

Curriculum Intent - Computing

Curriculum Priorities

A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Our curriculum is designed to enable our young women from diverse communities to access a multitude of skills and activities which do not limit them to traditional gender stereotypes, which are also tailored to our local context, and which will foster a life-long love of computing and other STEM subjects.

Computing has deep links with mathematics and science and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

Knowledge

The Nottingham Girls' Academy curriculum for computing aims to ensure that all pupils:

- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- are responsible, competent, confident, and safe users of information and communication technology
- can understand and use information technology, including new or unfamiliar technologies
- have opportunities to experience aspects of the curriculum through trips, events and activities and broaden their horizons

By the end of Key Stage 4 we want pupils to have:

- an understanding of how to use algorithms to solve problems.
- the ability to use a computer program to write code.
- the ability to use Mathematical and logical concepts to solve problems.
- an understanding of different networks and how they communicate.
- an understanding of different security issues and how to deal with them.

- the ability to explain the different hardware in computers and how they work together.
- the ability to evaluate real world issues by using personal experiences and real-life examples.

For those who study this subject at Key Stage 5 we want students to have and understanding of:

- the different types of hardware and how they interact
- the different types of software
- different number systems
- different types of networks and servers
- what skills and attributes are needed to be ready for work
- security principles, including risks, impacts, and protection
- the holders, types, and formats of information
- how to manage information effectively, including classifications, styles and quality
- categories of information and data analysis methods
- legislation and green IT
- data flow diagrams

Skills

The skills we aim to develop are:



Literacy & Numeracy



Communication



Problem Solving



Metacognition



Leadership



Collaboration



Physical,
Practical &
Technical



Digital Literacy

For example:

- **Literacy** is developed in the e-safety units as they require a lot of written work. It is also important through coursework units in KS5.
- **Numeracy** is developed when they learn about binary and hexadecimal and how to add and convert them. It is also developed when they study algorithmic thinking and problem solving, along with logic and Boolean. Modelling in the spreadsheets unit also develops algebraic skills. In KS4 it is very important throughout Unit 2 and there also specific maths sections of Unit 1.
- **Communication** is developed when they look at different ways to communicate online, and the risks and protection methods they can utilise. They also use non-verbal and verbal skills through group work at all levels and written skills through coursework in KS5.
- **Problem Solving** is developed when they study algorithmic thinking and solve problems using programming techniques. The entirety of Unit 2 in KS4 centres on solving problems. Some of the coursework in KS5 requires students to solve given problems.

- **Metacognition** is developed when they study algorithmic thinking and enhance their skills in imagining creative solutions to problems through decomposition and abstraction. This runs throughout KS3 and KS4.
- **Practical skills** are developed specifically in the app development, spreadsheet and programming units. There are also other skills and knowledge taught throughout the curriculum. Unit 2 in KS4 also requires programming skills which are mainly gained through practical application.
- **Digital literacy** is developed throughout the whole of the curriculum.

Qualities



The qualities we aim to develop are:

Respect is developed through demonstration of British Values, environmental friendliness, and being ethical. There is a classroom culture of building people up and not pulling them down, e.g. by giving appropriate and helpful feedback to peers and by listening to each other during group discussions.

Kindness is developed by pupils volunteering to help in class, helping in the department as a volunteer during open evening, or being prepared to assist peers who struggle or need assistance during lessons.

Tolerance is developed by showing respect for each other's opinion when carrying out a discussing in class and that all pupils understand diversity in culture, religion, race, and ethnicity.

Resilience is developed throughout the curriculum as we establish a classroom culture that 'failure' is just an opportunity to learn and develop. Also, by handing work in on time and improving it when necessary. In KS5, students will have to present work in front of unfamiliar people.

Creativity is developed throughout all the programming activities. The digital graphics and HTML units also allow pupils to express their creativity and individuality through the creation of unique content. KS4 requires creative thinking skills throughout and KS5 requires students to create innovative projects for the coursework.

Positivity is developed by encouraging pupils to try anything and everything and that there's no harm in not getting something wrong – every time this happens is a learning moment.

Integrity is developed through the e-safety units that allow pupils to consider the ethics of various computing technologies and innovations. Pupils are also encouraged not to plagiarise other people's work.

Aspiration is developed by showing pupils that there are no limits to what they can do regardless of what their sex, gender, ethnicity, or background are. In KS5, students will have to investigate skills and attributes required by employers, and how to improve these in themselves.

Empathy is developed within the e-safety units as we cover how to act appropriately online and the consequences of not doing so. Students are also encouraged to give appropriate and helpful feedback to peers and to listen to each other during group discussions. They are also encouraged to support each other in projects and to treat visitors with deference.

Curriculum Principles

Sequencing, Learning and Assessment

Our curriculum has been structured to take into account the cognitive science of how we learn. Key knowledge is covered sequentially and deliberately revisited and built upon. Spaced practice and retrieval are a feature of the curriculum structure.

This is further reinforced by:

- Learning Challenge: a purely formative assessment to help evaluate, and then reshape learning and address misconceptions at the end of each unit.
- Learning Consolidation: a summative assessment, taken at a planned interval from the end of the unit, to help evaluate retention of learning in the long-term memory.

Cultural Capital

Cultural capital is developed throughout the curriculum with deliberate opportunities for all pupils (but especially disadvantaged pupils) to experience aspects of the taught curriculum through trips, events and activities and broaden their horizons.

For example:

- In year 7, pupils are shown the history of computers, which features innovations from women of major importance.
- In year 7, pupils are offered the chance to go to a local company to undertake a day of app building.
- In year 9, pupils are afforded the chance to create an app of their own choosing – they are encouraged to choose something suitable for people outside of their comfort zone
- In year 11, pupils are asked to create an interactive multimedia project that incorporates attractions within Nottingham.
- In KS5, students are given the opportunity to present part of their coursework to a global IT company with their head office in Nottingham; they also undertake a tour

of the company. They also visit a server room to see puts the theoretical work being done into perspective and allows learners to ask questions of the IT technician.

Equality

We want our curriculum to reflect what it means to be a young, British woman today; for our pupils to know about the struggle and sacrifice that has led to the freedom and opportunity they have. We want them to know about their heritage and culture, and that of others in our community, enabling them to celebrate it and contribute to the progress of democracy as global citizens. We therefore regularly review and consult on the equality of our curriculum.

For example:

- In year 7, pupils are shown the history of computers, which features innovations from women of major importance.
- In year 9, we encourage pupils to take computing as one of their options and apprise them of the need for more women in the industry by showing the statistics.

Careers and Employability

To support our pupils growing understanding of how our subject might support them with employment, we plan in explicit links between their subject area and possible career pathways. Examples of the careers and sectors we highlight are:

- Software Developer
- Applications Programmer
- Systems Programmer
- Multimedia Programmer
- Systems Analyst
- Computer Sales Support
- Database Administrator
- IT Technical Support Officer
- Computer Security Consultant
- Games Developer
- IT Consultant
- Web Designer