



Attainment target and statements of attainment for information technology capability

Pupils should be able to use information technology to:

- communicate and handle information;
- design, develop, explore and evaluate models of real or imaginary situations;
- measure and control physical variables and movement.

They should be able to make informed judgements about the application and importance of information technology, and its effect on the quality of life.

Attainment target 5

Information technology capability

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
1	<p>Pupils should be able to:</p> <p>1a) work with a computer.</p> <p>1b) talk about ways in which equipment, such as toys and domestic appliances, responds to signals or commands.</p>	<p><i>Use an overlay keyboard to select items on a computer screen.</i></p> <p><i>Press a button to ring a door bell; turn a knob to adjust the volume of a tape recorder; observe the automatic switch on an electric kettle.</i></p>
2	<p>2a) use computer-generated pictures, symbols, words or phrases to communicate meaning.</p> <p>2b) use information technology for the storage and retrieval of information.</p>	<p><i>Select furniture for a house displayed on the computer screen, using an overlay keyboard; construct a simple story as a sequence of words, pictures or sounds, using an overlay keyboard or mouse.</i></p> <p><i>Write about "today's weather" using a word processor so that the writing can be retrieved later.</i></p>
3	<p>3a) use information technology to make, amend and present information.</p> <p>3b) give a sequence of direct instructions to control movement.</p> <p>3c) collect information and enter it in a database (whose structure may have been prepared in advance), and to select and retrieve information from the database.</p> <p>3d) describe their use of information technology and compare it with other methods.</p>	<p><i>Use a word processor to draft a class diary; use information technology, with voices or conventional instruments to make music and replay it.</i></p> <p><i>Give instructions to another pupil playing the part of a robot; control the movement of a screen turtle, using turtle graphics.</i></p> <p><i>Enter data recording the birds using the school bird table, check the data and retrieve it to compare the numbers and types of birds on different days.</i></p> <p><i>Write about the differences between using a programmable toy and giving instructions to another pupil; identify the differences between using pencil and paper and using information technology for handling information.</i></p>

LEVEL

STATEMENTS OF ATTAINMENT

EXAMPLES

4

4a) use information technology to retrieve, develop, organise and present work.

4b) develop a set of commands to control the movement of a screen image or robot; understand that a computer program or procedure is a set of instructions to be followed in a pre-determined sequence.

4c) amend and add to information in an existing database, to check its plausibility and interrogate it.

4d) understand the need to question the accuracy of displayed information and that results produced by a computer may be affected by incorrect data entry.

4e) use a computer model to detect patterns and relationships, and how the rules governing the model work.

4f) review their experience of information technology and consider applications in everyday life.

Produce a class newsletter or a set of information screens to give parents information about the school.

Drive a robot round an obstacle course or maze; use turtle graphics to draw a house.

Store personal information (such as name, height, weight, age, sex, shoe size, hair colour, eye colour), check it is correctly stored and find the names of girls and boys with particular characteristics.

Correct a file of data about individuals in the class in which some data has deliberately been entered incorrectly.

Use a program which simulates a trawler looking for fish, or an adventure program with a clearly defined objective.

Investigate overlay keyboards used in fast-food shops.

5

5a) use information technology to present information in different forms for specific purposes.

5b) understand that a computer can control devices by a series of commands, and appreciate the need for precision in framing commands.

5c) use a software package to create a computer database so that data can be captured, stored and retrieved.

5d) use information technology to explore patterns and relationships, and to form and test simple hypotheses.

5e) understand that personal information may be held on computer, which is of interest to themselves and their families.

Edit a newspaper for parents; work together to produce a book for younger pupils.

Investigate control systems such as automatic doors and alarm systems; make a set of computer-controlled traffic lights.

Use information from a survey of prices of goods in local shops and markets.

Using a simulation, explore how the populations of predator and prey species fluctuate, and suggest when a predator is most active.

Collect correspondence received by their families which has been addressed using computer databases and discuss data needed to produce it.

LEVEL

STATEMENTS OF ATTAINMENT

EXAMPLES

6

6a) use information technology to combine and organise different forms of information for a presentation to an audience.

6b) understand that devices can be made to respond to data from sensors.

6c) identify advantages and limitations of data-handling programs and graphics programs and recognise when these offer solutions to a problem of data handling.

6d) investigate and assess the consequences of varying the data or the rules within a simple computer model.

6e) review experiences of using information technology and consider other applications and their impact on everyday life.

Produce a report which involves use of different fonts and letter sizes, and illustrations.

Use a computer to draw a graph of the temperature of a liquid as it cools; write a procedure, using a software package, to provide a warning sound if a light beam is interrupted.

Use a desk-top publishing program to integrate text and images in the report of a scientific experiment; choose a data-handling program for processing the results of sports day.

Define or change the way information is grouped into columns in a spreadsheet showing the nutritional values of types of meals; modify a turtle graphics procedure or its parameters to draw a variety of shapes and transform them.

Compare own use of control devices with bar codes used for automatic stock control in supermarkets; compare own expression of information using IT with computer-produced bills or personalised mail and consider the implications of access to personal information.

7

7a) select software and use it to produce reports which combine different forms of information to fulfil specific purposes for a variety of audiences.

7b) design, use and construct a computer model of a situation or process and construct computer procedures involving variables.

7c) understand that the results of experiments can be obtained over long or short periods or at a distance using data-logging equipment.

7d) select and interrogate a computer database to obtain information needed for a task.

7e) know when it is appropriate to use a software package for a task rather than other means of information handling.

7f) understand that dangerous or costly investigations, or those not easily measured can be simulated by information technology.

Produce a presentation suited to a specific audience, combining graphics and text.

Model the queue of people waiting at a supermarket check-out and vary the service time, number of customers and number of check-outs.

Use information technology to measure the acceleration of a model car as it runs down a ramp; interpret data transmitted by a weather satellite.

Make use of a large database about careers or courses, and refine techniques of enquiry to select relevant information.

Consider the usefulness of a computer-aided design package to investigate the ergonomics of kitchen design.

Experiment with the operation of a simulated nuclear reactor.

LEVEL**STATEMENTS
OF ATTAINMENT****EXAMPLES****8**

8a) design successful means of collecting information for computer processing.

8b) select and use software to capture and store data, taking account of retrieval, ease of analysis and the types of presentation required.

8c) construct a device which responds to data from sensors; explain how they have made use of feedback when implementing a system incorporating monitoring and control.

8d) use software to represent a situation or process with variables, and show the relationship between them.

8e) understand why electronically stored personal information is potentially easier to misuse than that kept in conventional form.

Design and refine a questionnaire for collecting complex data in a form suitable for analysis by computer; use monitoring and data-logging equipment to record environmental change.

Select and use database or viewdata software to provide information about local amenities.

Use software to record movement patterns of small mammals, and produce graphs and tables for use in a presentation; develop a robot vehicle which follows a path marked on the ground.

Model and investigate the growth of bacteria using a spreadsheet, use a graph-plotting program to find a curve which fits a set of experimental data.

Consider cases of computer fraud and unauthorised access to computer files.

9

9a) evaluate a software package or a complex computer model; analyse the situation for which it was developed; assess its efficiency, ease of implementation and appropriateness and suggest refinements.

9b) design, implement and document a system for others to use.

9c) understand the effects of inaccurate data in files of personal information.

Evaluate a computer-assisted drafting program used in technology; a graphics package used in art; a desk-top publishing program used in English.

Design a system to investigate production schedules and stockholding strategies for a company making and distributing fast foods.

Research cases where the use of inaccurate data has caused inconvenience; investigate safeguards on access to personal data in computer systems.

LEVEL	STATEMENTS OF ATTAINMENT	EXAMPLES
10	<p>10a) decide how to model a system, and design, implement and test it; justify methods used and choices made.</p> <p>10b) discuss the environmental, ethical, moral, and social issues raised by information technology.</p>	<p><i>Develop a system for monitoring the performance of a central heating system in order to plan a system for a house or school; develop a system for notifying parents that their child's immunisation is due.</i></p> <p><i>Visit organisations making extensive use of information technology; prepare for the visit by deciding issues to be discussed with employees, such as how information technology was introduced, its effects on their work, their view of information technology; make suggestions about how the introduction of information technology might have been improved.</i></p>

Note: Pupils unable to communicate by speech, writing or drawing may use other means including the use of technology or symbols as alternatives.



Programmes of study for information technology capability

In each key stage pupils should develop information technology capabilities through a range of curriculum activities which will:

- develop confidence and satisfaction in the use of information technology;
- broaden pupils' understanding of the effects of the use of information technology;
- encourage the flexibility needed to take advantage of future developments in information technology;
- enable pupils to become familiar with the computer keyboard;
- encourage the development of perseverance;
- enable pupils to take greater responsibility for their own learning, and provide opportunities for them to decide when it is appropriate to use information technology in their work.

Programme of study for key stage 1

Levels 1 to 3 (ages 5 to 7)

Pupils should be taught:

- that control is integral in many everyday products, *such as cookers, cars, telephones;*
- that information technology can be used to help plan and organise ideas in written and graphical form;
- how to give instructions to electronic devices, *such as programmable toys and computers;*
- how to store, select and analyse information using software, *for example using a simple database package;*
- that information technology can be used for tasks which can often also be accomplished by other means.

In addition pupils working toward level 1 should be taught to:

- know that information can be held in a variety of forms, *for example words, numbers, pictures, sounds;*
- know that it is not always necessary to use the computer keyboard in order to produce information, *for example, by using an overlay keyboard to select musical phrases; by using a two-position switch to select from a menu;*
- control everyday items, *such as central heating thermostats and televisions,* and describe the effects of their actions.

Pupils working towards level 2 should be taught to:

- know that IT can be used to store, modify and retrieve information in words, pictures and sounds;
- organise and present ideas using IT, *for example using a simple word processor package.*

Pupils working towards level 3 should be taught to:

- use software packages confidently and well;
 - locate information stored in a database; retrieve information and add to it; check the accuracy of entries.
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Programme of study for key stage 2

Levels 2 to 5 (ages 7 to 11)

Pupils should be taught to:

- organise, develop and present ideas in a variety of forms by using software packages, *for example using a word processor or desk-top publishing program;*
- put existing information into a new format, *for example a newspaper, "teletext" screen, message to a remote receiver, taking account of the audience;*
- use information technology to organise ideas in written, pictorial, symbolic and aural forms;
- work together to prepare and present stored information using information technology;
- know that programmable devices, *such as programmable toys and computers* can be controlled using sequences of instructions;
- use information technology for investigations requiring the analysis of data, *for example using a simple database;*
- know that information technology can be used to do things which can also be done in other ways, *for example using a database rather than a card index;*
- know that computers are used to store personal information, *for example medical records and commercial mailing lists.*

In addition for pupils working towards levels 2 and 3, teachers should refer to the relevant material in the programmes of study for key stage 1.

Pupils working towards level 4 should be taught to:

- find and present stored information, *for example retrieve text and amend it using a word processing program; retrieve an image and amend it, replay a musical composition and improve it;*
- insert and amend information in a computer database; test their procedures by checking how reasonable the results are, *for example comparing collected data with national statistics;*
- analyse the patterns and relationships in a computer model to establish how its rules operate; change the rules and predict the effect, *for example considering the way an adventure program responds to the choices made by the user;*
- review their use of information technology and consider applications in the outside world, *for example compare production techniques of a class newspaper with those of a commercial newspaper publisher.*

Pupils working towards level 5 should be taught to:

- collect and organise information for entry into a database, *for example design, trial and refine a questionnaire intended to collect information for a database;*
- know that the order in which instructions are presented, and the form in which they are given to a computer is important, *for example investigate the effect on a computer-controlled model of changing the order of the instructions;*
- write a simple computer program for a particular purpose, *for example a turtle graphics program to draw a street of houses; a set of instructions to operate a simple database program.*

Programme of study for key stage 3

Levels 3 to 7 (ages 11 to 14)

Pupils should be taught to:

- integrate more than one form of information, *for example words and pictures; symbols; pictures and sound*, into a single presentation or report for a particular audience;
 - *desk-top publishing to write about population growth, illustrating with graphs and charts; develop a sequence of screens of information to introduce visitors to the school, co-ordinated with a spoken commentary on a tape recorder;*
- work together to prepare and present information using information technology;
- use information technology to work more effectively;
 - *use a word processor for developing ideas for an essay; use a graphics program to investigate colour combinations for a design (instead of producing a series of design examples by hand);*
- know that each software item has its own strengths and weaknesses, and that the selection of software involves consideration of the facilities offered, ease and simplicity of use, availability and cost;
- select software for a task or application;
 - *choose between a word processing or desk-top publishing package to produce a book for young readers; choose between a database or spreadsheet program to store data about the additives contained in popular foods;*
- know that the use of information technology does not always provide an appropriate solution to a need, and that the effectiveness, appropriateness, and cost of alternative solutions must be considered;
 - *compare books, directories and databases as means of storing and presenting information;*
- know that information technology is used to monitor physical events and conditions, and to process, present and respond to collected data, *for example monitor the dampness of the soil around house plants, with a view to developing a self-watering system;*
- review and discuss their use of information technology applications and to consider related applications in the outside world, and their impact on daily life, *for example compare the setting up and running of a school viewdata system with that of a travel agent.*

In addition for pupils working towards level 3, teachers should refer to relevant material for key stage 1.

In addition for pupils working towards levels 4 and 5 teachers should refer to key stage 2.

Pupils working towards level 6 should be taught to:

- identify clearly the requirements, and make correct use of information technology equipment, software and techniques, in making presentations and reports;
 - *combining text and images in different ways for a newspaper report and a poster; composing and playing music to a class;*
- modify the data and rules of a computer model;
 - *examine the development of a simulated colony of pond algae by varying the rules of reproduction.*

Pupils working towards level 7 should be taught to:

- know that outcomes are affected by incorrect data, inappropriate procedures, limitations in the methods of data capture and the techniques of enquiry used to retrieve information; *for example compare the quality and quantity of data obtained by direct recording such as local weather statistics and remote recording by satellite monitoring;*
 - translate an enquiry expressed in ordinary language into forms required by information retrieval systems;
 - use search methods to obtain accurate and relevant information from a database; *for example use a database where knowledge of Boolean logic will improve the efficiency of the enquiry;*
 - design a computer model for a specific purpose.
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Programme of study for key stage 4

Levels 4 to 10 (ages 14 to 16)

Pupils should be taught to:

- work together, using discussion, explanation and negotiation, to improve the quality of the information presented using information technology;
- use information technology to improve efficiency and to support new ways of working;
 - *make use of a word processor for the entire development and production of a piece of written work; use information technology as a single means of accessing large databases instead of using a variety of printed sources of information;*
- select software appropriate for a particular task or application;
 - *choose between a word processing or desk-top publishing package, to develop a book for young readers; choose a database package which can handle large quantities of data, to set up a system to contain the results of a questionnaire for the whole school; choose an integrated software package to include the statistics from a database enquiry in a report;*
- know that there is an increasing range of methods of collecting data for computer processing, including many in which data is collected automatically, without human intervention; *for example bar-coded food and book labels; bank cash cards; computerised car park passes; medical monitoring systems;*
- design and implement an information technology-based system for use by others, *for example design a computer-based system for recording pupil choices and preferences of school meals;*
- review and discuss their use of information technology and consider applications in the outside world, and the impact on daily life, including environmental, ethical, moral and social issues; *for example word processors being more widely available in schools or offices; widely available portable telephones.*

In addition for pupils working towards levels 4 and 5, teachers should refer to key stage 2.

In addition for pupils working towards levels 6 and 7, teachers should refer to key stage 3.

Pupils working towards level 8 should be taught to:

- define the information required, the purposes for which it is needed, and how it will be analysed; and to take these into account in designing ways of collecting and organising the information when creating a database, *for example create a database to enable a paint manufacturer to identify customers' preferences for colour and type of paint;*
- use information handling software to capture, store, retrieve, analyse and present information.

Pupils working towards level 9 should be taught to:

- evaluate methods of searching and sorting data manually and using a computer;
- know that the mathematical basis of a computer representation of a situation determines how accurately the model reflects reality; *for example a program to trace the trajectory of a tennis ball; a spreadsheet to anticipate trends in predator/prey populations;*
- analyse a situation, and then design, implement, assess and refine a complex model to represent it.

Pupils working towards level 10 should be taught to:

- analyse systems to be modelled using information technology, make choices in designing, implementing and testing them, and justify the methods they have used.
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