

Statement of Intent

The learning program in place at Litcham focusses 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 curriculum¹ 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.

Constructs ^① Decomposition ^② Variables ^④ Writing to File ^③ Binary Logic ^⑤ SQL Programming ^⑥ Algorithms ^⑦ The IDE ^⑧ Systems ^⑨ Primary Memory ^⑩ Translators ^⑪												
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	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 constructs^① 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 shapes^⑦ required to design a flow chart and their meaning. This leads on to sub programs (Decomposition^②) 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 Circuits^⑤ to understand small electrical circuits. Students work on understanding logic gates, which links with x-curricula science.	Coding in Python^① Students write a variety of programs that can show decomposition, and students able to explain what is happening. Students create their own storyboard^{①④} 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 depth^{①③④⑤⑥} Student’s carryout the exam content Binary Logic^⑤ understanding. Students code programs with planning evident using algorithms^{①②④} flow charts^⑦ 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. SQL^⑥ 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.	Revisit unit 2 until Autumn Half term in preparation for the mock exam. Students explore the Python IDE^⑧ application with regard to benefits and drawbacks of different translators. Compare and contrast translators. Students to understand different systems^⑨ 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 memory^⑩ 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, ROM^⑨ vs Cache vs RAM^⑩, 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

			lengths, turn a turtle Draw shapes Use repeat to iterate algorithm s								Students learn basic algorithms to search and sort data. Students undertake a module on data representation of images and sound.	internet and services are also learned, from DNS to VPN services. 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; learners cannot approach it in the fashion of learning topic A in lesson 1, topic B in lesson 2 etc, 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.

Much 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 Digital 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.

Assessment & Feedback

Students have trackers to monitor and plot their learning via self-assessment, and summative assessments are matched to the students perceived understanding.



KEY	MY BAND
P = ✓	B
O = ✗	

Version 10.0 (Password is 123)

Python Tracker

Personalised Learning Point	My Assessment	Teacher Assessment	Target
1	I know this!	✓	
2	I know this!	✓	
3	I know this!	✓	
4	I know this!	✗	
5	Not Yet	✗	

Unit Level	C	Unit 1- Python the program
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I know what the interactive window is
 I know what the script window is
 I can explain what selection is
 I can explain what sequence is
 I can explain what iteration is

Personalised Learning Point	My Assessment	Teacher Assessment	Target
1	I know this!	✓	
2	I know this!	✓	
3	I know this!	✓	
4	I know this!	✓	
5	I know this!	✓	
6	I know this!	✓	
7	I know this!	✓	
8	I know this!	✓	
9	I know this!	✗	
10	I know this!	✗	

Unit Level	B	Unit 2 - Introduction to programming
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I can explain what a variable stores
 I can identify what goes on the left of the variable assignment
 I can identify what goes in the middle of the variable assignment
 I can identify what goes on the right of the variable assignment
 I know the 3 rules for variable names
 I know what a whole number DATA TYPE is called in coding
 I know what a decimal number DATA TYPE is called in coding
 I know what text DATA TYPE is called in coding
 I can assign a value to a variable name
 I can identify an 'expression'

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 can set individualised targets for each lesson.

Understanding is revisited for consolidation, by pupil a teacher led re-assessment, or more often, by the pupils themselves.

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:

KEY
P = ✓
O = ✗

MY BAND
B

Python Tracker

Version 7.5

Unit 1

Personalised Learning Point (PLP)	My Assessment	Teacher Assessment	Target
1	I know this!	✓	
2	I know this!	✓	
3	I know this!	✓	
4	I know this!	✗	
5	I know this!	✗	
6	I know this!	✗	

Working Band Level
C

Unit 1- Python the program

I can open and Save a file in PYTHON IDLE
I know what the interactive window is
I know what the script window is
I can explain what selection is
I can explain what sequence is
I can explain what iteration is

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

KEY
P = ✓
O = ✗

MY BAND
B

Python Tracker

Version 7.5

Unit 1

Personalised Learning Point (PLP)	My Assessment	Teacher Assessment	Target
1	I know this!	✓	
2	I know this!	✓	
3	I know this!	✓	
4	I know this!	✓	
5	I know this!	✗	
6	I know this!	✗	

Working Band Level
B

Unit 1- Python the program

I can open and Save a file in PYTHON IDLE
I know what the interactive window is
I know what the script window is
I can explain what selection is
I can explain what sequence is
I can explain what iteration is

Pupil current working level matches Target Grade.

KEY
P = ✓
O = ✗

MY BAND
B

Python Tracker

Version 7.5

Unit 1

Personalised Learning Point (PLP)	My Assessment	Teacher Assessment	Target
1	I know this!	✓	
2	I know this!	✓	
3	I know this!	✓	
4	I know this!	✓	
5	I know this!	✓	
6	I know this!	✗	

Working Band Level
A

Unit 1- Python the program

I can open and Save a file in PYTHON IDLE
I know what the interactive window is
I know what the script window is
I can explain what selection is
I can explain what sequence is
I can explain what iteration is

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.

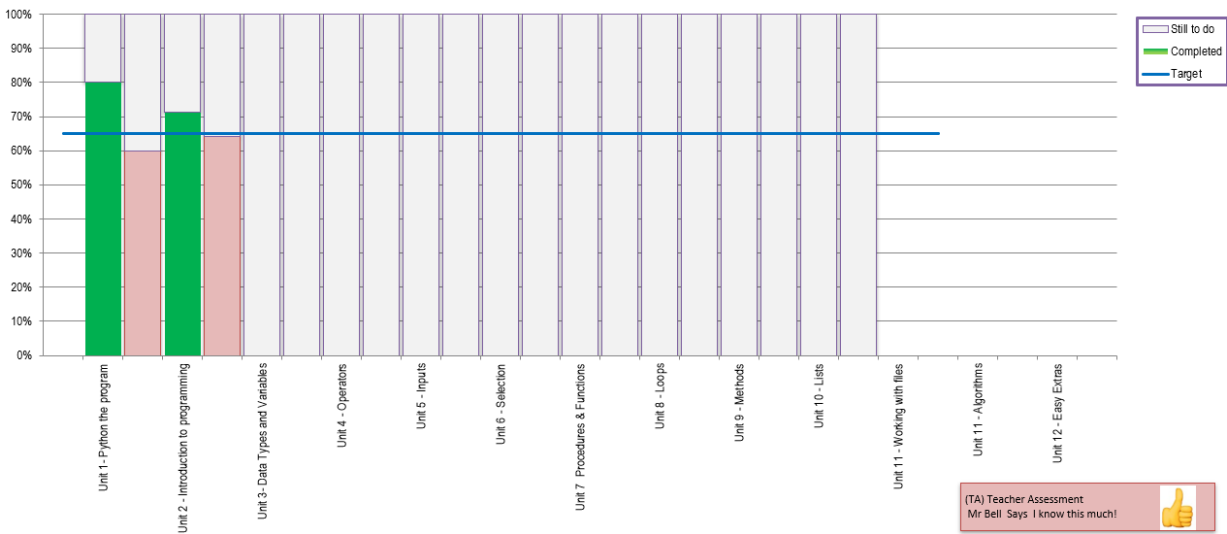


Fig.7 Students Data Graphically represented for them

Py4_Score
25%
50%
33%
75%
25%
50%
75%
92%
17%
50%
58%
50%
75%
58%
100%
42%
92%
58%
42%
25%

Fig.8 Teacher Master copy of data

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an

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	Total	My Level	✓	I can explain the terms Algorithm I can explain the process to design an algorithm I can explain the term Abstraction I can explain the term Decomposition I can explain the term Algorithmic thinking I can use the BUBBLE sort Algorithm to sort data I can use the MERGE sort Algorithm to sort data I can use the INSERTION sort Algorithm to sort data I can use the BINARY Search Algorithm to Search data I can use the LINEAR Search Algorithm to Search data I can compare searching algorithms I can identify and explain the five main shapes used in algorithmic thinking flow charts I can explain the SWITCH/CASE statements in pseudocode I can explain and code a COUNT controlled loop I can explain and code a CONDITION controlled loop													
	2	Not Yet	2	2																	
	3	Not Yet	2	2	45%																
	4	Not Yet	2	2	4																
	5	Not Yet	2	2																	
	6	Not Yet	2	2																	
	7	Not Yet	2	2																	
	8	Not Yet	1	1																	
	9	Not Yet	0	3																	
	10	Not Yet	0	3																	
	11	Not Yet	0	2																	
	12	Not Yet		4																	
	13	Not Yet		1																	
	14	Not Yet		2																	
	15	Not Yet		2																	

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 Data structures and techniques	2.3 Problem solving and analysis	2.4 Computational Logic	2.5 Translators and Testing	2.6 Data Representation	
Benjamin, Matthew	40%	39%								40%	78%	82%	79%	74%	90%		63%	
Chloe, Joseph	60%	41%								50%	87%	73%	99%	100%	85%		78%	
Chloe, David	57%	88%								72%	85%	85%	85%	90%	95%		68%	
Chloe, Benjamin	53%	42%								48%	57%	73%	31%	65%	85%		34%	
Freddie, Michael, Fyfe	60%	82%								71%	86%	100%	79%	100%	65%		86%	
Freddie, Lawrence	53%	30%								42%	67%	80%	58%	52%	90%		53%	
Henri, Katie	60%	58%								59%	90%	85%	96%	94%	95%		80%	
Henry, Michael	53%	8%								31%	30%	18%	24%	58%	20%		31%	
Harriet, William	47%	35%								41%	68%	76%	69%	52%	90%		53%	
Kyle, Michael	49%	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.

	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	
NAME	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	PLP 15
Marks Available	10	1	7	5	1	3	4	3	6	6	1	7	1	1	1
XXXXXXXXXX	10	1	7	5	1	0	4	3	6	5	0	4	1	1	1
XXXXXXXXXX	9	1	7	5	1	3	4	3	6	6	1	7	1	1	1
XXXXXXXXXX	7	0.5	7	5	0	3	4	3	6	6	1	6	1	0	0
XXXXXXXXXX	3	1	0	4.5	0	2	2	0	0	4	0	4	1	0	0
XXXXXXXXXX	8	1	3	5	1	2	4	3	3	6	0	7	1	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.

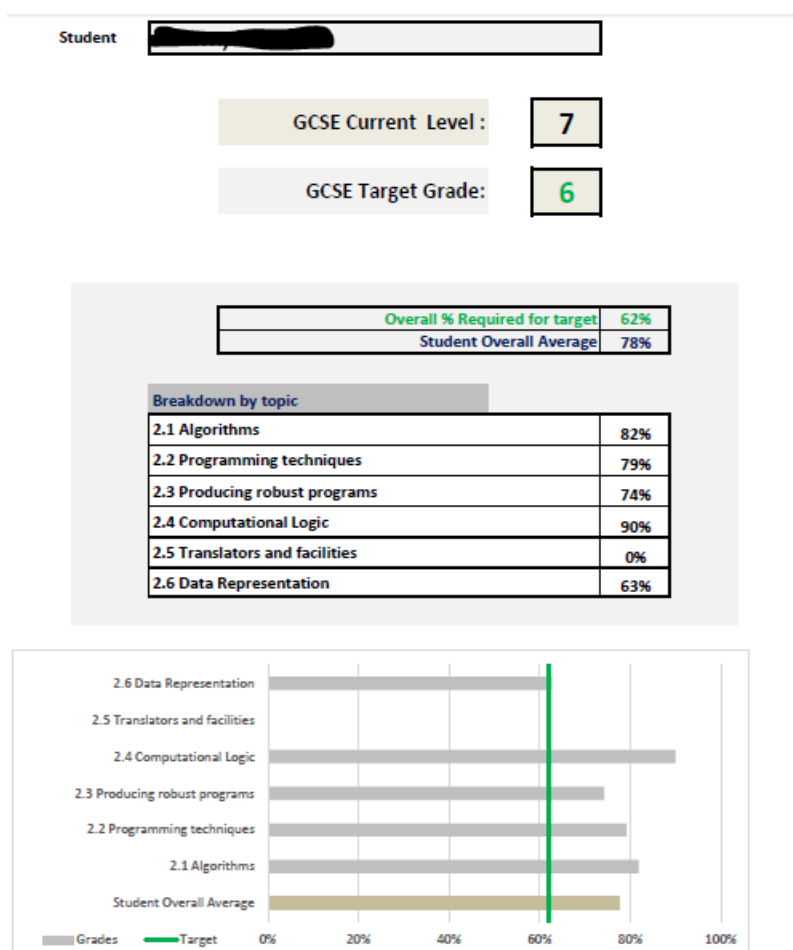


Fig.12 A report emailed to KS4 parents outlining pupil progress

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.

Algorithm of assessment process

