NHGS – Physics - Curriculum Intent, Implementation and Impact

Intent (Aims and purpose)

We aim to create the very best Physicists. We challenge students to think, act and speak like those working in the field would. We do this by quality first teaching, which ensures that students understand the fundamental concepts of Physics can articulate them with precise use of technical terminology and can apply them to a variety of familiar and unfamiliar contexts. Students develop strong working scientifically skills so that they understand how experiments can provide evidence, can critically evaluate data and link this to theory.

Our curriculum at NHGS goes far beyond what is taught in lessons, for whilst we want students to achieve the very best examination results possible, we believe our curriculum goes beyond what is examinable. As a department, we bring the subject to life through demonstrations, experiments and real world concepts. KS3 pupils take part in the national STEM 'race to the line' rocket car competition. We provide the opportunity for our highest achieving KS4 and KS5 students to enter the British Physics Olympiad. KS5 students are encouraged and supported to attend Headstart courses and master classes offered by Isaac Physics. Teams are entered annually for the international rocketry competition - one of our teams in 2019 won the national final at the Paris international air show.

Our curriculum in Physics forms a backbone to our ethos statement. Examples of how our curriculum supports the ethos statement are through the Physics curriculum's incremental and cyclical structure, with integrated interleaving which enables students to develop confidence in the subject. Students are nurtured to have an enquiring approach to understanding how the universe works. Enthusiasm is modelled by our staff and praised in our students who are engaged and motivated to do well.

As a knowledge engaged curriculum we believe that knowledge underpins and enables the application of skills; both are entwined. As a department, we define the powerful knowledge our students need and help them recall it with topic checklists and increasingly, knowledge organisers. Most lessons start with a low stakes quiz, which provides students with regular spaced retrieval practice. Half-termly, formative diagnostic assessments further support this. In addition to all their paper resources, students have access to all these and further resources through the google drive and classroom, which directs students to other additional resources that they can access. In addition, students have access to the online kerboodle resource, which includes self-marking quizzes that give the students instant feedback.

We build the Cultural Capital of our students by exploring with the students links to the curriculum of current scientific issues. Through our curriculum we introduce students to the narrative of some of the most influential Physicists throughout history, their discoveries and the impact their work has had on the world in which we live.

Further rationale behind our curriculum design includes having a carefully planned progression through our curriculum. Year 7 and 8 pupils develop their Physics understanding under the key themes of forces, electromagnets, energy and wave. Our GCSE teaching starts in year 9 and follows a spiral structure. The fundamentals of energy, motion and waves are introduced in year 9, revisited, and built upon each year. We spent a great deal of time structuring the course to help students develop their understanding of the subject incrementally and holistically. We ensure the level of challenge is high enough for the most able, with scaffold and support available for students who need it.

Implementation

Collaborative curriculum planning lies at the heart of what we do in the department. We are committed to a three-year plan of developing our schemes of work. In 2019/2020 we are working on KS4 schemes of work. These are focussed on embedding challenge, metacognition, memory techniques and literacy into our departmental curriculum

Alongside our schemes of work, we are developing knowledge organisers at KS3. This is enabling us to define the core knowledge our students need to master.

In Physics we also implement our curriculum through a variety of teaching approaches and tasks such spiralling back low stakes quizzes, formative diagnostic assessments, demonstrations and discussions of key experiments and applications of concepts to the real world, pupil experiments, worked examples, problem practice, questioning and discussions leading to extended writing.

Impact

We know our curriculum is working in the Physics department through last years (and indeed previous years) exam results. At GCSE Physics was the department in the school with the highest average points score (6.93), with positive residuals (students achievement compared to their achievements in their other subjects). A-Level results were also strong achieving ALPS 3 with 63% achieving A* to B grades.

Numbers studying A-Level Physics are rising year on year and a significant proportional of our A-level Physics students go onto undergraduate study in physics or closely related subjects such as engineering. Sixth form students like to give back to the department by helping to mentor and support students lower down the school.

Departmental QA shows students feel well prepared for exams, and enjoy the way their teachers relate the subject to the real world.