DON'T PANIC!

THE HITCHHIKER'S GUIDE TO KEY STAGE 3 COMPUTING

To ensure the most highly engaging and rewarding experiences for all students aged 11-14 years, computing teachers may be tempted to cram too many learning activities and content into the precious few timetabled hours available. In this guide, **Alan O'Donohoe** (Computing At School Master Teacher and Leader of exa.foundation) suggests some strategies and approaches to curriculum planning to ensure your students are engaged and inspired

The following strategies and approaches are based on the principle that Key Stage 3 (KS3) shouldn't only serve as a solid foundation for your Key Stage 4 (KS4) courses, but should also offer as realistic an experience as possible of KS4, to encourage your students to make more informed choices later on.

Less is more

I'll admit that I myself have been guilty in the past of trying to squeeze too many different topics into our KS3 curriculum. For example, one academic year, we had planned eight separate topics for students to study, which included online safety, computer systems, photo editing, data modelling, games development, text-based programming, and sound editing. You know, the very fact that I can't remember what the eighth topic was shows just how foolish this move was!

At the end of that year, we teachers conducted a 'pupil voice survey', in which we asked students to tell us about the topics they had enjoyed learning the most and the topics they had found most useful and relevant. Apart from the most recent they had studied, very few could even remember the titles of the topics from earlier in the year, let alone remember how they felt about them or what they had learned. That served as the wake-up call I needed, persuading me to plan far fewer topics, with more time invested in each.

Don't squeeze too many topics into your curriculum

Quite apart from anything else, it's very difficult to plan and measure learning progress if every five lessons you're starting a new topic that doesn't seek to build on students' learning from the previous five lessons. Anyone who has spent time learning to play a musical instrument or taken driving lessons, will know the true value of repetition and practice to improve competency, confidence, and deepen one's understanding.

Three topic model

My recommendation would be to plan a computing curriculum around three key topics that broadly reflect the options available to your students at KS4 and then repeat these same three topics every year. But instead of merely repeating everything again, each year go as deeper and far with each topic as you can. The key is to carefully select three broad topics that you know and your teaching colleagues will feel confident delivering, which have clear pathways into KS4. I've suggested three topics in the example below, but your topics may be completely different from these:

Suggested curriculum plan

Year 7: Autumn Term - Games Development
Spring Term - Computer Networks
Summer Term - The Web

Year 8: Autumn Term - Games Development
Spring Term - Computer Networks
Summer Term - The Web

Year 9: Autumn Term - Games Development
Spring Term - Computer Networks
Summer Term - The Web

Keep topics relevant to your students to ensure they're engaged

Keep topics relevant

When deciding which topics to focus on, it's worth trying to select those that are most directly relevant to your students and avoid any content that is not. When your students see how relevant the learning content is to them, it will make much more sense to them why they're studying these topics and hopefully persuade them of the value of choosing to study the subject further at KS4.

For example, if you chose to plan a term on the topic of 'Computer Networks', you would elect to focus much of the learning on cybersecurity threats, and how to protect networks and individuals against them. This may seem much more relevant to your students than, for example, teaching them about token-ring networks or other network topologies that are required on a GCSE specification. This would also provide highly relevant opportunities for students to understand what has happened when security alerts are reported in the news, like the WannaCry attack that affected much of the NHS.

Keep learning progress highly visible

I believe it's extremely important for students to have a real grasp of their own sense of achievement and progress throughout the year. There are an endless variety of tools available to teachers that enable progress data to be shared with students, but the trick is making sure that this is truly accessible. One mistake we made was that the student progress data, although accessible 24/7 through our learning platform, was actually quite difficult for students to access quickly and easily. We found that by having a physical copy of the same progress data readily available at a glance in an exercise book, it meant that students had instant access at any point during lessons, which they could refer to.

The abundance of Multiple Choice Questions already available through CAS Quantum diagnostic questions provides a great

Most students enjoy hands-on creative, digital making activities and experiences

starting point for teachers to create their own assessment tool that can be used regularly to evidence learning progress from lesson to lesson, rather than waiting until the end of a topic to inform a student how much progress they've made.

Emulate other successful subjects

In my last school, the geography department had achieved success on many different levels. The GCSE results were among the highest in the region and the subject remained over-subscribed at KS4.

To emulate some of the geography department's success, I invested some time in talking to our teachers of geography as well as casual conversations with students to ascertain what made the subject so popular at GCSE. The majority of students responded that while they didn't find geography particularly stimulating, they experienced a high degree of success and achievement, and felt that choosing GCSE geography was a safe choice that would guarantee them desirable GCSE grades. They could also see why they needed to learn certain topics to understand the effects of climate change, tourism, and international trade.

Don't serve other subjects

One mistake I feel we made at our school was in being too willing to serve other subjects in our school. For example, the maths department (and it wasn't the only example) asked if we would teach a certain set of data-handling skills to enable them to teach data-handling more successfully in maths. While we embraced this request early on, I don't feel that we did ourselves any favours, as it soon became clear from student perceptions that our subject existed purely to meet the needs of other subjects. This in turn meant that students didn't value the unique status of our subject, computing.

Allow students to work on extended projects lasting a term or longer

As our department made the transition from teaching ICT to computing, we realised it was better to leave the maths department (and other departments) to teach the things the maths department needed for us to be seen as a subject in our own right. I recall how we spent some time reviewing and analysing our subject-specific vocabulary for computing and then went to great lengths to encourage students to use these terms in lessons.

Celebrate your unique features

Our subject has some unique qualities and characteristics. Teachers should identify these – the ones with maximum student appeal – then capitalise on them as much as possible to ensure the long-term growth and success of their subject, trying to focus more on them when planning learning activities.

It was clear to us in our computing department that the majority of students enjoyed the hands-on creative, digital making activities and experiences. So we sought to make these an even more prominent feature, with much more time being devoted to collaborative problem solving, practical activities, and the creation of digital artefacts. Rather than learn the theory of networking and network security, it would be far more rewarding and stimulating for students to actually build a network using real network gear and Raspberry Pi computers, or model a network using a tool like Cisco Academy's Packet Tracer.

■ Devote more time to practical activities

Flip the learning of the theory

We employed some strategies to ensure that the more traditional learning activities took place outside of our precious lesson time. We adopted a flipped-learning approach in which students would study the theoretical content for a topic out of lesson and then we would assess these briefly in lessons using a light-touch MCQ so that students could see their progress.

To do this, we identified relevant content that could be learned from books, online, and videos so that students would then improve their own understanding. We prescribed 12 topics per term in each year in advance and then revisited the same 12 topics each term, each time requiring the students to go deeper in their understanding.

■ Allow students to study theoretical content for a topic out of lesson, then assess it briefly in lesson

Alternatively, you might prescribe 39 topics per year in advance and then revisit the same 39 topics each year, each time requiring the students to go deeper in their understanding. You need to signpost students to the locations where they can access the content, and then students use a simple system to demonstrate that they've visited the topics featuring the following:

- Description/title of the topic
- Date
- Minimum of words
- Some images to convey understanding of the topic
- Good use of the page

We still relied on traditional exam-style questions and written responses as a more accurate means for assessment and reporting, but these were limited to just one 10 minutes every five or six lessons to ensure there was still plenty of time for hands-on practical activities. The exam-style assessments we created could be marked by students, which saved valuable teacher time and also taught the students other skills, helping to improve the quality of their responses.

Extended projects

When we allowed students to work on extended projects lasting a term or longer, we observed that they were much more heavily invested in their own learning, and this led to them suggesting additional areas of study where they felt they would need support from teachers to further their learning.

It's entirely practical for students to work on an extended project in tandem with other whole-class learning in the classroom. You may have one class project serving as a 'core project', with students' own individual projects running alongside. Warning – don't try to assess student projects, only the student learning! You'll only end up creating overly complicated sets of criteria on which to judge their work.

If you'd like some free, friendly advice about planning your computing curriculum, contact author Alan O'Donohoe on **alan@exa.foundation** (HW)