings of the evaluation of the Young Foresight Programme indicate that it is possible, though not desirable, for Part 1 (Teaching the Young Foresight Toolkit) to be implemented by a teacher without a ambassador. To ensure effective implementation of Part 2 (Teaching Designing for the future) ambassador input is really essential. The ambassador brings an industrial perspective to bear, which can be shared with pupils and used by pupils to enhance their design activity, particularly with regard to technical feasibility and market potential.

Role of regional centre in recruiting and supporting

The Young Foresight Programme has been most effective when the work of teachers and ambassadors has been underpinned by the involvement of a regional centre that provides support in the following ways.

◆ The regional centre has recognised industry-school links.
◆ The regional centre administers the recruitment and allocation of ambassadors and schools.
◆ The regional centre acts as mediator to support the teacher-ambassador partnership supported by guidance materials from the Programme.
◆ The regional centre takes part in providing teachers and ambassadors with guidance about the nature and purpose of the industrial perspective in the Young Foresight Programme and the role of the ambassador in reinforcing this and contextualising it in pupils' design activities.

A partnership

It is important to see the role of the ambassador as one of a partnership with the teacher. This partnership can be enhanced and rendered effective in the following ways.

◆ Teachers and ambassadors are encouraged during training to exchange their views and interests in the Young Foresight Programme in order to develop a shared perspective.
◆ Teachers and ambassadors identify their expert strengths in relation to the Programme to inform their plans either at the training session or subsequent to it.
◆ Teachers and ambassadors discuss, negotiate and plan in advance the implementation to maximise pupils' learning.
◆ The partnership is maintained through a process of collaborative reviewing and planning.
◆ The requirements for expert input from ambassadors should be flagged in the session plans.
◆ Teachers and ambassadors identify essential inputs, their sources and whose responsibility it will be to implement them.
◆ Practices and tools introduced from industry by ambassadors will be modified by teachers for use with young learners.
◆ In the classroom ambassadors are identified as particular experts whose role it is to teach when that expertise is called upon.
◆ Teachers have the responsibility to make explicit the expert partnership in the classroom and to maintain it.
Mentoring and ambassadors

**Shared values**

For the partnership to be effective it is important that the ambassador and the teacher share the following common set of understandings and expectations.

- Recognise that creativity is a human attribute that can be fostered and developed.
- Be genuinely interested in pupils’ ideas and their potential to make a difference.
- Understand how to value individual contributions and constructively challenge pupils’ thinking.
- Recognise the significance of dialogue in learning and how to engage in this.
- Recognise the value of collaboration and teamwork.
- Have a broad and authentic conception of design that is related to production and retail.
- Have an understanding of how design ideas are generated and the tools needed to support this.
- Model aspects of design activity and solutions so that pupils can access them and make decisions about their significance and value to their own design problems.
- Recognise when pupils need access to additional information or examples of design practices.

**Maintaining the community of practice**

It is important that maintaining the necessary conversations between teachers, ambassadors and regional centre staff is not laborious or time consuming. This is best achieved by regular use of email to enhance the less frequent face-to-face contact. This will be a significant factor in ensuring effective implementation and will provide professional development opportunities for both teachers and ambassadors. It will also enable the regional centre to provide formative feedback to the Young Foresight Programme developers.

It is important that the regional centre organises informal gatherings where teachers and ambassadors can meet with regional centre staff to discuss progress and share their experiences. These meetings also allow those who have yet to begin teaching or mentoring the Young Foresight Programme to develop an understanding of what is involved, pitfalls to avoid and the factors that ensure success. These meetings will enable the regional centre to provide formative feedback to the Young Foresight Programme developers.

It is important that regional centre staff visit schools to observe the Young Foresight Programme in action and report its success in a variety of ways. These can include: making press releases; inviting the local paper to report on the work taking place in schools; getting items on local radio and television news broadcasts; using centre staff, teachers and pupils to make presentations at business–education conferences; involvement of Young Foresight schools in innovation and enterprise competitions.
Mentoring and ambassadors

Some practical details

It is often helpful to ambassadors if they can visit their schools informally before the programme starts. This enables you to introduce them to other teachers in your department so that they will be recognised and greeted. You can also introduce them to members of the senior management team, which is a useful way of reminding them that the school is taking part in Young Foresight and emphasising the business-education links that are such an important part of the Programme. The informal visit also allows ambassadors to explore journey times and best routes.

You will need to discuss with ambassadors how they would like to be addressed by pupils. Some ambassadors are often quite happy to be called by their first name. Others prefer a more formal approach. It is important that the chosen mode of address sits comfortably with school policy and that pupils are able to use it without embarrassment. If your school has a very formal approach to dress, for example if male teachers always wear a suit plus a shirt with collar and tie, it is important that ambassadors dress in line with this.

You will need to explain to ambassadors that permissions are something that only you can give however reasonable the request seems. It is a simple matter for a ambassador to say “That’s something you need to ask your teacher,” with regard to, for example, leaving the room to visit the library or answer a call of nature.

You will need to introduce the ambassador(s) to your class and explain why they are there. The ambassadors should say a little bit about themselves: who they are, who they work for and what they do, for example. You can use this introduction to establish appropriate modes of address.

It is important that the Young Foresight ambassador is not confused with other types of mentors working in the school - mentors working with teachers in training or mentors providing individual guidance to particular pupils. It is probably best to introduce the ambassador as the Young Foresight ambassador to avoid confusion.

Some ambassadors arrange for the teacher to visit their place of work and spend time shadowing them and seeing at first-hand the industrial context of the ambassador’s work. Teachers who have experienced this always comment on how useful it has been.

A teacher who had participated very successfully in the Young Foresight pilot summed up the successful teacher ambassador relationship like this:

“It's all about trust and flexibility. If these sum up the relationship, then your lessons will be better than anything you’ve done before.”
6 Teaching the Young Foresight Toolkit

Six guiding principles

The units that make up the Young Foresight Toolkit have been designed to provide your pupils with the concepts and processes needed to design products and services for the future. The way you teach these units is as important as their content. By teaching in an appropriate way you will lay the foundation for the way your pupils can use what they have learned when they design future products and services.

Here are six guiding principles that underpin the way learning takes place through the Young Foresight Toolkit.

The learning is clarified

Pupils need to be clear about what they are expected to learn. You have the essential task of ensuring that they appreciate the learning outcomes for each session and understand how these relate to one another.

The learning is active

Pupils need to be actively engaged in the learning activities. You have a key role in motivating them to participate.

The learning is personally relevant

Pupils will be motivated by problems that involve their personal perspectives and concerns. You have an important role in demonstrating this relevance with regard to the units in the Young Foresight Toolkit.

The learning takes place in groups

Pupils will form their own meaning and understanding of important concepts and processes by means of discussion with other pupils. All the units have a What to discuss section and it is important that you are active in supporting pupils in this process. The process of discussing is as important as the outcome of the discussion.

This group work is a key feature of the Young Foresight approach to learning. It has several purposes.

- It enables collaboration through which pupils can develop a shared view of the problems that need solving.
- It enables pupils to co-operate in solving the problems.
- It enables pupils to be more creative than when working in isolation.
- It enables pupils to develop their ideas and understanding through discussion with others.
- It develops good communication skills.

You have a critical role in supporting group work so that it is genuinely collaborative, leading to co-operation, enhanced creativity and improved learning.

The learning involves problem-solving

Problems are dilemmas that pupils perceive so they cannot be anticipated and produced as tasks. However, the activities in the units have been designed so that, as pupils engage with them through discussion, they will perceive dilemmas to which they can respond. In any one unit different pupils will perceive different dilemmas, but by engaging with these various dilemmas they will all learn from the unit because the dilemmas are personally relevant. You have an important role in helping pupils articulate their dilemmas so that learning can take place.

The learner should feel valued

Pupils’ learning is enhanced if they feel that their individual input and their progress is valued. You have an important role in helping all the pupils feel a sense of worth as they work through the units in the Young Foresight Toolkit.
Three important teaching strategies

You can use three important teaching strategies to ensure that the way you teach the units in the Young Foresight Toolkit meets the requirements of the six guiding principles.

Appropriate questioning

It is important to ask questions that engage pupils with the work in hand; questions they find puzzling and intriguing but not intimidating. These can be addressed to the class as a whole and also to individuals working within small groups. Remember that some pupils find it difficult to answer questions in public because they fear being ridiculed if their answer is seen as inadequate, either by the teacher or their peers.

It is important to ask questions which pupils will be able to answer and, if the answer is inappropriate, to have ways of indicating this without that pupil losing face. Don’t forget that a question to which there is only one correct answer is the easiest to ask but the least useful, as even the correct answer will do little to promote discussion unless it is part of a carefully structured sequence, in which the correct answer is an important starting point.

Much more useful are those questions that start “Who can help us think about ...?” It is preferable where possible to address a question to a particular individual by name e.g. “John, what do you think about ...?” If that individual doesn’t answer the question particularly well you can move the lesson on by asking “Who can help John out here?” If you base your introductory talks and opening class questions for each of the units around areas of pupil interest you will be rewarded by increased interest.

It is in supporting pupils in small group discussions that you can use questioning to help them make their thinking explicit and to share their perspectives as they refine and develop group solutions. Sometimes it is just a matter of asking one of the group to read out the discussion question the group is trying to answer, and then asking one of the group to say what they think about it. You can encourage the others in the group to listen carefully and then ask them to build on the answer.

Unless the answer is completely outrageous or irrelevant, it is usually possible to use it to move things forward. If the answer is completely inappropriate, then you should admonish the pupil in a way that indicates your personal disappointment in this behaviour and how it has let everyone else in the group down. You should always try to leave a way back into the discussion for such pupils, as it is important that they are not marginalised. Similarly it is important that you encourage reticent pupils to take part. You can do this by asking them questions directly.

It is important to listen to pupils’ answers and comments and help other members of their group respond positively to them even if you are in disagreement with them. You may, at the end of a session, compare the views of different groups and contrast them with your own, but during the discussion sessions themselves it is important that each group is autonomous.

The end of the lesson provides you with another opportunity to use questions effectively. You will have noticed which groups, and which members of groups, have performed particularly well during the discussions. You can target your questions at these pupils in the sure knowledge that, with a little encouragement, they will be able to answer well. This will increase their self-esteem and provide useful recapitulation and reinforcement for the rest of the class.

It will be important to establish a “questioning” culture in your classroom. Make it a place where it is understood by your pupils that first answers are rarely complete and often starting points for discussion and more questions and answers with several pupils joining in. You can develop your approach to questioning by keeping a record of which sorts of questions lead to interesting and useful discussions and which don’t. Then you can weed out those that don’t from your repertoire of questions. In the discussions that flow from the sequences of questions and answers it is important to let pupils use wide sources of information, particularly popular culture, as reference. If you are successful at introducing this approach to questioning into your classroom you will notice that your classroom has changed; it will have become a community of learning actively engaged in reflection and conversation.

There are examples of useful questions in each of the unit teaching notes in Book 2 Toolkit Teaching.
Three important teaching strategies

Modelling ways of working

Pupils can use their observations of the way teachers do things to develop good practice for themselves. This is much more than simple copying.

By being a role model in how to do things you can give pupils the confidence to try things for themselves in ways that are likely to be successful and lead to improvement. This is particularly true if you do it in a way that enables the pupil to share in the process with you.

Here are some examples.

◆ If you want pupils to listen to one another during discussion it is important that you listen to them as well.
◆ If you want pupils to ask sensible questions of one another it is important that you do this, too, and help them to phrase questions by giving them starter phrases to which they can add.
◆ If you want pupils to answer questions sensibly it is important that you give their questions serious consideration, and also help pupils who are struggling to answer. This might, for example, involve helping them rephrase their answer.

Sometimes the best way to answer a question or solve a problem is to draw a sketch and add notes. You can do this with the pupils; sharing the paper and pencil with them. You might start the drawing off and ask them to add more detail and some notes. They might start the drawing off and you add detail and notes. On occasions the pencil may move back and forth between you and several pupils as the ideas are developed through a sequence of drawing, adding notes and talking. This modelling gives pupils very clear indications of what is expected of them and you can use their performances as a clear indicator of the learning that is taking place. Their individual responses within the group will provide you with good assessment information.

There are examples of how to model ways of working in each of the unit teaching notes in Book 2 Toolkit Teaching.
Three important teaching strategies

Connected thinking

It is important that the significant elements within each unit of the Toolkit and their relationship to one another are reinforced so that pupils develop a sound grasp of the concepts and processes underpinning each part of the Toolkit.

It is also important that the learning outcomes associated with each of the units in the Young Foresight Toolkit do not remain separate from one another. They need to become part of a network of concepts and strategies that pupils can call upon, on an as-needed basis.

You will need to reinforce the relationship between the concepts and processes within each unit, and between the units, as pupils move through the Toolkit. In this way the pupils will develop the connected thinking that is important if they are to respond fluently and flexibly to the challenge of designing products and services for the future. As you take your class through the Toolkit you will need to help the pupils make multiple connections between the current unit and previous units. It is useful to present this as a large wall map showing the growing set of connections as your class progresses through the Toolkit.

Pupils will develop the connected thinking that is important if they are to respond fluently and flexibly to the challenge of designing products and services for the future.

There are examples of ways to reinforce the relationship between the elements that make up the Young Foresight Toolkit in each of the unit teaching notes in Book 2 Toolkit Teaching.
7 Teaching Designing for the future

You will need to help pupils consider the four key factors when they develop design ideas for products and services of the future. These are the new or emerging technologies that will be available; the needs and wants of the people who will use the product or service, the nature of the society in the future and the markets that might exist or could be created for the new products and services. There is much that they have learned in the Young Foresight Toolkit that is relevant and it is important that you help them to call upon this learning. You and your ambassador will also have developed a wide range of important and useful approaches to teaching during Part 1 of the Programme that you can put to good use in Part 2. Both of you will have become more skilled at using questions with small groups of pupils to help them with discussing their ideas. This will obviously be important as the majority of Part 2 will revolve around small group work. You will both have become more adept at modelling ways of working pupils can emulate. You will be able to use these to good effect in supporting pupils in both generating and developing their design ideas. Ambassadors will now be much more familiar with how to use their industrial and commercial expertise to good effect and be able to exploit this more fully.

Setting the scene for a creative response

Here are two ways that you can help your pupils see how creative they can be. One way involves looking back 20 - 30 years and seeing what life was like then in terms of all the products and services our society didn’t have. You can use the worksheet DF1 What’s new since 25 years ago? in which pupils identify some of the products and services that have become available over the past 25 years. You can also use activity sheet DF2 The same thing then and now - what’s changed? in which pupils compare the same or similar products from the 1970s and now.

Generating, selecting and communicating design ideas

Designing for the future can be divided into two parts. In the first part the pupils work in small groups to generate a wide range of possible design ideas. From these they select one that they consider to be most viable for development in the second part. Before they move on to the second part they present their possible design ideas to the rest of the class, explaining clearly why they have rejected some ideas and give reasons to justify their decision to develop one particular idea further. They should comment briefly on each of the key factors for each of the ideas – the technology, the user, the society and the market. These presentations are simple oral feedback sessions with little if any use of visual aids. The role of the ambassador and teacher here is to help the rest of the class give each group constructive criticism.

Developing and communicating design ideas

In the second part each group develops their chosen idea further to the point where they have a quality presentation drawing supported by comprehensive annotation. The use of software such as ProDesktop® can help considerably. In some cases it may be useful to develop a 3D prototype so that the human factors associated with using the product or service can be explored and evaluated, but in many cases this will not be necessary. Each group should present their developed design idea to the class. As before they should comment on the technology, the user, the society and the market but in more detail. This final presentation is more than a short oral feedback session. It should be carefully planned, be well executed and have impact. Again the role of the ambassador and teacher is to help the rest of the class give each group constructive criticism.

Two presentations with differing styles help pupils communicate their design ideas.
Teaching Designing for the future

Starting with the technology
You can use any of the three new television programmes to introduce your pupils to new and emerging technologies. Materials Technology – The Future Of deals with both soft and hard materials at the cutting edge of research and development. Food Technology – The Future Of deals mainly with developments in food technology but also considers marketing. Electronic Communications Technology – The Future Of deals with the increased capacity for communication that will take place in the future and its impact. The worksheets associated with these programmes have been written so that they can be used as the starting points for brainstorming applications of the technologies described in the television programmes.

In asking pupils to brainstorm and discuss “What sorts of things can we use this technology for?” it will be important to give them concrete starting points to which they can relate. For example, in considering the applications for new materials technology a starting point might be “What can we use this technology for regarding personal appearance?” There are several areas to consider - clothing, accessories, make up, body adornment, hair style. With two or three ideas for each of these a group has plenty to work on. Using the creativity techniques in the Young Foresight Toolkit will help to prevent groups ‘getting stuck’. For each of the ideas they develop pupils should discuss its technical feasibility, the needs to be met, the acceptability of the idea to a future society, whether people will want the product or service and the nature of the market for the product or service. Unless the product or service gets the ‘thumbs up’ in each of these areas it is unlikely to be successful.

In developing their chosen idea further it is important that each group identifies the use to which their product or service will be put, and why this is likely to be both acceptable and popular in the future. They will need to develop the details of the overall style, the nature of the user interface and details of the appearance, as these will all contribute to the appeal of the product to the intended user. Each group should also consider how they will market their product or service; this will involve considering where it will be sold, how it will be sold and how it will be advertised.

Starting with the society
You can use trend data to introduce pupils to possible future societies. One way of doing this is to revisit the activities in the Young Foresight Toolkit YF4 and YF5. These indicate the following trends.

◆ People in the UK will live longer and the elderly are likely to be more active than at present.
◆ More people in the UK will live as individuals and pairs rather than in larger family groupings.
◆ The population in the UK will increase with cities becoming more crowded.
◆ People will learn new skills throughout their lives.
◆ The way people learn both at school and in later life will change.

Other trends that are apparent are as follows.

◆ Our use of road and air transport will increase although there is a limit to this growth. It is still uncertain whether the trend in use of the railway, i.e. little if any change, will continue.
◆ Crime is increasing although there are strong efforts to combat this.
◆ The National Health Service is under pressure; this is likely to affect the personal responsibility individuals are asked to take for their own health care.
◆ Popular culture – television, film, music, interactive games, fashion – is likely to increase in its impact on all our lives.
◆ People’s working patterns are likely to change involving periods of re-skilling for new employment, working from home or local hot-desk work stations, periods of planned unemployment.

Sustainability and concern for the environment will be important considerations for governments and this will have an impact on the lifestyle of ordinary people in terms of the level of consumerism that is seen as acceptable.
A group of pupils can take any of the trends listed (or a selection of them) and ask what needs will there be in society as a result of that trend or trends. The identified needs are a good starting point for developing ideas for products and services to meet those needs. The ideas for possible products and services enable the group to discuss the market – in quite simple but nonetheless useful terms. Is it large or small? Is it likely to grow or get smaller? Is it in competition with other markets? How are these markets likely to change? Finally the pupils need to identify the technology that will be needed to make the product or service work. In selecting the best option to take forward pupils will need to demonstrate that their idea meets a need, will be popular, has a market and is technically feasible.

In developing their chosen idea further each group will need to develop details along similar lines to those groups who had the technology as their starting point.

Ensuring flexibility

Teachers who had been involved in the pilot phase of Young Foresight stressed the importance of maintaining a flexible approach as each group works through designing for the future. They noted the importance of keeping the initial brainstorming activity as wide as possible and sharing the results from each group across the class. As the groups move from generating lots of ideas to developing one or two more fully they stressed the importance of pupils having access to a wide range of appropriate modelling media. This will enable each group to explore and refine their developing ideas using conversation and discussion, annotated sketching, simple mock-ups, and design visualisation software such as ProDesktop®. They noted that different groups would use these resources differently according to their preferences and abilities. They emphasised that a key role for the teacher and ambassador was to enable each group to use those tools which were most helpful in moving the ideas forward rather than insist that particular techniques were used. They also emphasised that here was where the pupils showed what they could do with the Young Foresight Toolkit and that it provided very many informal assessment opportunities.
The Young Foresight Promise to Pupils

Through the Young Foresight Programme you will get much better at designing. Your creativity will improve and you will understand more about really modern technology and the way it will affect our life in the future. Your communication skills will increase and you will be able to work well with other pupils and learn from them. You will do well at design and technology; much better than you ever thought you could!
“students did better than in normal D&T lessons … they revealed strengths and qualities I hadn’t seen before”

a design and technology teacher