Mathematics A Level: Developing Cultural Capital, Diversity and Equality

Cultural capital is the accumulation of knowledge, behaviours, and skills that a student can draw upon and which demonstrates their cultural awareness, knowledge, and competence; it is one of the key ingredients a student will draw upon to be successful in a diverse society, their career and the world of work. In the Sixth Form, we aim to build our student aspirations and expose them to a range of experiences to help them achieve goals and become successful individuals who understand and support diversity and equality.

We recognise that for students to aspire and be successful academically and in the wider areas of their lives, they need to be given diverse, rich, and sustained opportunities to develop their cultural capital. We do this in many ways, for example, through our curriculum, extra-curricular activities, trips and visits, careers activities, and PSHE/RSE programme.

There are nine key realms to cultural capital in the Sixth Form at Samuel Whitbread Academy:

Cultural Capital provides health, well-being and growth

Cultural Capital lets us share our histories, our memories, the people, the places and the things that matter to us.

Cultural Capital creates the curiosity and confidence to make connections between the past, the present and the future.

Cultural Capital sparks generations of innovators.

Cultural Capital is to be found locally, nationally, globally - everywhere.

Cultural Capital nurtures inclusive communities.

Cultural Capital
enriches today and
inspires tomorrow.

Cultural Capital
is ours to discover,
ours to create,
ours to share.

Cultural Capital
belongs to me,
belongs to you,
belongs to us all.

These nine realms can be broken down further into the following sub-categories: **Personal development, Social development (including political and current affairs awareness), physical development, spiritual development, moral development, and cultural development**.

What is now outlined are the key areas of both academic and enrichment that take place within and outside of this course area to enhance and develop these diverse elements of cultural capital:

Personal Development:

Personal development consists of activities that develop a person's capabilities and potential, build human capital, facilitate employability, and enhance the quality of life and the realisation of dreams and aspirations.

Element of the curriculum and/or enrichment
The specific content gives students the opportunity to develop a knowledge of both theoretical mathematics and of applied. Students will encounter calculus, advanced trigonometry and proof alongside learning how to apply statistical and mechanical calculations to real life situations. In Further Maths students also encounter algorithms used for computing and business. The course encourages pupils to become critical, reflective and independent learners, with the expectation of self-study out side of taught hours. Communication skills are enhanced as pupils need to show method and not just answers. Intrapersonal Skills: Resilience – ability to keep going and to try different techniques if the first one does not work. Particularly useful with trigonometric identities. Time management – scheduling out of lesson time to ensure that all prep work is completed before the lesson where it is required and that all independent work is completed and handed in on time. Self-discipline – being able to assign time to a work on a topic and to then stick to that schedule, being focused on learning when in the study room. Persistence – asking questions and reading examples to ensure full understanding of a topic.

Social Development:

The process by which a child learns to interact with others around them. As they develop and perceive their own

individuality within their community, they also gain skills to communicate with other people and process their

actions.

Element of the curriculum and/or enrichment
Within the Decision Maths section of further maths, activities are designed to improve student's ability to communicate and to work as part of a team; working in pairs to fill car ferries in bin packing, working in teams to complete a treasure hunt of definitions and giving a presentation to the rest of the class on a linear programming problem. Within mathematics as a whole, pupils are encouraged to talk to each other and work together to solve problems when stuck. Intrapersonal skills: Openness to new ideas – Many situations being modelled in maths have more than one route to the solution and when going through examples together we highlight this by exploring options suggested by pupils even if different to the method originally presented.

Physical Development:

These are the major motor or physical achievements a student enhances and develops. Physical development is

a vital part of growing up as students learn to master control of their body

Element of the curriculum and/or enrichment

Spiritual Development:

The development of the personality towards a religious or spiritual desired better personality.

Element of the curriculum and/or enrichment
Studying the large data set, which focuses on weather, allows pupils to find out about the great storm of 1987, to reflect on the interconnectedness of people, landscapes, weather and well-being. This encourages empathy.

Moral Development:

The development of attitudes and behaviours toward other people in society, based on social and cultural

norms, rules, and laws.

Element of the curriculum and/or enrichment
In the decision maths element of further maths, students find minimum spanning trees, inspection routes, and study critical path analysis. These are all techniques used in business to improve efficiency and thus profit. However, they also reinforce social norms – such as not driving the wrong way down a one-way road. The act of creating an algorithm to reduce the length of a postal route was actually undertaken to improve the lives of the postal workers, who benefitted from shorter working days as a result. Students are given the brief history to this.

Cultural Development:

Cultural Diversity is at the heart of the Sixth Form and students will learn about themselves and relationships

with others from a variety of cultural backgrounds.

Element of the curriculum and/or enrichment
Diversity is embedded into the environment in the Mathematics Department. We have corridor displays celebrating "famous mathematicians from around the world" and "pioneering women of the world". Each classroom has a poster to highlight the "black heroes of maths". Within our teaching we reference mathematicians from all cultures: Leibniz and Newton during the teaching of Mechanics, Gauss, Descartes, Leibniz and Newton for Pure, Fibonacci is met when studying statistics and Kuan Mei-Ko, Kruskal and Prim are all met in the decision module of further maths.

During the study of hypothesis testing in statistics we may discuss the reason for the different significance levels. We can explore the amount of evidence needed to prove things beyond a reasonable amount. We have resources that link to a murder investigation and trial and others that look how much evidence would be needed to switch medical treatment to a new drug compared to the amount and quality of evidence needed to change the recipe of a box of cereal.

When studying the large data set we look at data from 5 UK locations, a location in China, one if Australia and another from the USA. Students need to draw on their general knowledge to make inferences about the type of weather they would expect at different times of the year in the different locations and to think about the differences between coastal and Inland locations. Any discussions around this help to demonstrate the school value of ingenuity.

The school value of equality can be modelled to students in the information given with regards to how mathematics has developed – with reference to the two different notations used for calculus due to two mathematicians simultaneously working on the same area whilst in different geographic locations.