Curriculum III Computing & ICT

Ambition

Subject sentence – What is the quest of your discipline

"The Computing department, through their love for ICT & Computing, empowered students with the knowledge and skills to prepare themselves for anything".

- How does your subject address social disadvantage by equipping students with powerful knowledge?

Every student comes into Trinity with an idea of what they want to achieve. At Trinity we encourage students to aim high and aspire to climb the mountain to success. Computing is a skill, not a talent and we teach those skills to each of our students in KS3, so they have an opportunity to achieve their goal through hard work. With changes in modern technologies students need to be equipped with updated knowledge that will help them adapt to the changing world Computing and ICT support disadvantage students by ensuring that they are priority in their classrooms and are targeted when appropriate for intervention. Computing is notorious for not attracting many women into the workforce. At KS3 we make a strong push to ensure that our curriculum is engaging for girls, and we strongly promote the subject to all girls. We have opportunities built in the SoW where we look at famous women in computing such as Ada Lovelace & Grace Hopper. SEND are supported by careful planning of SoW. We have video tutorials in more challenging topics such as game design to support students who require extra help. The powerful knowledge they learn will help them climb their mountain to success by equipping the students with desirable skills which employers look out for, giving them the ability to become independent when they leave school. ICT is integrated into their lessons which makes the lesson enjoyable which increases engagement so that they will be able to retain powerful knowledge more effectively.

- What skills and cultural capital do students acquire in your subject?

Students acquire analytical and creative skills and knowledge in both digital information technology and computer science. We support students through aspirational teaching to acquire knowledge on the fast technological world around them. In order to achieve a true understanding of Computing and ICT, topics have been intelligently sequenced, based on the following rationale: Digital Literacy, IT skills and computer science. In additional to the practical aspects of both computing and ICT, students will gain knowledge on computational theory and the science of computing. Students will learn how to research, explore and apply their learning towards a practical product they produce at the end of a project/cycle. Students will explore a range of different user interfaces and create their own masterpiece.

- How do you make careers education explicit in your curriculum?

In addition to termly whole-school 'Careers Spotlights' our curriculum explicitly and extensively teaches students about varied careers in the digital and programming industry. This is often approached at the start of a new topic, introduced with a video about a career that is linked with the topic, students are consistently told why such skill and knowledge is important in the future and how it would like with other careers across other subjects. As part of their project based work across all year groups students gain experience in working in a project environment which also links to project management and the Apprentice. At KS4, students as part of their formally assessed coursework must respond to and work to live briefs reflecting on the technological practice in digital information technology or programming. Students are exposed to a different types of careers and higher education within the subject for example: Web Developer, software engineer, database analyst, app designer/developer, programmer, cyber security, network forensics and graphics designer.

- How does your curriculum support Civic Responsibility for the local community?

Civic responsibility brings in knowledge and understanding about becoming informed citizens. The skills we teach in computing and ICT help those in the community to allow students to access a wide range of information, opinions and perspectives from around the world from using the internet. Allowing them to support their arguments to back up their answer during class discussions on ethical, legal and social impact on computer systems. Students also have the opportunity to approach a problem by thinking logically by using methodologies to solve issues in relation to their coursework brief. Through both digital information technology and computer science we teach students how to interpret statistical data and show them how to use their analytical thinking to understand and apply their knowledge to practical aspects in computing.

- How does your curriculum approach issues surround race?

Race is not an issue that has typically come up for the subject of computing as we teach a lot of facts about the material. However, to address this there is slide about the purpose of the lesson and skills which are to be learnt within the lessons, these slides illustrate the history of computing and the importance behind the concept being covered. We are actively trying to include people from varying different backgrounds and origins to make sure a fair representation is being given of the important figures. We are also using career spotlights to help tackle this issue giving examples of varied careers and people within those jobs from different walks of life. This is to allow students to see that the history of computing is global and to see the different influences from different cultures. In computing we will keep this consistent by reflecting the diversity to create value for female pupils and ethnic minorities by providing

them an opportunity to choose this as an option for GCSE, this will be addressed by showing female role models and other examples to the students to give them an insight that this subject is open to both males and females.

- What additional experiences (including expeditions) do your students access in your subject?

In previous years we had worked alongside STEM and Leeds Beckett University to complete a GO4Set STEM project with year 9's. This is where students get to work in groups and compete with other schools to create an innovative, technological product to support the environment and then get to go to the finals. This is an event that explores puzzles to challenge the student's way of thinking to solve real world problems. We also provide co-curricular to year 9 students with both gaming and magazine design. This is an excellent way of introducing both creativity and problem solving skills, working through projects in teams to create a final product which they will showcase to the class. However, we would like to organise a computing/digital technology centred trip to do with programming or user interfaces to really immerse students in the practical applications of working through their KS4 topics for GCSE.

- Where does your curriculum link with the PDS curriculum?

The PDS curriculum is centred on giving the student's knowledge outside of academia to help them becoming functioning and contributing members of society. The knowledge and awareness come up in these discussions when introducing the students to cyber-security, being safe on the internet, being aware of the potential dangers and how to prevent them from happening. Something else that may be covered in PDS is learning how to plan and organise their time effectively, this is really important as part of Digital Information technology students are required to create a project plan, milestones, gantt charts and checklists to manage their project well. This allows them to have a clearer and well-rounded understanding of what may be happening in businesses and other organisations and how to create projects successful.

- How do you support personal development through House and Stretch?

We would like to incorporate computing and ICT in House and Stretch and think about competitions that we can include in House

Rationale

How is your curriculum designed

- A true love of Computing & ICT involves learning about the domain of Computing & ICT. When doing this, we aim to also nurture a genuine love for the subject. We teach beyond the specification requirements, but do ensure students are well prepared to be successful in GCSE examinations:

  o E-safety: students in Y7 learn about all of the dangers and how to keep safe. We cover all of the key issues and really explain how to use internet related devices and platforms safely and constructively. We allow the students to create their own comics towards the end of the topic, in which they demonstrate their learning and showcase autonomy by deciding on the content of the comics. We also include game design as we believe this is one of the sectors that will continue to grow in the future. We do stretch our students from the moment they begin in Y7, we allow students to open and explore old computers and put them back together. We also have built opportunities for discussions around the social, legal and environmental impact that technology has. These topics are not required at GCSE level, but I feel that they provide students with powerful knowledge and skills which allow them to transfer these to other areas in the future.

- What content do you cover and how is this delivered over time?

In KS3 computing can be split into three different segments, the creative field, computational thinking and theory based topics. These segments are then split into smaller topics which is taught throughout KS3 and KS4 depending on which option has been selected out of the two (BTEC Digital Information Technology and Computer Science).

At KS3- the first unit undertaken by the students is to make them understand the dangers of being online. This allows the computing department to make students aware of the dangers of being online from home and also at the same time being aware of the dangers of potential viruses which could damage or corrupt their devices. After this unit students then look at the hardware and peripherals, this topic will be delivered over time in year 8, year 9 computer science unit 1: systems architecture and revisited again in year 10 & 11 CS.

Year 7: In C1 of year 7, the students focus on E-Safety in computing and in their daily lives, leading onto a focus onto algorithms in computing. In C2, of year 7 we focus on computer systems, hardware, software and storage devices. This provides the students with knowledge that is fundamental for accessing year 8 schemes of work and those who chose to continue computing for GCSE and BTEC in ks4. Students are also introduced to representing images, which lays the foundations for understanding the development of binary representation (Y8,Y9 CS). In Year 7 C3, students focus on introduction to spreadsheets, which provides the students with knowledge required for students that wish to undertake BTEC Digital Information Technology (Y9-Y11). Majority of students have not covered this in Primary-level so we aim to do the basic level first in looking at formulas and formatting skills in spreadsheets. We then focus on user interface in year 7, which introduce students' knowledge that will be required in progressing onto BTEC Digital Information Technology. All students are also taught skills in Year 7 through basic application work on MS Word, MS Power-point and MS Excel throughout the content that is covered.

Y8: In C1 of year 8, we introduce students to operating systems and security which links to the topics covered in year 7 both computer systems and e-safety. This focuses on computer crime, threats, policies and legislations in computing and exploring both graphical user interface and command line interface, which links to both GCSE Computer Science and BTEC Digital Information

Technology (Y9, Y10, Y11). In C2 of year 8, students continue on with binary numbers and calculations and how this is implemented in computing. This gradually builds onto the programming unit in Python, where the students are exposed to the basics of programming which is the fundamental knowledge that is required for those students who wish to take up Computer Science as GCSE. Following this the students start their gaming topic, where students recap the programming aspect of computing as well as developing their creativity skills. Creativity skills are required in both computer science and BTEC Digital Information when working on their individual projects. In this schemes of work students complete a project at the end of the cycle and showcase their work to the class. In C3 of Y8, students will continue with practicing spreadsheet skills and learn complex formulas to apply to a given scenario, this develops their knowledge needed for those who wish to continue with BTEC Digital Information Technology (Y9, Y10, Y11).

Y9 Computer Science: Students revisit computer systems, operating systems, internet security and ethical and legal issues in computing and work towards the OCR GCSE Computer Science qualification. The qualification consists of 2 external assessments.

Y9 BTEC Digital Information Technology: Student revisit user interface and work towards the Tech Awards Level 1/2 BTEC Digital Information Technology qualification. The qualification consists of 2 internal assessments and 1 external assessment.

Y10 (BTEC DIT) students are introduced with the project brief for component 1 which involves completing an internal coursework based on investigating user interface design for individuals and organisations. This will then lead to project planning and implementing a user interface of their own from a given scenario. In C2, year 10 will explore the second internal assessment brief which includes creating their own dashboard from a given data using a spreadsheet document.

Y10 CS: Students are introduced with component 2 computational thinking and programming units which includes python programming, algorithms, logic gates, testing, binary and pseudocodes.

Y11 BTEC DIT: Students to continue with component 2, spreadsheet implementation and then start the external assessment topics for component 3. This includes learning about computer network threats, computer security and ethical and legal aspects of computing.

Y11 GCSE Computer Science: Revisit both component 1 computer systems and component 2 computational thinking.

- Which content do not you cover (that others might)? Why?

Creative Media is a separate course that was taken a few years ago and now is no longer being offered here at Dixons. This is due to other courses such as computer science and digital information technology would provide better skill set and knowledge required for students that would like to continue further with computing and ICT in higher education. Creative Media would link more towards media and relates less to computing. The basic ideas of creativity in computing is covered in KS3 and parts of digital information technology anyways o the students can still gain the necessary skills needed to understand creativity in technology.

- How many lessons do students have per week, for each year group?

In KS3, both year 7 & 8 have 1 lesson per week, year 9 have 2 lessons per week. In KS4, year 10 have two lessons per week and year 11 have one lesson per week.

- Which exam board to you use? Why?

BTEC Digital Information Technology (Pearson Tech Award) & GCSE OCR Computer Science. The reason why we chose Pearson Tech Award as this is a vocationally related qualification that provide valuable opportunities for individuals to develop skills and gain knowledge to support entry into work or progression to further higher education. OCR Computer Science builds on the knowledge and understanding of computer science by building on real world application and help the develop computational thinking which will prepare students to make informed decisions about further opportunities and career routes.

Concepts

- How is your subject curriculum designed and delivered in a way that allows pupils to transfer key knowledge to long-term memory?

There is an expectation for every computing and IT lesson to begin with a retrieval practice, this usually practiced in the method of a 'Do Now', quiz or the use of the computer science retrieval practice booklets. The retrieval practice is based on the previous lesson or information from previous topics learnt throughout the year. We also carry out keyword tests, from the keywords that have been learnt throughout the topic, this is implemented for the students to understand the definitions and use these when cold-called or in their written pieces of work.

- How do you intelligently sequence your curriculum so that new knowledge and skills build on what has been taught before?

The curriculum is based on the building blocks format, the students start off with the foundation in year 7 and gradually build on the topics through each year, getting more complex. At year 7 and 8 we prioritise teaching fundamental concept, which allows students to develop understanding and ensure that their able apply their learning to different scenarios in computing, these substantive topics have been selected that we know the students will continuously come across throughout their education in computing here at Trinity. These are defined in the year 7 schemes of work and developed throughout the key stages. For example, in year 7 students learn about the basics of user interfaces, this is then developed in year 8 when they are researching different types of interfaces, in year 9 BTEC DIT they are exposed to features that enhance user interfaces, in year 10 and 11 they are using

a real-life scenario to develop and create their own interface to meet an organisation/users needs. This is encountered multiple times throughout a curriculum, by adding on a complex layer in each key stage.

- How do you use spaced practice / retrieval practice?

Homework at KS3 & KS4 allows students to reflect on their learning in lessons This allows the computing department to reinforce knowledge taught in lessons and look at reteaching content which students may have misunderstood in their homework tasks. Quizzing is also embedded in computing and IT. Students from all year groups are quizzed throughout the lessons using quzziz.com, through Do Now (5 questions) and exit tickets online. For key stage 4, these questions are related to knowledge required for their GCSE and internal assessments.

- How does your subject use homework to support learning?

The computing department heavily uses Seneca learning and paper-based quizzes for students to reflect on their learning from lessons. This is regularly checked and misconceptions are addressed in a Do Now. Students in KS4 are provided with a retrieval practice booklet and exam practice booklets to complete parts of this as homework, using exam questions and techniques to prepare themselves for their GCSE. These are then reviewed together as a class in lesson and green pen activity is carried out, for students to learn from their mistakes. For BTEC DIT students, homework worksheets are provided for them to recall on their lesson and apply this on their written research tasks to prepare them for their next lesson.

- How is reading and mathematical fluency prioritised in your subject?

We focus on binary representation, programming and spreadsheet formulas which provides opportunities to encourage mathematical fluency in both KS3 & KS4 and encourage them to tackle computational questions using their mathematical skills.

Our lessons also provide opportunity for 'reading reconsidered' to allow students to read aloud to improve student's vocabulary in computing and getting the students to understand the keyword. Students are exposed to a set of new keywords when we start a new topic which they all have a copy of and continuously refer to as retrieval practice and for homework. Reading out briefs and going through extracts from a scenario and potential exam questions also provides students opportunity to develop their reading fluency.

Implementation

- Subject leadership – What are the roles and responsibilities for staff in your department?

CBL- Supports with BTEC Digital Information Technology

AMU - Creating LTPs and SOW and ensuring these are up to date with the most recent pedagogy. Creating resources and PPTs to be used within the school, for other members of staff to use to teach year 7 and for remote learning. Planning intervention for Y11. Planning co-curricular for current year 9.

BLO - Support with BTEC Digital Information Technology, support with assessment plans with BTEC.

- Subject knowledge – What are the staff specialisms? What has been the impact of staff training?

AMu specialises in both Computer Science and BTEC Digital Information Technology

CTO, IHU, VHA specialises in teaching year 7 fundamental of computing and IT

- Equitable delivery – How do you support disadvantaged students and students with SEND?

Disadvantaged students are always a priority for staff and disadvantaged students who are not making progress are identified on intervention and prevention documents. These documents inform daily planning and tailored interventions. All computing lessons are differentiated to provide challenge and support at a realistic level for all students, including those in year 7 who have had no previous experience in using MS Office applications, as well as stretching those with existing levels of skills in the subject.

The computing department offer free revision booklets, guides and exercise books for disadvantage at no cost. This is paid from the faculty budget. This ensures that all learners including disadvantaged students have the same resources available for them to use at home and at school.

SEND students learn the full computing curriculum and are not disadvantaged by a lack of access to the powerful knowledge we provide. The computing department provides the same push and expectations we provide for group 1 to push for the success criteria and pushing them to achieve the best (grade 8, Distinction) by providing decomposed checklists and guides to achieve the grade. These lessons are tailored for individual classes and provides intervention and sessions in school for students to use the resources and computers to allow them access the learning.

- Planning the progression model – How does a certain topic (e.g., algebra / language analysis) progress across the key stage(s)?

Progression in programming in computing:

Year 7 - Encourage students to develop computational thinking through algorithms and pseudocode

Year 8 - Students use python programming to develop practical skills in using algorithms to produce working codes

Year 9 - Students undertaking computer science to look for errors in codes and how to solve those codes to make them run. Explore programming data types and apply them to their own codes

Year 10: Develop programming knowledge based to explore how codes work using search, sort and list algorithms.

Year 11: Use scenarios/briefs to construct their own codes, using data types, algorithms, converting codes and scenarios to pseudocodes. Generate fully functioning codes without errors.

- Breadth and depth – How do your LTPs / SoW demonstrate extent of knowledge and skills coverage and depth?

The curriculum at years 7 and 8 is designed to give students a wide range of both computing and IT knowledge and skills across the SoW and to develop key skills such as computational thinking, creativity and analytical skills. This includes developing a sense of understanding on the architecture of a computer, security in computing and complex substantive concepts within the domain of programming. The current curriculum prepares the students rigorously for GCSE/BTEC assessments at the end of Year 11. The use of intervention for year 11, includes prep, extra revision and BTEC catch up sessions. The intervention for each group is tailored to the specific needs of these students.

- Assessment – How do teachers assess across the unit / term / cycle / year / key stage?

Formative Assessment is embedded within every computing lesson. These include questioning, written work, presenting and through the use of practical observations during lesson. The use of questioning and demonstrating is used to assess and develop students learning within computing. The focus is to continue to provide feedback and use DIRT to encourage student to improve and master their knowledge and skills.

Summative assessment is applied on a cyclical basis. At years 7 and 8, students will undertake a summative assessment twice a year, one which will be based on trust-wide common assessment.

At years 9, 10, 11 students will be formally assessed twice a year. In addition, students practice exam style questions within each GCSE unit. This will follow the format of the OCR GCSE exam style assessment. For BTEC Digital Information students in year 10 complete internal assessments by producing coursework pieces and project work.

- Covid - Based on identified gaps in skills and knowledge, how have you adapted the curriculum due to the pandemic?

The curriculum has been adapted by reteaching units that were taught during the pandemic as this was not accessed/understood properly by all year groups, most of all year 10. During the pandemic some students did not have access to a computer or technology for them to complete their coursework or use a specific software to work on their project. As a result of this, component 1 learning aim a and b were retaught to allow these students to reach the same point as group 2 in year 10. The department has chosen to adapt the curriculum to focus on this unit through the use of after school intervention on a Wednesday, Do Now quizzing and BTEC catch up lesson. The LTP has been delayed and it is fundamental that the students understand component 1 before moving onto component 2. For computer science, students have been provided with retrieval practice booklets, updated OCR textbooks and exam practice booklets to support students with knowledge retention and exam techniques which is now being highly prioritised. Year 7s were also highly impacted and have significant gaps with the knowledge on systems architecture and specific keywords. The curriculum has been adapted to reteach these key words and the department will make this consistent as part of each lesson to memorise and understand these keywords. During the pandemic the course for year 11's was also changed from BTEC Creative Media Production to Digital Information Technology, therefore a lot of changes have been made to the LTP, by changing schemes of work for each year group to make sure the knowledge is being learnt from year 7-11 is appropriate and provides building blocks from ks3 onwards.

- Covid - How have you integrated remote learning plans with your school curriculum?

Year 7 and 8: Weekly lessons, power-points and worksheets emailed to students to complete. Students asked to complete 100% sheet on topics being covered and missed.

Year 9: students assigned Seneca learning tasks, adapted power-points and online worksheets via email

Year 10 & 11: Students assigned Seneca learning tasks, OCR revision guide and exam question booklets. Students also sent adapted power-points and asked to make their Cornell notes and answer exam questions based on the power-point topic of the week.

Students without access to IT at home will be directed to use their revision guide provided, work pack also posted to individuals from Reception.

Support materials such as links to YouTube videos on how to use a specific software, tutorials, step by step instructions (BTEC Digital Information Technology)

Powerful knowledge: It is the substantive content, agreed by the subject specialist as being the best knowledge in the discipline that opens up opportunities for the student. It will not be picked up by students from their everyday life.

Cultural Capital: It is the essential knowledge that pupils need to be educated citizens, introducing them to the best that has been thought and said helping to engender an appreciation of human creativity and achievement.