Computer Science Education

*Detective Dot compliments the UK National Curriculum which can be found **here**. Below is a breakdown highlighting how each chapter covers the core concepts in our KS1 and KS2 Computing Curriculum*

Chapter 1: Detective Dot

Description	We are introduced to the main character, Dot, and her friend and sidekick Drone. Dot talks about how she enjoys inventing and how she wants to share her creations with the Children's Intelligence Agency (CIA). Dot shares her unique ability to be able to 'talk' to technology and understand their code.
CS Themes	Computational thinking, tinkering, patterns
Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: work with variables and various forms of input and output
Vocab	Sensors, Database, Code

Chapter 2: Shelly Belly on Telly

Description	We are introduced to Shelly Belly, a teenage trillionaire and youngest ever boss of a global business. She's seen on a TV advertisement explaining her latest tech gadget—-LavNav. Dot's a little bit jealous and suspicious of Shelly, but her dad and sister love all Shelly Belly's bargain-basement offers. We are also introduced to Dot's Indian heritage and see how her Dad likes her to watch movies in Punjabi.
CS Themes	Making
Curriculum Links	KS1: use logical reasoning to predict the behaviour of simple programs KS2: solve problems by decomposing them into smaller parts
Vocab	Debugging

Chapter 3: Let Rip

Description	Dot tries to polish Drone when the rag gets caught in her propellers and rips. Suddenly the ripped thread starts talking and is introduced as Tumble, a high-tech t-shirt. Worried about how he looks, Tumble grabs the selfie stick and unleashes the MegaFart security system. Dot then has to reprogram it so he can use it.
CS Themes	Testing and fixing, debugging
Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: create a range of systems that accomplish given goals KS2: use sequence, selection, and repetition in programs; work with variables and various forms of input and output
Vocab	Algorithms, Internet Access

Chapter 4: Darn It!

Description	Dot tries to fix Tumble. Unable to repair Tumble herself, she begins to plan different ways to try and fix the situation. Tumble gets very cross and increasingly upset that he is broken. Dot decides to investigate using her detective powers.
CS Themes	Testing and fixing, tinkering
Curriculum Links	KS1: debug simple programs KS2: debug programs that accomplish specific goals
Vocab	Debugging

Chapter 5: Planet Anushka

Description	Dot begins her investigation by investigating the Tumble's label, which says he was made by 'Ellyn Shic'. Sneaking into Anushka's room, Dot guesses her sisters laptop password and discovers that Tumble was bought from Shelly Inc. She tries to figure out the link between Ellyn Shic and Shelly Inc when the internet mysteriously crashes.
CS Themes	Logical thinking, tinkering
Curriculum Links	KS1: keeping personal information private KS2: use technology safely, respectfully and responsibly KS2: recognise acceptable/unacceptable behaviour
Vocab	Hacking, High-spec computer, Bandwidth, Data

Chapter 6: The Detective Den

Description	Dot decides the best course of action is to investigate the local shelly inc store - shelly has really high security according to the CIA, which causes Drone to fret. before they sneak out, Dot activates a hologram version of herself to make her dad think she's still in.
CS Themes	Persevering

Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration
Vocab	GPS, hologram

Chapter 7: Buy! Who cares why?

Description	The Shelly Belly shopping mall is full of silly adults buying even sillier gadgets. An assistant tries to sell Dot a doll because she is a girl. Dot asks difficult questions about how Shelly Inc make their clothes, and before they know it, the security team throws her out. It's all a bit suspicious!
CS Themes	Persevering, Decomposition
Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: use technology safely, respectfully and responsibly; recognise acceptable/ unacceptable behaviour; identify a range of ways to report concerns about content and contact.
Vocab	Security

Chapter 8: Handy Hanzi

Description	Dot's sure they're on the right track, but what now? Tumble - not interested in the case - took lots of selfies inside, and in the background Dot spots a clue. The t-shirts all say made in China. That's where they need to go next!
CS Themes	Persevering, logical reasoning
Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
Vocab	Wi-Fi, virus

Chapter 9: What a Flight-mare

Description	The gang arrive at the airport. Dot's CIA e-badge gets them through security and they're on the plane. Drone isn't keen on all this sneaking but Dot's not listening. Just before take off Shelly Belly arrives and buys the plane. She wants to fly to China too!
CS Themes	Persevering

Curriculum Links	KS1: recognise common uses of information technology beyond school KS2: select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
Vocab	Login, e-badge

Chapter 10: Agent An Xing

Description	The gang arrive in Changsha, China. Drone's unable to use Wi-Fi because the government have blocked every site, but they meet their CIA contact An Xing - a Chinese boy with excellent English. He doesn't know Shelly but offers to take them to Ellyn Chic's factory.
CS Themes	Collaborating
Curriculum Links	KS1: use technology purposefully to create, organise, store, manipulate and retrieve digital content KS2: understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration KS2: use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
Vocab	Wi-Fi, search engine, signal

Chapter 11: Ellyn Chic

Description	After a wild ride through Changsha on the back of An Xing's scooter, they arrive at the factory. Tumble was expecting paradise but it's a dump. An Xing leaves them to it, now how do they get in?
CS Themes	Tinkering
Curriculum Links	KS1: recognise common uses of information technology beyond school
Vocab	Video feed

Chapter 12: Gate Crashing

Description	Dot spots lorries driving into the factory and decides they should hide in the back of one. Drone thinks this is too dangerous and they argue. Drone's had enough and leaves. Dot and Tumble are going through with the lorry plan. They climb a tree and jump for one!
CS Themes	Persevering

Curriculum Links	KS1: create and debug simple programs KS2: design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts KS2: use sequence, selection, and repetition in programs; work with variables and various forms of input and output
Vocab	Reprogram, variable, code

Chapter 13: We're In!

Description	Dot's mistimed her jump, but Drone swoops in and catches her, dragging her into the lorry. Phew. They make up and the gang sneak inside.
CS Themes	Collaborating
Curriculum Links	KS1: use logical reasoning to predict the behaviour of simple programs KS2: use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
Vocab	GPS

Chapter 14: Going Loopy

Description	The gang discover Tumble is made of cotton from Uzbekistan - over ten hours away! Dot hacks the factory CCTV to play a loop of old footage.
CS Themes	Algorithms
Curriculum Links	KS1: create and debug simple programs KS2: design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts KS2: use sequence, selection, and repetition in programs; work with variables and various forms of input and output
Vocab	Coding, looping

Chapter 15: Keeping up with Fashion

Description	Sneaking through the factory, Dot spots the poor living conditions and multi-bed dorms. They find the factory floor and everyone is being worked to the bone. Just as they're downloading t-shirt designs looking for Tumble's design, who should appear but Shelly Belly. She's angry that they've snuck in. They try to escape but Shelly's cornered them.
CS Themes	Persevering
Curriculum Links	KS1: use technology purposefully to create, organise, store, manipulate and retrieve digital content KS2: use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content

Vocab	Password

Chapter 16: Shelly Belly Showdown

Description	Dot confronts Shelly about what she's been up to. Shelly spots her selfie stick and is worried about evidence getting out. She grabs the stick but unleashes the Megafart. Dot, Drone and Tumble make their escape, sneaking into a lorry on it's way out.
CS Themes	Persevering
Curriculum Links	KS1: use technology purposefully to create, organise, store, manipulate and retrieve digital content KS2: use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content KS2: use sequence, selection, and repetition in programs; work with variables and various forms of input and output
Vocab	Database, Terms and Conditions, Thumbprint sensor

Chapter 17: Mission Complete

Description	The gang fly back to England. They've uncovered Shelly but they haven't fixed Tumble. Anushka's going to be furious! They go through the designs and much to Tumble's dismay, he finds out that he's a very cheap, old, discontinued tee--not designer at all. Dot comes clean to Anushka but she's cool with it because she no longer wanted Tumble anyway. He's pretty upset, but Dot inviting him to join the CIA cheers him up. Just as Dot is uploading the case to the CIA, Shelly hacks their website. How will Dot respond next??
CS Themes	Testing and Fixing
Curriculum Links	KS1: use technology purposefully to create, organise, store, manipulate and retrieve digital content KS2: use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
Vocab	Uploaded, downloaded, standby mode, hack

Computer Science Themes

The process of writing code often draws on a number of practices, as illustrated below:

- **Making**: Coding is a creative work – you're actively involved in making things, typically for others. Art, music, D&T, English etc.
- **Persevering**: coding is /hard/ - that's part of the fun of it! Much harder than putting together powerpoint slides, but for many the challenge itself is intellectually fulfilling and the sense of satisfaction of getting something to work after trying hard is great. Maths, music, PE, etc
- **Collaborating**: most software development is a social activity, with coders relying on others' work and making their own contribution to joint projects. Pair programming is a highly effective development methodology and the internet makes work on large projects by distributed teams entirely practical. Much school work, but perhaps particularly PE, drama
- **Tinkering**: there's a strong sense of playful experiment to much coding, particularly when it comes to learning a new language or fixing code that isn't working. D&T, science
- **Testing and fixing**: Figures will vary from team to team and coder to coder, but up to 80% of a project might be about refining, testing and debugging or fixing code. Whilst getting things right in the first place is sensible, a good programmer needs to know that it's right. English, D&T, maths etc.

Alongside these principles are a set of concepts which seem common to most coding, but have far wider applications:

- **Logical reasoning** – computers are entirely deterministic machines: if in the same state, given the same input and using the same programs they should reliably produce the same output (apart from Windows Vista, natch ;)). When writing or fixing code, it's crucial to think things through logically – this is both about drawing conclusions based on evidence and thinking things through carefully in a step by step fashion. Often explaining what the code should do to someone else (or a rubber duck, see http://en.wikipedia.org/wiki/Rubber_duck_debugging) . Examples from science or history teaching might help, where pupils have to draw logical conclusions from the evidence they have.
- **Algorithms** were discussed earlier, but it's worth reiterating the idea of sequences of steps / sets of rules for a particular objective. It's also worth mentioning the idea of looking for more efficient or sometimes just more general algorithms. Common applications in maths lessons, where pupils apply the same method to working out arithmetic questions. Also relate to recipes in D&T.
- **Patterns** or generalisation captures the idea of the good coder being a lazy coder, building on the work of others, using reusable code libraries and looking to re-use a more general version of their own code rather than writing lots of special cases. Talk about the idea of the three part lesson as an example, or of maths exercises where the same type of question is repeated, just with different numbers.

- **Decomposition** is about breaking down problems (or systems) into smaller parts – most modern code is modular, as this helps a lot in development and testing, but it's a useful way of thinking for any project management task – like putting on a school play, or working on research projects.
- **Abstraction** is one of the most powerful CT ideas, but also quite a subtle one – at one level, it's about throwing away the unnecessary detail when modelling a system or analysing a problem – for example the Tube map doesn't show distances, but does capture the relationships between stations and train lines. The relationship between world history, national history and local history has something of this flavour, as does mapping at different scales, from the big world map through the road atlas to the 1:25K (or even larger scale) map of the local area.

Contact hello@detectivedot.org for more information ❤️