



Benedict Biscop CE Academy

STEM POLICY

Review Date:	Autumn 2020
Next Review Due:	Autumn 2022
Person in Charge:	Headteacher
Governance:	Chair of RA Committee

Other policies that link and should be read in conjunction with this policy:

- Teaching and Learning Policy
- Assessment Policy
- Marking Policy
- English Policy
- Mathematics Policy
- Display Policy
- Presentation Policy
- Educational Visits Policy

Introduction

The curriculum at Benedict Biscop CE Academy is based on Christian values, taught both explicitly and implicitly throughout the day and made real in our everyday lives.

The curriculum at Benedict Biscop CE Academy is organised throughout the school around areas of learning linked to the Early Years Foundation Stage plus Religious Education.

The Arts [Art, Dance, Drama, Music,]

English/Communication and Language

Mathematics/ Mathematical Development

STEM [Science, Technology/Computing, Engineering, Mathematics]

Humanities/Knowledge and Understanding [Geography and History]

Personal Social and Emotional Development

Physical Development [PE]

As a school that respects the rights of the children and adults in our school family, community and beyond, we aim for each school policy to adhere to articles set out in the convention. Article 28 states: You have the right to a good quality education. You should be encouraged to go to school to the highest level you can.

Other articles pertinent to policies relevant to teaching and learning across school are:

Article 3: All adults should do what is best for you. When adults make decisions, they should think about how their decisions will affect children.

Article 12 : You have the right to give your opinion, and for adults to listen and take it seriously.

Article 29: Your education should help you use and develop your talents and abilities. It should also help you learn to live peacefully, protect the environment and respect other people.

Article 31: You have the right to play and rest.

In the academic year 2013-2014, this curriculum has been reviewed in line with the new National Curriculum changes; which are effective September 2014. Amendments have been made accordingly annually to ensure fit for purpose in our context.

Computing

Information Technology is not seen as a separate area of the curriculum, but as a tool for accessing learning across every area of the curriculum and the specific skills of IT will be taught through all other curriculum areas. Key skills IT deals with the application of IT to specific purposes. It is not just about using software packages or using operating systems, neither is it concerned only with keyboarding skills and student's ability to copy-type or follow instructions. Rather, key skills IT is about how students use their knowledge about IT to find, develop and present information, whether it is text, image or numbers, or all of these in an integrated task.

Computing includes the ability to use a range of information sources and IT tools to find, analyse, interpret, evaluate and present information for a range of purposes across the curriculum.

IT teaching offers opportunities for children to:

- develop IT capability, including their knowledge and understanding of the importance of information and of how to select and prepare it;

- develop and evaluate their skills in using hardware and software to manipulate information in their processes of problem solving, recording and expressive work;
- develop their ability to apply their IT capability and IT to support their use of language and communication, and their learning in other areas;
- explore their attitudes towards IT, its value for themselves, others and society, and their awareness of its advantages and limitations.
- Specific to Knowledge and Understanding, children should understand how IT can be used to communicate and handle information, control and monitor events, and model real and imaginary situations.
- New technologies are purchased by school and used to develop the skills of children with Special Education Needs and Disabilities. School acts on advice of outside Agencies and other Professionals when purchasing new programs for this group of individuals.
- understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation.
- analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.

Science

At Benedict Biscop we want our children to learn that all things are possible. We want our children to aspire and to achieve highly. We want all children to have a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and also an understanding of the uses and implications of Science, today and for the future – BECOMING SCIENTISTS.

At Benedict Biscop, scientific enquiry skills are embedded in each topic the children study and these topics are revisited and developed throughout their time at school. Topics, such as Plants, are taught in Key Stage One and studied again in further detail throughout Key Stage Two. This model allows children to build upon their prior knowledge and increases their enthusiasm for the topics whilst embedding this procedural knowledge into the long-term memory. All children are encouraged to develop and use a range of skills including observations, planning and investigations, as well as being encouraged to question the world around them and become independent learners in exploring possible answers for their scientific based questions. Specialist vocabulary for topics is taught and built up, and effective questioning to communicate ideas is encouraged. Concepts taught should be reinforced by focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions.

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Benedict Biscop CE Academy aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future National Curriculum.

The essential characteristics of a scientist at Benedict Biscop CE Academy are:

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.

Design and Technology

At Benedict Biscop we want our children to learn that all things are possible. We want our children to aspire and to achieve highly. We want our children to develop as designers, developing DT knowledge and skills.

At Benedict Biscop, we actively encourage cross-curricular learning, to give pupils maximum opportunity to transfer skills and knowledge. Year groups are taught through predominately Historic themes, which inspire and motivate our pupils. Themes in KS2 are arranged in chronological order to further aid pupils understanding of chronology. In every year group, one theme is inspired by the United Nations Rights of a Child, pupils think about 'What I believe?' and learn about how events in History have helped to shape our lives today. Where possible, we link learning to our local context so that pupils gain an awareness of where they are from and how this links to their lives today enabling them to become active Global Citizens.

Benedict Biscop CE Academy aims to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

The essential characteristics of a designers at Benedict Biscop CE Academy are:

- Significant levels of originality and the willingness to take creative risks to produce innovative ideas and prototypes.
- An excellent attitude to learning and independent working.
- The ability to use time efficiently and work constructively and productively with others.
- The ability to carry out thorough research, show initiative and ask questions to develop an exceptionally detailed knowledge of users' needs.
- The ability to act as responsible designers and makers, working ethically, using finite materials carefully and working safely.
- A thorough knowledge of which tools, equipment and materials to use to make their products.
- The ability to apply mathematical knowledge.
- The ability to manage risks exceptionally well to manufacture products safely and hygienically.
- A passion for the subject and knowledge of, up-to-date technological innovations in materials, products and systems.

Time Allocation

Throughout the school year we aim to seek a balance between all subject areas. Science will be taught as a core subject. Where appropriate links will be made to the academy's thematic curriculum but where this isn't a viable option, the key skills will be taught discretely. Children will receive 12 hours minimum of science teaching each term. Design and technology will be taught using a thematic approach providing flexibility for short and long projects at a relevant time for the children to build onto all their learning. Teachers will use their professional judgement in deciding the best use of time.

Strategies for the Teaching of STEM subjects

Teaching and Learning Style:

In planning to meet the needs of each individual we will:

- Motivate and stimulate interest and excitement for learning
- Ensure children discuss and take an active part in their learning
- Ensure children are given opportunities to develop the knowledge and key skills identified in the National Curriculum
- Provide a broad and balanced curriculum using a thematic approach where curriculum areas are linked.
- Ensure that we use a range of classroom practice and teaching style appropriate to the needs of the learners in the group.
- Use the full range of differentiation strategies to ensure that all learners have the opportunity to access the curriculum and make progress and adopt teaching methods that reflect the differing learning styles of the individuals in the group.
- Address the literacy and numeracy needs of each individual and make full use of ICT in the provision of learning opportunities for all learners with additional educational needs, setting appropriate yet challenging targets for improvement.
- Monitor progress against targets and share the information with the learner.

- Seek to overcome potential barriers to effective inclusion.
- Ensure display in the learning environment celebrates the achievement of our children and scaffolds their learning to extend their achievement further.
- Provide home learning activities which extend and support learning.

Curriculum Planning

Specific skills and knowledge developed through STEM subjects are mapped out in the National Curriculum. Our school uses the National Curriculum of work as the basis for its curriculum planning in STEM subjects. We have adapted the national curriculum to the local circumstances of our school.

We carry out the curriculum planning for STEM subjects in three phases: long-term, medium-term and short-term.

Long-term plans map out the themes covered in each term during the key stage. The curriculum leader for STEM subjects will liaise with all curriculum leaders to ensure that learning builds upon learning.

Medium-term plans provide:

- a mapping overview of content which are constantly being reviewed and amended to ensure relevance for the cohort of children, give details of each unit of work for each term. They ensure an appropriate balance and distribution of work across each term.
- key skills development to ensure children progress at a level according to their ability. They identify learning objectives and outcomes for each theme.

Short term /Weekly plans are completed by staff for each lesson. These include:

- the specific learning objectives and skills for each lesson and detail how the lessons are to be taught,
- success criteria which are shared with the children to ensure children understand their next steps to learning,
- links between skills and knowledge,
- activities to engage the children and to lead their development through active participation.

We plan the activities in STEM subjects so that they build upon the prior learning of the children. We give children of all abilities the opportunity to develop their skills, knowledge and understanding and we also build planned progression into the scheme of work, so that the children are increasingly challenged as they move through the school.

Planning is recorded on the intranet and is accessible by all staff. In this way subject/curriculum leaders can monitor and develop learning within their curriculum area. Termly scrutinies of planning and work are carried out by all staff with feedback given to ensure children access the full curriculum.

We will ensure that we plan to meet the needs of the following clearly identifiable groups:

- More able learners
- Learners with disabilities
- Learners from different ethnic groups
- Learners for whom English is an Additional Language
- Learners with Special Needs
- Girls and Boys
- Learners from different faiths
- Learners with emotional, behavioural or social needs
- Learners who are at risk of disaffection or exclusion
- Learners who are "Looked After" in public care
- Learners for who the pupil premium applies

Early Years and Foundation Stage

We teach the children in Foundation Stage to 'understand the world' around them as an integral part of the themed work (linked to children's interests) covered during the year. Science comes under the Understanding the World section of the Early Years Outcomes. As the reception class is part of the Foundation Stage, we relate the Understanding of the World aspects of the children's work to the objectives set out in the Early Years Outcomes which underpin the curriculum planning for children aged three to five. Understanding the World makes a significant contribution to the Early Years Outcomes objectives by developing a child's sense of the world, forming the foundation for later learning. Design and technology is taught to children in Foundation Stage, through the areas of Expressive Art and Design including using

media and materials and being imaginative. This forms an integral part of the work covered during the year. As the reception class is part of the Foundation Stage, we relate the The Arts aspects of the children's work to the Early Years Outcomes which underpin the curriculum planning for children aged birth to five. Expressive Art and Design makes a significant contribution to the Early Learning Goals. There is also a close link to the outcomes from 'understand the world' which is used as part of DT planning.

Spiritual, Moral, Social and Cultural Development

Learning through STEM subjects contributes to the children's SMSC in many ways including:

- Pupils gaining an insight into the chemical nature of natural changes in the atmosphere.
- Pupils debating the ethical issues surrounding current issues.
- Learning about the future implications of the use of finite resources and landscape changes.
- Learning about theories concerning the creation of the universe and evolution of life with consideration of religious beliefs in accordance with the Church of England.
- Looking into the future options for the production of electricity, alternative fuels, and methods to reduce pollution with discussion of how these can improve people's lives and the environment in general.
- Pupils investigating the historical impact of scientists from around the world in numerous famous discoveries.
- Pupils considering how scientific perceptions can alter across the planet; from the phases of the moon, the safety of food additives and the local importance of recycling.

Learning through STEM subjects contributes to the children's spiritual development in many ways.

We provide children with the opportunity to discuss moral questions, what is right and wrong. Children learn how society has changed and develop skills to become good citizens. They study their own rich cultural heritage and developing an understanding of how this culture is enriched by the multi-cultural British society of today, based on British values of democracy, the rule of law, individual liberty and mutual respect and tolerance of those with different faiths and beliefs.

Resources

We have sufficient resources available in school to meet the needs of the Academy Curriculum. This allows resources to be matched to any developments in the curriculum, through the teaching of key skills. The SLT audit resources to ensure they are matched to any changes in the curriculum.

Assessment

Formative assessment involves spending time before and during each unit or theme time eliciting children's knowledge and understanding – Mind Mapping/ Spider Graphs, discussions etc. We follow the principles of Assessment for Learning in all of our STEM subjects teaching and learning. This involves identifying a child's progress in each area of learning, determining what each child has learned and identifying the next steps in his/her learning, linked to the learning intention and success criteria for the session.

Effective tools used by our teaching staff include:

- Sharing explicit learning intentions and success criteria
- Quality questioning
- Self assessment and peer assessment against learning intentions and success criteria
- Quality marking to identify areas where the success criteria has been met and areas that need to be improved

Summative assessment involves spending time at the end of each unit as well as the end of each term and year assessing children's skills and understanding. The Foundation Stage Profile provides a baseline assessment level in each area of learning. This can be used to produce end of year targets throughout KS1 and KS2. In KS1 and 2 children will be assessed using the progression document at the end of each unit, this is to inform teaching and ensure skills are secure. At the end of the year, teaching staff will assess the standard that the children are working at and input it into the schools tracking system. At the end of Key Stage, teachers will assess Science using the most up to date 'Teacher Assessment Framework'.

Inclusion

The governors and staff of the academy are committed to providing an inclusive range of high quality learning opportunities for everyone involved with the school and Community. We will ensure that everyone has an equal opportunity to access the full range of provision available in STEM subjects and will actively seek to remove barriers to learning and participation. The teaching and learning, achievements, attitudes and well-being of every child are important. We follow the necessary regulations (set out in the SENd Code of Practice (2014)) to ensure that we take the experiences and needs of all our children into account when planning for learning.

Teaching STEM subjects to Children with Special Needs

At our school we teach STEM subjects to all children, whatever their ability. STEM subjects forms part of the school curriculum policy to provide a broad and balanced education to all children. Through STEM subjects teaching we provide learning opportunities that enable all pupils to make progress. We do this by setting suitable learning challenges and responding to each child's different needs through differentiated activities. Assessment against the National Curriculum allows us to consider each child's attainment and progress against expected levels.

When progress falls significantly outside the expected range, the child may have special educational needs. Our assessment process looks at a range of factors – classroom organisation, teaching materials, teaching style, and differentiation – so that we can take some additional or different action to enable the child to learn more effectively. This ensures that our teaching is matched to the child's needs.

Intervention is provided, as set out in the renewed SEN code of Practice (2014), through quality first teaching and where a child is in receipt of a statement of Special Educational Needs or Education Health Care (EHC) plan a specific education plan will be in place linked to specific targets. The targets may include, as appropriate, specific targets relating to Knowledge and Understanding of the world.

We enable pupils to have access to the full range of activities involved in learning STEM skills. Where children are to participate in activities outside the classroom, for example, an educational visit, we carry out a risk assessment prior to the activity, to ensure that the activity is safe and appropriate for all pupils.

Role of the Curriculum Leader/Subject Leader

The role of all subject leaders will consist of:

- Lead curriculum development in the area throughout the school
- Plan progressive curriculum throughout the school linked to identified themes ensuring that key skills are developed
- Monitor progress through curriculum area and ensure this is tracked on a termly basis
- Develop annual Curriculum action plan which feeds directly into the School Improvement Plan
- Review the policy and scheme of work which will inform action plan
- Carry out an audit of resources annually which will inform action plan
- Organise, maintain, order resources using the allocated annual budget available.
- Ensure children's work is recorded and moderated across the school in the curriculum area.
- Lead professional development across school in response to need
- Provide support and advice to colleagues
- Keep up to date with developments in curriculum area and feed information into Senior Leadership Team
- Link with relevant School Governor and ensure they are informed of curriculum developments on termly basis.

The Subject Leader has the responsibility for overseeing and resourcing the subject. There is an annual budget for resourcing STEM subjects so that effective teaching can take place and the school's policy can be maintained. This may vary from year to year according to curricular priority and resources available.

Monitoring and Review

The curriculum leaders are responsible for monitoring planning, the standard of children's work and the quality of teaching. Curriculum leaders carries out planning and work scrutinies. This involves interviewing children across key stages. Children are asked focused questions about their learning with their work. This enables curriculum leaders to monitor progress within their subject. The curriculum leaders support colleagues in the teaching of STEM subjects, by giving them information about current developments in the subject and by providing a strategic lead and direction for the curriculum area in the school. The curriculum leaders are also responsible for devising an annual action plan devised by the curricular team [Summer term] and evaluating this on a termly basis, evaluating strengths and weaknesses in the curriculum area and indicating areas for further improvement. The curriculum leader is responsible for providing an annual overview to the Governing Body. Curriculum leaders meet with governors on a termly basis to discuss current developments in their subject. Key questions are discussed during these meetings.

Through monitoring and evaluating our practice, constantly reviewing what we do, we will address the following key questions, as identified in our inclusion Policy:

- Do all our children achieve as much as they can?
- Are there differences in the achievement of different groups of children?
- What are we doing for those children who we know are not achieving their potential?

- Are our actions effective?
- Is the curriculum promoting outstanding learning?

Leadership

The senior leadership team and the curriculum leader or teacher responsible for the subject should have a clear view of the purpose of curriculum development in this area and how learning outcomes can be achieved. Effective communication is necessary at all times. Sharing ideas, involving others in leadership and management considerations can ensure that all staff understand the requirements and that individual talents are put to full use. All staff have a responsibility in maintaining a positive approach to teaching, maintaining high moral stance, clear vision. Effective interaction and collaboration calls for active participation from all.

Health and Safety

The teacher will be responsible for planned activities within STEM subjects that are appropriately risk assessed to comply with health and safety requirements. They are also responsible the health and safety of themselves, classroom assistants, visitors and pupils within their class.

Signed

Signed

Chair of Governors

Headteacher