Statement of Intent

The learning program in place at Litcham focuses on learners' understanding the building blocks required to be able to create software programs of varying complexity with a large focus on doing so independently. It supports weaker learners via a range of methods, and stretches most able pupils by providing a project based approach to learning, revisiting key aspects continually, and empowering learners to be as successful and knowledgeable as they desire. There are no boundaries in place to allow high achieving pupils the opportunity to work on projects outside the scope of the department scheme of work.

Litcham School Computing Department aims to equip students with the skills to participate in a rapidly changing world through challenging and engaging topics. Students will develop an understanding and application in the fundamental principles of Computer Science by having the opportunity to develop software, improve their mathematical understanding, and develop legislation and environmental awareness.

Computing skills are a major factor in enabling children to be confident, creative and independent learners and it is our intention that children have every opportunity available to allow them to achieve this.

The national curriculum[1] for computing aims to ensure that all pupils at Key Stage 3 are taught the following:

- *understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem*
- *use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions*
- *understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]*
- *understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits*
- *understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns*

The objective at Key Stage 3 is to empower students to have the confidence and knowledge/skills to be able to develop computational skills that carry out a specific task that demonstrates the learners' knowledge has been transferred to skills. This means pupils can make sensible options choices in whether to pursue Computer Science at Key Stage 4.

[1] https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study/national-curriculum-in-england-computing-programmes-of-study

Pupils have differing levels of enthusiasm and ability in all subjects and the computer Science department's attitude to learning reflects this. Whilst the Scheme of work is written, pupils have access to it and can work at their own pace to make sure they understand content which is reviewed by me before they move on. Enthusiastic high achieving pupils can flourish in this environment, and create software using techniques and constructs in advance of their school year. This environment can be fostered due to the department having tutorial videos on YouTube which enables all pupils to learn independently, at their own pace.

Pupils are assessed, and reassessed to address previous misconceptions, or confirm understanding. This is an ongoing process, and pupils can request to take assessments outside of windows, as many are keen to map their progress onto their individual charts.

Constructs① Decomposition② Variables④ Writing to File③ Binary Logic⑤ SQL Programming⑥ Algorithms⑦ The IDE⑧ Systems⑨ Primary Memory ⑩ Translators⑪

Chronological Understanding	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Safeguarding												
		PT 7 e-Safety: Safer Internet Day + CEOP report concerns about content/ contact Basic IT skills and word processing culminating in writing a small document about themselves . Computer Art in paint, and programming toy mimics.	e-Safety: Safer Internet Day + CEOP report concerns about content/ contact Using the Internet Links, Blogs, Logging in/out, eSafety, uploading images, searching **Turtle Logo – Textease Unit** Draw shapes, squares, distances etc. Repeat command to get it in one command Programming turtle logo and scratch Draw lines different lengths,	Internet Research and Communication, Email communication – bookmark pages, safety, behaviour online, share web pages, research using online tools, and digital footprint. Word processing II Undo, redo, selecting texts, changing cases, aligning text, copy, paste, inserting images, formatting text, screenshots.	Animation And Photo Stories Word processing III Select edit text indifferent ways, tables, columns, margins, layouts, apply effects to an image Manipulate tables, hyperlinks, spell checking Write a program to achieve a set goal, using logical sequence, debugging, iteration, variables and adjust them. Duplicate tool, and create a quiz for assessment.	Internet research and web page design Images, text, hyperlinks , Share a web page Advanced features of googles web search Controlling devices, sequence, symbols in flow charts, inputs, create program from sequence. Multiple inputs and outputs. Subroutines and decisions.	Spreadsheets I Enter cell values, locate cells, formula (sum) edit formula in cells, avg, min, max graphs. Film making Plan and write a script, use a digital video camera, plan questions, import files onto video editing software. Kodu Navigate application, create instructions, move character round track, create path for character to follow.	Introduction to all KS3 learners on all systems and how to Access Insight, OneDrive, email and basic use of office applications. Using Scratch application (Block Based Coding) students are introduced to programming constructs① iteration, sequence and selection. Students use the application to create simple programs that gain in complexity from basic movement up to receiving and storing inputs. Control Technology Students gain understanding of the algorithm shapes⑦ required to design a flow chart and their meaning. This leads on to sub programs (Decomposition②) and the benefits of.	Introduction to digital animation, resulting in students designing their own sprites in several frames for use in game coding. Microbit coding module Binary Logic Circuits⑤ to understand small electrical circuits. Students work on understanding logic gates, which links with x-curricula science.	Coding in Python① Students write a variety of programs that can show decomposition, and students able to explain what is happening. Students create their own storyboard①④ based on variables and strings and every time the program runs a different story is written. Web design, Excel and App design Modules improve digital literacy.	Students undertake coding technique skills in depth①③④⑤⑥ Student's carryout the exam content Binary Logic⑤ understanding. Students code programs with planning evident using algorithms①②④ flow charts⑦ and pseudocode and understand why it's needed. Students add robust program design to their work and understand reasons why it's needed. Students undertake a programming project for their GCSE course implementing techniques and learning already learned for 20 hours*①②③④⑦ Students learn data representation or images and sound, and character sets. SQL⑥ programming. Understanding how databases store retrieve and update information stored in them. Students write statements of varying complexity to solve problems on an actual database so they can see their work in action. Students learn basic algorithms to search and sort data.	Revisit unit 2 until Autumn Half term in preparation for the mock exam. Students explore the Python IDE⑧ application with regard to benefits and drawbacks of different translators. Compare and contrast translators. Students to understand different systems⑨ and their implication on hardware. Students learn a detailed understanding of how the von Neumann CPU architecture works, including running programs and fetching instructions from primary memory⑩ through to their processing in the correct registers, and contrast characteristics of the CPU. This culminates in being able to write at assembly language level on Little man Computer for the processes involved in instruction execution on a Von Neumann processor ⑧⑩⑪. Students learn about types of Memory, primary and secondary and the advantages/disadvantages of both, comparing like for like technologies, ROM⑨ vs Cache vs RAM⑩, MHDD vs SSD. Students learn about network physical and logical topologies, compare the benefits/pitfalls of wired vs wireless in terms of performance and security. The internet and services are also learned, from DNS to VPN services.

			turn a turtle Draw shapes Use repeat to iterate algorithms								Students undertake a module on data representation of images and sound.	Students need to be able to contrast the threats available to network security and vulnerabilities⑥. Students to compare command line interfaces and GUI and the facilities offered by both, by researching the Linux and windows operating systems. Students' carryout a research project based on the ethical and legal implications of technology and companies storing their data with view to what the law says a company can hold, and the persons ethical view of how that data is treated and protected, up to and including the disposal of data/equipment.
								Various small projects allow for learning coding technique then a task to show understanding by application of the technique.				

Extra-Curricular

Lunch Times games and activities club.

Impact

The assessment system in Computer Science at Litcham School could be complex to understand, but the students are familiar with it, and implement it well.

Class learning, or an individual's learning is not linear, therefore in Computer science the course is not delivered as a modular learning experience; leaners cannot approach it in the fashion of learning topic A in lesson 1, topic B in lesson 2etc, treating each topic as an isolated event. Topic B requires firm understanding of topic A and therefore learners can spend as long as they need on topic A, so pupils will be allowed extra exposure and time to fully develop confidence in their abilities of mastery of a topic before moving on to create acknowledge led approach to understanding.

75% of the delivery and learning that occurs at Key Stage 3 is actually decided by the students themselves, who develop independence and have ownership of their learning.

The units of learning are decomposed into specific pieces of knowledge the learners need to understand, with appropriate challenges for that level.

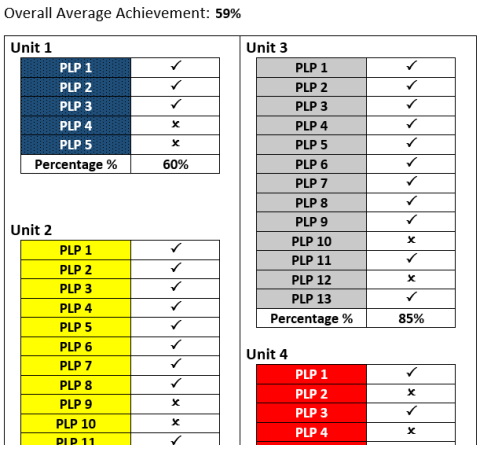
Assessment in computer science is a combination of teacher marked work, verbal feedback, student self-assessment and specific teacher summative feedback.

Students completing the Python Programming Units, which spans KS3, have their programs marked in their books, pupils are able to rate their understanding of each unit on a Likert scale 5 (Strong) – 1 (confused). This enables the teacher immediately to set a specific area for revisiting.

Summative assessment

Students take onscreen test with the results accumulated and exported to an Excel spreadsheet. This data is then delivered back to students via email in real time.

An example of a feedback email is in figure 1 (redacted), assessments colour coded for easy use by learners:



Overall Average Achievement: **59%**

Unit 1

PLP 1	✓
PLP 2	✓
PLP 3	✓
PLP 4	×
PLP 5	×
Percentage %	60%

Unit 2

PLP 1	✓
PLP 2	✓
PLP 3	✓
PLP 4	✓
PLP 5	✓
PLP 6	✓
PLP 7	✓
PLP 8	✓
PLP 9	×
PLP 10	×
PLP 11	✓

Unit 3

PLP 1	✓
PLP 2	✓
PLP 3	✓
PLP 4	✓
PLP 5	✓
PLP 6	✓
PLP 7	✓
PLP 8	✓
PLP 9	✓
PLP 10	×
PLP 11	✓
PLP 12	×
PLP 13	✓
Percentage %	85%

Unit 4

PLP 1	✓
PLP 2	×
PLP 3	✓
PLP 4	×

Fig.1 Individualised feedback

Students then respond to the feedback in **TWO** separate ways.

#1 The **first response**, pupils open their personalised learning tracker and add the correlating information from the feedback. Below is an example of the tracker.

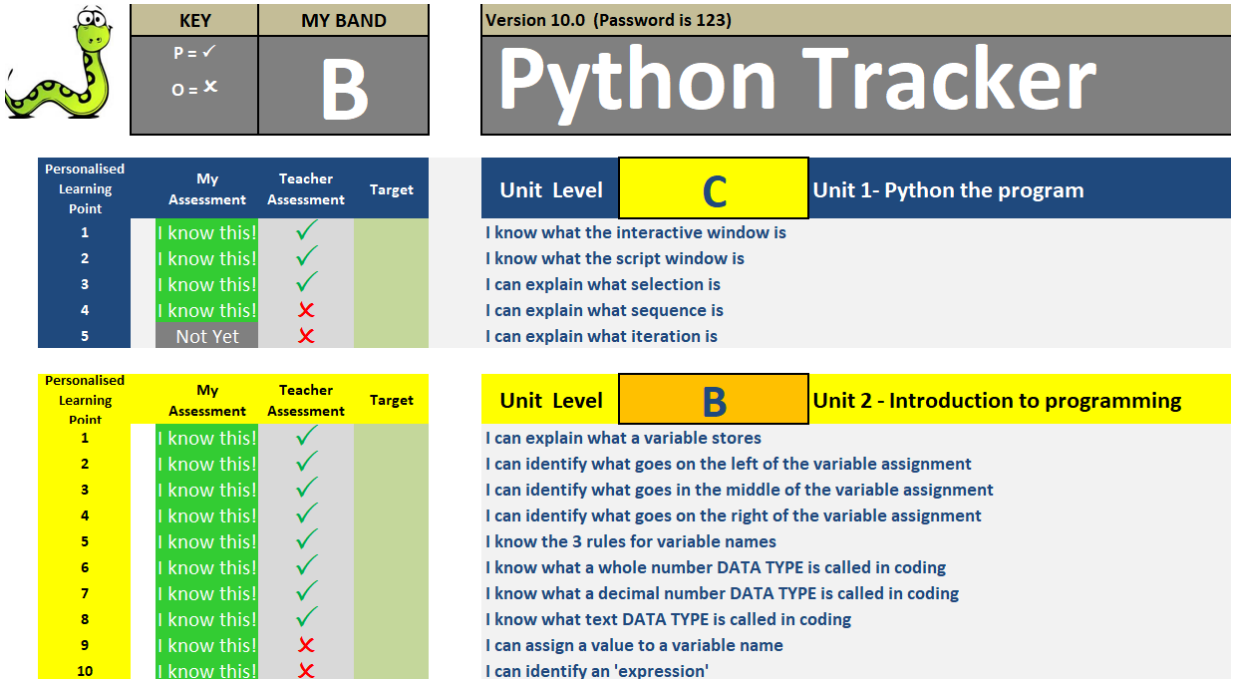


Fig.2 Student Programming tracker showing self and Summative Assessment

Once the gaps in knowledge have been outlined, the pupils then set personal targets for a lesson, in which they must discover the answer. Various mechanisms are available to achieve this, with quizlet.com being one of the more popular where unit questions/answers reflect the units they study.

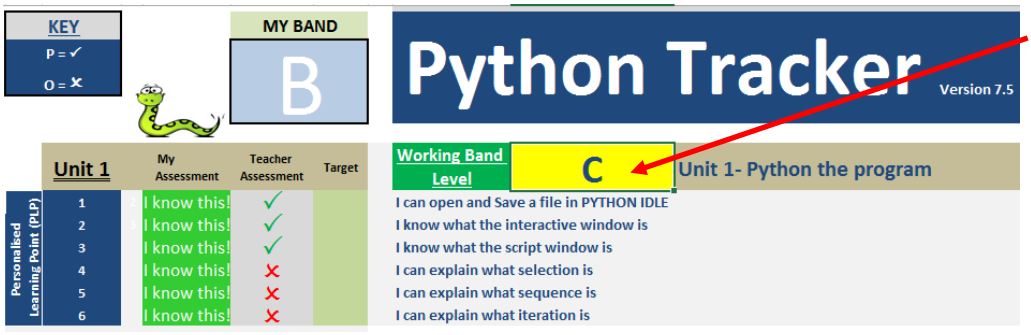
This means every pupil has **different targets** for each lesson, in conjunction with setting their own learning agenda. It further enables me to set homework that can be **pupil specific**, for example: *"Learn four of the points itemised in your tracker."*

Understanding is revisited for consolidation, by pupil a teacher led re-assessment, or more often, by the pupils themselves. Pupils have multiple 'electronic stickers' in their books, often as a result of them wanting to retake a similar test to show their learning and update their trackers to reflect the new grades.

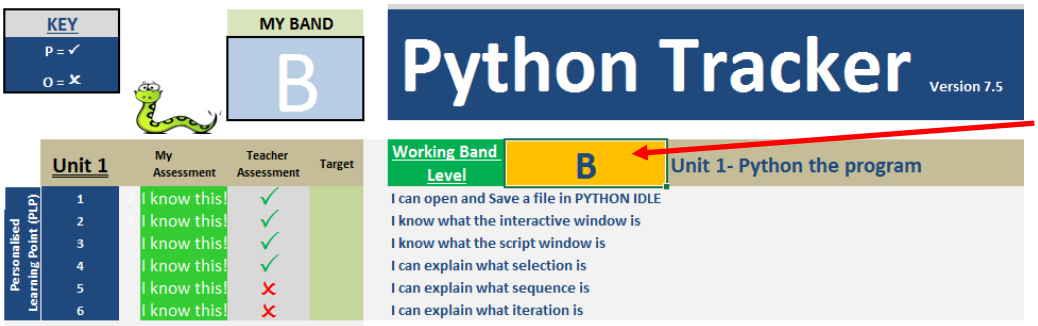
The tracker has the learners grade Banding at the top of the sheet and the student gets an automatically generated grade for each sub section. This grade can be compared to the Band and the pupil can easily see whether they are:

- On target
- What they need to learn to improve

The following images show:



Pupil actual band is a B, Here the current working level for Unit 1 is below the Pupil's actual Band.



Pupil current working level matches Target Grade.

Pupil Exceeding target grade

Students can see the data represented graphically., whether they are above/below their Band grade.

This gives them a sense of achievement.

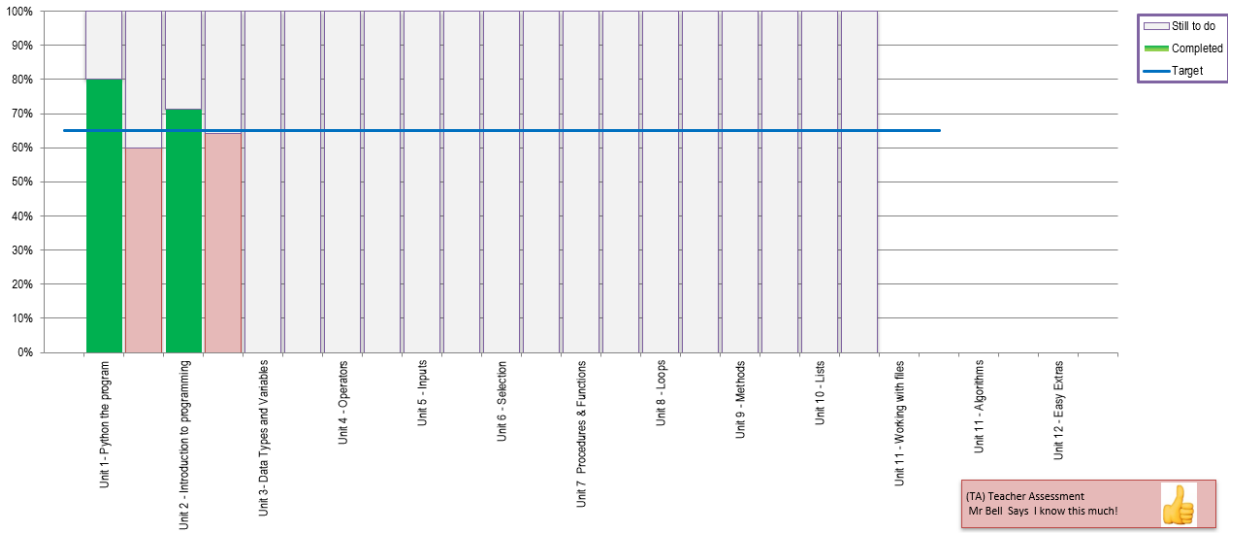


Fig.7 Students Data Graphically represented for them

The teacher also holds the master copy of all student attainment.

	UH2 LPW8	UH2 LPW9	UH2 LPW10	UH2 LPW11	UH2 LPW12	UH2 LPW13	UH2 LPW14	Py_2_Score	comment_	UH3 LPW1	UH3 LPW2	UH3 LPW3	UH3 LPW4	UH3 LPW5	UH3 LPW6	UH3 LPW7	UH3 LPW8	UH3 LPW9	UH3 LPW10	UH3 LPW11	UH3 LPW12	UH3 LPW13	UH3 LPW14	UH3 LPW15	UH3 LPW16	Py_3_Score	Comment_3	UH4 LPW1	UH4 LPW2	UH4 LPW3	UH4 LPW4	UH4 LPW5	UH4 LPW6	UH4 LPW7	UH4 LPW8	UH4 LPW9	UH4 LPW10	UH4 LPW11	UH4 LPW12	Py4_Score
Pupil Name	×	×	×	✓	✓	✓	×	71%		✓	×	✓	✓	×	✓	×	✓	×	×	✓	✓	×	×	×	✓	50%		✓	×	×	×	×	×	✓	×	✓	×	×	×	25%
Pupil Name	×	×	✓	✓	✓	✓	✓	86%		✓	×	✓	✓	✓	×	✓	✓	✓	×	✓	×	✓	×	×	×	56%		✓	✓	✓	×	×	✓	✓	×	×	×	×	✓	50%
Pupil Name	×	×	✓	✓	✓	×	✓	57%		×	×	×	×	×	✓	✓	×	×	×	×	×	✓	×	×	×	19%		×	✓	✓	×	×	✓	✓	×	×	×	×	×	33%
Pupil Name	✓	×	✓	✓	✓	✓	✓	93%		✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	×	×	×	✓	69%		✓	×	✓	×	×	✓	✓	✓	✓	✓	✓	✓	75%
Pupil Name	✓	×	✓	✓	✓	✓	✓	71%		×	×	×	×	×	×	×	×	×	×	✓	×	✓	×	×	×	13%		×	×	×	×	✓	×	✓	×	×	✓	×	×	25%
Pupil Name	×	×	×	✓	✓	×	✓	71%		×	✓	✓	✓	✓	✓	×	✓	×	×	×	×	×	×	×	✓	44%		✓	✓	✓	×	×	✓	✓	×	×	×	✓	×	50%
Pupil Name	×	×	✓	✓	×	✓	✓	71%		✓	×	×	×	✓	✓	×	×	×	×	×	×	×	×	×	×	19%		✓	✓	✓	×	×	✓	✓	✓	✓	✓	✓	×	75%
Pupil Name	✓	×	✓	✓	✓	✓	×	86%		✓	✓	✓	✓	✓	✓	×	✓	×	×	×	×	✓	×	×	×	56%		✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	92%
Pupil Name	×	×	✓	×	✓	✓	✓	57%		×	✓	×	×	×	✓	×	×	×	×	×	×	✓	×	×	✓	25%		×	×	✓	×	✓	×	×	×	×	×	×	×	17%
Pupil Name	×	×	✓	✓	✓	×	✓	71%		×	×	✓	✓	✓	✓	×	✓	×	×	×	×	✓	✓	✓	✓	56%		×	✓	✓	×	×	×	✓	✓	✓	✓	×	×	50%
Pupil Name	×	×	✓	✓	✓	✓	✓	79%		✓	✓	✓	✓	✓	✓	×	×	×	×	✓	×	✓	✓	×	×	56%		✓	✓	✓	×	×	×	×	✓	✓	✓	✓	×	58%
Pupil Name	×	×	✓	✓	×	×	✓	57%		×	✓	✓	✓	✓	✓	✓	×	×	×	✓	✓	×	×	✓	×	56%		✓	✓	✓	×	×	✓	✓	×	×	✓	×	×	50%
Pupil Name	✓	×	✓	✓	✓	✓	✓	93%		✓	✓	✓	✓	×	✓	×	✓	×	×	×	×	✓	✓	✓	✓	63%		✓	✓	✓	✓	✓	×	✓	✓	✓	✓	×	×	75%
Pupil Name	×	×	✓	✓	✓	✓	✓	71%		✓	✓	✓	×	×	×	×	×	×	×	×	×	✓	×	×	×	25%		✓	✓	✓	✓	×	✓	✓	×	×	✓	×	×	58%
Pupil Name	✓	×	×	✓	✓	✓	✓	86%		✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓	×	×	✓	×	69%		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100%
Pupil Name	×	×	×	✓	✓	✓	✓	64%		✓	✓	✓	×	✓	✓	✓	×	✓	×	×	×	✓	×	×	×	50%		×	×	✓	✓	×	✓	✓	×	×	×	×	✓	42%
Pupil Name	✓	×	✓	✓	✓	✓	×	79%		✓	✓	✓	✓	×	✓	✓	✓	✓	×	✓	✓	×	×	✓	✓	75%		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	92%
Pupil Name	×	×	✓	✓	✓	×	×	57%		✓	×	×	×	✓	✓	×	×	×	×	×	×	✓	✓	×	×	31%		×	✓	×	✓	×	×	✓	✓	✓	✓	×	✓	58%
Pupil Name	✓	×	✓	×	✓	✓	✓	86%		✓	×	×	✓	✓	×	✓	✓	×	×	×	×	✓	×	×	×	38%		×	×	✓	✓	✓	×	✓	×	×	✓	×	×	42%
Pupil Name	×	×	×	✓	×	×	✓	29%		×	✓	×	×	✓	×	×	×	×	×	×	×	✓	×	×	×	19%		×	✓	×	×	×	✓	×	×	×	×	✓	×	25%

Fig.8 Teacher Master copy of data

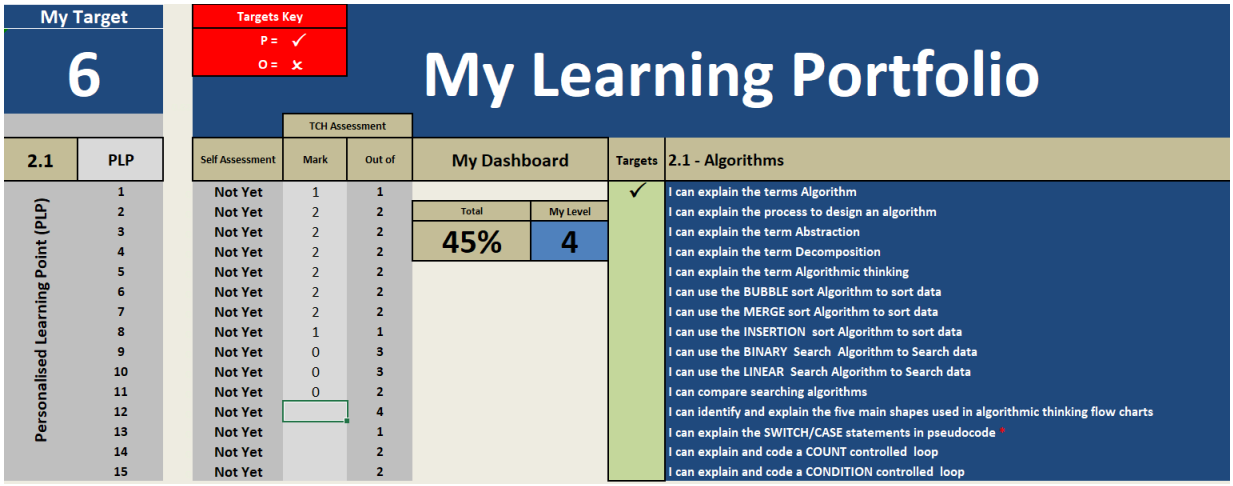
Such a master copy allows the teacher to interject with a specific lesson if many pupils have the same misconception or gap in knowledge.

Starters and Plenaries often take the form of Quizlet live games, based on amalgamating the units, the class are divided into teams to offer low stakes assessment via competition, and constant revisiting of previous knowledge. It is hoped this leads to a knowledge rich curriculum in Computer Science, and the mastery of knowledge, with pupils able to revisit and refresh any topic at any time.

Furthermore, the constant use of quizzes every lesson as plenaries or starters, provides an opportunity to test the knowledge rich aspects pupils should have learned.

Assessment at Key Stage 4.

Following a similar personalised tracking system for each learner, the tracker highlights required knowledge, perceived knowledge, and assessed knowledge.



My Target	Targets Key	My Learning Portfolio					
6	P = ✓						
	O = ✗						
			TCH Assessment				
2.1	PLP	Self Assessment	Mark	Out of	My Dashboard	Targets	2.1 - Algorithms
Personalised Learning Point (PLP)	1	Not Yet	1	1		✓	I can explain the terms Algorithm
	2	Not Yet	2	2	Total / My Level		I can explain the process to design an algorithm
	3	Not Yet	2	2	45% / 4		I can explain the term Abstraction
	4	Not Yet	2	2			I can explain the term Decomposition
	5	Not Yet	2	2			I can explain the term Algorithmic thinking
	6	Not Yet	2	2			I can use the BUBBLE sort Algorithm to sort data
	7	Not Yet	2	2			I can use the MERGE sort Algorithm to sort data
	8	Not Yet	1	1			I can use the INSERTION sort Algorithm to sort data
	9	Not Yet	0	3			I can use the BINARY Search Algorithm to Search data
	10	Not Yet	0	3			I can use the LINEAR Search Algorithm to Search data
	11	Not Yet	0	2			I can compare searching algorithms
	12	Not Yet		4			I can identify and explain the five main shapes used in algorithmic thinking flow charts
	13	Not Yet		1			I can explain the SWITCH/CASE statements in pseudocode *
	14	Not Yet		2			I can explain and code a COUNT controlled loop
	15	Not Yet		2			I can explain and code a CONDITION controlled loop

Fig.9 Student Tracker for GCSE Computer Science

In addition, this data is kept in a centralised spreadsheet for the teacher for a complete overview per student.

	UNIT 1										UNIT 2						
Name	1.1a Systems	1.1b Systems Architecture	1.2 Memory	1.3 Storage	1.4 Networks	1.5 Network Topologies	1.6 System Security	1.7 System software	1.8 LEEC Considerations	Overall Average	Overall Average	2.1 Algorithms*	2.2 Programming techniques*	2.3 Producing robust programs*	2.4 Computational Logic	2.5 Translators and Facilities	2.6 Data Representation
[redacted]	40%	39%								40%	78%	82%	79%	74%	90%		63%
[redacted]	60%	41%								50%	87%	73%	99%	100%	85%		78%
[redacted]	57%	88%								72%	85%	85%	85%	90%	95%		68%
[redacted]	53%	42%								48%	57%	73%	31%	65%	85%		34%
[redacted]	60%	82%								71%	86%	100%	79%	100%	65%		86%
[redacted]	53%	30%								42%	67%	80%	58%	52%	90%		53%
[redacted]	60%	58%								59%	90%	85%	96%	94%	95%		80%
[redacted]	53%	8%								31%	30%	18%	24%	58%	20%		31%
[redacted]	47%	35%								41%	68%	76%	69%	52%	90%		53%
[redacted]	43%	59%								51%	77%	88%	63%	77%	90%		69%

Fig.10 Teacher complete overview of attainment

Each unit subdivides (Figure 9) into showing the exact sections the pupils may need intervention with.

AME	**Student understands:** What is a variable naming variables rules constant variables statements	**Student Understands:** Decalring variable data types	**Student Understands:** Associated memory allocations for data types	Student can identify Data types: Integer Real (float) Boolean char,	Student can explain Casting	Student can explain the use of flow control via constructs sequence selection iteration	Student can explain methods and carryout basic string manipulation using methods	Student can demonstrate the use of basic file handling operations:	the common Comparison operators	the common arithmetic operators	the Assignment operators	Applying computing-related mathematics: + – / * Exponentiation (^) MOD DIV	Identify Boolean Data Types	Identify Boolean Operators	
	PLP 1	PLP 2	PLP 3	PLP 4	PLP 5	PLP 6	PLP 7	PLP 8	PLP 9	10	PLP 11	PLP 12	PLP 13	PLP 14	PL
Marks Available	10	1	7	5	1	3	4	3	6	6	1	7	1	1	
[redacted]	10	1	7	5	1	0	4	3	6	5	0	4	1	1	
[redacted]	9	1	7	5	1	3	4	3	6	6	1	7	1	1	
[redacted]	7	0.5	7	5	0	3	4	3	6	6	1	6	1	0	
[redacted]	3	1	0	4.5	0	2	2	0	0	4	0	4	1	0	
[redacted]	8	1	3	5	1	2	4	3	3	6	0	7	1	1	

Fig.11 Breakdown of all class pupils by topic, formed from assessment.

After every assessment at Key Stage 4 the data is collated into a report and emailed to parents so they can see their pupils' progress in the subject. A report is included in **figure 12**. It shows pupil attainment and their target level, outlining individual topics of study the pupil should revisit to further improve.

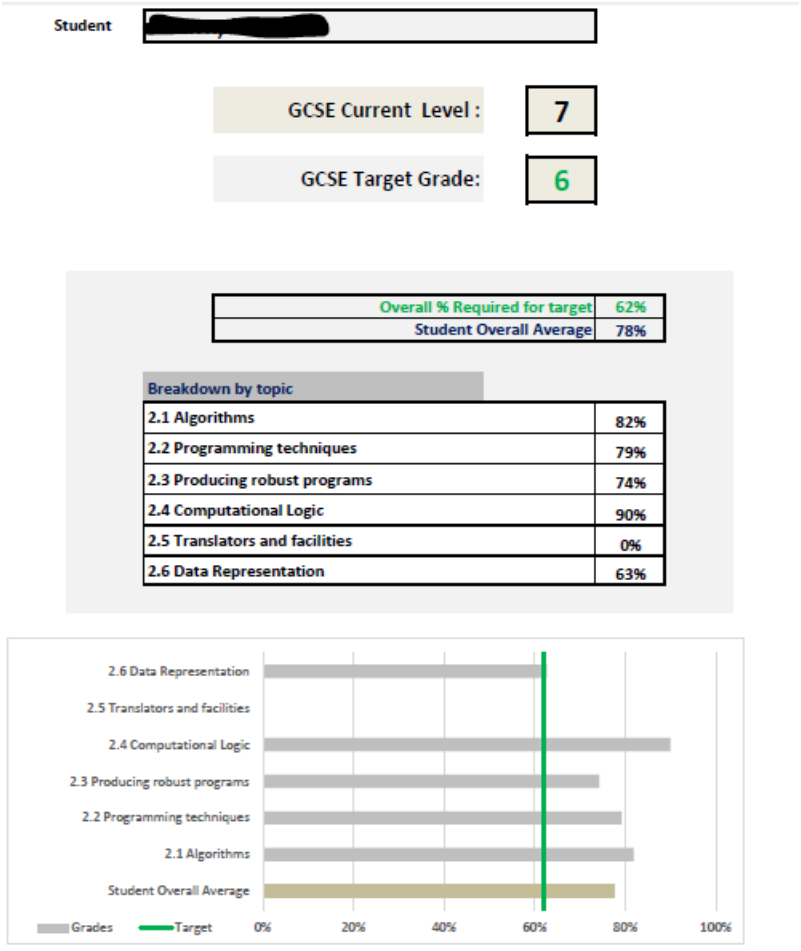


Fig.12 A report emailed to KS4 parents outlining pupil progress

The individual feedback students receive leads to a very diverse classroom. Learners are often able to work at their level, and consolidate the learning required before moving on to the next steps. This should remove ambiguity and address misconceptions, making subsequent learning for the pupils easier due to the fact they have stronger foundations.

It also facilitates stretching the top end who work at a faster pace and can independently move forward onto challenges and problem solving pitched at their level without the need for teacher approval.

How does it scaffold for LAPS?

I believe in laying strong foundations of solid knowledge, and I do not have a “teach to the test” approach. This has led to consistent Key Stage 4 outcomes to exceed National Averages often.

Algorithm of assessment process