Creative Hut

FIRST LEGO LEAGUE EXPLORE

Teacher Guide for Ireland

Developed by the DCU Institute of Education

FIRST® LEGO® League Explore

Presenting: UNEARTHED℠

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Ollscoil Chathair Bhaile Átha Cliath
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Taighde Éireann Research Ireland

Welcome to the *FIRST*® LEGO® League Explore UNEARTHED℠ Teacher Guide for Ireland

Research Ireland

The development of this guide has been enabled by the Research Ireland Discover Programme.

Dublin City University Institute of Education

This guide has been developed by a leading team from the DCU Institute of Education to support teachers across Ireland to engage with *FIRST*® LEGO® League Explore within their classrooms.

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Creative Hut

Since 2010 Creative Hut, formerly Learnit, has been on a mission to 'inspire the creators of tomorrow by making learning fun for the children of today'. We are the delivery partners for *FIRST*® LEGO® League in Ireland. We are proud to partner with *FIRST* and DCU to bring STEM to life through this hands-on, minds-on approach to learning.

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For the digital version of this guide visit:
fll.ie/unearthed

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Welcome to the UNEARTHED℠ Teacher Guide

The **theme** of this year's *FIRST*® LEGO® League Explore season is **UNEARTHED℠**. Through the UNEARTHED challenge, learners will develop an appreciation for the work of historians and an in-depth understanding of the archaeological process by investigating the past as if they are a team of archaeologists.

Our archaeological discoveries teach us how past civilisations and cultures interacted with their environments and each other, providing important insights into the human story. As much of human history remains undiscovered, curious minds are now offered opportunities to dig deep, unearthing more hidden stories to understand ways of life in the past.

Throughout their engagement in the UNEARTHED challenge and this authentic real-world investigation, learners will develop confidence, critical thinking, and design skills through hands-on learning. They will also develop an understanding of how archaeology helps uncover cultural histories through the study of artefacts, providing insight into how people have interacted with our planet and each other throughout history, and how these sites and relics require exploration and careful preservation.

This UNEARTHED Teacher Guide aims to support Irish primary school teachers by connecting *FIRST* LEGO League Explore UNEARTHED with the Irish Primary School Curriculum. Learners will use LEGO® bricks, powered by LEGO® Education SPIKE™ Essential or WeDo 2.0, to tell a story of the past, sharing what they have learned about the work of historians and an in-depth understanding of the archaeological process.

Through this authentic real-world context, children learn to design, build, and code. *FIRST* LEGO League Explore UNEARTHED is embedded throughout the different subjects of the Irish Primary School Curriculum, achieving curriculum objectives, skills, and competencies in a holistic and integrated manner.

This Teacher Guide is organised in two parts:

Part A provides a background to *FIRST* LEGO League Explore UNEARTHED. An overview of the Irish Primary Curriculum and Policy connections is presented alongside general support and advice for teachers.

Part B is a detailed description of each of the 12 sessions of the UNEARTHED Teacher Guide for Ireland. Primary curriculum links and skill development opportunities are highlighted in each session. Throughout the sessions, learners will be exploring themes and ideas, creating solutions, testing them, iterating on them and sharing with others what they have learned. The learning activities are specifically designed with plenty of scope for differentiation so the sessions can be adapted to suit each participating class. Resources required, details of coding, teacher support, and guiding questions are provided for each session. It is important to note that each session has core curriculum links that are necessary for the learners to learn about the importance of working as a historian, the archaeological process, and stories of the past. Extension activities which link across the curriculum and support the development of the learners' knowledge and skills are presented, thereby enhancing their understanding of this real-world context and achieving the aims of the curriculum simultaneously. Engagement with the 12 sessions of the UNEARTHED Teacher Guide for Ireland will involve approximately 15 hours of class time.

What is *FIRST* LEGO League Explore?

FIRST LEGO League Explore is a non-competitive, hands-on programme geared towards primary school aged learners from 2nd class (aged 7-8) to 6th class (aged 11-12).

The programme aims to inspire learners to experiment and grow their confidence, critical thinking, and design skills through meaningful, hands-on learning activities. Each year *FIRST* LEGO League Explore focuses on a relevant, real-world theme with this year's challenge called UNEARTHED. Children work together in teams using elements from a LEGO Education Set (SPIKE Essential or WeDo 2.0) and an UNEARTHED Explore Set to build a Team Model that tells a story of the past, sharing what they have learned about the work of historians and demonstrating an understanding of the archaeological process.

This UNEARTHED Teacher Guide has been designed to provide learners with authentic and meaningful curriculum connections. The sessions in this Teacher Guide have been intentionally laid out so that learners build up their knowledge, understanding and skills, in advance of designing and building their Team Models and accompanying posters in session 10, preparing to present at a Showcase Event in session 11, and reflecting upon their learning journey in session 12. Figure 1 provides an overview of UNEARTHED sessions 1-12.

Sessions 1-9	Context and knowledge	Developing familiarity and understanding of knowledge, skills and concepts including working as a historian, computational thinking and coding
Session 10	Team Model and Poster	Building and coding Team Model Creating Team Poster
Sessions 11-12	Showcase Event Reflecting on the UNEARTHED experience	Sharing what the team have learned during the Showcase Event and reflecting on their UNEARTHED learning journey

Figure 1. UNEARTHED Sessions 1-12

Core Values of *FIRST* LEGO League

FIRST LEGO League Explore is underpinned by the six *FIRST* Core Values that are the cornerstones of the programme. *FIRST* LEGO League envisions that through the Core Values, learners use discovery and exploration in each session and learn that helping one another is the foundation of teamwork. Throughout each session it is important that the learners have fun and are motivated. You will find references to the six Core Values (see Table 1 below) throughout each of the sessions. You can take time to emphasise the Core Value when you see the symbol.

Core Value	Description
	We are stronger when we work together.
	We respect each other and embrace our differences.
	We use creativity and persistence to solve problems.
	We enjoy and celebrate what we do!
	We explore new skills and ideas.
	We apply what we learn to improve our world.

Table 1. Core Values of FIRST LEGO League

The Core Values have strong connections to the Irish SPHE curriculum:

Subject	Strands	Strand Units/Elements	Skills and Concepts
SPHE	Myself and others Myself and the wider world	My friends and other people Relating to others Developing citizenship	Communication skills Working collaboratively and co-operatively with others Personal and self management skills Confidence and competence using language Decision-making skills

Table 2. Irish SPHE curriculum

Learning principles behind UNEARTHED

The Engineering Design Process underpins the entire UNEARTHED challenge, see Figure 2. Here, learners are encouraged to work like real engineers, using a range of skills and understanding to investigate and think critically about real-world challenges relating to this year's theme and propose interesting solutions. The Engineering Design Process has four stages: Explore a problem; Create one or more solution(s); Test the solution(s); Share with others what you have learned.

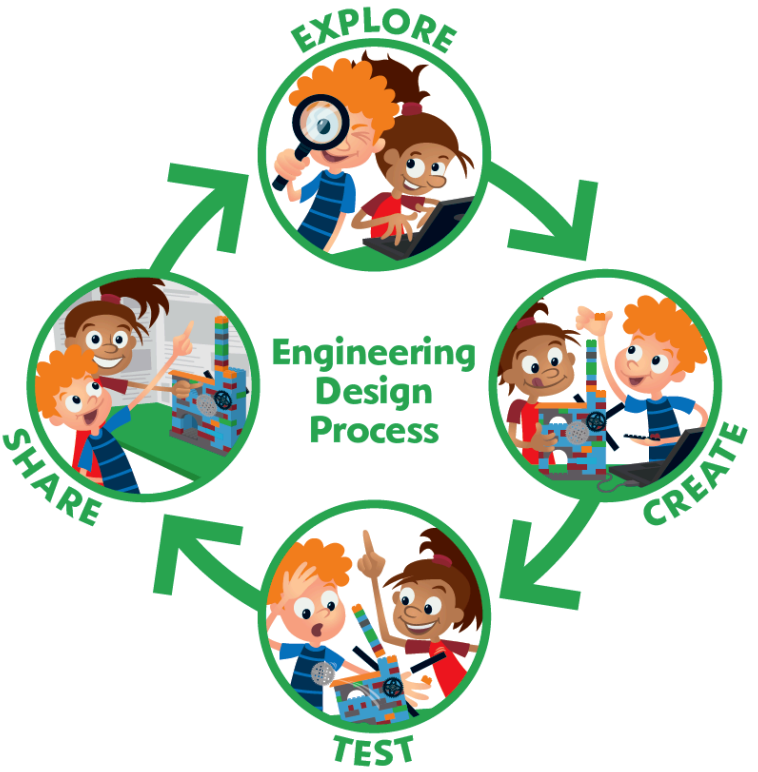


Figure 2. Engineering Design Process

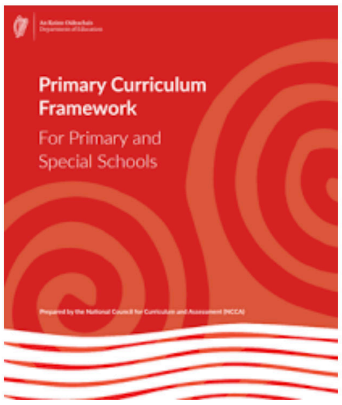
There is no fixed order for this process. Learners may go through some or all parts several times throughout the sessions. These four stages of the Engineering Design Process align with the stages of enquiry-based learning, particularly for both science and geography.

The enquiry-based learning process comprises a child-centred, experiential, constructivist approach whereby learners are active in their learning and participate in the leading of investigations through posing questions and generating ideas before actively creating and collecting data to help develop their understanding. These teaching and learning approaches are advocated throughout the Irish Primary School Curriculum. Enquiry-based learning begins with a problem or obstacle to a learner's development; they analyse the situation; they identify possible solutions; they compare the implications of the different solutions and select the best course of action; they implement this in practice. Roberts' (2013) Framework for Enquiry (Figure 3 overleaf) is an example of an enquiry-based learning process for teaching and learning in geography and science. As outlined below it has explicit correlations with the Engineering Design Process.

Figure 3. Enquiry-based learning framework (Roberts, 2013)

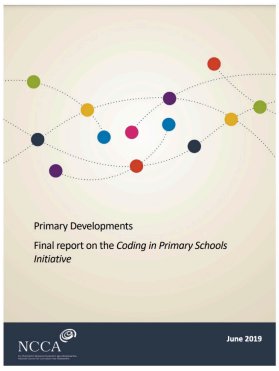
The Explore stage of the Engineering Design Process is directly aligned with the Creating a Need to Know stage of the enquiry framework. Here, the learners are introduced to the problem or scenario through a stimulus. This involves the learners hypothesising, speculating and generating ideas and questions for investigation drawing on their existing knowledge and everyday experiences. The Create stage of the Engineering Design Process is connected to the Using Resources stage of the enquiry framework. This involves the learners actively carrying out investigations on the issue at hand. Here they use a range of resources to both create and collect data to be used as evidence for their investigations. In both the Test stage of the Engineering Design Process and the Making Sense stage of the enquiry process, the learners analyse and interpret the data pertaining to their investigations, thus reflecting on and modifying their ideas and concepts and developing specific recommendations and solutions for issues. Finally, similar to the Reflecting on Learning stage in the enquiry process, the Share stage of the Engineering Design Process culminates in the learners presenting their work, reflecting on what they learned, and identifying areas where they were successful and areas in need of improvement.

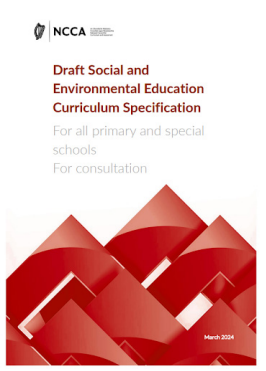
Connections to policy



FIRST LEGO League Explore has explicit and embedded connections across the Irish Primary School Curriculum.

FIRST LEGO League Explore is directly linked with a number of domains, standards and statements across both dimensions of the Digital Learning Framework (DLF). This is a school self-evaluation process and aligns with the Digital Strategy for Schools to 2027.





FIRST LEGO League Explore has strong connections with a range of recent policy initiatives, including the proposed Science, Technology and Engineering Education specification which will sit alongside the Primary Mathematics Curriculum to comprise the new primary Science, Technology, Engineering and Mathematics (STEM) curriculum area.

Table 3. Policy connections

How does *FIRST* LEGO League Explore UNEARTHED connect to the Irish Primary Curriculum?

Table 4 below below presents the connections to the Irish Primary School Curriculum (strands and skills associated with curriculum subjects).

Science Energy and Forces; Materials *Scientific Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating); Sorting and classifying; Designing and making*		**Geography** Natural Environment; Human Environments *Sense of place; Sense of space; Mapping Skills; Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating)*
Visual Arts Drawing; Construction *An awareness of line;* *An awareness of form;* *An awareness of space*	**History** Early People and Ancient Societies; Local Studies; Continuity and change *Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating)*	**SPHE** Myself and others; Myself and the wider world *Communication;* *Cooperation;* *Decision-making*
Mathematics Number; Shape and space; Measures *Understanding and connection; Communicating; Reasoning; applying and problem-solving*		**Literacy** Oral Language; Writing; Reading *Communicating; Understanding; Exploring and using*

Table 4. Irish Primary Curriculum connections

Table 5 provides a more explicit overview of the curriculum Strand and Strand Unit links in each of the UNEARTHED sessions.

UNEARTHED Curriculum Connections

Session	Session 1: Introducing Archaeology and Working as a Historian	Session 2: Digging up the Past	Session 3: Understanding the Archaeological Process	Session 4: Identifying Local Historical Sites
Overview of the session	Learners will identify how artefacts can be used by archaeologists to reconstruct what life was like for people in the past. Learners will identify the importance of asking good questions of an artefact in order to reveal the story of its past.	To provide learners with a hands-on opportunity to undertake a small-scale excavation which enables them to practice excavation skills, identify the importance of stratigraphy (recognising different layers of soil), and to understand how artefacts are related to each other and their environment.	Learners will develop a deep understanding of the archaeological process and become familiar with some of the technology and tools used by archaeologists by focusing on one of the most common historical features of the Irish landscape; ringforts (or fairy forts) and, in particular, the Rathgurreen Ringfort in Maree, Co. Galway which was excavated in 2025.	Learners will use current and historic maps, aerial photographs, and digital mapping to identify some historical sites worthy of archaeological investigation in their locality.
Curriculum connections	**History** *Strand(s):* Early people and ancient societies *Strand Unit(s):* Bronze age people *Skill(s):* Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating) **Science** *Strand(s):* Material *Strand Unit(s):* Properties and characteristics of materials *Skill(s):* Working as a Scientist Scientific Investigation Skills (Questioning, Hypothesising, Predicting, Observing, Analysing, Recording, Communicating)	**History** *Strand(s):* Early people and ancient societies *Strand Unit(s):* Bronze age people *Skill(s):* Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating) **Science** *Strand(s):* Material *Strand Unit(s):* Properties and characteristics of materials *Skill(s):* Working as a Scientist Scientific Investigation Skills (Questioning, Hypothesising, Predicting, Observing, Analysing, Recording, Communicating) **Geography** *Strand(s):* Natural Environment *Strand Unit(s):* Rocks and soils *Skill(s):* Sense of place; Sense of space; Mapping Skills; Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating) **Mathematics** *Strand(s):* Shape and space *Strand Unit(s):* Spatial awareness and location *Skill(s):* Record directional instructions and location	**History** *Strand(s):* Early people and ancient societies *Strand Unit(s):* Bronze age people *Skill(s):* Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating) **Geography** *Strand(s):* Natural Environment; Environmental Awareness and Care *Strand Unit(s):* People living and working in the local area; People living and working in a contrasting part of Ireland; Counties, Regional and National Centres' Local Natural Environment; Rocks and Soils. *Skills(s):* Mapping Skills (comparing maps and aerial photographs, using digital maps and satellite imagery); Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating)	**History** *Strand(s):* Local studies; Continuity and change over time; early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skills(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy) **Geography** *Strand(s):* Human Environment *Strand Unit(s):* Living in the local area; my county *Skill(s): Sense of space; Sense of place; Mapping skills; Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating)* **Literacy** *Strand(s):* Oral Language *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using

Session	Session 5: STEM in the Past	Session 6: Dig Site Tools	Session 7: How Archaeologists Use Sensors	Session 8: How Archaeologists Handle and Move Artefacts
Overview of the session	Learners will explore how science, technology, engineering, and mathematics were used in the past to build Newgrange. Learners will engage in practical hand-on investigations to illustrate how mathematical and scientific understanding supported the construction of Newgrange.	Learners will explore the tools used on a dig site and start to develop their understanding of computational thinking and coding.	Learners will explore how archaeologists use sensors, and develop an understanding of how sensors work through building and coding a LEGO robot.	Learners will be introduced to how archaeologists handle and move artefacts at excavation sites using vehicles.
Curriculum connections	**Mathematics** *Strand(s):* Measures *Strand Unit(s):* Measuring *Skill(s):* Reasoning; Applying and problem-solving **History** *Strand(s):* Local studies; Early people and ancient societies *Strand Unit(s): Building, sites, or ruins in my locality; Stone Age people* *Skill(s):* Using evidence; Synthesis and communication; Empathy **Science** *Strand(s):* Energy and forces *Strand Unit(s):* Forces; Light *Skill(s):* Working as a Scientist Scientific Investigation Skills (Predicting, Investigating, Experimenting, Observing, Estimating, and Measuring)	**History** *Strand(s):* Local studies; Continuity and change over time; early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skill(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy **Mathematics** *Strand(s):* Number; Shape and space *Strand Unit(s):* Fractions; Decimals; Lines and angles *Skill(s):* Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning; Implementing **Literacy** *Strand(s):* Oral Language; reading *Strand Unit(s):* Communicating; Understanding *Skill(s):* Communicating; Understanding; Exploring and using	**Geography** *Strand(s):* Human Environments *Strand Unit(s):* People and Places; People at work *Skill(s):* A sense of space; Mapping skills **Literacy** *Strand(s):* Oral Language; reading *Strand Unit(s):* Communicating; Understanding *Skill(s):* Communicating; Understanding; Exploring and using **History** *Strand(s):* Local studies; Continuity and change over time; early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skill(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy	**Geography** *Strand(s):* Human Environments *Strand Unit(s):* People at work *Skill(s):* Mapping skills; Geographical Investigation Skills (Predicting; Analysing, Recording, Communicating) **Literacy** *Strand(s):* Oral Language *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using **History** *Strand(s):* Local studies; Early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; Stone age people *Skill(s):* Using evidence; Synthesis and communication; empathy **Mathematics** *Strand(s):* Number; Shape and space *Strand Unit(s):* Fractions; Decimals; Lines and angles *Skill(s):* Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning

Session	Session 9: Archaeology Careers	Session 10: Team Model and Poster	Session 11: Let's Share - Preparation for Showcase and Showcase Event	Session 12: Let's Reflect
Overview of the session	Learners will explore archaeology careers and build a radar model which uses sensors and outputs.	Learners will work in teams to create their Team Model and Poster, which tells a story of the past, sharing what they have learned about the work of historians and demonstrating an understanding of the archaeological process. .	Learners will prepare to share their UNEARTHED project (including Team Model and Poster) at a Showcase Event.	Learners will reflect upon their Team Model and Poster, their appreciation for the work of historians, their understanding of the archaeological process, and their knowledge of life in the past.
Curriculum connections	**History** *Strand(s):* Local studies; Early people and ancient societies; continuity and change *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Houses and homes; Food and farming; Clothes; Communications; People from the past *Skill(s):* Time and chronology; Using evidence; Change and continuity; empathy **Geography** *Strand(s):* Human Environments; *Strand Unit(s):* People at work *Skill(s):* Geographical Investigation Skills (Predicting;, Analysing, Recording, Communicating) **Literacy** *Strand(s):* Oral Language *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using	**Mathematics** *Strand(s):* Shape and space; Measures *Strand Unit(s):* 2-D/3-D shapes; Time *Skill(s):* Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning; Implementing **Science** *Strand(s):* Energy and Forces; Materials *Strand Unit(s):* Forces; Properties and characteristics of materials *Skill(s):* Design and Make **Literacy** *Strand(s):* Oral Language *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using **Visual Arts** *Strand(s):* Construction; Drawing *Strand Unit(s):* Making constructions; Making drawings *Skill(s):* An awareness of line; An awareness of form; An awareness of space **SPHE** *Strand(s):* Myself and others; Myself and the wider world *Strand Unit(s):* My friends and other people; Relating to others; Developing citizenship *Skill(s):* Communication; Cooperation; Decision-making **History** *Strand(s):* Local studies; Continuity and change over time; Early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skill(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy	**Literacy** *Strand(s):* Oral Language; Writing *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using **Visual Arts** *Strand(s):* Construction; Drawing *Strand Unit(s):* Making constructions; Making drawings *Skill(s):* An awareness of line; An awareness of form; An awareness of space **History** *Strand(s):* Local studies; Continuity and change over time; Early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skill(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy	**Literacy** *Strand(s):* Oral Language; Writing *Strand Unit(s):* Communicating *Skill(s):* Communicating; Understanding; Exploring and using **Visual Arts** *Strand(s):* Construction; Drawing *Strand Unit(s):* Making constructions; Making drawings *Skill(s):* An awareness of line; An awareness of form; An awareness of space **History** *Strand(s):* Local studies; Continuity and change over time; Early people and ancient societies *Strand Unit(s):* Building, site and ruins in my locality; My locality through the ages; Homes and houses; food and farming; clothes; communications; People in the past *Skill(s):* Time and chronology; change and continuity;cause and effect; using evidence; empathy

Table 5. UNEARTHED curriculum connections

Working as a Historian

The concept of 'Working as a Historian' promotes child agency and constructivist child-centred pedagogy, providing children with opportunities to develop the historical knowledge, skills, concepts, dispositions, attitudes, and values associated as they study the lives of people in the past through the process of historical inquiry. When 'Working as a Historian,' children engage in historical thinking, pose questions about historical concepts, and encounter a range of sources, analysing and interpreting historical evidence from multiple perspectives to deconstruct and reconstruct historical narratives about the past. In working as historians, children are enabled to explore the past in an active, participative way. They develop an understanding of key historical concepts such as cause and effect, continuity and change, and time and chronology.

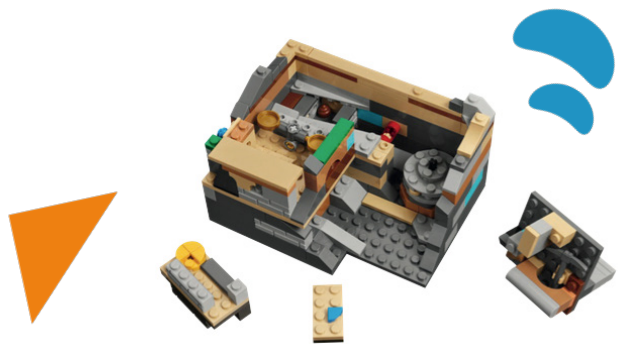
Digital Learning Framework (DLF) and School Self-Evaluation (SSE) connections

As part of the process in writing a digital learning plan, schools should firstly familiarise themselves with the Digital Learning Framework (DLF). Having reviewed the domains and standards, the school should identify the standard or standards on which it wishes to focus. This could be **one standard**, but not more than three. In some instances a school might identify one standard from the Teaching & Learning Dimension, and one standard from the Leadership & Management Dimension. For each standard there are a number of statements of effective practice and highly effective practice.

This UNEARTHED Teacher Guide will only refer to statements of effective practice, however a school may feel the statement of highly effective practice is more suitable to their context.

For further information on the Digital Learning Framework and the process of completing a Digital Learning Plan for your school visit **dlplanning.ie**. The **Digital Learning Planning Guidelines book** is a very useful guide in creating a Digital Learning Plan.

Tables 6 and 7 give an overview of the connections between UNEARTHED and the DLF and SSE.



For a school beginning to use a LEGO Education Set (SPIKE Essential or WeDo 2.0) and *FIRST* LEGO League Explore for the first time, one or two of the following standards and statements could be considered when preparing your Digital Learning Plan:

	Teaching and Learning	
Subject	**Detail from DLF**	**Guidance**
Pupil	**Domain 1:** Learner Outcomes **Standard:** Pupils enjoy their learning, are motivated to learn and expect to achieve as learners. **Statement:** Pupils use appropriate digital technologies to foster active engagement in attaining appropriate learning outcomes.	Through engagement with UNEARTHED, pupils will use appropriate digital technologies (e.g. LEGO Education materials & digital devices etc.) to actively explore the 'challenge question' and create Team Models.
	Domain 1: Learner Outcomes **Standard:** Pupils enjoy their learning, are motivated to learn and expect to achieve as learners. **Statement:** Pupils use digital technologies to collect evidence and record progress.	Pupils will use digital devices and a portfolio tool to document the engineering design process while exploring the challenge question in UNEARTHED.
Teacher	**Domain 3:** Teachers' Individual Practice **Standard:** The teacher selects and uses planning, preparation and assessment practices that progress pupils' learning. **Statement:** Teachers use appropriate digital technologies to design complex, real-world problems and structure them in a way that incorporates key subject matter concepts.	Teachers adapt and use the UNEARTHED learning activities in order to provide pupils with complex, real-world problems which incorporate key subject matter concepts.

Table 6. Connections between UNEARTHED and the DLF and SSE.

For schools who have previously engaged with a LEGO Education Set (SPIKE Essential or WeDo 2.0) or *FIRST* LEGO League resources, or schools who would like to take a different focus within their DL plan, the following section identifies several standards which could be met through participating in *FIRST* LEGO League Explore.

Remember, in order for the DL plan to be achievable, a school should ideally only select one/two standard(s) in a given DL planning cycle.

	Teaching and Learning	
	Detail from DLF	**Guidance**
DOMAIN 1	**Domain 1:** Learner Outcomes **Standard:** Pupils enjoy their learning, are motivated to learn and expect to achieve as learners. **Statement:** Pupils use appropriate digital technologies to foster active engagement in attaining appropriate learning outcomes.	Through engagement with *FIRST* LEGO League Explore, pupils will use appropriate digital technologies (e.g. LEGO Education materials & digital devices etc.) to actively explore the 'challenge question' and create Team Models.
	Domain 1: Learner Outcomes **Standard:** Pupils enjoy their learning, are motivated to learn and expect to achieve as learners. **Statement:** Pupils use digital technologies to collect evidence and record progress.	Pupils will use digital devices and a portfolio tool to document the engineering design process while exploring the challenge question in UNEARTHED.
	Domain 1: Learner Outcomes **Standard:** Pupils demonstrate the knowledge, skills and understanding required by the primary curriculum **Statement:** Pupils can use a range of digital technologies to demonstrate the knowledge, skills and understanding required by the Primary School Curriculum.	Through engagement with the UNEARTHED challenge question, pupils will use a range of digital technologies (e.g. LEGO Education materials & digital devices etc.) to demonstrate knowledge, skills and understanding in the form of Team Models, Team Posters and other tasks included in UNEARTHED.
	Domain 1: Learner Outcomes **Standard:** Pupils demonstrate the knowledge, skills and understanding required by the primary curriculum **Statement:** Pupils use digital technologies effectively to develop their knowledge, skills and understanding in accordance with the content objectives, learning outcomes, skills and concepts of the Primary School Curriculum.	Pupils develop their knowledge, skills and understandings through engagement with the UNEARTHED challenge question; specifically through the Engineering Design Process, in designing and building Team Models and in preparing a Team Poster.
DOMAIN 2	**Domain 2:** Learner Experiences **Standard:** Pupils engage purposefully in meaningful learning activities **Statement:** Pupils use digital technologies for sourcing and exchanging information to develop understanding and support basic knowledge creation.	While engaging with the UNEARTHED challenge question and tasks, pupils use digital technologies for sourcing, exchanging of information to develop understanding and support the creation of their Team Model and Team Poster.
	Domain 2: Learner Experiences **Standard:** Pupils reflect on their progress as learners and develop a sense of ownership of and responsibility for their learning **Statement:** Pupils use digital technologies to collect evidence, record and reflect on their progress, and develop their competence as self-directed learners.	The UNEARTHED challenge question and focus on Engineering Design Process enable pupils to engage in self-directed learning activities which involve the collection, recording and reflection on their projects, including Team Models and Team Posters.

	Teaching & Learning	
	Detail from DLF	**Guidance**
DOMAIN 3	**Domain 3:** Teachers' Individual Practice **Standard:** The teacher has the requisite subject knowledge, pedagogical knowledge and classroom management skills **Statement:** Teachers design or adapt learning experiences that incorporate digital technologies and make learning activities relevant and meaningful to support pupils' learning.	Teachers adapt and differentiate the UNEARTHED learning activities which incorporate digital technologies (e.g. LEGO Education materials & digital devices etc.) to support pupils' learning.
	Domain 3: Teachers' Individual Practice **Standard:** The teacher selects and uses planning, preparation and assessment practices that progress pupils' learning **Statement:** Teachers use appropriate digital technologies to design complex, real-world problems and structure them in a way that incorporates key subject matter concepts.	Teachers adapt and use the UNEARTHED learning activities in order to provide pupils with complex, real-world problems which incorporate key subject matter concepts.
DOMAIN 4	**Domain 4:** Teachers' Collaborative Practice **Standard:** Teachers value and engage in professional development and professional collaboration **Statement:** Teachers engage in professional development and work with colleagues to help them select and align digital technologies with effective teaching strategies to expand learning opportunities for all pupils	Teachers engage with professional learning opportunities (e.g. DCU/Creative HUT/ Oide) in order to develop confidence and competence in making use of the LEGO SPIKE Essential or WeDo 2.0 and *FIRST* LEGO League resources to design learning opportunities for all pupils.
	Domain 4: Teachers' Collaborative Practice **Standard:** Teachers work together to devise learning opportunities for pupils across and beyond the curriculum **Statement:** Teachers participate in professional online communities to help them design learning opportunities for pupils across and beyond the curriculum.	Teachers engage with outside agencies (e.g. DCU/Creative HUT/Oide) in order to develop confidence and competence in making use of the LEGO SPIKE Essential or WeDo 2.0 and *FIRST* LEGO League resources to design learning opportunities for pupils across and beyond the curriculum.
	Domain 4: Teachers' Collaborative Practice **Standard:** Teachers contribute to building whole-staff capacity by sharing their expertise **Statement:** Teachers collaborate in determining how digital technologies can be used effectively for teaching, learning and assessment (TLA).	Teachers collaborate to discuss and determine how the UNEARTHED resources and equipment can be used effectively for teaching, learning and assessment.

Table 7 a. Connections between UNEARTHED and the DLF and SSE.

Leadership and Management		
Detail from DLF	**Guidance**	
Domain 1: Leading Learning and Teaching **Standard:** Promote a culture of improvement, collaboration, innovation and creativity in learning, teaching, and assessment **Statement:** The principal and other leaders in the school encourage teachers to use digital technologies to enhance their learning, teaching and assessment practices, and to share their practice.	School leaders actively encourage and support teachers in their use of UNEARTHED with pupils. Teachers are encouraged and facilitated to share their UNEARTHED practice with colleagues.	DOMAIN 1
Domain 1: Leading Learning and Teaching **Standard:** Manage the planning and implementation of the curriculum **Statements:** The principal and other leaders in the school plan for and implement a broad and balanced curriculum using digital technologies that offer new opportunities for learning. They are committed to ensuring that the school curriculum is implemented in a way that provides valuable learning experiences designed to exploit the potential of digital technologies.	School leaders plan to implement UNEARTHED in order to provide valuable learning experiences which both exploit the potential of digital technologies and facilitate a broad and balanced curriculum with new opportunities for thematic teaching.	
Domain 1: Leading Learning and Teaching **Standard:** Foster teacher professional development that enriches teachers' and pupils' learning **Statement:** The principal and other leaders in the school support teachers' continuing professional development to develop teacher competence in the use of digital technologies, to support high-quality teaching and learning.	Teachers are encouraged and supported to engage with professional development which supports their engagement with UNEARTHED.	
Domain 2: Managing the Organisation **Standard:** Manage the school's human, physical and financial resources so as to create and maintain a learning organisation **Statements:** The board of management ensures the provision and maintenance of digital teaching aids and equipment to a good standard. Physical learning spaces have been designed or adapted to harness and optimise the use of a range of digital technologies for learning.	All required digital technologies (e.g. LEGO Education materials & digital devices etc.) are available to the teacher and pupils. Considerations are made to the maintenance of this equipment. Considerations are made to the layout of the classroom/multi-purpose space to best facilitate the Engineering Design Process and engagement with the UNEARTHED learning activities.	DOMAIN 2

Leadership and Management		
Detail from DLF	**Guidance**	
Domain 3: Leading School Development **Standard:** Manage, lead and mediate change to respond to the evolving needs of the school and to changes in education **Statement:** The principal and other leaders in the school are informed by national policy and technological developments, and see their relevance to the school.	School leaders support and encourage teachers in use of UNEARTHED due to its clear alignment with policy and relevance to the school.	DOMAIN 3
Domain 4: Developing Leadership Capacity **Standard:** Empower staff to take on and carry out leadership roles **Statements:** The principal and other leaders in the school encourage teachers to take on leadership roles and to lead the use of digital technologies for learning, teaching and assessment, and are willing to distribute significant leadership responsibilities. They develop organisational structures to facilitate and encourage the sharing of practice and peer mentoring in the use of digital technologies for learning, teaching and assessment.	School leaders encourage teachers to participate in UNEARTHED. Teachers are then facilitated to share their experiences and expertise with colleagues in order to enable another teacher and class to participate in UNEARTHED.	DOMAIN 4

Table 7 b. Connections between UNEARTHED and the DLF and SSE.

The Seven Key Competencies of the new Primary Curriculum Framework

In order to support learners interacting with and engaging in the social world of their home, school and community, the Irish Primary Curriculum Framework includes seven 'key competencies' which are inextricably interconnected. These competencies were identified specifically in order to support and enable learners to develop a deep appreciation for the natural world and an understanding of how the world works. It is envisaged that this approach will enable learners to develop the essential knowledge, skills, concepts, dispositions, attitudes and values to adapt and deal with a range of situations, challenges and contexts in support of broader learning goals. These seven key competencies are presented in Figure 4.

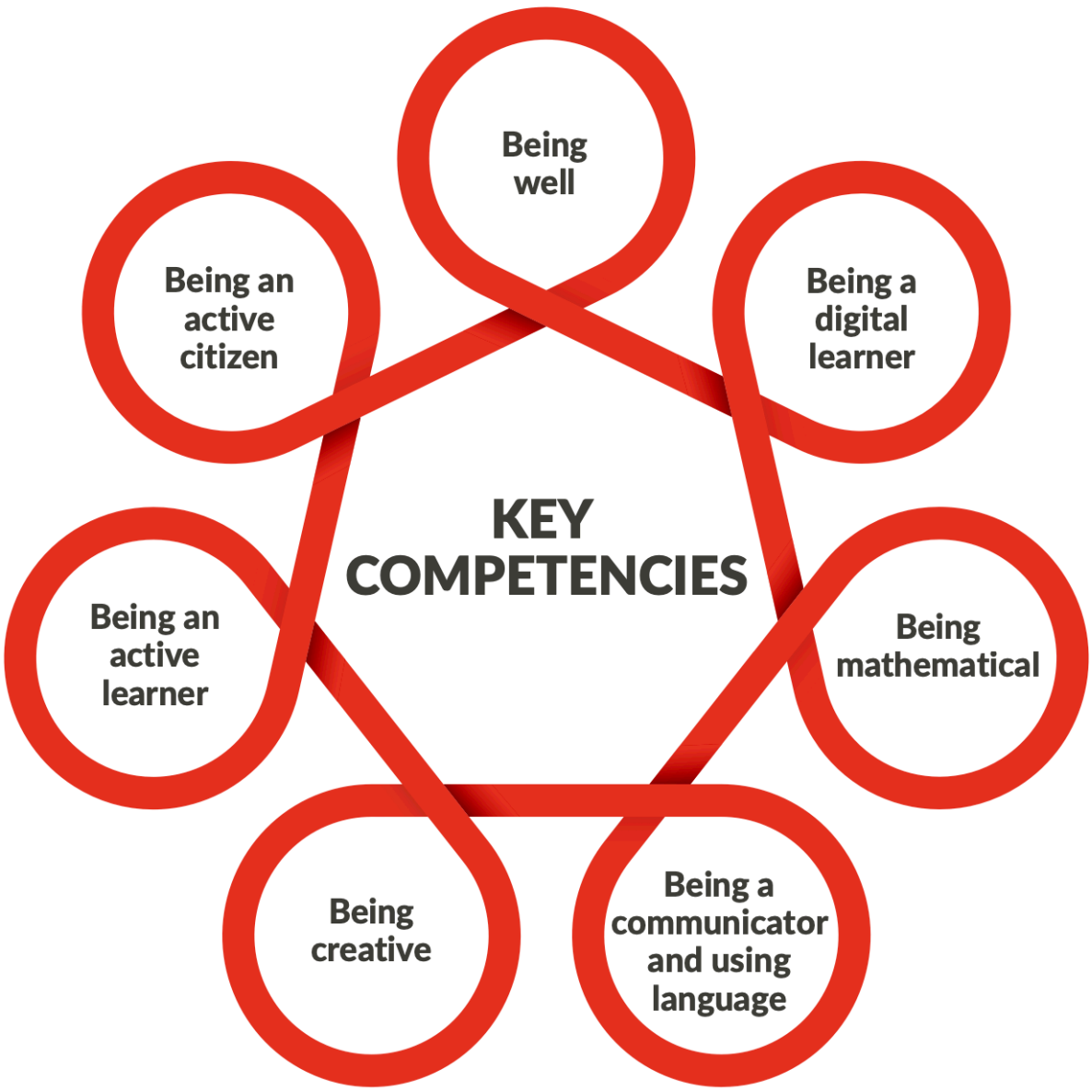


Figure 4. The Seven Key Competencies of the Primary Curriculum Framework.

This *FIRST* LEGO League Explore UNEARTHED Teacher Guide has been designed to support the development of all seven of the key competencies of the Primary Curriculum Framework in an integrated way as presented in Figure 5 and outlined below:

The '**Being an Active Citizen**' competency fosters within learners the knowledge, skills, concepts, attitudes, values and dispositions that motivate and empower them as citizens to take positive actions to live justly and sustainably. It enables learners to question, critique and understand what is happening in the world and how aspects of our lives can be improved. It places democratic practices at the centre of the learning process.

Through engaging in *FIRST* LEGO League Explore UNEARTHED, learners are facilitated in understanding the interconnectedness and interdependence of past and present societies, and the enduring impact of historical actions. *FIRST* LEGO League Explore UNEARTHED therefore encourages and enables learners to appreciate the importance of history, cultural heritage, and the role of archaeology in understanding human civilisation. They investigate the challenges related to preserving the past, exploring historical contexts, and proposing solutions for archaeological sites or the interpretation of historical evidence.

Learners are working collaboratively to identify and solve problems, and make decisions through democratic practices. The 'Being an Active Citizen' competency is embedded within *FIRST* LEGO League Explore UNEARTHED in that the challenge and associated sessions foster within learners the knowledge, skills, concepts, attitudes, values and dispositions that motivate and empower them as citizens with regard to respecting cultural heritage and the natural world.

The **'Being Creative'** competency focuses on recognising and nurturing learners' innate creativity, providing learners with opportunities for meaningful creative experiences through exploring and expressing ideas and reflecting on experiences.

FIRST LEGO League Explore UNEARTHED actively fosters learner creativity, encouraging them to be curious, open-minded, and imaginative. This encompasses attributes such as participating in and enjoying creative experiences relating to the theme, demonstrating curiosity, imagination, and innovation, as well as exploring alternative ways of communicating.

Throughout the learning activities and sessions of this challenge, learners are encouraged to share and challenge each other's ideas, reflect upon new learnings and their own experiences, and apply imaginative thinking to devise realistic solutions for real-world challenges. This could include creatively interpreting archaeological discoveries, designing innovative models that enable historical understanding, and finding new methods to present their findings about the past.

The '**Being a Digital Learner**' competency in the new Primary Curriculum Framework aims to support learners in becoming creative, confident, and critical users of digital technology.

Throughout *FIRST* LEGO League Explore UNEARTHED, learners will develop their knowledge, skills, concepts, attitudes, values, and dispositions through problem-solving, experimenting, and creating, using a wide range of digital technologies.

This could include a 'digital' approach to the mapping of archaeological sites, experimentation with virtual reconstructions of historical environments using augmented reality apps, coding LEGO models for robotic exploration or data collection, and using simple software/apps/websites for collaborative historical research. *FIRST* LEGO League Explore UNEARTHED develops learners' responsible, safe and ethical use of technology by embedding digital technologies in the learning process.

The '**Being Mathematical**' competency aims to aid learners in developing and applying mathematical thinking to solve a range of problems in everyday situations.

In order to participate effectively in today's world, learners need to be able to think and communicate quantitatively, to make sense of data, to have spatial awareness, and to recognise and understand patterns and sequences.

Being mathematical involves learners drawing upon a range of knowledge, skills, concepts, attitudes, values, and dispositions as they recognise and interpret real-world information presented mathematically.

Core attributes of the 'Being Mathematical' competency are naturally integrated throughout the sessions for *FIRST* LEGO League Explore UNEARTHED. Learners are challenged to make sense of real-world archaeological contexts using mathematics by measuring and mapping excavation sites, identifying patterns in historical artefacts, understanding chronological sequences, and interpreting information and data from their discoveries.

According to the new Primary Curriculum Framework, the '**Being a Communicator and using Language**' competency develops learners' understanding and enjoyment of interacting with others.

Communicating and using language means being able to understand, interpret, and use different forms of communication, including gesture, expression, spoken language, printed text, broadcast media, and digital media.

FIRST LEGO League Explore UNEARTHED involves learners engaging purposefully with various text types, such as historical maps, archaeological reports, and digital records and resources. Here, learners are encouraged to share and reflect upon their experiences, thoughts, ideas, and feelings about their historical discoveries in a variety of ways. They also learn how to observe, listen to, interpret, and show respect for diverse perspectives on the past.

The '**Being Well**' competency fosters self-awareness, promotes the importance of learners seeing themselves as capable & resourceful.

It helps children become positive and engaged in their learning and realise their own uniqueness and potential.

It supports healthy relationships with themselves, their peers, their family, and the wider world.

The Core Values of *FIRST* LEGO League Explore UNEARTHED facilitate learners in being self-aware and resilient, acting responsibly and showing care towards themselves and others, particularly in their approach to historical discoveries and cultural heritage. They are encouraged to be persistent and flexible in navigating challenges during their investigations. The investigative approach of any challenge encountered is conducive to fostering cooperation, positive team relationships, and self-improvement.

Finally, the '**Being an Active Learner**' competency is aimed at aiding learners to develop themselves as learners, individually and in collaboration with others.

It promotes the development of the knowledge, skills, concepts, attitudes, values, and dispositions needed for being an active and continuous learner.

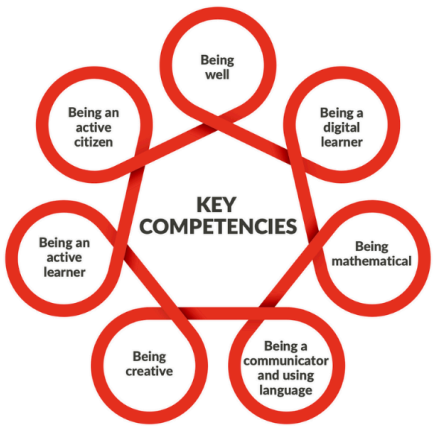
The structure of *FIRST* LEGO League Explore UNEARTHED facilitates learners in being active during sessions, facilitating them in learning how to communicate, set personal and collaborative learning goals related to their historical enquiries, and navigate complex situations inherent in discovery through practical, hands-on engagement. They interpret their findings by physically designing, building, and coding models. The real-world context of these tangible learning activities enables learners to make sense of past civilisations and their connection to the wider world.

Through developing this competency, learners also learn to reflect on their learning process, an important feature of *FIRST* LEGO League Explore UNEARTHED. Learning with and about others also enables children to develop empathy for diverse historical perspectives and cultures.

Being an active citizen
- Developing an understanding of, and acting on, the rights and responsibilities of myself and others
- Experiencing learning through democratic practices
- Recognising injustice and inequality and ways to take action
- Developing capacity to make choices and take action in favour of a sustainable future

Being creative
- Participating in and enjoying creative and cultural experiences
- Being curious
- Being imaginative
- Being innovative
- Using creative processes
- Exploring alternative ways of communicating

Being a digital learner
- Communicating and collaborating with others through digital technology
- Accessing, analysing, and managing content using digital technology
- Enabling content creation, problem-solving, and creativity using digital technology
- Interacting ethically, critically, and responsibly with digital technology



Being mathematical
- Understanding the usefulness and beauty of mathematics
- Thinking and communicating mathematically
- Solving problems and making sense of the world using mathematics
- Observing, estimating, predicting, and calculating
- Recognising relationships, trends, connections, and patterns
- Interpreting, processing, and evaluating information and data

Being an active learner
- Playing, learning, and working, both individually and with others
- Developing metacognitive skills and strategies
- Fostering and maintaining positive relationships
- Dealing with conflict
- Respecting difference
- Learning about others
- Caring for and showing empathy towards others

Being a communicator and using language
- Developing understanding and enjoyment of words and language
- Developing expressive language
- Reading for enjoyment and with critical understanding
- Writing for different purposes and for a variety of audiences
- Exploring and creating a variety of texts

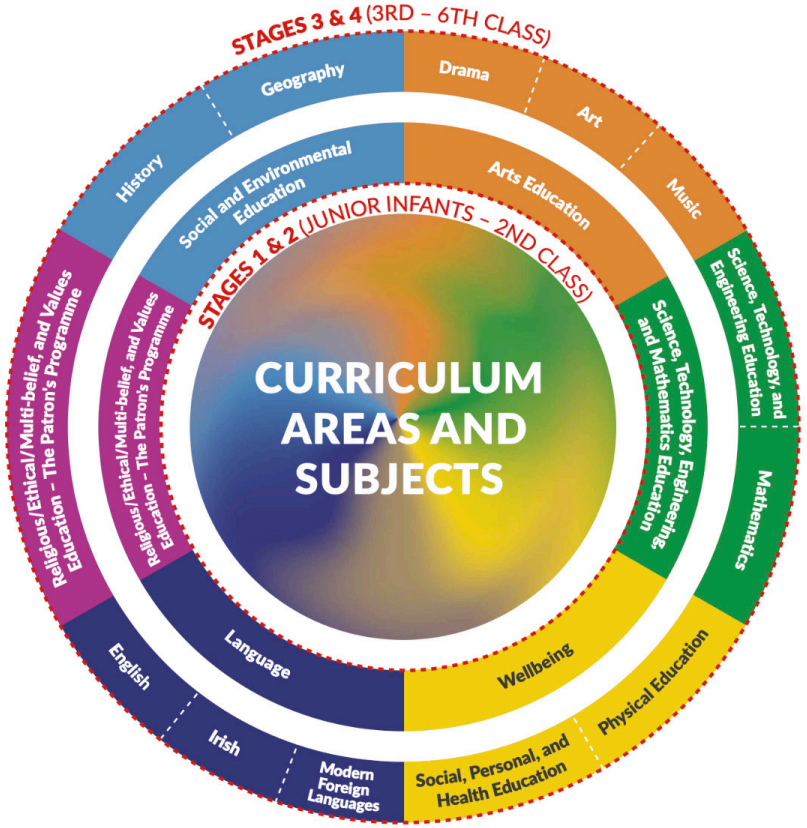
Being well
- Showing awareness of how to make good choices in relation to wellbeing
- Participating with growing confidence and skill in physical activity
- Being self-aware and resilient
- Acting responsibly and showing care towards self and others
- Being spiritual and having a sense of purpose and meaning
- Being persistent and flexible in solving problems
- Being able to assess risk and respond

Figure 5. The Seven Key Competencies of the new Primary Curriculum Framework.

Curriculum areas and subjects of the Primary Curriculum

The curriculum is presented in five broad curriculum areas:

1. Language
2. Science, Technology, Engineering, and Mathematics (STEM) Education
3. Wellbeing
4. Arts Education
5. Social and Environmental Education.



	Language	Science, Technology, Engineering and Mathematics Education	Wellbeing	Arts Education	Social and Environmental Education	Religious / Ethical / Multi-belief, and Values Education - The Patron's Programme
Stages 1 and 2 Junior Infants - 2nd Class	(Irish and English)					
Stages 3 and 4 3rd - 6th Class	Irish English Modern Foreign Languages	Science, Technology and Engineering Mathematics	Social Personal and Health Education Physical Education	Drama Art Music	History Geography	

Concepts and Approaches of Computational Thinking and Coding

As discussed by Butler & Leahy (2022) the concept of computational thinking originates in the work of Seymour Papert (1980; 1991) when he introduced the 'idea of the computer being the children's machine that would allow them to develop procedural thinking through programming' (Dede, Mishra & Voogt, 2013, p. 2), enabling them to combine critical thinking with computing power as the foundation for innovating solutions to real-life problems (Tabesh, 2017). In the Irish context the NCCA has been investigating possible approaches to the introduction and development of computational thinking in primary schools (NCCA, 2016; 2017, Millwood et al., 2018). This can be seen in the recently published Draft Science, Technology and Engineering Education Specification (NCCA, 2024).

Computational thinking and coding are a key element of UNEARTHED sessions. At the heart of these sessions is a process of testing and learning, whereby learners work logically by changing and testing one variable (or code block) at a time, and documenting this. In so doing, learners can reflect upon the process and debug (or fix) the code that may not be having the intended result. This process can be scaffolded by probing questions from the teacher. The intention is to help learners to think about the problem differently; *"I wonder if…", "how might you…", "have you considered…"*
Examples of guiding questions are provided in each session.

While engaging in coding and computational thinking it is important to assist learners in using the correct **terminology** to describe the concepts and approaches they are developing. Table 8 below details five concepts and approaches of computational thinking and coding which are developed across the *FIRST* LEGO League Explore UNEARTHED sessions.

Concept or Approach	Explanation	Example of the concept or approach in use
Algorithms	Making steps, rules, and/or instructions	Creating the code or programme within the LEGO App (SPIKE Essential or WeDo 2.0). Creating algorithms. Writing instructions.
Debugging	Finding and fixing 'bugs' in a logical and methodical manner	Iteratively making small changes to the code or programme and testing the outcome in order to overcome a problem. Creating tests, evaluating programme outputs and statements.
Decomposition	Breaking down into parts	Organising information, creating representations of relationships and systems in diagrams e.g. labelling the parts of a plant, creating a mindmap on a topic.
Logic	Predicting and analysing	Evaluating for correctness.
Tinkering	Trying things out	Creating systems and playing with 'variables'. Experimenting and playing with the code or program.

Table 8. Five Concepts and Approaches of Computational Thinking developed across the UNEARTHED sessions.

Other concepts and approaches of computational thinking and coding include:

- Pattern recognition - looking for similarities among and within problems
- Abstraction - focusing on the important information only, ignoring irrelevant detail
- Evaluation - making judgements
- Creating - planning, making and evaluating things
- Persevering - never giving up, being determined, resilient and tenacious
- Collaborating - working with others to ensure the best results

(Adapted from Millwood et al., 2018)

The Barefoot Computing curriculum (**www.barefootcomputing.org**), includes a useful graphic which summarises the key concepts and approaches of computational thinking and coding.

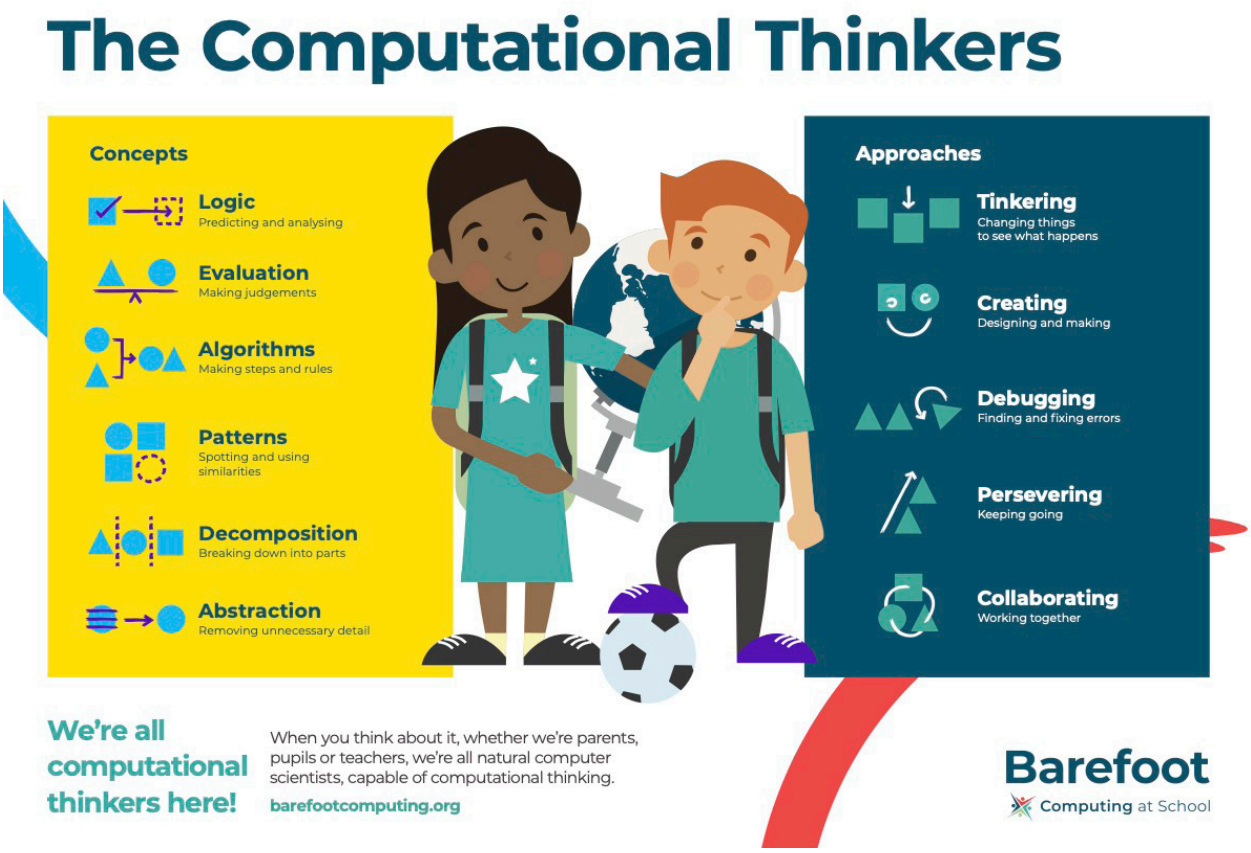


Figure 6. The Computational Thinker: Concepts and Approaches

What Does the Team Need?

LEGO® Education Set

The LEGO® Education SPIKE™ Essential set, with its motor, sensor, and hub, is the set referenced throughout the sessions in this guide.

Note: Other LEGO Education sets are also allowed and can be used to complete the activities, although specific instructions may vary.

Electronic Device

Your team will need at least one compatible Bluetooth-enabled device like a laptop, tablet, or computer to run the LEGO® Education SPIKE™ App.

Scan the QR code to view system requirements and download the SPIKE App.

UNEARTHED™ Explore Set

Each team will need one Explore Set, which includes the Explore model, mat, building instructions, and prototyping pieces.
Leave the LEGO pieces in their numbered bags until the team reaches the sessions that need them.

Team Poster Supplies

Each team will need a poster board and various art supplies in Session 10 to complete their team poster. These supplies can also be used in earlier sessions to record team progress.

Engineering Notebooks

Each team member needs their own *Engineering Notebook* to record their ideas and progress. The *Engineering Notebook* contains session tasks, jobs and technology, and relevant information to guide them through the sessions.

	Radar	Excavation Site	Excavation Site Hub and Motor Pieces	Prototyping Pieces
Book	1	2	2	-
Bag	1	2-5	6	7-12
				

Organisation of team

Learners will work together in teams of four to six using elements from a LEGO Education set (SPIKE Essential or WeDo 2.0) and an UNEARTHED Explore Set. They will collaborate and communicate to build, learn, and play together. Please refer to Figure 7 below for details of Team Roles. Learners should remain in the same teams for all sessions.

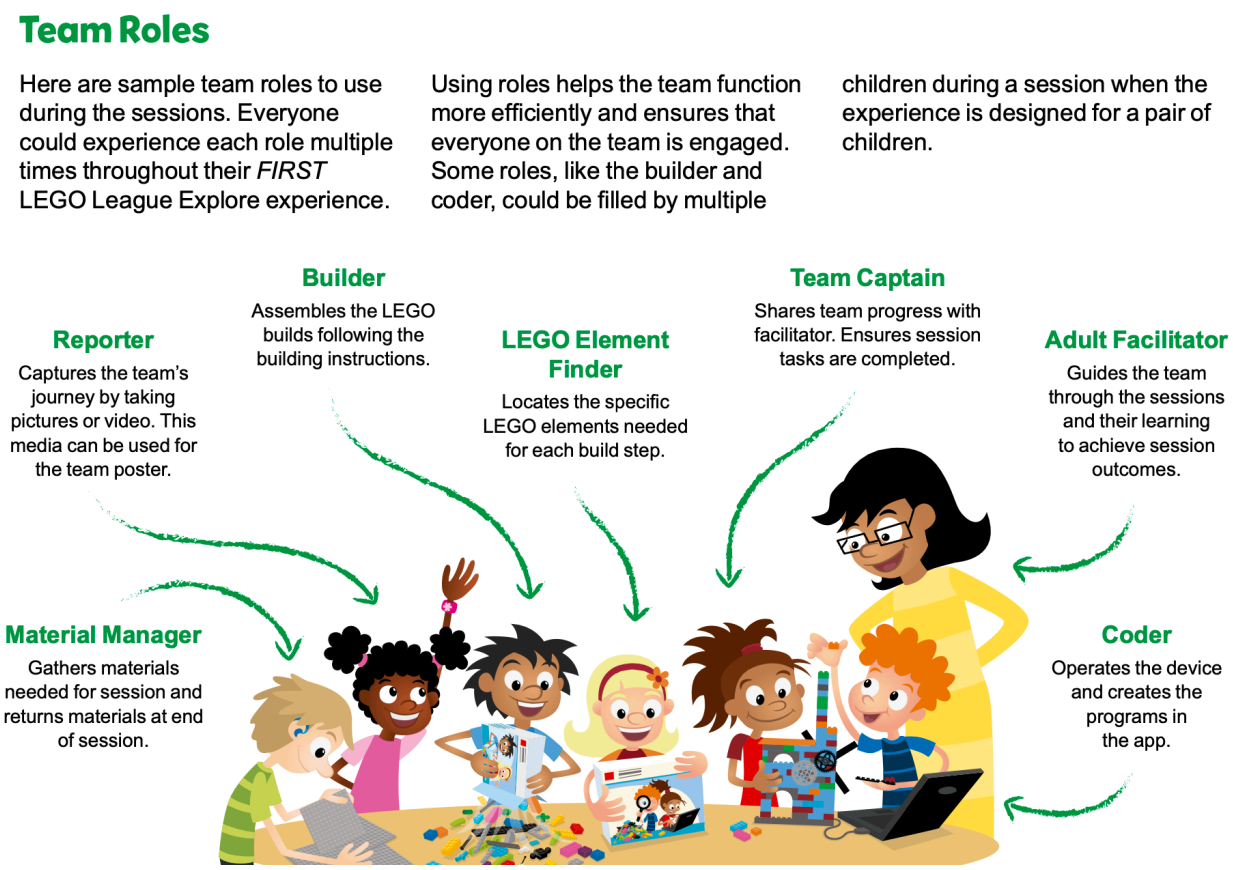


Figure 7. Team Roles

Engaging with experts

There are opportunities to engage with experts over the course of the season through school visits, Zoom etc.

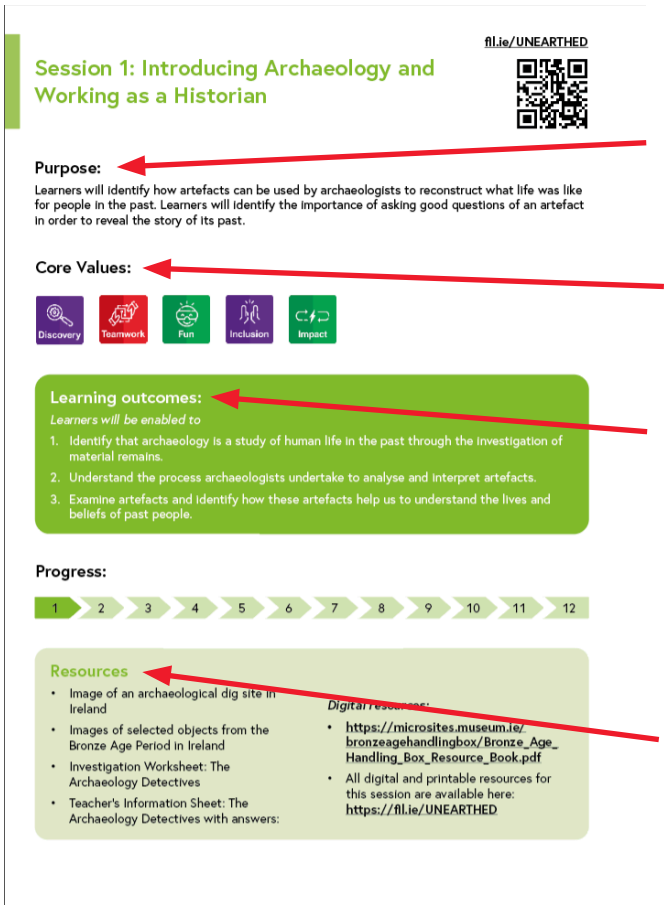
For example: **https://www.heritageinschools.ie/heritage-expert/search-for-an-expert?setting=inperson&c=&q=#filters**

Managing equipment

Here are some recommendations on managing the *FIRST* LEGO League Explore UNEARTHED materials:

Before	Ongoing	After
If the sets have been previously used - each team checks that they are not missing any elements before completing their first session. This can be done by comparing the contents against the cover insert. Designate one LEGO Education Set (SPIKE Essential or WeDo 2.0) and UNEARTHED Explore Set per team. Where possible, label these to avoid confusion or swapping of sets.	A large lunchbox per team could be used to store the prototyping pieces between sessions. Any LEGO elements found on the floor could be placed in a box on the teacher's desk. Teams missing any elements can then check this box. Move all school bags and personal belongings of learners to the back of the room while completing sessions involving the LEGO materials. This is to avoid any elements accidentally falling into bags or pockets. After building the Explore models, store the printed books containing building instructions for future use.	After the Showcase Event: Each team checks that their LEGO Education Set (SPIKE Essential or WeDo 2.0) is not missing any elements. Disassemble the UNEARTHED models and place the pieces (and printed building instructions) into zip lock bags for future use. Prototyping pieces can be resealed into storage containers.

Session overview



fll.ie/UNEARTHED

Session 1: Introducing Archaeology and Working as a Historian

Purpose:

Learners will identify how artefacts can be used by archaeologists to reconstruct what life was like for people in the past. Learners will identify the importance of asking good questions of an artefact in order to reveal the story of its past.

Core Values:

Discovery | Teamwork | Fun | Inclusion | Impact

Learning outcomes:

Learners will be enabled to

1. Identify that archaeology is a study of human life in the past through the investigation of material remains.
2. Understand the process archaeologists undertake to analyse and interpret artefacts.
3. Examine artefacts and identify how these artefacts help us to understand the lives and beliefs of past people.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

- Image of an archaeological dig site in Ireland
- Images of selected objects from the Bronze Age Period in Ireland
- Investigation Worksheet: The Archaeology Detectives
- Teacher's Information Sheet: The Archaeology Detectives with answers:

Digital resources:

- https://microsites.museum.ie/bronzeagehandlingbox/Bronze_Age_Handling_Box_Resource_Book.pdf
- All digital and printable resources for this session are available here: https://fll.ie/UNEARTHED

Each session follows the same format.

Purpose: The purpose of each session is provided.

Core Values: Each session will focus on a specific Core Values.

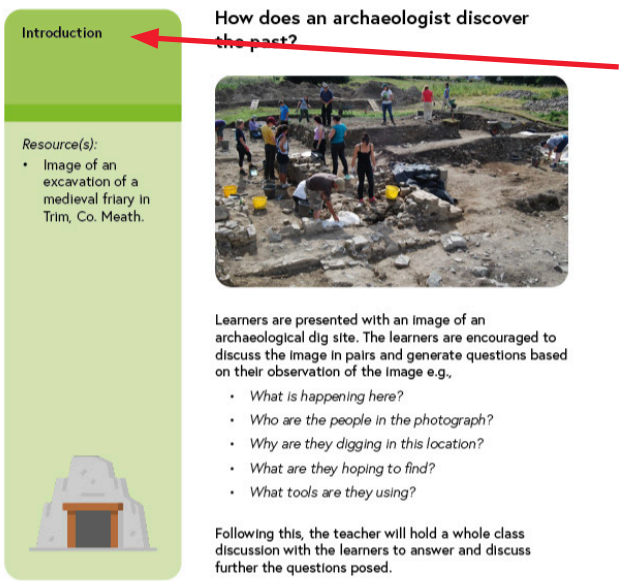
Learning outcomes: Learning outcomes for each session are provided. These are indicative learning outcomes and should be adapted to meet the needs of your learners.

Resources: This includes Team Resources, Digital Resources and any Printable Resources. All digital resources can be accessed via the link provided

Curriculum content

Subject	Strands	Strand units/ elements	Skills and concepts
History	Early peoples and ancient societies	Bronze Age peoples	Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating)
Science	Material	Properties and characteristics of materials	Working as a Scientist Scientific Investigation Skills (Questioning, Hypothesising, Predicting, Observing, Analysing, Recording, Communicating)

Curriculum content: This includes reference to (i) strand, (ii) strand units/ elements and (iii) skills and concepts.



Introduction

Resource(s):

- Image of an excavation of a medieval friary in Trim, Co. Meath.

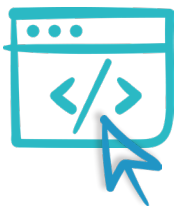
How does an archaeologist discover the past?

Learners are presented with an image of an archaeological dig site. The learners are encouraged to discuss the image in pairs and generate questions based on their observation of the image e.g.,

- *What is happening here?*
- *Who are the people in the photograph?*
- *Why are they digging in this location?*
- *What are they hoping to find?*
- *What tools are they using?*

Following this, the teacher will hold a whole class discussion with the learners to answer and discuss further the questions posed.

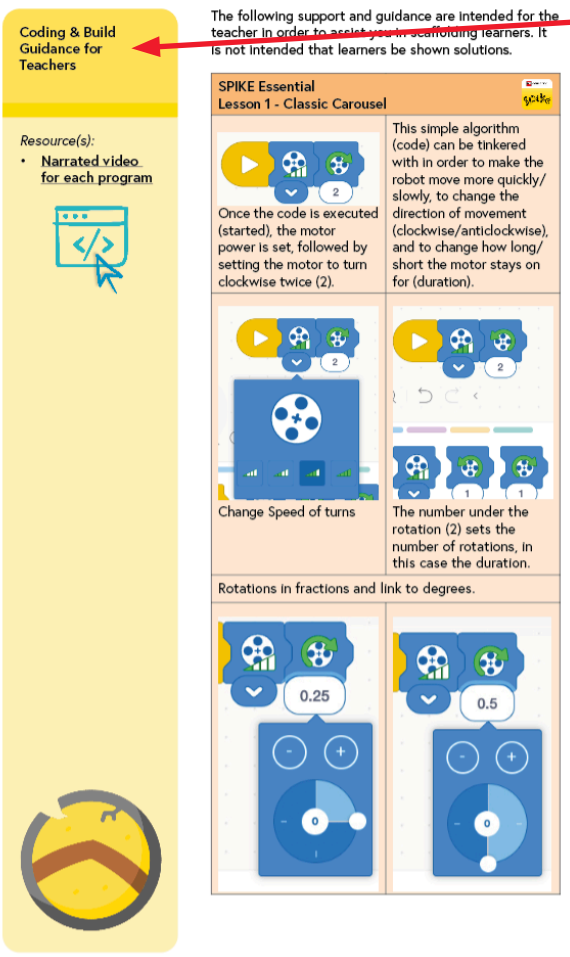
Session introduction and development: Learning activities, resources, guiding questions and suggested time frame for each key activity provided. Digital resources are also linked throughout this section and will also be available online at **fll.ie/unearthed**



Icon to indicate visiting a website

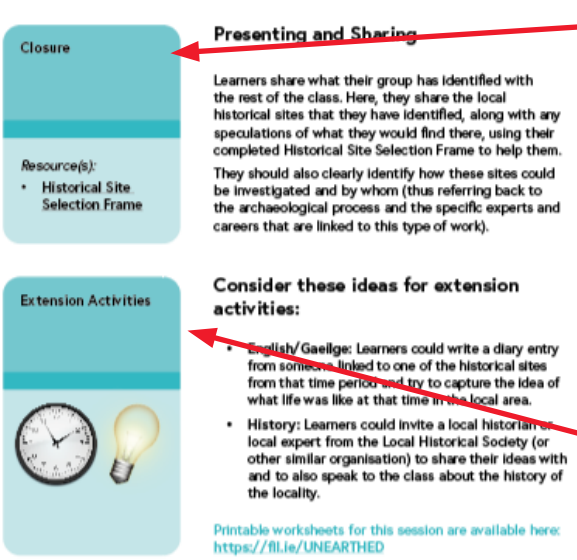
Resource icons:

Resources that require visiting a website or watching a video will have icons under them in the resource section to indicate that a link must be clicked on to access the resource.



Coding and build:

Details of the build and code are provided. Teacher Guiding Questions and Important Points to Note will support the learners' development of computational thinking and coding skills.



Closure:

This is an important feature of every session as it allows learners time to reflect upon their new learnings and understandings. The portfolio or learning diary being kept will be invaluable when learners begin to design their Team Models. Further details and teacher guidance is provided in the next section.

Extension activities:

These highlight activities which develop the learners' skills and knowledge in a specific subject area within the context of *FIRST* LEGO League Explore UNEARTHED. These are optional but recommended extension activities.

Session closures: document, share, reflect

Every session ends with an opportunity for learners to document, share, and tidy up. This is a pivotal part of the Engineering Design Process as it enables learners to reflect and think about what they have learned through the session, in order to build upon this in future sessions.

These session closures have been designed to support learners as they work on their Team Model and Team Poster in the final sessions. By engaging fully with the session closures learners will have completed a lot of reflection in advance of the final sessions, which will make these more effective. For example, the builds and coding explored in earlier sessions should be documented and reflected upon so that learners can iterate and develop upon these for their Team Model.

Below is a general overview of what is intended in these session closures. Session-specific details are provided in the session guides that follow in Part B of this guide.

Document

It is recommended that learners use digital devices and/or portfolio tools to document the **Engineering Design Process** while exploring the sessions in *FIRST* LEGO League Explore.

The process of documenting their progress and ideas can support the learners in **learning to be learners**, and aids in retention of skills and knowledge.

The use of digital devices and digital portfolio tools is also linked to the **Digital Learning Framework** and the Key Competency of **Being a Digital Learner** in the Primary Curriculum Framework.

Share

Teams are invited to share what they did during the session, including demonstrating their model and explaining how their code works. The focus of these sharing sessions is to enable learners to explain their thinking and use the correct vocabulary in their explanations. In the initial sessions the teacher may need to model the types of questions that could be asked. As the class progresses through the sessions, learners from other teams could be called upon to pose questions.

The sharing could be organised in many ways, two recommendations include:

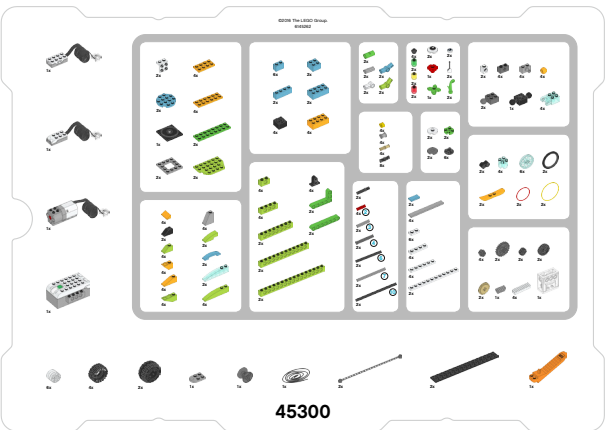
- The team who are sharing bring their LEGO model and digital device to the front of the class - option to connect to the digital display/ Interactive Whiteboard.
- The presenting team stays at their work area and all other learners physically move to this work station for the duration of the sharing.

Tidy up

It is recommended that each team be assigned a specific LEGO Education Set (SPIKE Essential or WeDo 2.0) for the duration of *FIRST* LEGO League Explore.

It is important to build up an expectation of learners that each team deconstructs and replaces all parts into the correct section of their LEGO Education Set at the end of each session, if appropriate. This will facilitate the following sessions to run smoothly, and avoid the loss of required pieces.

As illustrated in the picture, the LEGO Education Materials (SPIKE Essential or WeDo 2.0) have specific sections for different categories of pieces, with these pictured on the stickers and on the cover insert.



WeDo 2.0 Element Overview

SPIKE Essential Element Overview

Don't forget to share your progress with us where possible through:

Instagram: *@creativehut.ie, @dcu_joe, @dublincityuniversity*

And use the Hashtag: *#FLLIRE, #UNEARTHED*

Further help and support to schools

Help and support is available to teachers and schools. **Oide** and **Oide Technology in Education** are available to provide a range of supports to teachers and schools, including training, technical support, and ongoing sustained school support. Where available, sustained support is recommended as it provides for ongoing training and support to teachers engaged in *FIRST* LEGO League Explore.

Oide Sustained School Support is a deeper form of teacher professional learning aimed at building internal capacity and enabling schools to drive and embed change as independent communities of learners. The support is provided over a period of time, as part of a deliberately planned process, involving the school and teachers working towards clear and agreed-upon goals. In this context, our advisors will support teachers to collaboratively reflect, identify strengths and needs before deciding on the best way forward for your school.

(PDST, 2021)

Visit **oide.ie** for further information, and to request school support.

Help and support is also available from your local **Education Centre**. This support can include training sessions, cluster groups of schools and teachers, and the loan of equipment and devices. Visit their website for further information, including details of upcoming training events.

LEGO Education Support: For replacement parts, additional kits, workshops and teacher CPD visit **creative-hut.ie**.

Creative Hut

FIRST LEGO LEAGUE EXPLORE

UNEARTHED

Start of Sessions

For the digital version of this guide visit:
fll.ie/UNEARTHED

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DCU
Ollscoil Chathair Bhaile Átha Cliath
Dublin City University

Taighde Éireann Research Ireland

Session Overview

Session 1: Introducing Archaeology and Working as a Historian

Learners will identify how artefacts can be used by archaeologists to reconstruct what life was like for people in the past. Learners will identify the importance of asking good questions of an artefact in order to reveal the story of its past.

Page: 38

Session 2: Digging up the Past

Learners will undertake a small-scale excavation which enables them to practice excavation skills, identify the importance of stratigraphy (recognising different layers of soil), and to understand how artefacts are related to each other and their environment.

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Session 3: Understanding the Archaeological Process

Learners will develop a deep understanding of the archaeological process and become familiar with some of the technology and tools they use by focusing on one of the most common historical features of the Irish landscape; ringforts (or fairy forts) and, in particular, the Rathgurreen Ringfort in Maree, Co. Galway which was excavated in 2025.

Page: 54

Session 4: Identifying Local Historical Sites

Learners will use current and historic maps, aerial photographs, and digital mapping to identify some historical sites worthy of archaeological investigation in their locality.

Page: 64

Session 5: STEM in the Past

Learners will explore how science, technology, engineering, and mathematics were used in the past to build Newgrange. Learners will engage in practical hand-on investigations to illustrate how mathematical and scientific understanding supported the construction of Newgrange.

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Session 6: Dig Site Tools

Learners will explore the tools used on a dig site and start to develop their understanding of computational thinking and coding.

Build: Cooling Fan OR Classic Carousel

Page: 76

Session 7: How Archaeologists use Sensors

Learners will explore how archaeologists use sensors, and develop understandings of how sensors work through building and coding a LEGO robot.

Build 1: Spy Robot OR Animal Alarm

Page: 86

Session 8: How Archaeologists handle and move artefacts

Learners will be introduced to how archaeologists handle and move artefacts at excavation sites using vehicles.

Build: Milo the Science Rover OR Arctic Ride

Page: 96

Session 9: Archaeological Careers

Learners will explore archaeology careers and build a radar model which uses sensors and outputs.

Build: Build the Radar model including a sensor and hub. Optional - the excavation site model

Page: 108

Session 10: Team Model and Poster

Learners will work in teams to create their Team Model and Poster which tells a story of the past, sharing what they have learned about the work of historians and demonstrating an understanding of the archaeological process.
Time: 3 hours +

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Session 11: Let's share - preparation for Showcase and Showcase Event

Learners will prepare to share their UNEARTHED Team Model and Poster at a Showcase Event.

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Session 12: Let's reflect

Learners will reflect upon their Team Model and Poster, their appreciation for the work of historians, their understanding of the archaeological process and their knowledge of life in the past.

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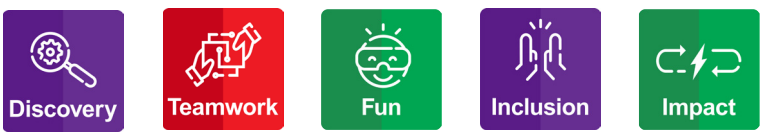
Session 1: Introducing Archaeology and Working as a Historian

Purpose:

Learners will identify how artefacts can be used by archaeologists to reconstruct what life was like for people in the past. Learners will identify the importance of asking good questions of an artefact in order to reveal the story of its past.

Core Values:



Learning outcomes:

Learners will be enabled to

1. Identify that archaeology is a study of human life in the past through the investigation of material remains.
2. Understand the process archaeologists undertake to analyse and interpret artefacts.
3. Examine artefacts and identify how these artefacts help us to understand the lives and beliefs of past people.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

- Image of an archaeological dig site in Ireland
- Images of selected objects from the Bronze Age Period in Ireland
- Investigation Worksheet: The Archaeology Detectives
- Teacher's Information Sheet: The Archaeology Detectives with answers

Digital resources:

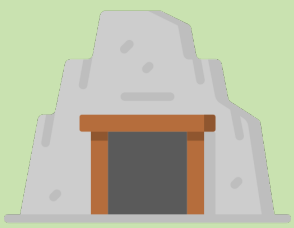
- **https://microsites.museum.ie/bronzeagehandlingbox/Bronze_Age_Handling_Box_Resource_Book.pdf**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
History	Early peoples and ancient societies	Bronze Age peoples	Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating)
Science	Material	Properties and characteristics of materials	Working as a Scientist Scientific Investigation Skills (Questioning, Hypothesising, Predicting, Observing, Analysing, Recording, Communicating)

Introduction

Resource(s):

- Image of an excavation of a medieval friary in Trim, Co. Meath.



How does an archaeologist discover the past?

Learners are presented with an image of an archaeological dig site. The learners are encouraged to discuss the image in pairs and generate questions based on their observation of the image e.g.,

- *What is happening here?*
- *Who are the people in the photograph?*
- *Why are they digging in this location?*
- *What are they hoping to find?*
- *What tools are they using?*

Following this, the teacher will hold a whole class discussion with the learners to answer and discuss further the questions posed.

Introduction

Archaeologists carefully study artefacts and solve real-life puzzles to uncover the stories of people from long ago. Archaeologists do lots of different jobs to help people learn about the past. They may do research, excavate or dig up treasures from underground, study in a lab, or manage collections of ancient artefacts.

The teacher will then explain to the learners what an archaeologist is. They will identify the methods used by archaeologists to discover what life was like in the past by excavating sites of historical significance in order to find material evidence of what life was like here in this place in the past.

Following on from this discussion, the teacher will inform the learners that they are going to undertake their own archaeological dig, examining a number of artefacts that reveal what life might have been like for people at some point in the past.

Development

What can the artefacts that you find reveal to us about people in the past?

The teacher provides the learners with the following scenario:

Scenario: The Archaeology Detectives

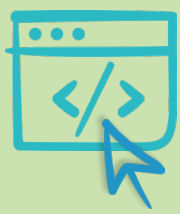
From the careful examination of aerial photographs and the use of LiDAR (Light Detection and Ranging) a site of potential hugely historical significance has been identified in close proximity to your school. There is huge excitement as to what this site might reveal about life here in the past. You have been employed as part of a team of young archaeologists to investigate and undertake an archaeological dig of this site.

From undertaking this dig the following artefacts were discovered.

Development

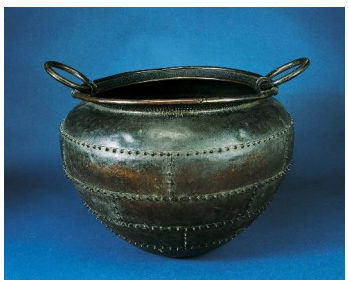
Resource(s):

- Images of selected objects from the Bronze Age Period in Ireland
- **Investigation Worksheet:** The Archaeology Detectives
- **Teacher's Information Sheet:** The Archaeology Detectives



Item A:

Item B:



Item C:

Item D:

Item E:

Item F:

Item G:

To encourage the learners to work like archaeologists, it is important for the teacher to model beforehand to the learners how to analyse an object from the past and to demonstrate how an archaeologist might draw inferences and deductions based on their analysis of the object. The teacher might take one of the objects and model asking questions of the object such as:

- *What do you think the object was used for?*
- *How was it used?*
- *By whom was it used?*
- *When do you think it was used and where might it have been used?*

Development

The teacher should also look to incorporate questions that develop learners' inductive reasoning. For example, asking questions such as:

- *What does this object tell us about the person, people or society who used it?*
- *What does this object tell us about life at the time it was used?*
- *Do we still use these objects today? Have these objects changed? If they have changed, how have they changed and why?*

Once the teacher has modelled to the learners how an archaeologist might set about investigating an artefact from the past through the use of questions, the learners are then encouraged to investigate the rest of the artefacts within their groups using this approach and completing the investigation worksheet.

At this point the teacher provides the learners with laminated images of each of the artefacts found on the archaeological dig. In groups of four, the learners investigate each of the discovered artefacts and record their findings on the investigation worksheet provided.

As the learners work with their artefacts, the teacher should go from group to group to guide and support the learners' investigations. The Teacher's Information Sheet provides detailed explanations and interpretations for each artefact.

For example, as the learners examine the axehead the teacher could support the learners' investigation by asking them to consider:

- *How well does the design of the object meet the requirements of the job it was designed to do?*

If the learners are examining a decorative object, the teacher might ask the learners to consider:

- *What can we learn from the design and decorations about what that society valued?*

The teacher should not reveal at this point what time period the objects date back to.

Closure

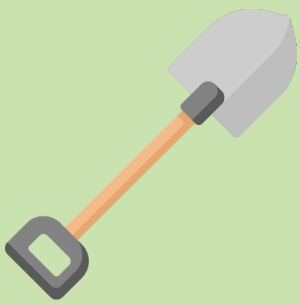
Presenting the findings of your Archaeological Dig:

Once the learners have completed their investigation sheets and drawn up their conclusions the teacher should allow sufficient time for the groups to discuss and present their evidence-based findings.

Once the learners have presented their evidence-based findings, the teacher can further the discussion by drawing upon and sharing with the learners the information provided regarding each of the objects in the Teacher's Information Sheet. The learners can see how accurate their own findings were compared to conclusions drawn by archaeologists who have examined these objects.

The teacher facilitates a cognitive closure on what the learners have learned pertaining to their investigation of the artefacts and from working as archaeologists in the classroom.

Extension Activities



Consider these ideas for extension activities:

- **History:** For further activities and related tasks pertaining to working as an archaeologist and investigating The Bronze Age Period visit the **National Museum of Ireland website** page.
- Through each of the Education Centres around Ireland, schools can gain free access to the Bronze Age Handling Box which contains museum quality replica objects based on archaeological artefacts found at the National Museum of Ireland. This handling box provides learners with examples of raw materials used by people during the Bronze Age as well as additional classroom resources and a booklet of teaching guidelines.
- Learn more about archaeology and the work of archaeologists by accessing some of the following digital resources:
- **Encyclopaedia Britannica**
- **National Park Service**
- **American Museum of Natural History**
- **The Heritage Council**

All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Session 2: Digging up the Past

Purpose:

To provide learners with a hands-on opportunity to undertake a small-scale excavation which enables them to practice excavation skills, identify the importance of stratigraphy (recognising different layers of soil), and to understand how artefacts are related to each other and their environment.

Core Values:

Discovery | Teamwork | Fun | Inclusion | Impact

Learning outcomes:

Learners will be enabled to

1. Recognise the importance of context in archaeology.
2. Identify simple excavation techniques e.g. learn how archaeologists carefully remove layers of soil to reveal hidden artefacts.
3. Develop their skills of observation, analysis and interpretation of artefacts.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

- **Classroom archaeological dig tasksheet**
- Plastic containers for the dig boxes
- Newspapers or plastic sheeting
- Small plastic bags to hold the artefacts discovered
- Artefact tags and labels
- Containers to place the excavated soil into
- Digging tools (e.g. small trowel, spoon, hand spade, brushes, toothbrush)
- Water
- Basin for washing artefacts
- Sieve (optional)
- String, pencil, eraser and ruler
- An object report form
- Objects for top layer of soil: (e.g. small kitchen utensils, old coins, small toys, buttons, pen, small empty tins and packaging, old pieces of clothing, match boxes, soap containers, small trinkets, rosary beads and religious medals).
- Objects for middle layer of soil: (e.g. Viking replica pieces such as an old Viking comb, rune stones, Viking chess pieces known as Hnefetafl, jewellery, coins, Viking drinking horn, pieces of weaponry)
- Objects for bottom layer of soil: (e.g. replica pieces from the Stone Age in Ireland such as stone axes, saddle quern, flint tools, pottery, javelin heads, scrapers, bone points, pieces of personal ornaments)

Digital resources:

- Website: The **LETHE (e)learning the invisible history of Europe** project website.
- Object Report Form Link: **Object report form** from the **LETHE (e) learning the invisible history of Europe** project website.
- Video: **Video** for teachers showing how to make and use a dig box in the primary classroom (5:08 - 9:20 of the video).
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
History	Early peoples and ancient societies	The Stone Age The Vikings	Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating)
Science	Material	Properties and characteristics of materials	Working as a Scientist Scientific Investigation Skills (Questioning, Hypothesising, Predicting, Observing, Analysing, Recording, Communicating)
Geography	Natural Environments	Rocks and Soils	Mapping Skills & Sense of Space. Geographical Investigation Skills: questioning, hypothesising, observing, recording and communicating
Mathematics	Shape & Space	Spatial Awareness and Location	Record directional instructions and location

Preparation

Prior to the session, the teacher will need to create classroom dig boxes. To create a dig box, the teacher will need a sturdy, clear plastic container, various soil types and a number of small artefacts from different periods of Irish history.

This **video** for teachers explains how to make and use a dig box in the primary classroom (5:08 - 9:20 of the video).

The following steps should be followed in the creation of the dig boxes:

Layering the soil:

Start with a base layer of one soil type, followed by adding two further layers with distinctive and different characteristics. *(The artifacts for each period should be added at the same time as placing each layer of soil.)* These three separate layers of soil act to represent the natural stratigraphic layers of the earth. Consider using soil types such as mulch, sand, topsoil, and clay to

Preparation

create each of the layers as part of your dig box. Place a 10cm layer of each soil into your dig box. Add some water to keep the soil moist and leave the container overnight.

Burying the Artefacts:

Identify three specific time-periods that you would like the children to examine through their excavation of the dig box. For example, you may decide to have the top layer of soil date to the mid 1900s, the middle layer date to the time of the Vikings in Ireland and finally, the bottom layer date to the Stone Age Period. At the same time as you are layering the soil, place your artefacts within the different layers of soil. Three objects for each of the time periods should be sufficient. The artefacts buried at each layer of the dig should reveal a simple story about what life was like during that time period.

(Laminated images of artefacts may also be used where there is limited access to suitable artefacts to place within the dig box).

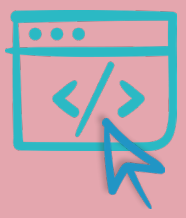
Materials needed:

- Pre-prepared dig boxes
- Newspapers or plastic sheeting
- Small plastic bags to hold the artefacts discovered
- Artefact tags and labels
- Containers to place the excavated soil into
- Digging tools (e.g. small trowel, spoon, hand spade, brushes, toothbrush)
- String, pencil, eraser and ruler
- An object report form
- Objects for top layer of soil: (e.g. small kitchen utensils, old coins, small toys, buttons, pen, small empty tins and packaging, old pieces of clothing, match boxes, soap containers, small trinkets, rosary beads and religious medals).
- Objects for middle layer of soil: (e.g. Viking replica pieces such as an old Viking comb, rune stones, Viking chess pieces known as Hnefataf, jewellery, coins, Viking drinking horn, pieces of weaponry)
- Objects for bottom layer of soil: (e.g. replica pieces from the Stone Age in Ireland such as stone axes, saddle quern, flint tools, pottery, javelin heads, scrapers, bone points, pieces of personal ornaments)

Introduction

Resource(s):

- Classroom archaeological dig tasksheet



Classroom Excavation: Creating a Dig Box

The teacher will introduce the lesson by explaining to the learners that they are going to learn more about the work of an archaeologist by undertaking an archaeological excavation using an already prepared dig box.

The learners will be asked to work in small groups. Each group will be provided with a dig box which will have three archaeological layers of soil. Each layer of soil will contain artefacts from a specific time period from Irish history.

Before commencing with the dig-box activity, the teacher should engage the children in discussion about the role of an archaeologist and how they go about excavating a dig site. At this point the teacher can introduce Chelsi (Classroom archaeological dig tasksheet). This provides the learners with a simple overview of the work of an archaeologist and a brief explanation of how they go about excavating a dig site.

The teacher should also use the dig box at this point to explain the layering of the soil and how the further down you dig into the soil the older the remains tend to be (superposition). It is important for the learners to recognise that an important part of archaeology is understanding the context in the soil in which the artefacts are discovered and that artefacts have a meaning in the time and place in which they originate.

Key Questions to support Discussion:

- *Why do archaeologists dig?*
- *What happens on an archaeological excavation?*
- *What can archaeological digs tell us about life in the past?*
- *How do archaeologists undertake an excavation of a dig site?*
- *Why do archaeologists set out a survey grid?*
- *What types of artefacts can be found during an excavation of a site?*
- *How is the soil removed during an excavation?*
- *What is the significance of the different layers of soil?*
- *What is stratigraphy? Why is this important to understand?*

Introduction

"Hello everyone! My name is Chelsi and I'm an archaeologist. It is my job to look for clues hidden in the ground to investigate what life was like for people in the past. By digging into the ground, my goal is to find buried artefacts. These artefacts are objects from the past and they can include anything from pieces of broken pottery to old coins, tools and even toys! The discovery of these objects helps me to tell the story about how people in the past lived, what they wore, what they ate, what tools they used and much more. In short, you could describe me as a history detective!

Over many years and centuries, objects from the past become covered and buried in the ground. Archaeologists dig under the ground using very specific methods to try and find what the people of the past have left behind. This is called an excavation or a 'dig' for short. When undertaking a dig, I am particularly careful and I use special tools like trowels, spoons and brushes to help me dig and ensure that I do not damage any of the buried objects.

Now that you know some of the work that an archaeologist does it is time for you to work in groups as archaeologists as well. Using the dig box that has been prepared for you, your job is to dig slowly and carefully, just as a real archaeologist would, and see what hidden artefacts you can find. When you have found the hidden objects, carry out an investigation of the objects and see if you can reveal the story of what each of the objects might have been used for, who might have used them and what they can tell us about life at this time.

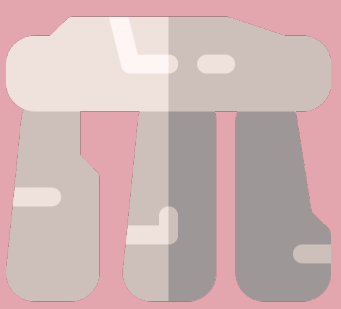
The very best of luck with your archaeological digs!!!!"

Development

Undertaking the Dig:

The teacher explains to the learners how they will undertake their classroom excavations using the dig boxes. The teacher should follow each of these steps:

1. *Assign roles to each of the group members. These roles can rotate as the learners move from one layer of soil to the next e.g. role of excavator, recorder, artefact handler (cleans and places the artefact into plastic bag) etc.*
2. *Place your dig box on the old newspapers or plastic sheet.*
3. *Using the string, create a survey grid by dividing your dig box into 9 or 16 sections (grid referencing using letters and number). See the photo of a larger survey grid below. The learners will be asked to record the position of each find using a grid reference.*
4. *Inform the learners that as they dig they will discover three different layers of soil and that each layer will reveal the story of life in Ireland at that specific period of time.*
5. *Excavate the dig box by removing a couple of cms of soil at a time. Explain to the learners that they must dig as real archaeologists would, and remove the layers of soil by working across the dig box with the dig tools as opposed to digging down into the soil. Have the learners place the excavated soil into the empty container.*
   ***Extension:** If you had a sieve, the learners could place the excavated soil onto the sieve and look to see if they can discover any smaller objects that may have been originally missed.*
6. *On finding an artefact, explain to the learners that they must be careful with the object and avoid damaging the object as they remove it from the soil. Have the group's recorder complete the tag/label for the object identifying the type of artefact it is, the date it was discovered, the location of the discovery (grid reference), the layer of soil it was found in and the size of the artefact. The artefact handler ensures that the artefact has been cleaned properly and places the artefact into a small plastic bag with the correct label/tag.*
7. *Each of the groups continue their excavations of their dig boxes in this manner until they reach the very bottom of the dig box.*



Development

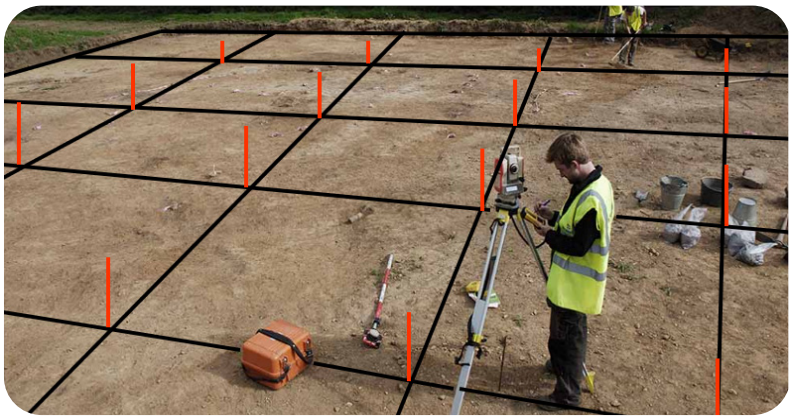


Image A: Setting out a survey grid. Taken from Archaeology Time in Transition.

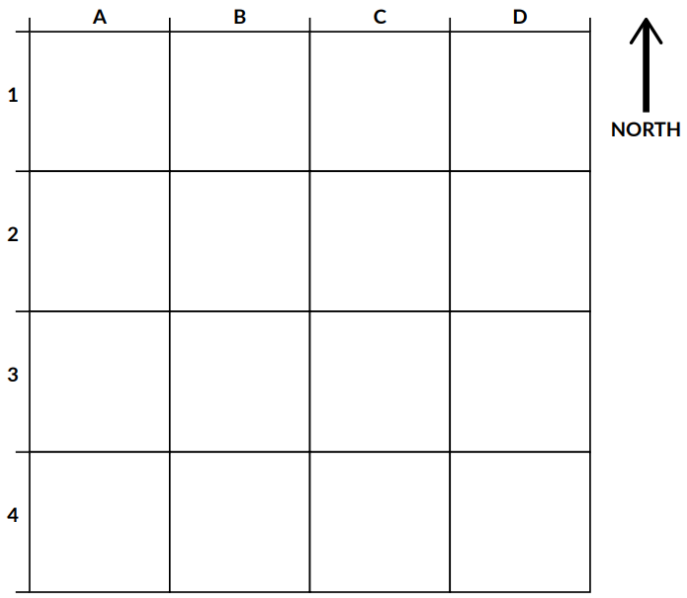


Image B: Grid reference outline

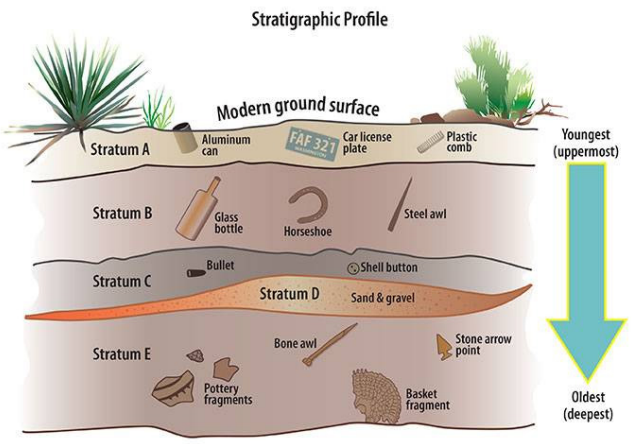


Image C: An example of a stratigraphic profile. Image taken from Crow Canyon Archaeological Center

Once the learners have completed their digs and have each of the excavated artefacts tagged and labelled they should commence with their examinations of these objects to see what they reveal about life in each of the three chosen time periods under investigation. The learners are provided with an object report form to help them with their examination of the objects discovered.

Development

The object report form should incorporate a multi-sensory approach in its design. This will assist the learners in making their initial observations and deductions as well as support group discussions with regards to the features, function and innovation of the object.

In the design of the object report form the teacher could consider including questions and tasks such as:

Draw: Sketch and annotate (label) your object.

Look: Describe what the object looks like. What colour is it? Are there any inscriptions or decorations on your object? What features can you see? Describe the shape of the object.

Touch: What does the object feel like to touch? Describe the texture of the object.

Sound: Does your object make any sounds? Describe what sounds it makes?

Smell: Does your object have a smell? Can you describe the smell of the object?

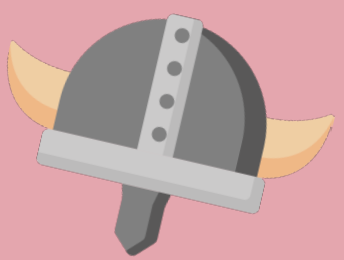
Additionally, the object report form should incorporate a number of questions that help to develop the learners' inductive reasoning. Depending on the object, questions, similar to those identified in session 1, should also be included. For example:

- *Who might have used this object?*
- *Where might this object have been used?*
- *Do we still use this object today?*
- *Why is this object of significance?*

An excellent example of an object report form that could be adapted or used to investigate the objects discovered from the excavation of the dig box can be found on the LETHE (e)learning the invisible history of Europe project website. A copy of this object report form can be found by clicking on this **link**.

Key Questions:

- *Why is it important to create a dig survey?*
- *Why is it important to work across the soil as opposed to digging straight down when excavating a site?*
- *What is the purpose of labelling your find and recording the location of your find?*
- *Why is the location of where the artefacts were found important?*
- *What stories do the artefacts that you discovered reveal?*



Closure

In groups, allow the learners the opportunity to present the findings of their archaeological dig. The learners identify what they believe the discovered artefacts reveal about life in Ireland during each of the different periods under investigation.

Alternatively, each of the groups create a classroom museum display using the discovered artefacts providing a description of the artefacts and an information card explaining what the objects tell us about life at that time.

Extension Activities

Consider these ideas for extension activities:

- **History:** Visit the LETHE Project website and undertake the fascinating archaeological investigation into the remains found in a grave in Sycamore Terrace in York, England. **Project link**
- **History and Science:** Explore the incredible preservatory power of bogs by exploring artefacts such as bog butter, bog bodies etc. using the below links:
  - VIDEO: **2400 year old murder mystery (bog body)**
  - VIDEO: **how bogs preserve ancient artefacts and even bodies**
  - **RTE Radio 1 Interview on Bogs and Archaeology**
  - **https://www.askaboutireland.ie/learning-zone/primary-students/5th-+-6th-class/history/history-the-full-story/evidence-left-behind/other-evidence-bog-bodies/index.xml**
- **Science:** Incorporate organic and inorganic materials in your dig. Examine why some materials can survive underground and some do not. Explore how different soil types and conditions affect whether organic artefacts will decompose or be preserved underground.

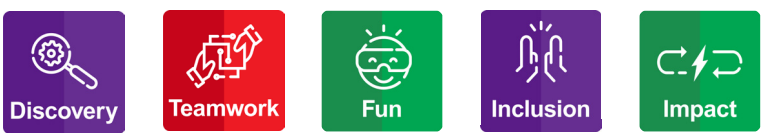
All digital and printable resources for this session are available here: **https://fil.ie/UNEARTHED**

Session 3: Understanding the Archaeological Process

Purpose:

Learners will develop a deep understanding of the archaeological process and become familiar with some of the technology and tools used by archaeologists by focusing on one of the most common historical features of the Irish landscape: ringforts (or fairy forts) and, in particular, the Rathgurreen Ringfort in Maree, Co. Galway, which was excavated in 2025.

Core Values:



Learning outcomes:

Learners will be enabled to

1. Understand the archaeological process including site identification, survey and mapping, excavation, sharing, and publishing.
2. Appreciate the different roles of various historians in the archaeological process.
3. Understand how historians identify specific historical sites for investigation.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- Images from Session 3
- Rathgurreen Ringfort Card Sort Domino Activity (printed for groups of 3/4)
- Printed Ringfort Annotation Activity

Digital resources:

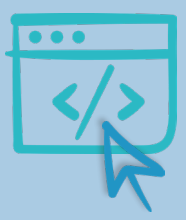
- Website: Monumental Ireland Ringforts
- Video: How Irish ringforts would have looked
- Video: Craggaunowen Ringfort Co Clare
- Maree Ringforts Google Earth Project
- All digital and printable resources for this session are available here: https://fll.ie/UNEARTHED

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
History	Early peoples and ancient societies; Local Studies	Bronze Age peoples; My locality through the ages	Working as a historian Historical Investigation Skills (Questioning, Observing, Inferencing, Hypothesising, Investigating, Analysing, Drawing evidence-based conclusions, Recording and Communicating) Time and chronology; Change and continuity; Mapping Skills (reading and interpreting historical maps)
Geography	Human Environment; Natural Environment	People living and working in the local area; and People living and working in a contrasting part of Ireland; Counties, Regional and National Centres Local Natural Environment; Rocks and Soils;	Mapping Skills (comparing maps and aerial photographs, using digital maps and satellite imagery); Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating)

Introduction

Resource(s):

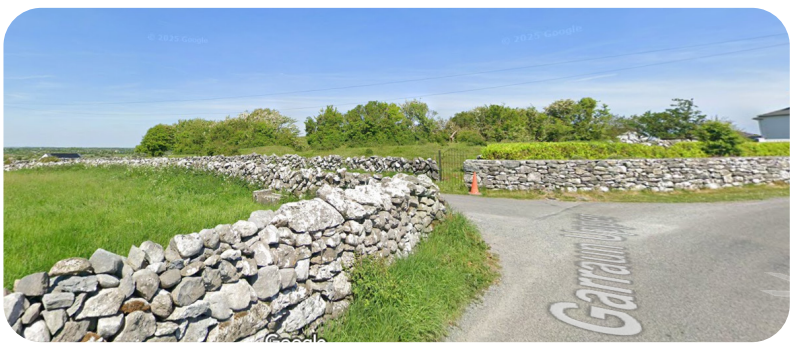
- **Printed Ringfort Annotation Activity**
- Pictures 1-6 for discussion and stimulus purposes
- Website: **Monumental Ireland Ringforts**
- Video: **How Irish ringforts would have looked like**
- Video: **Craggaunowen Ringfort Co Clare**
- **Maree Ringforts Google Earth Project**



Selecting Historical Sites for Archaeological Excavations

Stimulus: Teacher shares Picture 1 with the learners and asks them to observe and speculate as to what could be the historical site in this photo.

Picture 1 is a photo from the roadside looking at Rathgurreen Ringfort. It is not clear from the photo that this is a significant historical site! Therefore, satellite images and digital maps can help to identify it more clearly (see Picture 2). It is much easier and evident that this is a ringfort when viewing this site from above/ bird's-eye perspective.

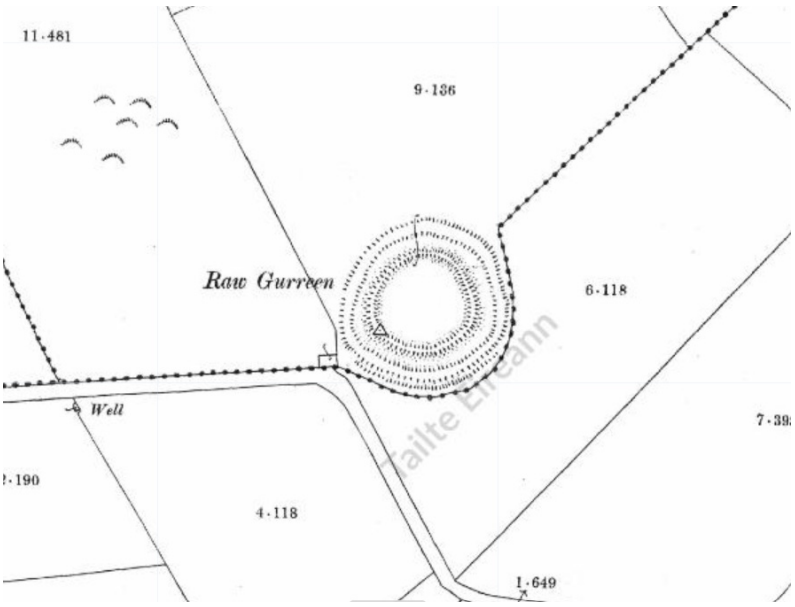


Picture 1: photo of Rathgurreen Ringfort from the roadside. Observe this picture from the roadside of Rathgurreen Ringfort in Galway. Is there any indication here that this is a historical site?

The teacher explains to the learners how historians use many tools and technologies to help them select sites of historical interest for investigation. They use maps and photos such as satellite imagery, digital maps, and historical maps (Teacher shows the learners Picture 2 and Picture 3).

Picture 2: aerial photo of Rathgurreen Ringfort taken by a drone. The red dot is where the roadside photo (Picture 1) was taken from.

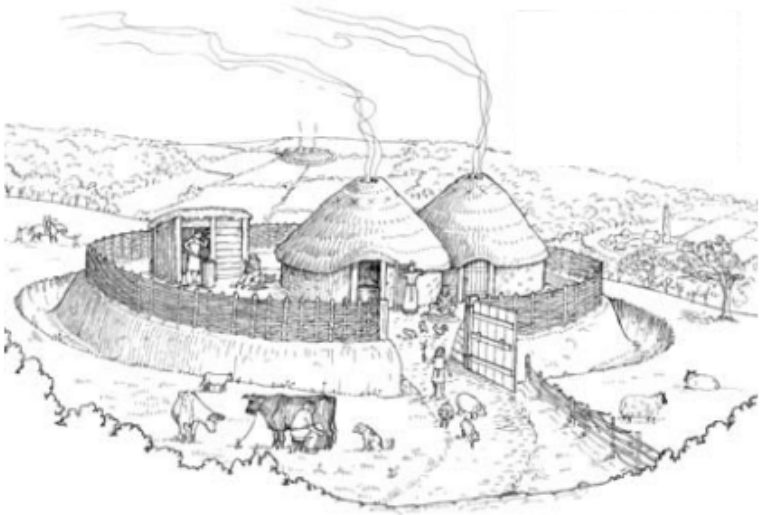
Introduction



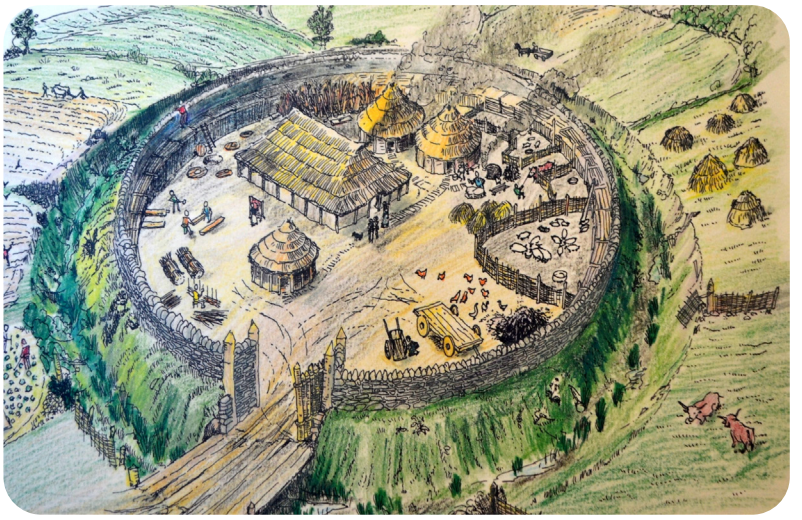
Picture 3: historical map of the Rathgurreen ringfort. This shows the two walled ditches, which means it was a very important place in need of extra protection and defence.

What are Ringforts?

The learners work in pairs to annotate Printed Ringfort Annotation Activity identifying features and speculating as to what ringforts were and what their purpose was.



Picture 4: drawing of a ringfort with thatched wattle and daub homes and shelters contained inside. These are protected by an earthen bank and timber fence.



Picture 5: drawing of a ringfort with thatched wattle and daub homes and shelters contained inside. These are protected by an earthen bank and stone wall.

Teacher Background Information:

Following on from the annotation activity, the teacher can share the following information with the learners as part of the class discussion.

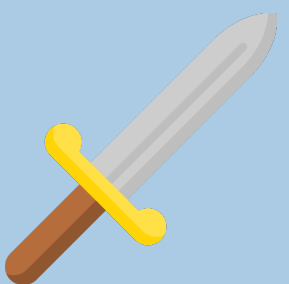
What are Ringforts?

Ringforts are enclosed settlements of the early medieval period (400 AD to 900 AD -over 1,500 years ago). They are circular forts (diameter circa 20-40m) enclosed by a bank of earth with an external ditch. These earth banks would have had a timber palisade fence on top of the bank; some had stone walls. Homes and animal shelters made of wattle and daub or timber would be contained within the ringfort. See Picture 4 and Picture 5.

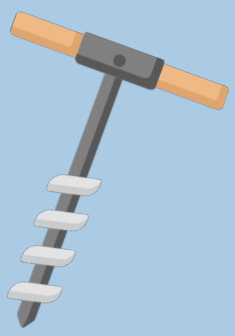
In Gaeilge/Irish they are known by a number of different names: Ráth (Rath), Lios (Lis), Caiseal (Cashel), Cathair (Cahir or Caher) and Dún (Dun or Doon). Ráth and Lios are earthen ringforts, Caiseal and Cathair are stone ringforts and the term Dún was usually used for any stronghold of importance. Many of the towns and villages in Ireland have these terms at the start of their names (e.g. Rathregan, Listowel, Caherdaniel, Cashel, Dunderry) as often they were built up around the site of a ringfort.

Why were Ringforts built?

Ringforts were built to protect people and their animals and other possessions. The entrance to the ringfort was defended by a large wooden gate. Hit-and-run cattle stealing was common in early medieval Ireland and so this type of protected enclosure worked well to defend people and animals.



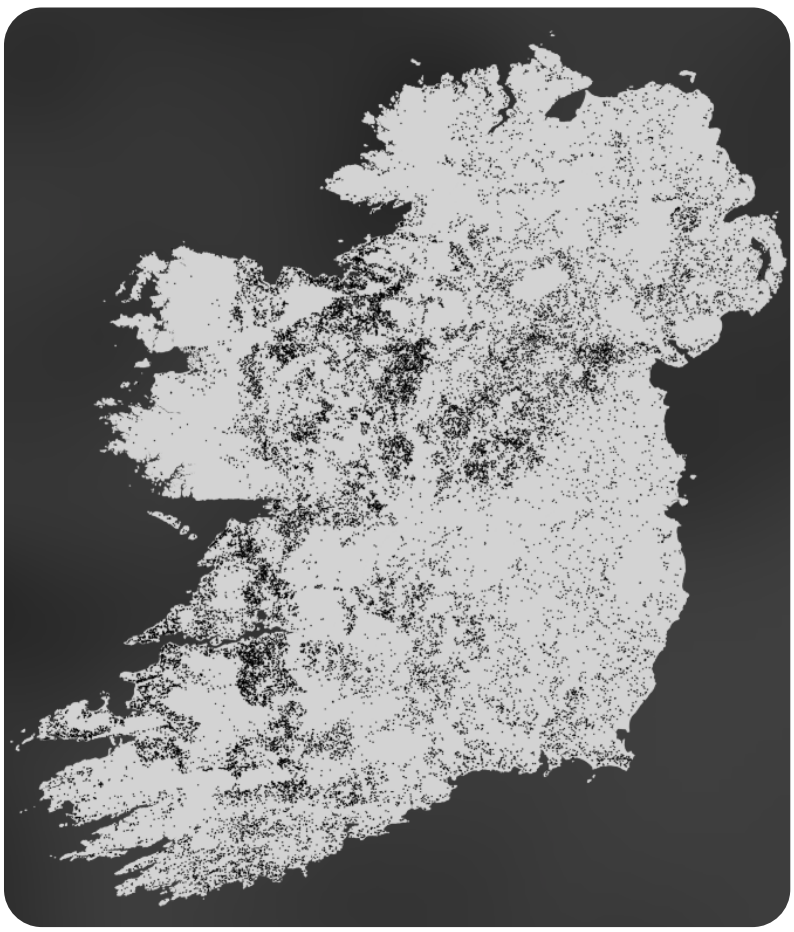
Introduction



The following website and videos can also be used to explain what ringforts are and what they were used for:

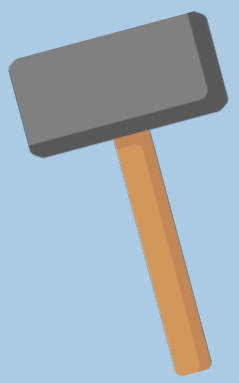
- Website: **Monumental Ireland Ringforts**
- Video: **How Irish ringforts would have looked like**
- Video: **Craggaunowen Ringfort Co Clare**

There are well over 40,000 ringforts in Ireland (see Picture 6).



Picture 6: Every black dot represents a known ringfort in Ireland. There are over 40,000 ringforts recorded in Ireland!

Introduction



Mapping Ringforts

Learners should work in groups of 2/3 on a digital device and explore the location of ringforts in Maree, Co. Galway using this Maree Ringforts Google Earth Project. Learners can explore these ringforts and identify the common features that make them identifiable.

Learners could then query why the Rathgurreen ringfort was selected to excavate above the other 39 ringforts in the area through a whole-class discussion facilitated by the teacher.

Key questions:

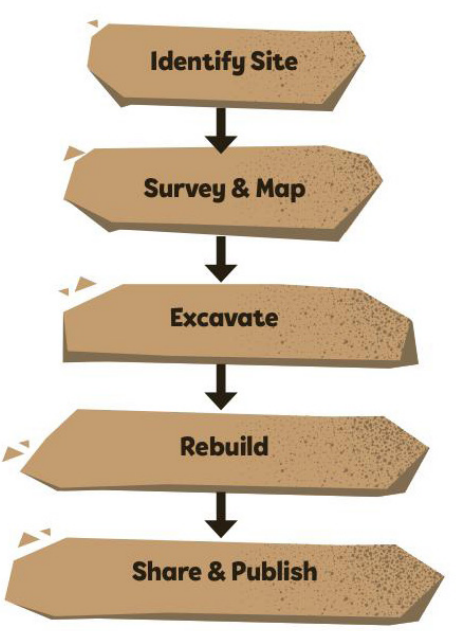
- *How did the historians decide that the Rathgurreen ringfort was worthy of investigation ahead of all of the other 39 ringforts on this map? (i.e. it is 3 times larger than average ringforts and it has two ditches/ banks which signifies greater importance).*
- *Why do many of the ringforts contain trees? (i.e. they have been left untouched for hundreds of years)*
- *Why might farmers avoid ploughing or flattening them? (i.e. respect to the past ancestors who lived here, link to fairyfort superstitions etc.)*

Development

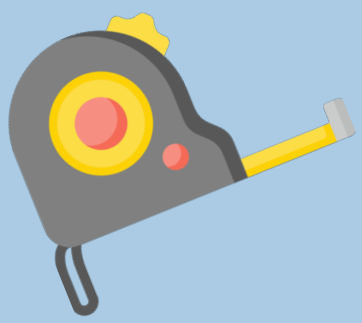
Archaeological Process: Case Study of Rathgurreen Ringfort, Maree, Co. Galway, Ireland

Learners can engage in the Rathgurreen Ringfort Card Sort Domino Activity in groups of 3/4 to sequence the images and match the captions to tell the story of the archaeological process in relation to Rathgurreen Ringfort in Galway.

Once these cards are sorted, learners should match the archaeological process cards to the correct section of the domino set.

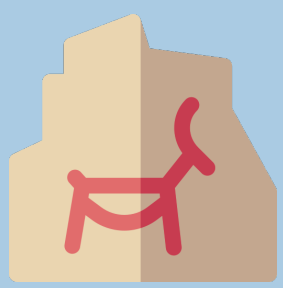


Development



1. **Identifying the Site:** using various maps and tools to identify a historical site for investigation
2. **Surveying and Mapping:** mapping the area, using radar and other tools to identify where on the site to excavate, marking out a grid plan for excavation
3. **Excavating:** using a range of tools to carefully dig through the layers of soil and unearth any artefacts or features
4. **Rebuilding:** re-creating what life was like at this time, rebuilding or drawing up what the feature/ site may have looked like back then
5. **Sharing and Publishing:** displaying artefacts and findings in a museum or visitor centre, publishing articles and videos explaining what has been discovered and unearthed and what this tells us about life in the past.

Closure



Recap on what the learners have learned around the archaeological process from engaging in the Rathgurreen Ringfort Card Sort Domino Activity and the different types of technology and roles involved in identifying a site and excavating it etc.

Key questions:

- *What kind of technology was used in identifying and excavating Rathgurreen Ringfort?*
- *How did the historians know that this ringfort was worth investigating?*
- *Why do historians think that nobles or kings and queens may have lived at Rathgurreen Ringfort?*
- *What places are connected to Rathgurreen Ringfort 1500 years ago? How do we know?*

Extension Activities

Consider these ideas for extension activities:

- **History:** Learners could benefit from a separate history lesson on ringforts, crannógs and other settlements of the past.
- **English/Gaeilge/Drama:** Learners could present a news report on what life is like inside a ringfort (e.g. using green screen).

Printable worksheets for this session are available here: **https://fll.ie/UNEARTHED**

Extension Activities

Resource(s):

- Green Screening Introduction Video
- Digital device
- Green Screening app best suited to your class
- Copyright free image search engine

Green Screen Visual Effect

Begin by showing the class the Green Screening Introduction Video (1:30min). This video is related to the 'DoInk' app, but gives a child-friendly explanation of how the process works for most of the apps listed.

Before beginning, each group will need to consider where their scene takes place. Find an appropriate copyright-free image to use as their backdrop.

Each group needs a Green Screen (this could be fabric/ paper; so long as it's a distinctive colour most apps will adjust); a digital device with the app installed (or logged in).

Select a Green Screen app which is compatible with the digital devices available to your class. Below are some apps to consider.

Digital Device	Green Screen app	How-to video
iPad	iMovie app	How to Create Green Screen Videos on Your iPad using iMovie
	DoInk Greenscreen app	Easy-to-Use Green Screen by DoInk App
Chromebook Windows Mac (web-based)	WeVideo	How to Create Green Screen Videos
	Canva	How to Make a Green Screen Video in Canva
	Kapwing	
Android	Chromavid	Chromavid V 2.0

Session 4: Identifying Local Historical Sites

Purpose:

Learners will use current and historic maps, aerial photographs, and digital mapping to identify some historical sites worthy of archaeological investigation in their locality.

Core Values:

Learning outcomes:

Learners will be enabled to

1. Compare historic and contemporary maps and satellite imagery of the locality to identify any interesting features, changes over time, or monuments that would be worthy of archaeological investigation.
2. Appreciate how historians and archaeologists use various maps and satellite imagery to identify potential sites for investigation.
3. Use digital resources to investigate significant sites and events of the past in the locality.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- Printed copies of historical maps, recent maps, and satellite images of the local area (for learners to use in groups)
- iPads/Digital Devices (to facilitate group investigations)
- **Historical Site Selection Frame** (printed for each group)

Digital resources:

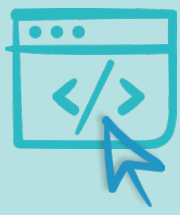
- **Heritage Data Maps**
- **Dúchas: Irish National Folklore Collection**
- **AskAboutIreland Place Names**
- **Placenames Data Base of Ireland**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy
Geography	Human Environment	Living in the local area; My County	Sense of place; Sense of space; Mapping Skills; Geographical Investigation Skills (Questioning, Hypothesising, Investigating, Observing, Analysing, Recording, Communicating)
Literacy	Oral Language	Communicating	Communicating; Understanding; Exploring and using

Introduction

Resource(s):

- **Heritage Data Maps**
- Printed out maps for comparison (if not using website)
- Learner devices



Introducing Maps of the Local Area

The teacher introduces the session by focusing on the locality around the school (where the majority of learners are from).

NB Teacher Preparation: The teacher must have developed their own capacity and familiarity with **Heritage Data Maps** in advance of the session to toggle between the 1913 map and recent satellite imagery, to identify specific sites or buildings that the learners might be interested in, and have some expectations of what learners will find.

The teacher demonstrates how to toggle between historic and recent maps and satellite imagery on this website using the Basemap Gallery tool on the website.

NB Teacher Preparation: Alternatively the teacher can have printed out screenshots of historical maps (MapGenie 25 Inch -which is 1913 map) and recent maps/aerial photo (2013 to 2018 MapGenie -aerial photo) from **Heritage Data Maps** for the learners to compare and note differences, changes and elements that have remained over time (see Image 1 and Image 2 below demonstrating the removal of the railway in Oldcastle, Co Meath over the past 100 years).

Introduction

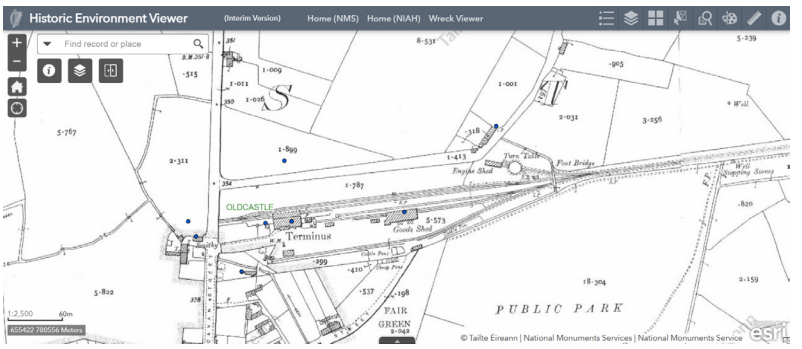


Image 1: Oldcastle, Co. Meath (1913) -MapGenie 25 Inch

Image 2: Oldcastle, Co. Meath (2018) -2013 to 2018 MapGenie

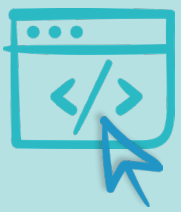
Key questions:

- *Can you find the location of our school on the map?*
- *Can you identify 3 things that have changed between the two maps? Why do you think this is?*
- *Can you identify 3 things that have remained the same in both maps? Why do you think this is?*

Development

Resource(s):

- **Heritage Data Maps**
- Historical Site Selection Frame



Identifying 3 Historical Sites of Interest

In groups, learners use **Heritage Data Maps** to zoom in on their school and locality and identify up to 3 sites of interest. This Historical Site Selection Frame can be used to help them record up to 3 sites that they have selected and justify their selection.

Learners should consider:

- Buildings or features on historical maps that are no longer there today
- Buildings or features on historical maps that remain in the locality today (perhaps a change of use, perhaps an old ruin)
- Clues in place names should also be considered

Development

Resource(s):

- Dúchas: Irish National Folklore Collection
- AskAboutIreland Place Names
- Placenames Data Base of Ireland

Key questions:

- *What changes can you see from comparing the 1913 map with the map and satellite imagery of today?*
- *Is there anything that was there in 1913 that is still there today?*
- *Are there any interesting place names that would cause us to think about how this place was or who lived here long ago?*

The following websites can be used to enhance the learners' investigations:

- Dúchas: Irish National Folklore Collection
- AskAboutIreland Place Names
- Placenames Data Base of Ireland

Closure

Resource(s):

- Historical Site Selection Frame

Presenting and Sharing

Learners share what their group has identified with the rest of the class. Here, they share the local historical sites that they have identified, along with any speculations of what they would find there, using their completed Historical Site Selection Frame to help them.

They should also clearly identify how these sites could be investigated and by whom (thus referring back to the archaeological process and the specific experts and careers that are linked to this type of work).

Extension Activities

Consider these ideas for extension activities:

- **English/Gaeilge:** Learners could write a diary entry from someone linked to one of the historical sites from that time period and try to capture the idea of what life was like at that time in the local area.
- **History:** Learners could invite a local historian or local expert from the Local Historical Society (or other similar organisation) to share their ideas with and to also speak to the class about the history of the locality.

Printable worksheets for this session are available here: https://fll.ie/UNEARTHED

Session 5: STEM in the Past

Purpose:

Learners will explore how science, technology, engineering, and mathematics were used in the past to build Newgrange. Learners will engage in practical hand-on investigations to illustrate how mathematical and scientific understanding supported the construction of Newgrange.

Core Values:

Learning outcomes:

Learners will be enabled to

1. Learn about Newgrange and how it was built.
2. Investigate how light travels.
3. Create a basic model to replicate how light travels through Newgrange.
4. Understand how a simple lever works and can be used to lift a heavy object.
5. Appreciate how science, technology, engineering, and mathematical understanding were used to plan and construct Newgrange.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- Torch
- 3 pieces of card
- Pencil
- Ruler
- Small weights (e.g., 10 grams)

- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Digital resources:

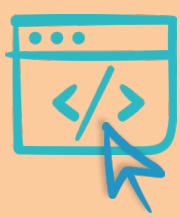
- **National Geographic Video on Newgrange**
- **Link to Virtual Tour of Newgrange**
- **Additional** digital resource on passage tombs in Ireland
- **Images** to support the session
- **Video of light shining through Newgrange**
- **Brú na Bóinne Primary School History Education pack**
- **Lever Investigation Sheet**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
Mathematics	Measures	Transport	Reasoning; Applying and problem-solving
History	Local Studies; Early People and Ancient Societies	Buildings, sites, or ruins in my locality; Stone Age people	Using evidence; Synthesis and communication; Empathy
Science	Energy and Forces	Forces; Light	Observing; Predicting; Investigating and experimenting; Estimating and measuring

Introduction

Resource(s):

- **Video on Newgrange**
- Digital devices for learners
- **Link** to Virtual Tour of Newgrange
- **Additional** digital resource on passage tombs in Ireland
- **Images**



Introducing Newgrange

Show the short video on Newgrange to the learners (approx. 6 minutes).

Learners can then visit Newgrange virtually on digital devices using the following **link**. Using this link, learners can enter Newgrange and observe what the passage tomb looks like. The following questions can be used to support discussion.

Key questions:

- *Where is Newgrange? Newgrange could be located on Google Earth.*
- *What is Newgrange? Learners can use the link under resources to develop a greater understanding of a passage tomb.*
- *Have any of you visited Newgrange?*
- *When was Newgrange built?*
- *Why was Newgrange built?*
- *Describe what Newgrange looks like. Refer to images 1 and 2 below. Image 1 was taken in 1968 at the time of excavation. Image 2 is Newgrange in 2025.*

Introduction

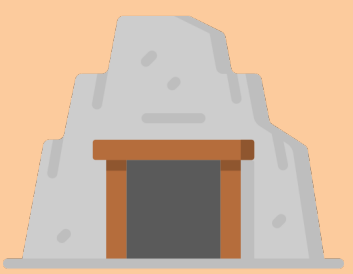


Image 1: Newgrange under excavation, March 1968

Image 2: Newgrange 2025

STEM and Newgrange

Show the short video on Newgrange to the learners (approx. 3 minutes).

The teacher will provide input on how Newgrange used scientific, technological, engineering, and mathematical understanding to plan and construct Newgrange.

Newgrange provides an example of how ancient societies used STEM principles in their culture and construction. The following learning activities will demonstrate how science, engineering, and mathematics were utilised in the planning and construction of Newgrange over 5000 years ago.

Development

Resource(s):

- **Video of light shining through Newgrange**
- **Images**

Development

Winter Solstice

Provide the following background to the learners:

One of the coolest things about Newgrange happens during the Winter Solstice. That's the shortest day of the year, usually around December 21st. On that morning, as the sun rises, a beam of sunlight shines through a special hole above the entrance called a roof box. The light goes down a long hallway and lights up the main room inside! It only lasts about 17 minutes. The light hits a spiral motif on the back wall of the chamber. The spiral motif has been said to represent the linking of two worlds. It is thought that when the light hits the symbol the dead complete their journey to another world. If you want to be inside Newgrange to see this special sunrise, you have to enter a kind of lucky draw (like a lottery). Around 30,000 people enter the lottery each year. In September, 50 names are picked, and each winner gets to bring one other person to see this amazing event.

STEM Investigation: How does light travel through the tomb?

The builders of Newgrange likely had to rely on observations and mathematical calculations to position the roof box so that it allows the sunlight to enter the chamber at sunrise on the shortest day of the year, light up the 19-meter passage, and enter the chamber. Display Images 4 and 5 to support this discussion.

Image 4: Roofbox above entrance at Newgrange

Development

Resource(s):

- Torch
- 3 pieces of card
- Pencil

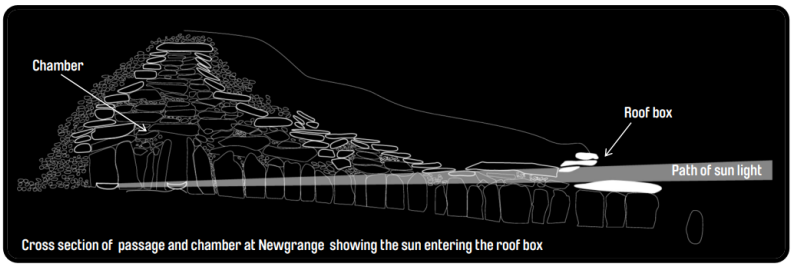


Image 5: Cross-section of Newgrange showing the sun entering the roof light.

Light investigation

Divide the learners into groups. Each group receives a torch and three pieces of cardboard. Cut three pin holes (using a pencil or something similar) into the pieces of cardboard. Each group must position the cardboard so that the light shines through the three pinholes. Blu Tack can be used to keep each card upright.

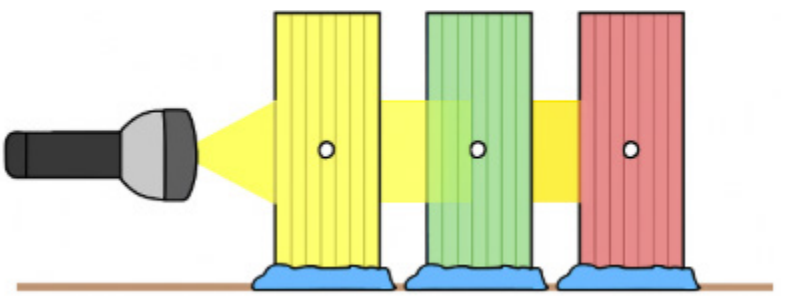


Image 6: Torch & card experiment

Key questions:

- *Investigate what happens if a card is moved out of line.*
- *Move the torch closer to the first card. What difference does this make to the light?*
- *Move the torch 30cm from the first card. What difference does this make to the light?*
- *Why do you think Newgrange was built to capture sunrise? Why does it not work during the day? Tilt the torch so that it is not shining directly into the holes (i.e. sun trajectory throughout the day rising low in the east and then moving high in the sky in the south before setting low in the sky in the west).*

The learners must rearrange the alignment of the cards to allow the light to shine through if the torch is at a different angle (e.g., from above rather than shining directly through the first pinhole card). Learners investigate how they can rearrange the cards to allow the light to shine through all three cards. Learners must first predict what changes they must make to the card alignments and why. They should then change the arrangement and test their predictions.

Development

Resource(s):

- Brú na Bóinne Primary School History Education pack
- Images

The learners should place an object behind the three cards and investigate how they can get it to light up. This will help the learners model how light travels in the passage tomb in Newgrange.

Teacher input:

Before building Newgrange, the builders would have had to create some models of the light travelling to ensure that it was constructed correctly. Given that this phenomenon only happened once every year, it is likely that the light travelling was observed for decades before they started to construct Newgrange. Detailed observation and measurement were key to the success of the construction.

Building Newgrange

The teacher should refer to the Brú na Bóinne Primary School History Education pack. For the next learning activity, the teacher should explicitly focus on page 6. The learners should also refer back to the Virtual tour of Newgrange provided in the introduction. Allow the learners to observe the inside of the tomb and, in groups, hypothesise how they think the tomb was constructed.

Display Image 7 to the learners.

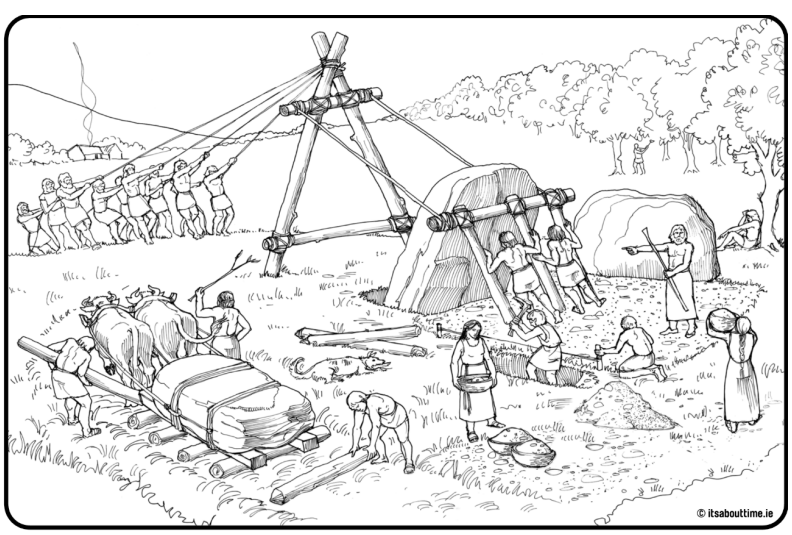
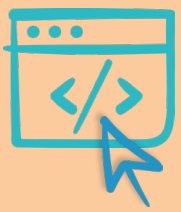


Image 7: Construction of Newgrange. Taken from Brú na Bóinne History Education pack.

Development

Resource(s):

- Pencil
- Ruler
- Small weights (10g)
- **Lever Investigation Sheet**



Key questions:

- *Newgrange was built over 5000 years ago. How do you think it was built?*
- *What do you think was the most challenging part of the construction?*
- *Where did the materials from Newgrange come from?*
- *What tools do you think were used?*

Science investigation: Levers

This investigation will allow the learners to investigate the role of levers when moving heavy objects. It is likely that levers were used when lifting heavy material during the construction of Newgrange.

Teacher input:

Levers are considered simple machines that make it easier to lift heavy materials. It allows you to gain a mechanical advantage in moving an object or in applying a force to an object. The mechanical advantage is that you can move a heavy object using less force than the weight of the object, or you can move an object further than the distance you apply to the lever.

Here is a simple investigation you can do with your class to investigate or illustrate how levers function.

Identify the different parts of the lever. See image 8.

Image 8: Simple lever using a ruler, pencil, and eraser.

The pencil is the fulcrum. The eraser is the load. The effort is what is needed to lift the eraser off the table. Place the pencil at 5cm and the eraser at the end as illustrated in Image 8.

Development

Key questions:

- *What is the smallest weight needed to lift the eraser?*
- *How will you investigate this? The weight should be placed at the end of the ruler. Record your results.*
- *Move the pencil or fulcrum to 15cm. Now predict what weight is needed to lift the load. Predict and investigate.*
- *Move the pencil or fulcrum to 25cm. Now predict what weight is needed to lift the load. Predict and investigate.*
- *Synthesise your findings. Which position required the least amount of weight to lift the load?*

The learners should observe that the further away the effort is from the fulcrum, the easier it is to lift the load. Allow the learners to think about how the builders used levers to lift heavy rocks when constructing Newgrange.

Closure

In groups, allow the learners to discuss how science, technology, engineering, and mathematics were used to build Newgrange.

Extension Activities

Consider these ideas for extension activities:

- **History:** Use **Dúchas.ie** to investigate the School Folklore Collection. This is a collection of folklore compiled by school children in Ireland in 1930. Here, Newgrange can be searched, and stories about Newgrange can be found and read by the learners.
- **History:** Investigate other ancient burial sites in Ireland using this **website**. For example, Lough Crew Cairns, Oldcastle, Co. Meath.
- **Science:** Investigate lifting heavy loads using pulleys. This **link** here is a useful resource.

Printable worksheets for this session are available here: **https://fll.ie/UNEARTHED**

Session 6: Dig Site Tools

Purpose:

Learners will explore the tools used on a dig site and start to develop their understanding of computational thinking and coding.

Core Values:

Discovery | Teamwork | Fun | Inclusion | Impact

Learning outcomes:

Learners will be enabled to

1. Develop an understanding of the tools used by archaeologists at dig sites.
2. Collaboratively build the LEGO® model from the lesson and explore motor coding blocks.
3. Experiment with cause and effect relationships using the motor and movement code blocks.
4. Work like an engineer to adapt the LEGO model so an archaeologist can use it at an excavation site.

Learners will build:

LEGO SPIKE Essential

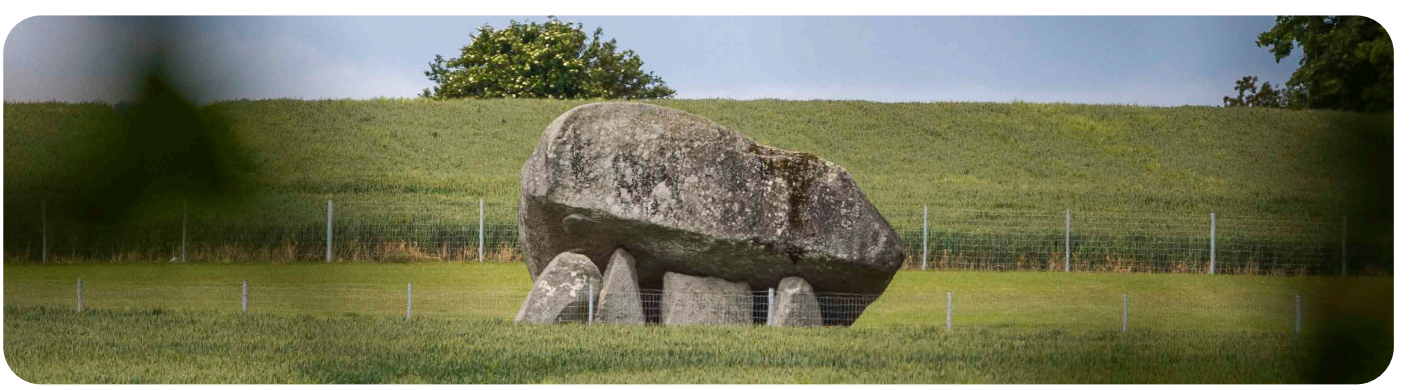
- Lesson 1 - Classic Carousel

LEGO WeDo 2.0

- Cooling Fan

Progress:

1 2 3 4 5 6 7 8 9 10 11 12



Resources

Per team:

- Archaeology Tool matching activity printed
- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device

Digital resources:

- **Archaeology Tool matching activity answers**
- **The Tools an Archaeologist Uses** (optional video)
- LEGO Education app: **https://spike.legoeducation.com/** or SPIKE app or WeDo 2.0 app
- **Canva**
- **Book Creator**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

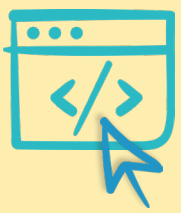
Curriculum content

Subject	Strands	Strand units/ elements	Skills and concepts
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy
Mathematics	Measures; Number	Angles; Fractions; Decimals	Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning; Implementing
Literacy	Oral Language; Reading	Communicating ; Understanding	Communicating; Understanding; Exploring and using

Introduction

Resource(s):

- Matching activity printed
- Images of archaeology tools for IWB
- Matching activity answers
- Whiteboards or paper



Dig Site Tools

Ask learners to think about what types of tools an archaeologist might need. Allow thinking time, before instructing learners to pair up to share their ideas. Learners could use paper or whiteboards to record their ideas. Seek suggestions from the class, and emphasise learners' explanations of why a tool was chosen, or how a tool might be used.

Archaeologists use a lot of different tools when excavating on a dig site. These tools will differ depending on:

1. *The geographical area you are working in,*
2. *The site conditions,*
3. *The type of archaeology you are doing.*

Explain to the class that you have been speaking to an archaeologist named Chelsi, and she has shared details about the tools she uses on a dig site. Unfortunately the tools and explanations have become mixed up, and the class will need to figure out how to correctly match them.

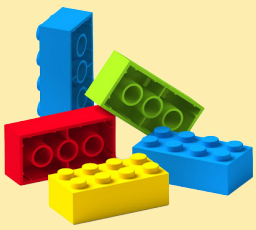
This activity could be completed in a number of ways:

1. *Learners in small groups examine the photos and descriptions. These can be cut out and then matched together*
2. *The teacher displays images and descriptions on the IWB, and learners discuss potential answers in small groups.*

Follow this with a whole class discussion of their suggested answers; emphasising why they have come to these conclusions.

Once learners have become familiar with the tools used by archaeologists on a dig site, explain that we are now going to create a tool of our own. But first, we need to learn how to use the LEGO Education set.

Development



Classroom Oganisation:

- Divide learners into groups of four or fewer while using LEGO materials.

Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device

LEGO Builds

Purpose of the Builds:

- To introduce learners to the LEGO® Education software and block-based coding.
- To introduce the 'motor' block and explore what happens when the power of the motor is changed.
- Learners modify and program their model so an archaeologist can use it at an excavation site.

Teacher Tip:

This session is a great way of thinking about how maths in the real world works. As learners are experimenting with their builds and code, encourage maths talk.

Dependent on the class, it may be beneficial to explicitly revise or pre-teach the following mathematical concepts:

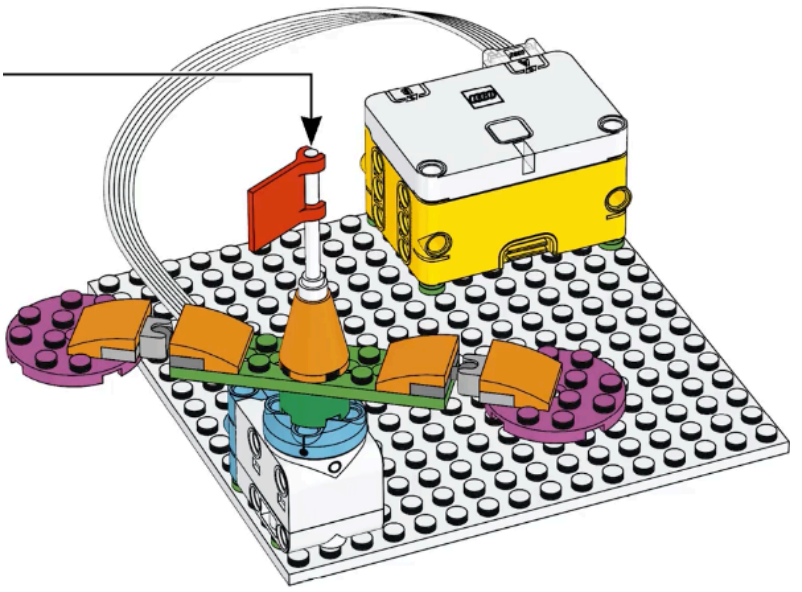
- Clockwise and anti-clockwise
- Fractions of a circle: half: ½: 0.5, and quarter: ¼: 0.25
- 5th & 6th: Degrees: 360 degrees, 180 degrees, 90 degrees

If your class is new to coding, you may want to begin by completing the tutorial activities in the LEGO Education SPIKE Essential or WeDo 2.0 app

Development

1. Guided Build and Code:

In teams, learners engage with the LEGO Education classroom project dependent on which kit they have.



SPIKE Essential
Lesson 1 - Classic Carousel

Learners follow detailed instructions to build and code the 'Classic Carousel'.

2. Coding Challenge Activities:

Once the basic build has been completed, set the following tasks that challenge them to explore how the coding works and how it can be changed.

Make their model:

a. Turn clockwise
b. Turn anti-clockwise
c. Move faster/slower
d. Play a sound before/after turning
e. Make a complete rotation (360 degrees) - start and stop at the same point
f. Move a half turn (180 degrees)
g. Move a quarter turn (90 degrees)
h. These challenges could be extended further e.g., fractions of a circle, speed, etc.

See the *Coding & Build Guidance for Teachers* section for a step-by-step guide to completing these challenges.

Development

WeDo 2.0
Cooling Fan

Learners follow detailed instructions to build and code the Cooling Fan.

Once the basic build has been completed, ask learners to add a red block, facing upwards, to the end of one green blade. This will help learners in the following challenge tasks.

2. Coding Challenge Activities:

Once the basic build has been completed, set the following tasks that challenge them to explore how the coding works and how it can be changed.

Make their model:

a. Turn clockwise
b. Turn anti-clockwise
c. Move faster/slower
d. Play a sound before/after turning
e. Make a complete rotation (360o) - start and stop at the same point
f. Move a half turn (180o)
g. Move a quarter turn (90o)
h. These challenges could be extended further e.g., fractions of a circle, speed, etc.

See the *Coding & Build Guidance for Teachers* section for a step-by-step guide to completing these challenges.

Development

3. Adapting their Build

Now that the class have built and coded their LEGO model, remind them of the tools used by Chelsi and other archaeologists on a dig site. The images could be shown again on the IWB.

Explain to the class that each group needs to work like engineers to adapt the LEGO model so an archaeologist can use it at an excavation site. Their model is a prototype, and could be bigger or smaller than it is in real life.

Prompt learners to think about the types of tools Chelsi uses, and how their new tool could improve on, or replace, one or more of those. Groups could be asked to plan out their ideas before modifying their build.

Below are some potential ideas to help groups:

- Auto-trowel: adapt the build and code so that their model is carefully scraping back and forth in a slow, controlled manner.
- Robo-dust-pan: modify the code and build so that their 'carousel' moves from one side to the other, 'sweeping' dust and soil up.
- Detail-brush: imagine their build is much smaller, and acts as a very precise brush that can have the pressure increased/decreased while revealing fine details of an artefact.

While groups are working, use the following guiding questions:

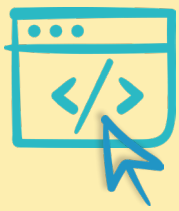
- What type of archaeological task will your team model perform? (e.g., careful scraping, sweeping, delicate brushing)
- Will this tool be used at a large excavation site, or focus on a small, intricate spot?
- What types of materials will your tool be interacting with? (e.g., loose soil, stubborn dirt, fragile artefacts)
- How will your model demonstrate the precision and control needed for archaeological work? (e.g., slow movement, adjustable pressure, specific sweeping patterns)
- What challenges might archaeologists face that your tool helps to solve?

Remind teams that they will be asked to share their prototype tools and explain how they work (e.g., the program/code).

Coding & Build Guidance for Teachers

Resource(s):

- Narrated video for each program

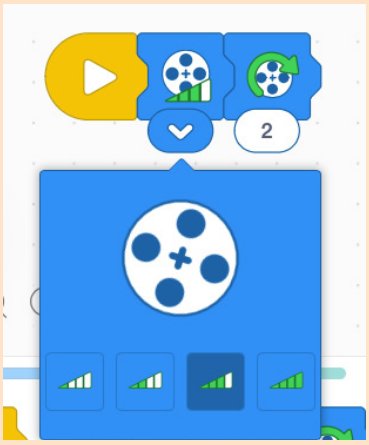


The following support and guidance are intended for the teacher in order to assist you in scaffolding learners. It is not intended that learners be shown solutions.

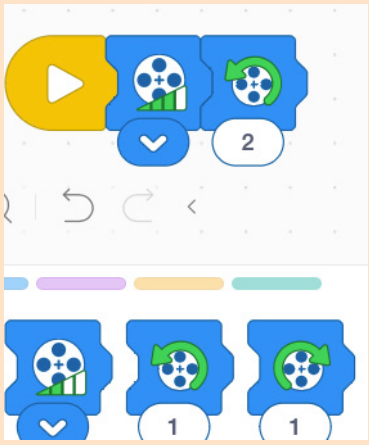
SPIKE Essential Lesson 1 - Classic Carousel

Once the code is executed (started), the motor power is set, followed by setting the motor to turn clockwise twice (2).

This simple algorithm (code) can be tinkered with in order to make the robot move more quickly/ slowly, to change the direction of movement (clockwise/anticlockwise), and to change how long/ short the motor stays on for (duration).

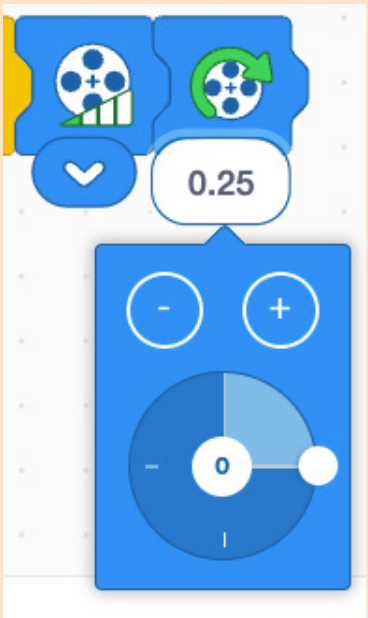


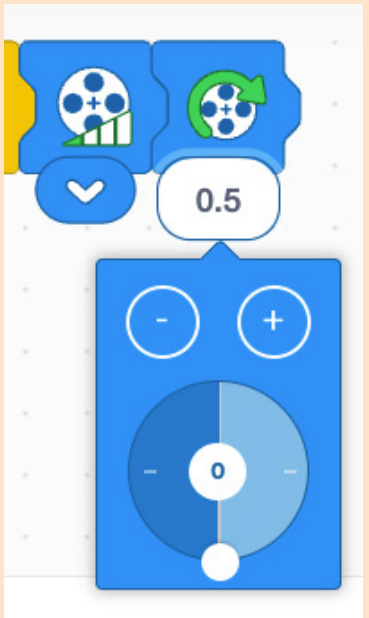
Change Speed of turns



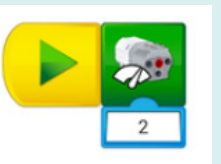
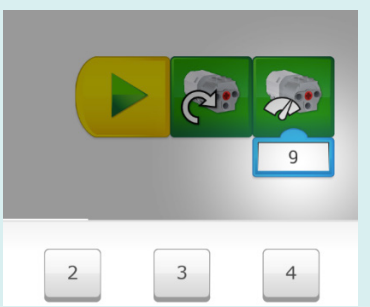
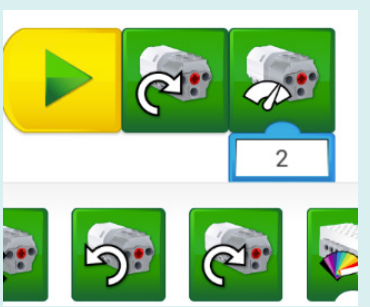
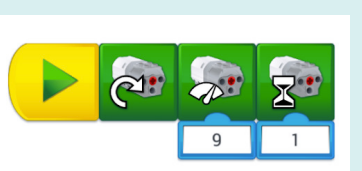
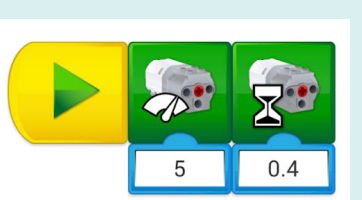
The number under the rotation (2) sets the number of rotations, in this case the duration.

Rotations in fractions and link to degrees.





Coding & Build Guidance for Teachers

WeDo 2.0 Cooling Fan	
 Once the code is executed (started), this robot will turn on the motor at a power of two (2), which will cause the fan to begin moving.	This simple algorithm (code) can be tinkered with in order to make the robot move more quickly/ slowly, to change the direction of movement (clockwise/anticlockwise), and to change how long/ short the motor stays on for (duration).
 Change Speed	  The number under the hourglass is the number of seconds the motor will run.
To get the WeDo cooling fan to make a half or quarter rotation the learners can be asked to think about making it turn more slowly (adjust speed) and for less or more time (duration). The image on the right is one possible solution of a program which has the fan turn one full rotation.	

Guiding questions:

- *Can you change the direction the robot turns?*
- *I wonder what might happen if you change the number under the motor block?*
- *Can you see any blocks that might make the robot stay running for longer?*
- *What is the fastest you can set the robot to turn?*

Closure *(Document/ Share/Tidy up)*
[10 min]

Resource(s):

- Digital Portfolio
- Digital Device
- **Canva**
- **Book Creator**

1. **Document:**
   a. Each team documents and reflects upon the models they built - **adding photos, videos, notes to their digital portfolios.**
   b. Consider how they built it, how it works, how they might change or adapt or improve it.

2. **Share:**
   a. What they built, and how it would help an archaeologist
   b. Show the coding skills they learned
      i. Explain how they changed the program
      ii. Explain a problem they faced or overcame
   c. Demonstrate their solutions

3. **Teams Tidy Up:**
   a. All builds should be disassembled and returned to the LEGO Education Set.

(LEGO SPIKE Essential - parts are colour coded)

(LEGO WeDo 2.0 - the stickers on the sides of each section show where parts should be returned to)

Extension Activities

Consider these ideas for extension activities:

Coding and Computational Thinking: Consider deepening learner understanding of how to build and code the motor by completing some of the following guided build activities:

- LEGO SPIKE Essential:
  - **Boat Trip**
  - **Underwater Quest**
  - **Tree House Camp**
- LEGO WeDo 2.0
  - **Moving Satellite**

After completing one (or more of these), learners could consider the following questions:

1) How did your extra practice build help you to learn more about coding and Computational Thinking?

2) What new ideas did it give you that might help Chelsi and her team?

Session 7: How Archaeologists use Sensors

Purpose:

Learners will explore how archaeologists use sensors, and develop an understanding of how sensors work through building and coding a LEGO robot.

Core Values:

Discovery | Teamwork | Fun

Learning outcomes:

Learners will be enabled to

1. Develop an understanding of, and appreciation for, how sensors can be used to detect things archaeologists cannot see at an excavation site.
2. Build and code a LEGO robot.
3. Experiment with cause and effect relationships using the sensor blocks.
4. Develop a deeper understanding of code and computational thinking by testing and adapting prototypes.

Learners will build:

Build 1:

LEGO SPIKE Essential

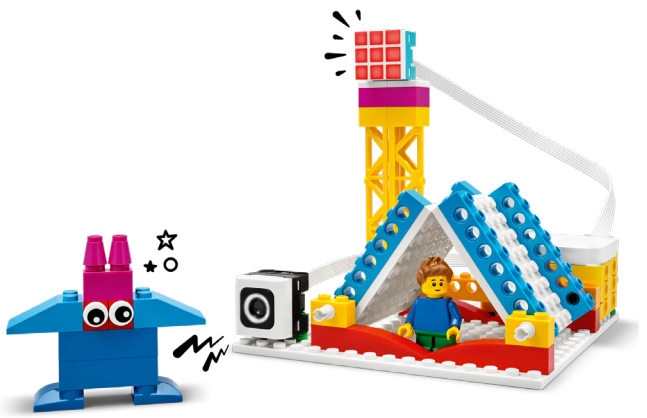
- Lesson 2 - Animal Alarm

LEGO WeDo 2.0

- Spy Robot

Progress:

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12



Resources

Per team:

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Digital resources:

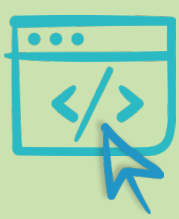
- **BBC News video**
- **How Archaeologists use Sensors**
- Images of modern sensor technologies
- **Additional video: drone footage of monument**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
Geography	Human Environments	People and Places; People at work	A sense of space; Mapping Skills (aerial and satellite imagery)
Literacy	Oral Language; Reading	Communicating; Understanding	Communicating; Understanding; Exploring and using
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy

Introduction

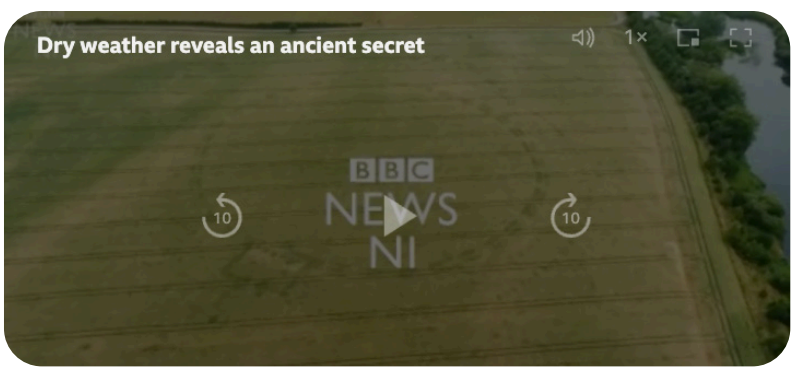
Resource(s):

- **BBC Video**



How Archaeologists use Sensors to detect things they cannot see:

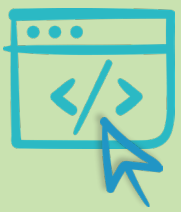
Begin this lesson by playing a **short video (43secs) from the BBC** which reports on how images captured by a drone during a heatwave led to archaeologists discovering a previously undiscovered monument or henge close to the 5000-year-old Newgrange monument in County Meath.



Introduction

Resource(s):

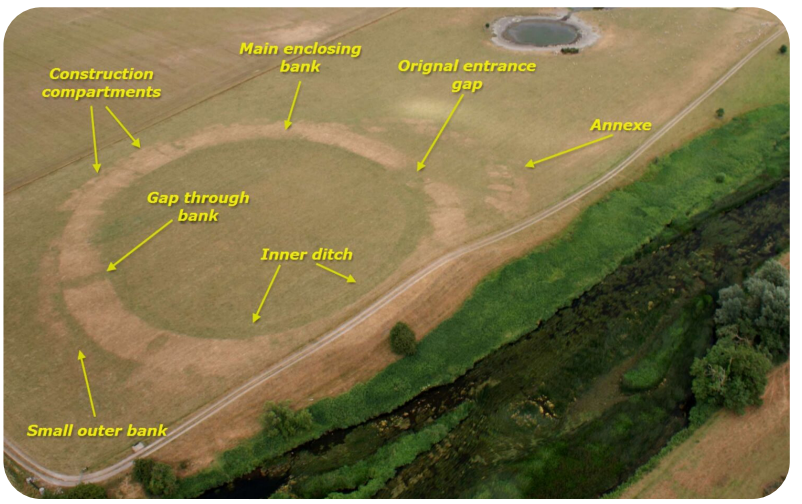
- Images of modern sensor technologies



After watching this video, ask the class if this reminds them of anything? As needed, make connections with Rathgurreen Ringfort explored in Session 3.

The following images could be used to help learners understand what exactly was found.

GIS surface model showing the arrangement of monuments on the floodplain. (Above image © DCHG; base image © Bluesky International Ltd; LiDAR provided by The Discovery Programme © Meath County Council/ The Heritage Council from https://dcenr.maps.arcgis.com /reused under CC BY 4.0.)



Introduction

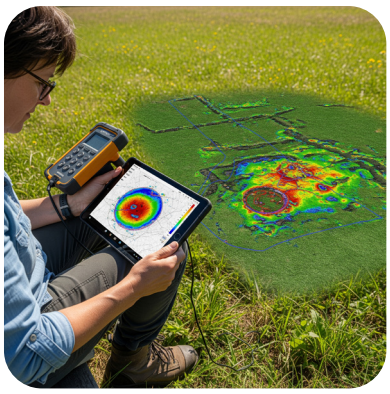
Resource(s):

- How Archaeologists use Sensors - activity

How Archaeologists use Sensors

In the last session, we learnt about some of the tools archaeologists use on dig sites. Today we are going to learn about how modern sensor technology is used by archaeologists to detect things they cannot see.

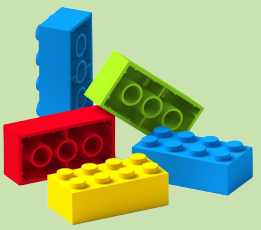
Divide the class into small groups and assign each group a modern sensor technology to read about and discuss.



After groups have had enough time to read about and discuss their sensor technology, tell the class that each group will be asked to explain their sensor technology to the rest of the class.

The images of modern sensor technology can be displayed on the teacher's IWB to support groups while explaining. After these explanations reinforce that in each case, the sensor technology is allowing archaeologists to detect things they cannot see. This includes identifying where they might excavate, and seeing inside artefacts.

Development



Classroom Oganisation:

- Divide learners into groups of four or fewer while using LEGO materials.

Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device

Teacher tip:

Remember that the sound comes from the digital device, not from the hub. Learners may need to turn up the volume on the device.

LEGO Sensor Builds

Explain to the class that we are going to use sensor technology just like the archaeologists. We will build and code a model which uses a sensor to react when something is detected. Then we will adapt this so that it can be used to detect or inspect artefacts.

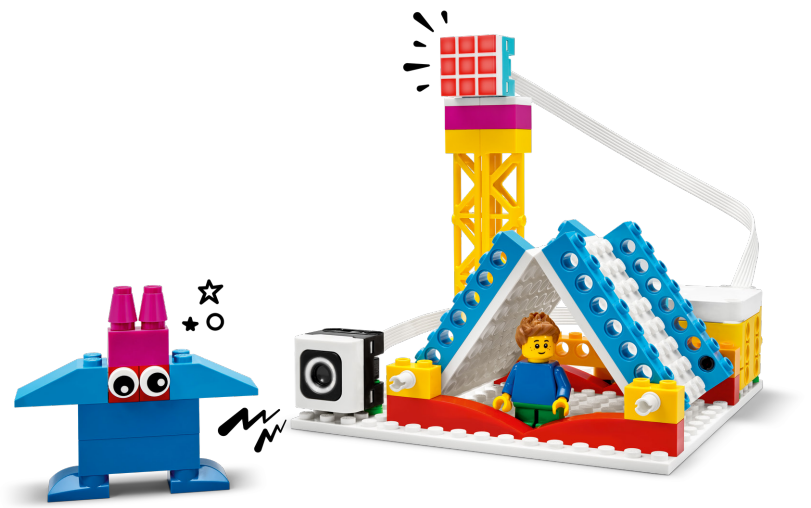
Purpose of the builds:

- To introduce the sensor and sensor code block.
- Explore how the sensor and sensor code block function.
- Adapt their sensor build so that it can be used by an archaeologist to inspect or detect artefacts.

1. Guided Build and Code:

In teams, learners engage with the LEGO Education classroom project:

a. SPIKE Essential - Animal Alarm



b. WeDo 2.0 - Spy Robot

Development

2. Coding Challenge Activities:

Once the basic build has been completed, set the following tasks which challenge them to explore how the coding works and how it can be changed.

It is important to emphasise to learners that this is not a case of trial and error; they are working like engineers by making a change, testing it, and then learning from this process. Encourage learners to document the programme (code blocks) they are trying as they will be using these sensors again in later sessions.

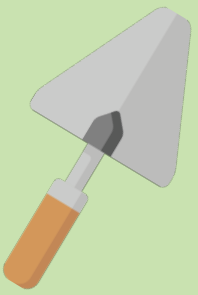
SPIKE Essential
Animal Alarm challenge tasks

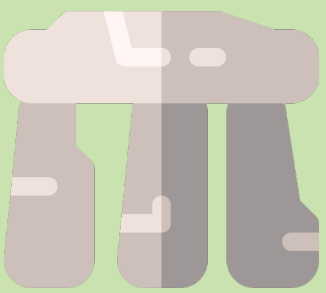
1. Change the colours displayed by the colour light matrix connected to the hub.
2. Create a 'pixel' image on the colour light matrix (e.g. green '+' to signify something was detected; red 'x' if not).
3. Add sound so that when the alarm is activated a sound is also played.
4. Record and add a learner-recorded sound to play when the sensor is triggered.
5. Write an algorithm that plays a noise and flashes a light when the sensor is activated.
6. Discuss why it is beneficial to have the sensor provide both visual and audio alerts.

WeDo 2.0
Spy Robot Challenge Tasks

1. Change the sound played when the alarm is activated.
2. Record and add a learner-recorded sound to play when the sensor is triggered.
3. Code the robot to flash a coloured light on the hub when the sensor is activated.
4. Change the colour displayed by the hub.
5. Write an algorithm (code) that plays a noise and flashes a light when the sensor is activated.
6. Discuss why it is beneficial to have the sensor provide both visual and audio alerts.

Development





3. Adapting their Sensor Build:

Now that the class have built and coded their LEGO sensor model, prompt learners to think about the modern sensor technologies we learnt about at the beginning of the lesson (e.g., LiDAR, Ground-penetrating Radar, CT Scanning), and how they enabled archaeologists to detect things they could not see.

Explain to the class that each group will work like engineers to adapt their sensor model so an archaeologist can use it to support their work. Their model is a prototype, and could be bigger or smaller than it is in real life.

Below are some prompt questions to help groups:

- *What is this sensor prototype being used for? Will it be used by an archaeologist to detect or inspect artefacts?*
- *Will this be used to detect artefacts? How will the archaeologist move it around? Will it be pushed, carried, flown?*
- *If it is being used to inspect artefacts, what might this look like? Will artefacts be placed inside it? Will there be a handheld scanner? What about very large artefacts? Will the scanner be portable?*
- *What will happen when an artefact is detected/ inspected? How will the archaeologist know the sensor prototype has discovered something? (sound/light)*

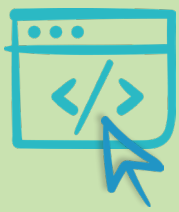
Teacher tip:

If using SPIKE Essential, encourage learners to think about how different colours might represent different things. For example, perhaps blue represents buried metals and red represents carbon.

Coding & Build Guidance for Teachers

Resource(s):

- **Narrated video for each program**



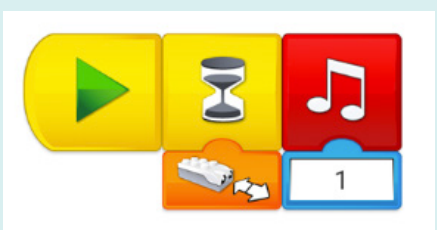
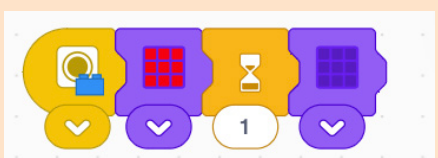
The overall build and code are very similar, however the different sets use different sensors:

The LEGO WeDo 2.0 Set uses a *motion* sensor:

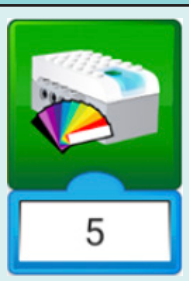
- The motion sensor detects changes in distance from an object within its range in three different ways:
  - Object moving closer
  - Object moving farther away
  - Object changing position
- e.g. a robot can be programmed to react after something moves within range of its sensor

The SPIKE Essential Set uses a *colour* sensor:

- The Colour sensor can be programmed to detect a specific colour and then react to this.
- e.g. a robot can be programmed to react after a specific colour is detected within range of its sensor

WeDo 2.0 Classroom Project: **Spy Robot**	SPIKE Essential: **Lesson 2 - Animal Alarm**
	
Once the code is executed (started), this robot will wait until the sensor senses motion. It will then start playing an audio file (sound 1).	Once the colour sensor recognises the target colour (blue), the colour light matrix will display a 3x3 grid of red lights. After 1 second has passed, the colour light matrix will not display any lights.

This simple algorithm (code) can be tinkered with in order to make the 'alarm' more effective by including both lights and sound. The additional code blocks for lights in WeDo 2.0 and sound in SPIKE Essential are shown below.

WeDo 2.0	SPIKE Essential
	

Coding and build guidance for teachers

Guiding questions:

- *Can you change the sound the robot makes?*
- *I wonder what might happen if you change the number under the music block?*
- *Can you see any blocks that might make the robot turn on a light?*
- *Can you change the colour of the light?*
- *Can you make the robot play a sound and flash a light one after the other?*
- *I wonder if you could change the order of sound and light?*

Closure (Document/ Share/Tidy up)

Resource(s):

- Digital Portfolio
- Digital Device

Document:

1. Each team documents and reflects upon their sensor prototype - adding photos, videos, notes to their digital portfolios.
2. Consider how they built it, how it works, how they might change or adapt or improve it.
3. In particular, document how they got the sensor programme (code) to work, and how they adapted this.

Share:

1. What they built, and how it could be used by an archaeologist to detect or inspect something they could not see.
2. Show the coding skills they learned.
   a. Explain how they changed the program.
   b. Explain a problem they faced or overcame.
3. Demonstrate their solutions.

Teams tidy up:

1. All prototypes should be taken apart and returned to the LEGO Education Set (SPIKE Essential or WeDo 2.0)

Extension Activities

Consider these ideas for extension activities:

Literacy: Task learners with creating an advert to market their sensor tool to archaeologists. Think about:

- *What makes your tool special?*
- *What does it do?*
- *Why would an archaeologist want it?*

Science: Investigate how the sensors used in the LEGO builds work by conducting experiments relating to light and sound (e.g. investigating how sound travels).

History: Learn more about how modern sensor technology was used by archaeologists in Brú na Bóinne

- heritageireland.ie
- www.ucd.ie
- mythicalireland.com

Session 8: How Archaeologists handle and move artefacts

Purpose:

Learners will be introduced to how archaeologists handle and move artefacts at excavation sites using vehicles.

Core Values:

Discovery | Teamwork | Fun | Inclusion | Impact

Learning outcomes:

Learners will be enabled to

1. Appreciate some of the ways archaeologists handle and move artefacts at an excavation site.
2. Develop a basic understanding of the vehicles used during the archaeological process.
3. Build and code a mobile LEGO robot that enables further experimentation with motor direction and motor speed.

Learners will build:

LEGO SPIKE Essential

- Arctic Ride

LEGO WeDo 2.0

- Milo the Science Rover

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- UNEARTHED map
- **Handle And Move Artefacts Activity**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content

Subject	Strands	Strand units/ elements	Skills and concepts
Literacy	Oral Language	Communicating	Communicating; Understanding; Exploring and using
Geography	Human Environments	People at Work	Mapping (map reading & map making) and Sense of Space; Analysing; recording and communicating; predicting
History	Local Studies; Early People and Ancient Societies	Buildings, sites, or ruins in my locality; Stone Age people	Using evidence Synthesis and communication Empathy
Mathematics	Number; Shape and Space	Fractions; Decimals; 2D / 3D shapes; Lines and angles	Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning

Introduction

Resource(s):

- **Images**

In previous sessions, we have examined the smaller tools used by archaeologists at a dig site, and the more technological tools that help them see things that aren't immediately visible. In this session the focus moves to exploring how archaeologists handle and move artefacts at excavation sites using vehicles.

Remind learners about the archaeological dig that took place in Newgrange.

Image 1: Newgrange under excavation, March 1968

Image 2: Newgrange 2025

Ask learners to think about how the archaeologists moved the very large kerb stones that were discovered. How did archaeologists move these when they didn't have the same types of machinery available as today?

Next, share the following photographs with the class and ask them to discuss answers to the following questions in pairs (or small groups).

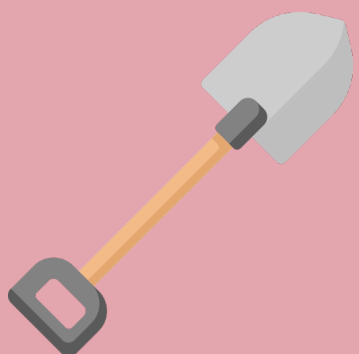
Key questions:

- *What types of vehicles do you recognise?*
- *How do you think these vehicles are used? Why do you think so?*
- *What benefits are there to using these vehicles? What challenges could there be?*

Introduction

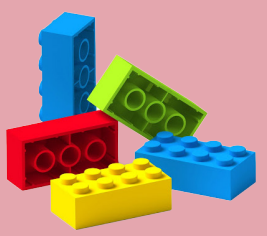
Field archaeologists excavate a late 18th to mid 19th century cemetery under St James Gardens near Euston train station in London, Nov. 1, 2018, as part of the HS2 high-speed rail project.

Trucks, cars, excavators, and cranes are all vehicles you might find at an excavation site.



After discussing their ideas, explain to learners that archaeologists sometimes use heavy machinery, such as backhoes and mini-diggers. These types of vehicles are very helpful if used properly. The greatest advantage they offer is efficiency. In a given amount of time, these machines can move much more soil than several people can with shovels.

Development
(Build)



Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device

Build a LEGO Vehicle

Explain to the class that we are going to build a LEGO vehicle and then adapt it so that it could be used by archaeologists at an excavation site.

Purpose of the builds:

- To apply their developing understanding of engineering and coding in building and adapting a LEGO vehicle.
- To reinforce learner understanding and experience of using and coding motors and sensors.

1. Guided Build and Code:

In teams, learners engage with the LEGO Education classroom project:

a. SPIKE Essential - Artic Ride

b. WeDo 2.0 - Milo the Science Rover

2. Coding Challenge Activities:

Once the basic vehicle build has been completed, set the following tasks which challenge them to explore how the coding works and how it can be changed.

Development
(Build)

SPIKE Essential
Arctic Ride challenge tasks

1. Make the vehicle move forwards and backwards.
2. Make the vehicle turn left and / or right.
3. Change the speed. What do you observe?
4. Change direction and / or duration of distance travelled.
5. Add a sensor to the LEGO vehicle and complete the following tasks (reinforce from Session 7):
    a. Code their vehicle to stop at an icon on the UNEARTHED mat.
    b. Record and add a learner-recorded sound to play when the sensor is triggered.
    c. Write an algorithm that plays a noise and flashes a light when the sensor is activated.
6. Remind learners from a previous session (7) why it is beneficial to have the sensor provide both visual and audio alerts.

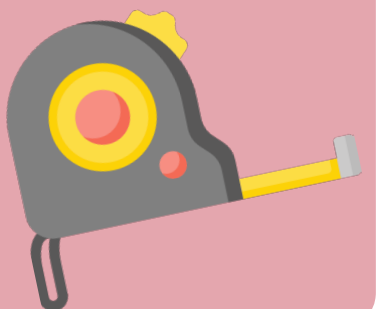
WeDo 2.0
Milo the Science Rover challenge tasks

1. Make Milo move forwards and backwards.
2. Make the vehicle turn left and / or right. (Milo is unable to turn without modifications to its design).
3. Change the speed. What do you observe?
4. Change direction and / or duration of distance travelled.
5. Use a sensor with Milo and complete the following tasks (covered in Session 7):
    a. Code Milo to flash a coloured light on the hub when the sensor is activated
    b. Change the colour displayed by the hub
    c. Write an algorithm (code) that plays a noise and flashes a light when the sensor is activated.
6. Remind learners why it is beneficial to have the sensor provide both visual and audio alerts.

Development
(Build)

Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- UNEARTHED Mat
- Pencils and rulers



3. Adapting their Vehicle:

Now that the class have built and coded their basic LEGO vehicle, prompt learners to think about the vehicles used by archaeologists to handle and move artefacts and excavated materials (e.g., trucks, cars, excavators, cranes).

Explain to the class that each group will work like engineers to adapt their vehicle so an archaeologist can use it to handle and/or move artefacts or excavated materials.

Scaffold and prompt this task with the following questions:

- *How will an archaeologist use your vehicle?*
  - *Moving something heavy?*
  - *Carefully transporting something?*
  - *Moving soil?*
  - *Sifting materials?*
- *What types of terrain and conditions will your vehicle be working in? How will you adapt your vehicle to suit these conditions? E.g., thick wheels/ tyres for uneven ground; size of the vehicle to allow for navigating tight spaces*
- *What physical (engineering) changes will you make to your model?*
- *What changes will you make to your vehicle's algorithm (code)?*
- *What could you add to improve your vehicle (e.g. colour sensor; LED matrix; sound recordings)?*

Programming their LEGO Archaeology Vehicle

1. Dig Site Challenge

Now that teams have adapted their vehicle to handle and/or move artefacts or excavated materials, it is time to test it out on a dig site.

Explain to the class that they have been tasked with programming their vehicle to move artefacts/materials from the dig site. The dig site is represented by the UNEARTHED mat, and the artefacts/materials are represented by LEGO elements.

Programme your vehicle to move from a starting point, to a point on the mat, collect the artefact/materials, and return to the starting point.

Development
(Build)

This task will likely take a few tries, and learners will need to think about:

- *How fast is your vehicle travelling; would it be more accurate if it were faster or slower?*
- *Is your vehicle starting at the same starting position each time? What could you do to ensure this? (e.g., use LEGO elements to mark the spot)*
- *Will your vehicle turn around to return, or could it drive in reverse? Your vehicle can't easily see what is behind: what could you add to your programme to make this more safe for passing archaeologists?*

Note to teachers:

Using LEGO WeDo 2.0: Vehicles adapted from Milo may not be able to make turns. Ask learners to programme their vehicle to travel to the grid square where a turn is needed, add a 30sec 'wait', and then manually turn the vehicle to point in the next direction of travel.

This challenge task can be adapted to include multiple pick-up locations, different start and end points, hazards to avoid, etc.

After learners have had a chance to work on this challenge, use the following prompt questions to spur a class discussion:

- *What was your original goal?*
- *What happened when your team tried to achieve it?*
- *What modifications did your team make?*
- *What has your group learned from this challenge that could inform the work of an archaeologist?*

2. Grid-reference Code Challenge

This learning activity develops upon the previous task by introducing a grid mapping system. This could also serve as an extension or early-finisher task.

Remind learners of the grid system used by archaeologists when working on a dig site. The images below demonstrate this.

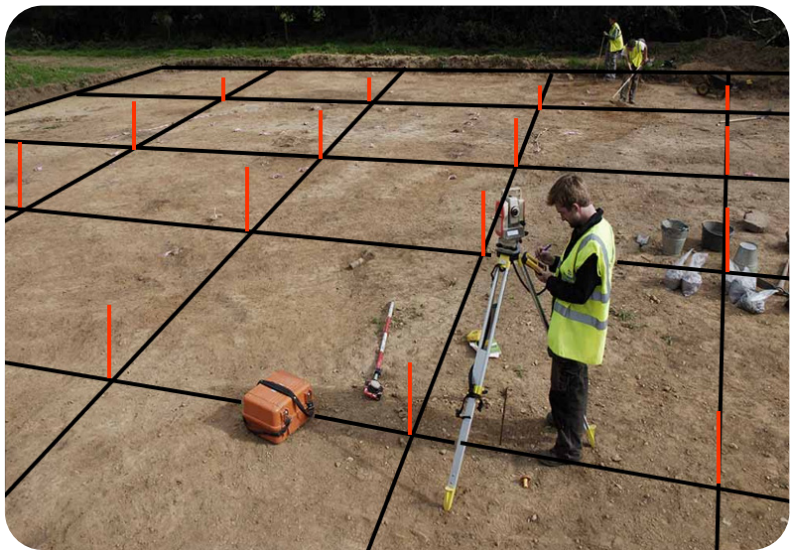
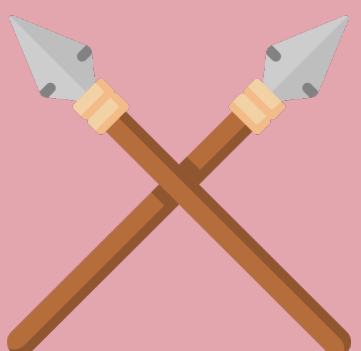


Image A: Setting out a survey grid. Taken from Archaeology Time in Transition.

Development
(Build)



	A	B	C	D
1				
2				
3				
4				

NORTH

Image B: Grid reference outline

Explain the challenge scenario to learners as follows: The site manager has asked you to programme your vehicle to travel from the entrance to the dig site (A1) and collect an artefact discovered in D4, before returning to A1. You must be careful to avoid B2 and B3 as these are being examined by archaeologists at present.

The activity sheet will help explain this to groups: HandleAndMoveArtefacts_activity

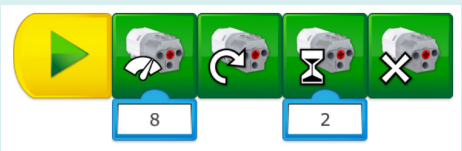
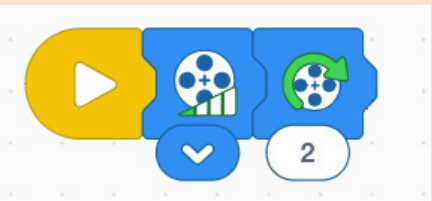
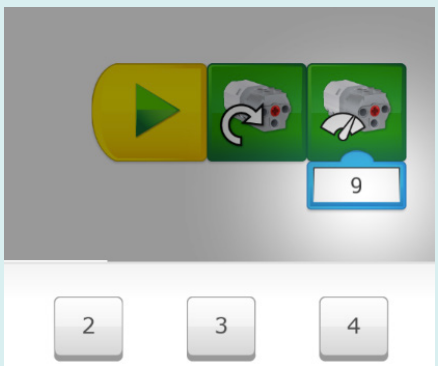
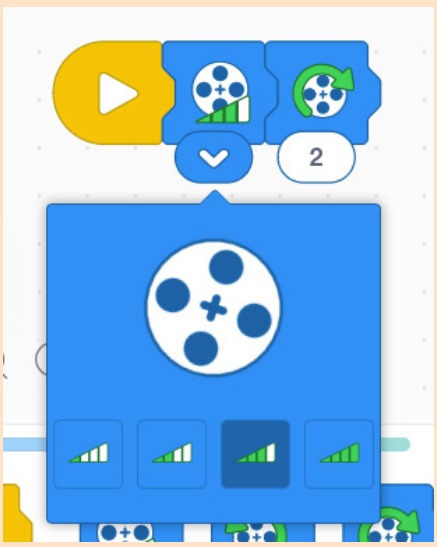
1. Groups either:
   a. Recreate this site grid map on graph-paper or
   b. Adapt the LEGO UNEARTHED Mat by adding grid details to it (with rulers and pencil).
2. Learners will need to use their mathematical skills to work out the size of their grid squares. They might see how far their vehicle travels in one rotation of the motor; or in two seconds of movement.
3. Write a programme (code) for your vehicle to collect the artefact. For example, learners challenge each other to get from B3 to D7 avoiding C6 etc.
4. Test and improve this programme so that it runs smoothly, without errors.

This task could then be adapted by adding further artefacts to collect and/or hazards to avoid.

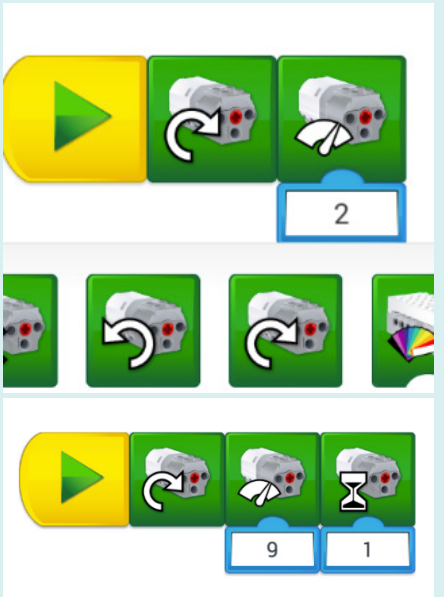
Coding & Build Guidance for Teachers

Resources:

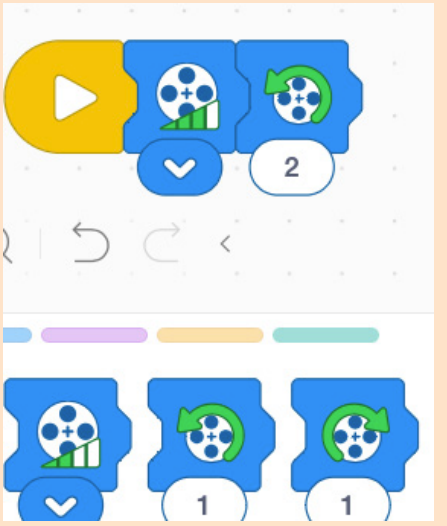
- Narrated video for each program

LEGO Education WeDo 2.0 classroom project: **Milo the Science Rover**	LEGO Education SPIKE Essential **Lesson 3 - Arctic Ride**
	
This program begins by setting the motor power at '8'. It then sets the rotation of the motor, clockwise, to move forward. The motor will run for a duration of '2' seconds before stopping.	This program begins by setting the motor power. It then sets the rotation of the motor, clockwise, to move forward. The motor will make two full rotations. Links could be made to each rotation equalling 360 degrees.
This simple algorithm (code) can be tinkered with in order to make the model move more quickly/slowly, to change the direction of movement (clockwise/anticlockwise), and to change how long/short the motor stays on for (duration).	
Change speed	
 The motor power can be increased or decreased	

Change direction and duration

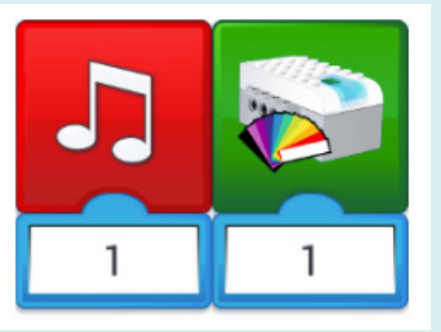


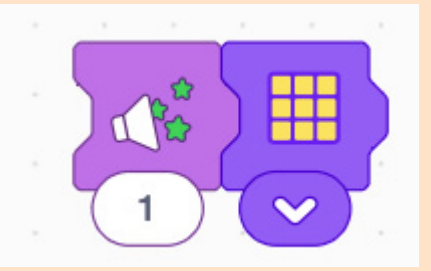
The number under the hourglass is the number of seconds the motor will run.



The number under the rotation (2) sets the number of rotations, in this case the duration.

The algorithm could be further adapted to add use of sensors and sound and/or lights. See the coding & build guidance in Session 7 and/or the SPIKE/WeDo app for further support and examples.



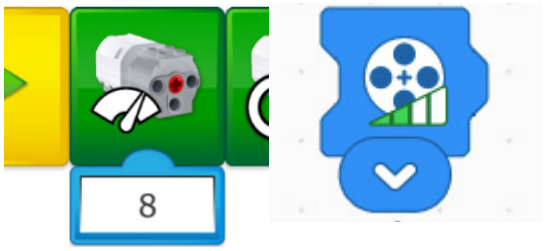


Guiding questions:

- *Can you tinker with the code in order to make the vehicle run for longer?*
- *Can you change the code to make the vehicle move faster?*
- *I wonder what might happen if you change the number under the motor or duration blocks?*
- *Can you see any blocks that might make the vehicle change direction? (change the rotation from clockwise to anticlockwise)*
- *I wonder if you could make the vehicle play a sound and/or flash a light to warn that it is about to move?*
- *I wonder if you could change the order of sound and light?*

LEGO WeDo 2.0 - Do a turn

Milo the Science Rover is not mechanically capable of turning due to its design. The purpose of this challenge task is to encourage learners to consider the design of a robotic model and any limitations it may face.



The number under this block sets the power of the motor. Encourage learners to test what happens when this number is changed. Does the robot move faster/slower?

Learners could build upon the code learnt in previous builds:

- The motion sensor or colour sensor could be used to start or stop the robot.
- A sound could be played or a light could flash when the code begins or ends. This idea could link to the reversing warning noise that is a feature on most newer models of cars.

Closure (Document/ Share/Tidy up)

Resource(s):

- Digital Portfolio
- Digital Device

Document:

1. Each team documents and reflects upon their vehicle prototype - adding photos, videos, notes to their digital portfolios.
2. Consider how they built it, how it works, how they might change or adapt or improve it.

Share:

1. What they built, and how it would help an archaeologist.
2. Show the coding skills they learned.
   a. Explain how they changed the program.
   b. Explain a problem they faced or overcame.
3. Demonstrate their solutions.

Teams tidy up:

1. All prototypes should be taken apart and returned to the LEGO Education Set (SPIKE Essential or WeDo 2.0).

Extension Activities

Consider these ideas for extension activities:

While their archaeology vehicle was on site, your team stumbled upon something unusual. It may be of great archaeological significance…

Drama: Your team will act out the moment of discovery and the immediate reactions to finding something significant.

Literacy: As a team, write a short "Field Log Entry" documenting your significant discovery.

Session 9: Archaeology Careers

Purpose:

Learners will explore archaeology careers and build a radar model which uses sensors and outputs.

Core Values:

Learning outcomes:

Learners will be enabled to

1. Develop initial understandings of careers linked to archaeology including: Site Manager, Lab Technician, Anthropologist, Conservator, Geologist, and Museum Curator.
2. Apply their understanding of sensors and if/then statements while building and programming the radar model.

Learners will build:

- Build the Radar model, including a sensor and hub
- Optional - the excavation site model

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- LEGO UNEARTHED Radar model and Book 1
- Optional - Excavation Model: UNEARTHED Bags 2-5 and Book 2

Digital resources:

- Archaeology Career task cards
- Short, simple YouTube video: Georadar and Archaeology (1 min 39 sec)
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy
Geography	Human Environments	People at Work	Analysing; recording and communicating; predicting
Literacy	Oral Language; Reading	Communicating; Understanding	Communicating; Understanding; Exploring and using

Introduction

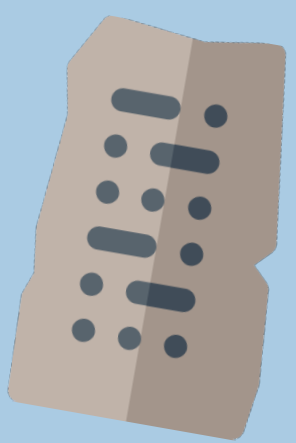
Begin this session by revisiting the work of an archaeologist. The following questions could be used to activate prior knowledge:

- *Can anyone explain what an archaeologist does?*
- *Do we know any archaeologists?*
- *Where might archaeologists work? Explain*
- *What types of work might an archaeologist do? What makes you think this?*
- *Who can remember a tool or piece of technology that an archaeologist uses? In your opinion, what is important?*
- *How might the work of an archaeologist and a detective differ? How might it be similar? Explain why you think this*

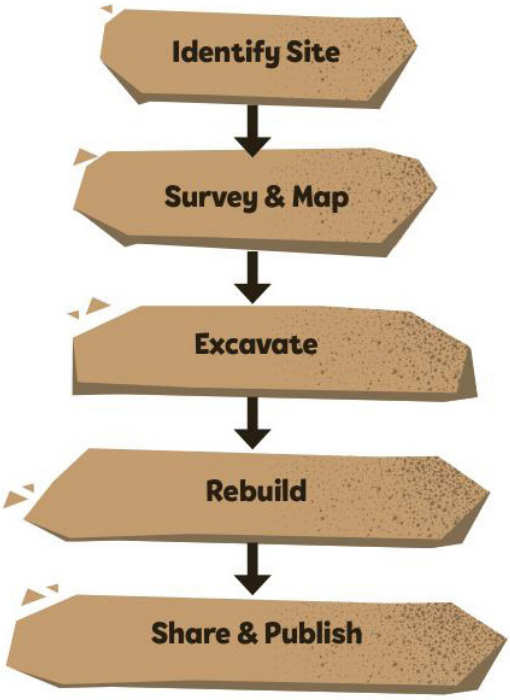
Remind learners that:

Archaeologists carefully study artefacts and solve real-life puzzles to uncover the stories of people from long ago. Archaeologists do lots of different jobs to help people learn about the past. They may do research, excavate or dig up treasures from underground, study in a lab, or manage collections of ancient artefacts.

Introduction



Ask the class to think about everything we've learnt about what happens during the archaeological process.



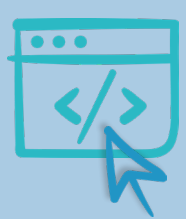
Use some of the following questions to prompt discussion:

- *What types of jobs happen at each stage?*
- *What jobs would you find at an excavation site?*
- *What places are artefacts sent to so that people can study them?*
- *What jobs support the work of archaeologists?*

Development

Resource(s):

- Digital device
- **Task cards**



Archaeology Careers

Explain to the class that there are many people involved in any archaeological excavation. These people all work hard at their jobs so that the overall archaeological process can be completed successfully. Some of the careers involved at different stages of the process include:

- Site Manager
- Lab Technicians
- Anthropologist
- Conservator
- Geologists
- Museum Curator

Rather than everyone reading about six different archaeology careers, we will divide into smaller groups (e.g., build teams, or other pairs/trios) and each group will investigate one archaeology career and then share their findings with the class.

Development

Display the following three guiding questions on the IWB and explain that each group will be answering these questions as they relate to their career:

- Describe what this job involves?
- What kind of training and skills does it require?
- What kind of tools or technology are used?

Groups could use digital devices to search for further answers to these questions using reliable online sources. The task cards include basic information which will answer each guiding question.

Distribute task cards and/or digital devices and allow groups time to work on their investigations.

These prompt questions could be helpful to scaffold groups while they undertake this activity:

- What does your archaeology career involve?
- Why is this important work?
- What kinds of tools or technologies do they use?
- Do the tools or technologies have any special features?
- What stage of the archaeological process are they involved in?
- What other archaeological careers do they interact or work with?
- What kinds of challenges might they face while undertaking this work?

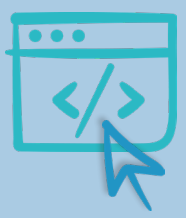
After sufficient time has passed, ask each group to share their answers to the three guiding questions. Careers and answers could be recorded on the IWB or whiteboard.

End this investigation of archaeological careers by asking each group to take a moment to discuss which career they are most interested in, and why.

Development

Resource(s):

- Video: **Georadar and Archaeology**



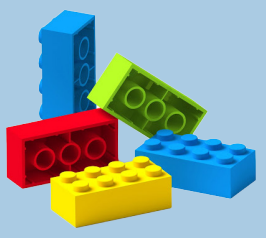
Introducing the radar

Radar is a technological tool used by almost all of the archaeology careers encountered. To help learners gain a greater understanding of how radar is used on a dig site, show the following short video: **Georadar and Archaeology** (1 min 39 sec).

As explained in the video, archaeologists use a special kind of radar (sometimes called GPR - Ground Penetrating Radar) to find old, buried things like ancient walls, pottery, or even buried cities, without digging up the whole field!

Imagine your team has been asked to build a device similar to radar to help them? What kinds of things do you need to consider? Let's explore!

Development
(Build)



LEGO Builds

Purpose of the Build:

- To reinforce the learner's understanding and experience of using and coding sensors.
- Tinker with and build upon the sensor code to add sound, light to their radar model.

First, each group will follow the same instructions in Book 1 to build the radar model.

Second, depending on whether your class is using SPIKE Essential or WeDo 2.0 sets, groups will follow the following instructions to apply their knowledge of sensors to their build.

Development
(Build)

Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- Book 1
- Kit Bag 1

SPIKE Essential - Improving the radar model

1. In teams, learners use the building instructions in Book 1 to improve their radar model by attaching the sensor, LED matrix and hub.
2. Open the SPIKE app and programme their Radar model to make use of the sensor, LED matrix and hub. The basic program will be very similar to what was used for the 'Animal Alarm' - see Coding & Build Guidance for Teachers for images.
3. Once a team has the basic program working, assign the following challenges.

Change the program so that your upgraded Radar will do the following:

a. When an artefact is detected, the LED matrix flashes a light, to notify the archaeologist.

b. When an artefact is detected, a sound is played, to notify the archaeologist.

c. When an artefact is detected, the LED flashes a light and a sound is played, to notify the archaeologist.

4. Each team chooses an archaeology career and discusses the tools used by this career. Adapt the Upgraded Radar model to be used by this archaeology career.
5. Task the group with testing out their radar model.
   a. If their radar is mobile, they could move their radar model to different locations on the UNEARTHED mat. What kinds of artefacts could be detected by their radar?
   b. If their radar is not mobile (i.e., more like a CT scanner), move different artefacts past the sensor and explain what the radar might detect about these artefacts?
   c. How could teams improve the physical design or the program (code) of their radar model for their chosen archaeology career?

Development
(Build)

Resource(s):

- WeDo 2.0 Radar instructions

WeDo 2.0
Improving the Radar model

1. In teams, learners use the building instructions - available here - to improve their Radar model by attaching the motion sensor and hub.
2. Open the WeDo app and programme their Radar model to make use of the motion sensor and hub. The basic program will be very similar to what was used for the 'Spy Robot' - see Coding & Build Guidance for Teachers for images.
3. Once a team has the basic program working, assign the following challenges.

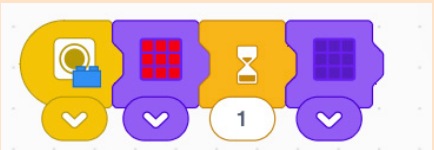
> Change the program so that your upgraded Radar will do the following:
>
> a. When an artefact is detected, the hub flashes a light, to notify the archaeologist.
>
> b. When an artefact is detected, a sound is played, to notify the archaeologist.
>
> c. When an artefact is detected, the hub flashes a light and a sound is played, to notify the archaeologist.

4. Each team chooses an archaeology career and discusses the tools used by this career. Adapt the Upgraded Radar model to be used by this archaeology career.
5. Task the group with testing out their radar model.
   a. If their radar is mobile, they could move their radar model to different locations on the UNEARTHED mat. What kinds of artefacts could be detected by their radar?
   b. If their radar is not mobile (i.e., more like a CT scanner), move different artefacts past the sensor and explain what the radar might detect about these artefacts?
   c. How could teams improve the physical design or the program (code) of their radar model for their chosen archaeology career?

Coding & Build Guidance for Teachers

Resources:

- **Narrated video for each program**

WeDo 2.0 Classroom Project: **Spy Robot**	SPIKE Essential: **Lesson 2 - Animal Alarm**
	
Once the code is executed (started), this robot will wait until the sensor senses motion. It will then start playing an audio file (sound 1).	Once the colour sensor recognises the target colour (blue), the colour light matrix will display a 3x3 grid of red lights. After 1 second has passed, the colour light matrix will not display any lights.

This simple algorithm (code) can be tinkered with in order to make the 'alarm' more effective by including both lights and sound. The additional code blocks for lights in WeDo 2.0 and sound in SPIKE Essential are shown below.

WeDo 2.0	SPIKE Essential
	

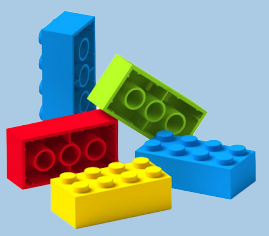
Guiding questions:

- *Can you change the sound the robot makes?*
- *I wonder what might happen if you change the number under the music block?*
- *Can you see any blocks that might make the robot turn on a light?*
- *Can you change the colour of the light?*
- *Can you make the robot play a sound and flash a light one after the other?*
- *I wonder if you could change the order of sound and light?*

Teacher tip:

Remember that the sound comes from the digital device, not from the hub. Learners may need to turn up the volume on the device.

Development
(Build)



Resource(s):

- LEGO Education Set (SPIKE Essential or WeDo 2.0)
- Digital Device
- Book 2
- Bags 2-5

OPTIONAL LEGO Build

The following build can be time-consuming, but it provides a useful example of the layered nature of an excavation site.

1. Instruct each group (or members of groups) to use the instructions in Book 2 and pieces from Bags 2-5 to build the Excavation Site model.
2. Use the building instructions in Book 2 to attach the hub and motor to the model.
3. Open the SPIKE or WeDo app and try the program provided in Book 2 to activate the millstone inside the excavation site model.

Closure (Document/ Share/Tidy up)

Resource(s):

- Digital Portfolio
- Digital Device

Document:

1. Each team documents and reflects upon their radar model - adding photos, videos, notes to their digital portfolios.
2. Consider how they built it, how it works, how they might change or adapt or improve it.

Share:

1. What they built, and how this radar would be used by their chosen archaeology career.
2. Show the coding skills they learned.
   a. Explain how they changed the program.
   b. Explain a problem they faced or overcame.
3. Demonstrate their solutions.

Teams tidy up:

1. The radar model can be left assembled
2. Remove the hub and sensor from the Radar and return them to the LEGO Education Set (SPIKE Essential or WeDo 2.0).
3. Any other prototyping pieces should be taken apart and returned to storage.

Extension Activities
[Consider These Ideas]

Consider these ideas for extension activities:

Coding and Computational Thinking: Consider deepening learner understanding of how to build and code using motors and sensors by completing some of the following guided build activities:

- LEGO SPIKE Essential:
  - **Cave Car**
  - **Rubbish Monster Machine**
  - **Energy Resources**
- LEGO WeDo 2.0
  - **Moon Base**
  - **Inspection**
  - **Animal Senses**

Become a Paleontologist - BBC Earth and Minecraft Education jointly created a build challenge that puts students in the role of paleontologists. These challenges and resources could be adapted to your class: **link**

Challenge questions for each career:

The following challenge questions could be used as the stimulus for drama, further research and investigation, oral discussion, writing, etc.

Site Manager Challenge: You've just been called because a huge storm is heading for the dig site later today. You have very delicate, recently unearthed artefacts exposed, and half your team is still far out in the field. What are the first three things you do as a Site Manager to protect the site and your team?

Lab Technician Challenge: You receive a new box of artefacts from a dig, and among them is a ceramic pot that has shattered into dozens of tiny pieces – some no bigger than your fingernail! It looks like a near-impossible puzzle. What steps do you take as a Lab Technician to begin piecing it back together, ensuring you don't lose any information?

Anthropologist Challenge: Your team has found a strange, unique tool at an ancient settlement site – unlike anything seen before. It doesn't seem to fit with the other known tools of that period. As an Anthropologist, what kind of questions would you ask, and what steps would you take to try and understand how the people from the past might have used this mysterious object?

Conservator Challenge: Archaeologists have just unearthed a very old, soggy wooden object – perhaps part of an ancient boat! You know that if it dries out too quickly, it will completely fall apart. As a Conservator, what is your immediate priority, and what special methods or tools might you use to save this fragile piece of history?

Geologist Challenge: Your archaeology team is digging in an area with many different layers of soil and rock, but they're unsure which layer is the oldest to help date their finds. They're also struggling to dig through a particularly hard, rocky section. As the Geologist on site, how do you help them understand the history of the ground and suggest the best way to continue digging?

Museum Curator Challenge: You have an amazing new artefact – a beautiful, intricate piece of ancient jewellery – but it's very small, and you want to tell a big story about the person who might have worn it. As a Museum Curator, how do you design a display that makes this tiny object stand out and helps visitors imagine its significance from long ago?

Session 10: Team Model and Poster

Purpose:

Learners will work in teams to create their Team Model and Poster, which tell a story of the past, sharing what they have learned about the work of historians and demonstrating an understanding of the archaeological process.

Core Values:

Learning outcomes:

Learners will be enabled to

Team Model:

1. Demonstrate knowledge and understanding of the archaeological process, the work of historians, and/or a story of the past.
2. Work collaboratively to build and code a Team Model which tells a story of the past, sharing what they have learned about the archaeological process.
3. Collaboratively design and label the Team Model.

Team Poster:

1. Work collaboratively to plan and design a Team Poster which describes the team's learning throughout the sessions and supports the Team Model.
2. Communicate the purpose of the Team Model.

Learners will build:

- Each team will build a LEGO model of their own design which includes motorised parts and sensors (at least one).

Progress:

Resources

Per team:

- Materials for planning design: digital tool (e.g. Book Creator/ Canva/Slides/Powerpoint, etc.) or paper/copy
- LEGO Education set (SPIKE Essential or WeDo 2.0)
- UNEARTHED Explore set (optional)
- UNEARTHED mat (optional)
- Prototyping pieces (from UNEARTHED set)
- Digital Device
- Digital poster software (e.g. Canva, Slides, **piktochart**)
  - OR poster board
- Digital portfolio which includes reflections, photos and videos of their building, coding and computational thinking to date
- Markers/crayons/colouring pencils

Optional:

- The Team Model can use extra LEGO bricks, minifigures, baseplates and other LEGO elements in addition to the LEGO Education Set and UNEARTHED Set.
- Additional multimedia resources can also be used to support their project (e.g. video, presentation, interactive materials).

Digital Resources:

- **UNEARTHED Team Build Checklist**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
Mathematics	Shape and space; Measures	2-D shapes; 3-D shapes; Time	Applying and problem-solving; Communicating and expressing; Integrating and connecting; Reasoning; Implementing
Science	Energy and Forces; Materials	Forces; Properties and characteristics of materials	Design and make
Literacy	Oral Language Writing	Communicating	Communicating; Understanding; Exploring and using
Visual Arts	Construction; Drawing	Making constructions; Making drawings	An awareness of line; An awareness of form; An awareness of space
SPHE	Myself and others; Myself and the wider world	My friends and other people; Relating to others; Developing citizenship	Communication; Co-operation; Decision-making
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy

Introduction

Introduction

1. Teacher introduces the session by reflecting on the UNEARTHED project to date. Suggested questions to scaffold this discussion:
   a. What have we learnt about the work of historians and the archaeological process?
   b. What makes stories from the past important?
   c. Which of the historical sites, cultures or stories was your favourite, and can you explain why?
   d. What types of jobs or careers relating to exploring life in the past did we learn about? Could you explain to your partner what each archaeological career involved? Which would you like to do most, and why?

Introduction

e. What types of tools and technology did the archaeologist/historian, etc. use that enabled their team to explore the past?

2. Follow this by asking learners what they would share with others from the UNEARTHED sessions (e.g. other classes, parents, family, wider school community)?
3. Next ask the class to think about the LEGO builds and programmes (codes) they encountered.
   a. What have they built?
   b. What types of coding blocks do they know how to use? (e.g. motor, sensor)
   c. What types of things could they program their LEGO robot to do? (e.g. sound, colour, movement)
   d. Were there any ways they could program their LEGO robot to react to motion (e.g. sensor)?
4. Finally, explain to learners that they are now going to use all that they have learnt through the UNEARTHED sessions in order to create a Team Model and Poster *"that represents an interesting way to share your team's understanding of working as a historian, and the archaeological process"*.

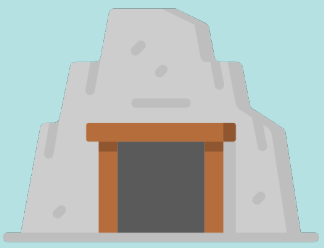
Note to teacher:

The UNEARTHED theme is intentionally deep, and allows for learner agency in selecting a project topic, or problem they would like to try to solve. The following are some general ideas for projects:

- Representing their understanding of an archaeological site (e.g., a local historical site or a significant national site such as Newgrange) or a specific time in history and the artefacts present in this context by creating a motorised model of the site or a relevant scene.
- Represent their understanding of how an artefact can be investigated to tell us more about the past.
- Creating a motorised team model which represents the work of an archaeological career (e.g., archaeologist, conservator, palaeontologist) at a given archaeological dig or historical location.
- Prototyping a new technology which could assist in exploring the past (e.g., a new tool or method to improve the excavation or preservation of a specific type of artefact).
- Identifying a challenge facing a specific archaeological site or historical discovery, and designing a team model which represents a way of addressing this challenge (e.g., erosion upon ruins or the preservation of delicate scrolls).
- Representing a solution to a real-world problem which involves preserving history or our understanding of the past (e.g. sustainable tourism practices for historical landmarks, or improving access to historical information for communities).

These ideas are provided to support teachers in guiding teams, and are not intended as a 'project menu'.

Introduction



Team Model requirements:

1. Include motorised parts and sensors (at least one).
2. Use LEGO coding (SPIKE/WeDo 2.0 app).
3. Should fit on a table, be sturdy and be easily transportable (to bring to a showcase).
4. There is no requirement to use the UNEARTHED Mat, or to include the radar model or the archaeological excavation site. If using either model, it is encouraged that they be adapted.
5. Teams can use additional materials to support and represent different aspects of their build.

Team Poster requirements:

Divided into three sections, **Explore, Create and Test,** and **Share**. The questions below are designed as a prompt, but team posters can/should be more specific to their model. It is not intended that the poster answer the questions below.

1. **Explore** - What did you learn about a story of the past, sharing what they have learned about the work of historians and understandings of the archaeological process, e.g.,
   a. What is archaeology and why is it important?
   b. What the team learned about the work of historians and the archaeological process?
   c. How and why do people explore the past?
   d. What have you learned about a local historical site or a significant national site such as Newgrange?
   e. How do historians and archaeologists use tools and technology to uncover the stories of people from long ago?
2. **Create and test** - The team's LEGO builds and coding
   a. Previous Builds: What did you learn about coding and computational thinking by completing previous builds? Including screenshots where helpful.
   b. Team Model: what does this model represent? How did you build and code this?
   c. Modifications: How did your team test and improve your build and code?
3. **Share** - Supporting information relating to the team's archaeological discoveries. *This section will differ depending on the team's project. Questions might include:*
   a. What did you learn about a (local) archaeological site? What does this tell us about life in the past?
   b. What archaeology career are you most interested in, and why?
   c. How could the tools and technology used by archaeologists be improved?
   d. How do archaeologists overcome challenges at archaeology sites?

Development

Resource(s):

- LEGO Education set
- UNEARTHED set
- Additional LEGO pieces
- Digital device
- Digital portfolio (reflections, photos and videos of previous builds and code)
- A4 paper or relevant copybook for planning

The focus for the remainder of this session is on the creation of a Team Model & Poster. It is likely that teams will work at different paces and require different levels of support and scaffolding.

Some groups may need to complete their discussion or plan for their Team Model, others may be ready to begin iteratively building their Team Model.

Some teams may elect to focus on the Team Model first, followed by the Team Poster. Others may work on both simultaneously. There is no 'correct' approach or order.

Team Model:

In teams, learners build the design using the prototyping pieces and any other LEGO elements available. Learners ensure that their Team Model meets the Team Model requirements:

1. Include motorised parts and sensors (at least one).
2. Use LEGO coding (SPIKE/WeDo 2.0 app).
3. Should fit on a table, be sturdy and be easily transportable (for future Showcase Event to share and communicate ideas).
4. Teams are encouraged to take inspiration from the builds encountered so far in order to develop an original motorised part in their model.
5. Remind teams to document their progress as they go as this will be used on their Team Poster.

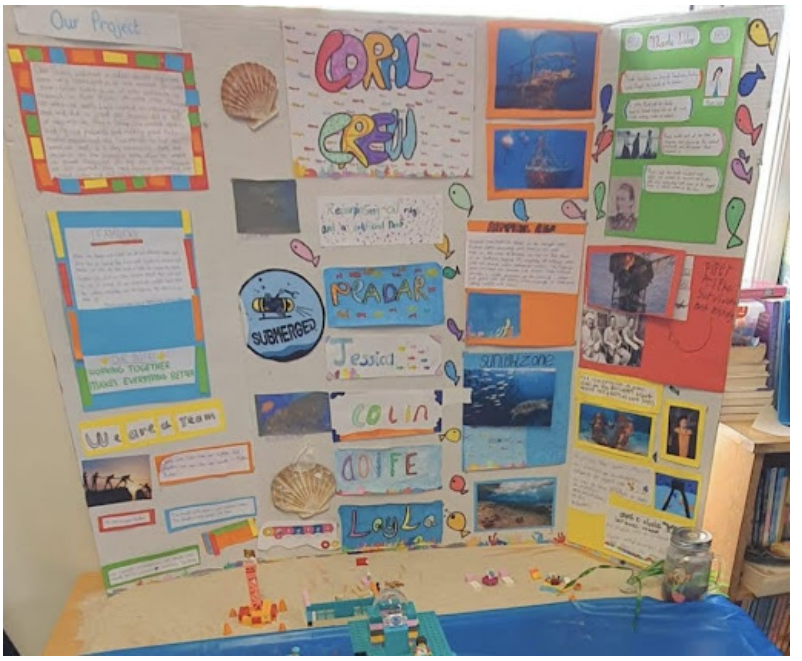
Make Team Poster:

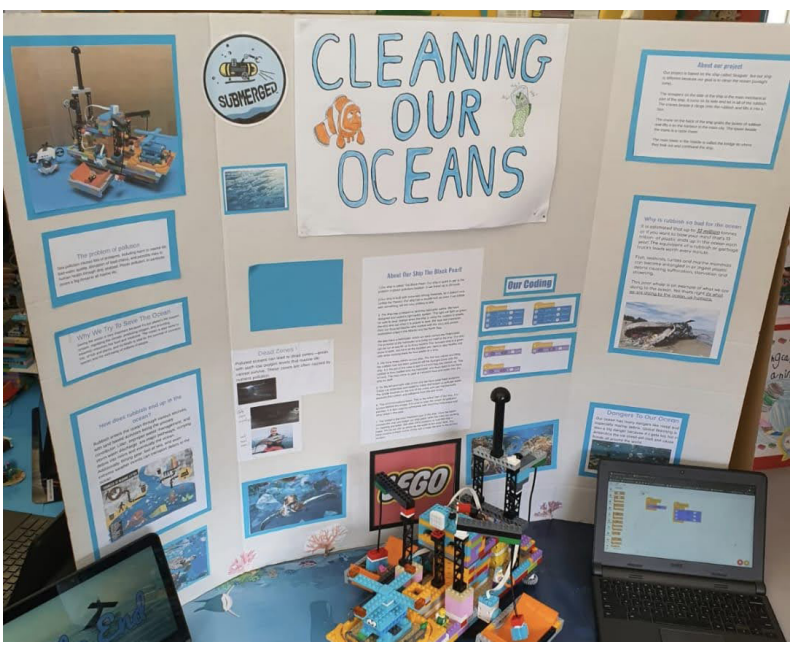
Alongside building their Team Model, teams are tasked with creating a Team Poster which supports their Team Model in sharing their team's archaeological discoveries and/or understanding of life in the past with others. Team Posters should meet the requirements listed at the beginning of this session.

Suggested headings include:

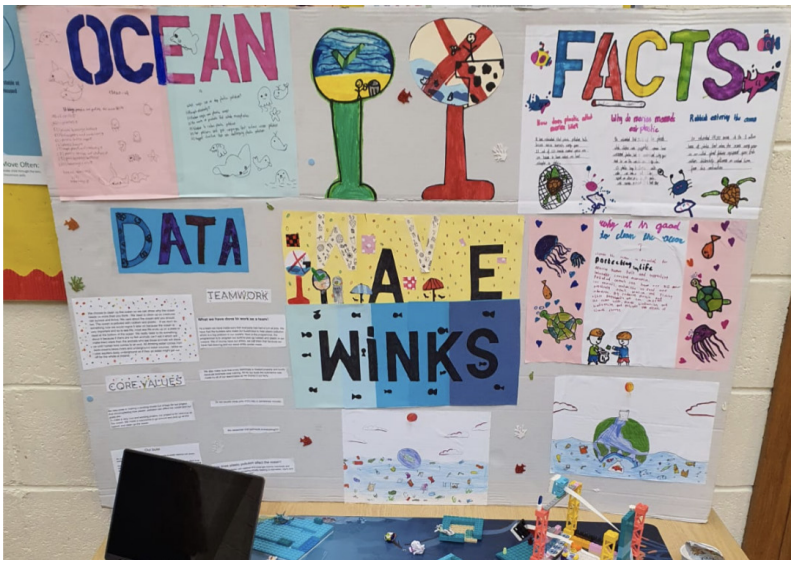
1. **Team name:** Each poster should include the Team Name.
2. **Our model:** Include a detailed drawing of the Team Model, including explanation of how they decided upon their model, and how this changed over time (iteration).
3. **Our coding program:** What program did the team use for their model? Can you add this here?
4. **Our Deeper Discoveries:** Any additional information to support their team model.

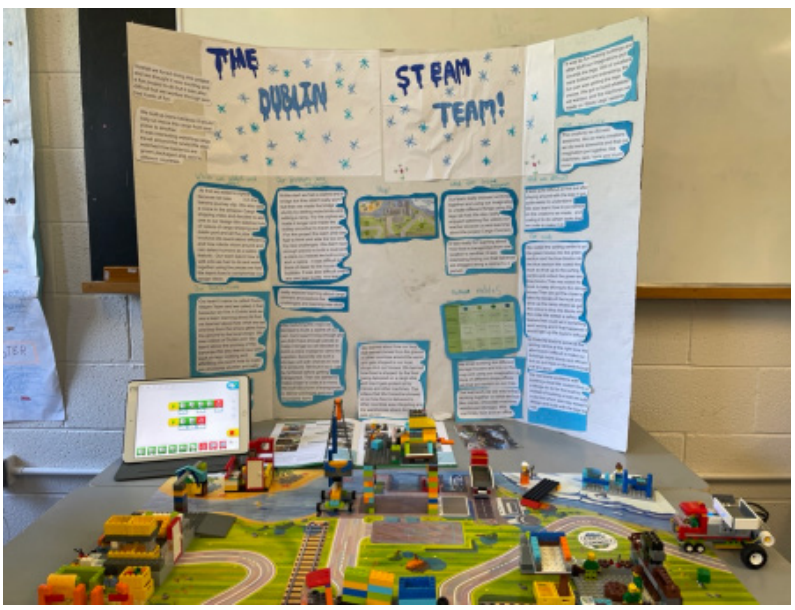
Development

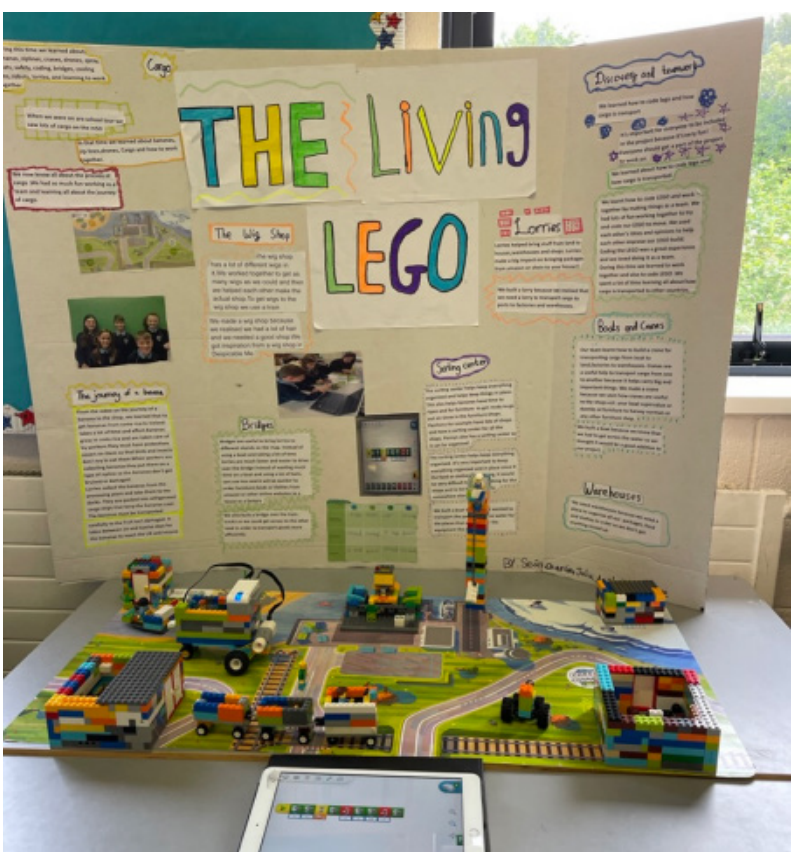




Development







Development

-- Suggested break between sessions --

Following completion of Team Models and Team Posters:

Evaluate: Encourage the learners to reflect on their build with their team: How does their Team Model share their team's archaeological discoveries and/or understanding of life in the past?

1. What part of your model is motorised, and how have you coded this?
2. What sensors have you used, and how do they improve your model?
3. What other things would you like to add?
4. What are the strengths and the weaknesses of your design? (particularly structural - is the model sturdy enough to be moved)
5. What will your model teach, show or demonstrate about your archaeological discoveries and/or understanding of life in the past?

The following **checklist of questions** can support assessment while teams share their models and run their code:

1. Is power running continually?
    a. Does it start/stop - is there a pattern?
2. Is there a motorised part?
    a. What does it represent?
    b. Does it work as intended?
3. Are sensors used?
    a. For what purpose?
    b. Does it work as intended?
4. Does it make a sound?
    a. Is this sound linked to motion or as a safety feature?
    b. Could self-recorded sound be used?
5. Are there any flashing lights?
    a. What do these lights symbolise or represent?
6. Could ideas from other teams be adapted to improve your team's model?

Closure (Document/ Share/Tidy up)

Resource(s):

- Digital portfolio
- Digital device
- Team build checklist

Document:

Each team documents and reflects upon their builds - adding to their digital portfolios etc.

Share:

1. Teams share their completed Team Models and Posters with the class.
2. Teams demonstrate and explain how their Team Model and Poster ***"represents a unique way to share your team's archaeological discoveries and/or understanding of life in the past with others"***.
3. Teams explain the program and how sensors and motors are used as part of their build.

Teams tidy up:

1. The Team Model will remain assembled from this point forward until the event and should be placed in the designated storage space.
2. Any unused pieces should be returned to the correct box and stored - this includes LEGO Education set, prototyping pieces, and any LEGO elements supplied by learners.

Coding & Build Guidance for Teachers

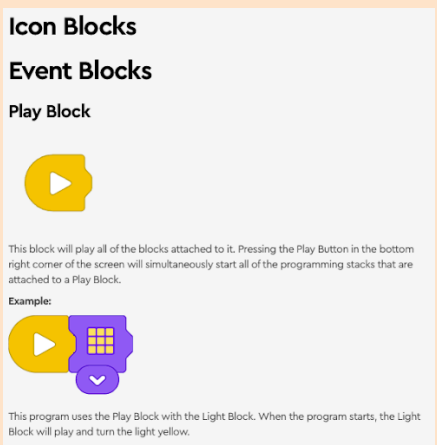
There is no specific code or build in this session.

The programs encountered to date should be adapted and innovated upon. Further assistance and guidance can be found below.

The LEGO WeDo 2.0 app includes a **program library** and **build library** which demonstrates ways in which learners could build and code their model in order to achieve different outcomes.

This can be accessed by clicking on the 'lightbulb' icon in the top left of the app.

The SPIKE Essential app **help section** (bottom left corner of the app) includes a helpful detailed explanation for each of the Icon Blocks used to create code.



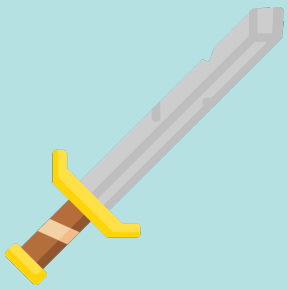
Coding & Build Guidance for Teachers

Teacher questioning and scaffolding will assist teams in creating innovative models. The more learners are questioned, the more they will be encouraged to think about the what/how/why of their prototypes/ models that represent their ideas. The following Guiding Questions could be adapted to support your class.

Guiding questions:

- *What part of your model could you motorise?*
- *What would you like it to do? How can you motorise it to do this?*
- *What sensors could you use? How might these sensors be used?*
- *Could we test and improve this?*
- *How does your model share your team's archaeological discoveries and/or understanding of life in the past with others?*
- *I wonder if you could make use of skills you've encountered in other builds? Could your digital portfolio have ideas you could build on?*
- *Could your model make use of light and/or sound?*
- *Could you tinker with your code in order to make it work faster/slower?*
- *Could your model play an original sound? How could you record your own original sounds?*
- *I wonder if you could change the order of sound and light?*
- *Have you spoken to other teams to see how their model and code works?*
- *Could you learn from any of the other teams?*

Important Points to Note



As each class is unique, please decide upon the best way of grouping learners.

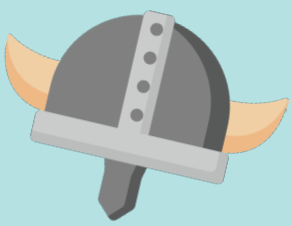
If learners are allowed to bring in LEGO elements, it is advised that either:

- Any LEGO elements contributed will become part of the class materials and not be returned.
- A clear record is kept of what a learner contributed so that it can be returned following completion of the project.

The teams will apply coding concepts throughout these sessions to create their programs.

As all teams will include learners of differing abilities, these sessions should be **differentiated** as required.

Extension Activities



Consider these ideas for extension activities:

- Aided by media captured during these sessions (images, video, etc.), learners write instructions on how to build their Team Model.
- In teams, learners record a short podcast based upon their experience creating their Team Model. The podcast can be created using an appropriate digital tool (Spotify for Podcasters, **Vocaroo**, etc). Suggested content: what part of their model is motorised, how a sensor is used, how these were coded, the individual input of each team member, etc.

Session 11: Let's share - Preparation for showcase and Showcase Event

Purpose:

Learners will prepare to share their UNEARTHED project (including the poster and model) at a showcase event.

Core Values:

Final Showcase Event

The capstone to *FIRST* LEGO League Explore project is a Final Showcase Event where teams can present their models and posters to other learners.

Schools and teachers may also opt for a Final Celebration Event within their own school where teams can present and share their projects and posters with members of the wider school community.

However the class decides to share their projects and solutions, it is important that all learners get a chance to both present their work, and examine the work of other teams. This is to enable deeper reflection and learning.

Learning outcomes:

Learners will be enabled to

1. Communicate the purpose of their Team Model and Poster at a Final Celebration Event - learners share their understanding of the archaeological process, their historical investigations, and/or understanding of life in the past with others.
2. Discuss their knowledge and understanding of the UNEARTHED theme.

Progress:

Resources

Per team:

- LEGO build
- Digital device *(tablet, laptop)*
- Poster *(physical or digital, see Session 10 for details)*

Digital resources:

- **Showcase Peer Review Sheet**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content

Subject	Strands	Strand units/ elements	Skills and concepts
Literacy	Oral Language Writing	Communicating	Communicating; Understanding; Exploring and using
Visual Arts	Construction; Drawing	Making constructions; Making drawings	An awareness of form; An awareness of space
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy

Introduction

1. Explain the Final Showcase Event where the learners will showcase their LEGO builds and posters.
2. The key purpose of these events is for learners to share their projects and learn from others. There is an equal focus on sharing the what/why/how of their project, as there is on learning from the projects of others.

Development

1. Explain to learners that they will have three main jobs at the Showcase Event
   a. Share their Team Model and Team Poster, and be able to explain them.
   b. Answer peer review questions.
   c. Speak to other teams and learn about their models and posters.
2. Share the peer review prompts with learners and begin a discussion around what each question refers to, how might they be answered, etc.
   a. Allow time for teams to discuss potential answers to the peer review questions.
3. In teams, learners decide who will present each section of the poster.
   a. Learners review their Team Model and ensure that their code works. Learners decide who will present the Team Model.
   b. In teams, learners discuss what they have learnt throughout the UNEARTHED sessions. Learners should be prepared to share what they have learned at the Final Showcase Event.
   c. Pair teams up so that each team can practise their presentations with other learners.
   d. The sample reviewing sheet and reviewing questions can be used to support the learners during this session.

The prompts in the concept cartoon below could be used to further scaffold teams in their preparations.

Closure (Document/ Share/Tidy up)

Share:

1. Reflection and assessment (self and peer) of presentations.

Teams tidy up:

1. Ensure Team Models and Team Posters are stored and ready to be transported to the event.
2. Ensure all devices are fully charged.

Session 12: Let's reflect

Purpose:

Learners will reflect upon their Team Model and Poster, their appreciation for the work of historians, their understanding of the archaeological process, and their knowledge of life in the past.

Core Values:

Teamwork | Innovation | Impact | Fun

Learning outcomes:

Learners will be enabled to

1. Describe their team's journey throughout the UNEARTHED sessions.
2. Discuss their knowledge and understanding of the UNEARTHED theme.

Progress:

1 2 3 4 5 6 7 8 9 10 11 12

Resources

Per team:

- Team Model
- Digital device (tablet, laptop)
- Team Poster

Digital resources:

- **Reflection prompt questions**
- All digital and printable resources for this session are available here: **https://fll.ie/UNEARTHED**

Curriculum content			
Subject	**Strands**	**Strand units/ elements**	**Skills and concepts**
Literacy	Oral Language Writing	Communicating	Communicating; Understanding; Exploring and using
Visual Arts	Construction; Drawing	Making constructions; Making drawings	An awareness of form; An awareness of space
History	Local Studies; Continuity and change over time; Early people and ancient societies	Buildings, sites and ruins in my locality; My locality through the ages; Homes and houses, food and farming, clothes, communications; People from the past	Time and chronology; Change and continuity; cause and effect; using evidence; empathy

Revisiting UNEARTHED

Revisiting UNEARTHED

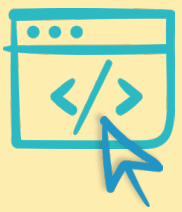
1. Ask the class to think about their recent Showcase Event. The following prompts could be completed as an oral discussion, think-pair-share, etc.
   a. *What did they enjoy most?*
   b. *Find the most challenging?*
   c. *Learn from other teams?*

2. Now that we have built Team Models, created Team Posters, and shared our passions at a Final Showcase Event, it is time to reflect on all that we have achieved and learned along the way.

Meta reflection

Resources:

- Digital devices
- **Prompt questions to display on IWB**



The following prompt questions should be considered by learners following engagement with UNEARTHED.

These might be discussed orally, in small groups or teams, or independently using a device/paper.

1. *What are three things you learnt about the archaeological process, about working as a historian and about life in the past?*
2. *What is one thing that you learnt about yourself through completing the UNEARTHED project?*
3. *What part of UNEARTHED stands out for you? (Your favourite session, build, code?)*
4. *What have you learnt about coding and computational thinking?*
5. *What will you do differently now as a result of UNEARTHED?*
6. *What would you like to do with your LEGO® Education set next?*
7. *What other real-life topics could we explore through the engineering design process?*

Following discussion, learners could be tasked with one of the following activities to further their reflection. The finished products could then be shared with the school community.

Record a short video diary of their experiences of UNEARTHED

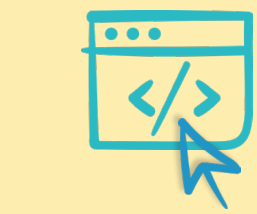
Make an audio recording or podcast

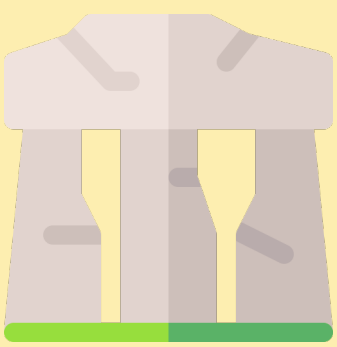
Write a short diary entry and type or photograph this for inclusion in their digital portfolio.

Audit equipment

Resources:

- **Audit sheets**

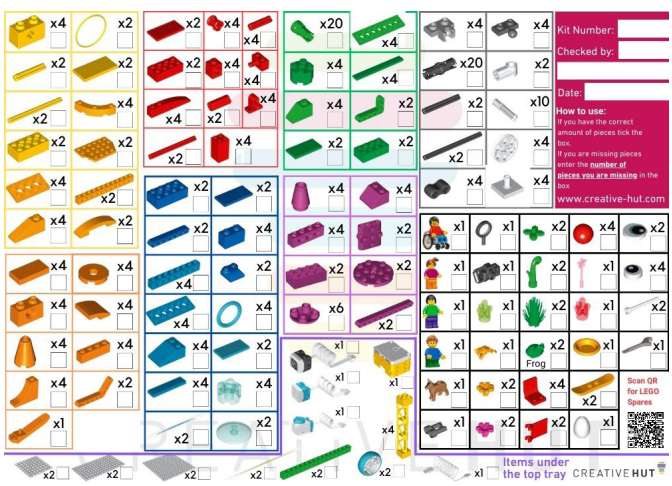




Any final photos or videos of the Team Model should be taken as the final part of this project is to disassemble and audit the LEGO Education equipment.

All LEGO Education equipment should be disassembled and returned to its correct place.

All elements from the SPIKE Essential or WeDo 2.0 boxes should be returned and audited using the audit sheet. (Find audit sheets at: **fll.ie/UNEARTHED**)



If any elements have been lost, replacements can be ordered from: **https://www.lego.com/en-ie/pick-and-build/pick-a-brick**

All LEGO elements from the UNEARTHED Explore Set should be disassembled and returned to suitable containers (e.g. ziplock bags) for use by a future class. It is highly advised that the Explore models (e.g. radar) be disassembled into separate bags for future use.

Any LEGO elements belonging to learners can be disassembled and returned to them at this point.

References:

fll.ie/UNEARTHED

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