

Violent Earth

(Source: GA project Making Geography Happen)

The High Arcal School in Sedgely, Dudley, is an 11-16 Foundation School with 1200 pupils (mixed gender) on role. It is an academy, has Gifted and Talented Lead School status and an ASD base catering for the needs of pupils with Aspergers and autism. The geography department has been awarded GA Centre of Excellence status.

In this series of lessons at the school, Year 8 students learned about the basics of plate tectonics, how and why earthquakes happen and how countries can minimise their impact. The activities were varied and included creative writing, practical tasks and drama. Teacher Ian Dixson explains the curriculum making process, the teaching and learning activities and how the students progressed throughout the unit.

The Unit of Work

The project centred on a Year 8 'Violent Earth' unit of work, part of the 'Dangerous Places' theme which runs through KS3 and KS4. This can be seen on the 'dartboard' curriculum model. At the time the unit was taught the 2007 National Curriculum was followed. All Year 8 classes are taught in mixed ability form groups, in some cases with non-specialist geography teachers.

Read more about how High Arcal School devised and adopted the 'dartboard' curriculum model in the articles *Visualising key stage 3* in GA Magazine spring 2008 and *Going round in circles* in GA Magazine autumn 2009

Scheme of work overview and key concepts (see end of document)

The Violent Earth unit consists of five lessons: two lessons on the basics of plate tectonics, followed by a test, a lesson on preparing to survive an earthquake (make a leaflet for homework) and a video-based lesson gathering information to write an imaginative story (completed for homework).

The curriculum making

The activities in detail

The work undertaken during the five lesson unit was assessed as a portfolio of three items:

1. A test

With two key questions 'Where do earthquakes happen and why?' and 'What are the effects of earthquakes?' There was an expectation that students would use a variety of key geographical terms such as Richter Scale, magnitude and epicentre.

2. An illustrated leaflet

Explaining how to prepare to survive an earthquake. When devising the 'preparation' leaflet students used a diamond ranking exercise having discussed possible ways to reduce deaths and injuries from earthquakes. The most able students were given the task of justifying their choice of such methods based on perceived cost, ease of implementation and benefits (hazard reduction).

3. An imaginative story

Written as though students themselves had been in a major earthquake. Lower ability students used a scaffolded set of headings to assist in placing their story in chronological order. Middle and higher ability students were given a similar scaffold to plan their work but then expected to write the story in paragraphs, without headings. More able students were expected to undertake individual research into a recent major earthquake to include the social, economic and environmental impacts.

Diamond ranking exercise on *Preparing to survive an earthquake*

Statements provided were:

- Cheap to do, needs professional help (DIY)
- Takes a short time to complete
- Will significantly reduce injuries/save lives in an earthquake
- Expensive to do, needs professional help (not DIY)
- Takes a long time to complete
- Might not reduce injuries/save lives in an earthquake

Ian Dixon talks about the unit of work (<https://youtu.be/SxqAoOuwwAw>)

Planning for Progression

Improving on prior understanding

Students had limited prior understanding of earthquakes. Some of our feeder primary schools now tackle 'Hazards' as part of the KS2 creative curriculum although by Year 8 students seemed to get rather confused between hurricanes and earthquakes.

To ensure progression, students were led through the basics such as the layers of the earth, plates and types of plate margins. In a similar way to controlled assessments students were then allowed to prepare illustrations, maps and diagrams for their test - a homework task. Progression was noted in the following lesson when students completed their test.

Ian Dixon talks about planning for progression (<https://youtu.be/xoWOqTvuWU>)

Practical activities to motivate students

Practical activities were included in lessons to engage and motivate the students. Examples include using custard/biscuits to represent the movement of tectonic plates and some drama to show the impacts of earthquakes and the ways to protect yourself.

See Earthquake drama (<https://youtu.be/FXA9ArcqFIs>)

Active discussion and demonstration helped to motivate students to ask questions and see that not all possible preparations are practical, useful or ultimately sensible.

Written tasks

For the leaflet exercise students were given a variety of resources, for example, the American Red Cross Earthquake Safety Checklist.

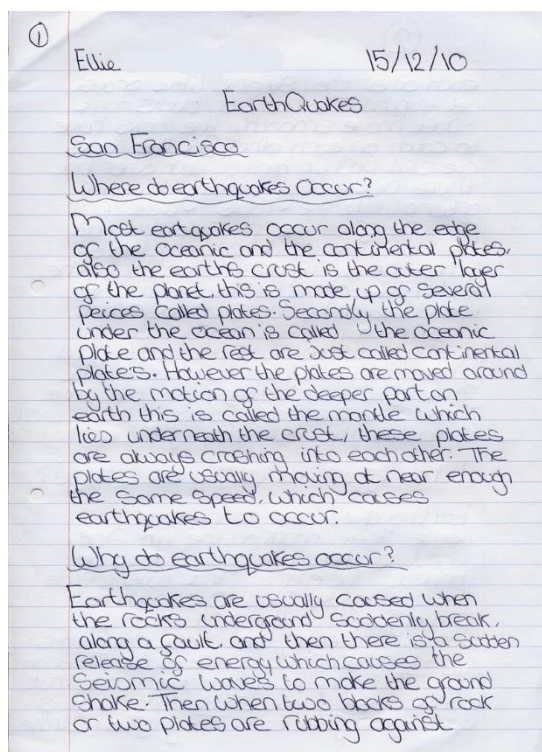
For the personal story students watched video extracts and made notes on a stick person diagram to show impacts on the senses and emotions. Students had to use their imagination and for 'what you would hear' they listened to the videos with their eyes closed.

There was something for everyone in this unit be they auditory, visual or kinaesthetic learners and this maintained motivation throughout.

We used examples from earthquake videos on YouTube and used resources on earthquakes from the GA website for information on more recent earthquakes.

The teacher's response to the students' work

From possibly no knowledge and understanding of earthquakes and their effects it was clear that students maintained their enthusiasm for the unit of work and produced an excellent range of differentiated outcomes. Most students achieved their target level with some exceeding their end of year target.



The test was challenging in that some students hadn't come across this style of assessment before, that is to learn, prepare resources and do the test. Given the balance with leaflet and imaginative story, overall there was something for everyone although managing the process of a portfolio type assessment can be challenging.

Ellie's test

Ellie used appropriate geographical vocabulary to articulate a very good understanding of tectonic processes. She could have extended this understanding in the case study section by referring to social, economic and environmental impacts.

Leaflets

The leaflets showed that students are capable of sifting through information, ranking ideas and using ICT to produce (for homework) a professional-looking publication. Most students got the idea that not everyone speaks English (for example in California) and that communicating through images can be more effective than writing. The diamond nine activity prior to producing the leaflet enabled the students to think more carefully about their selection of strategies.

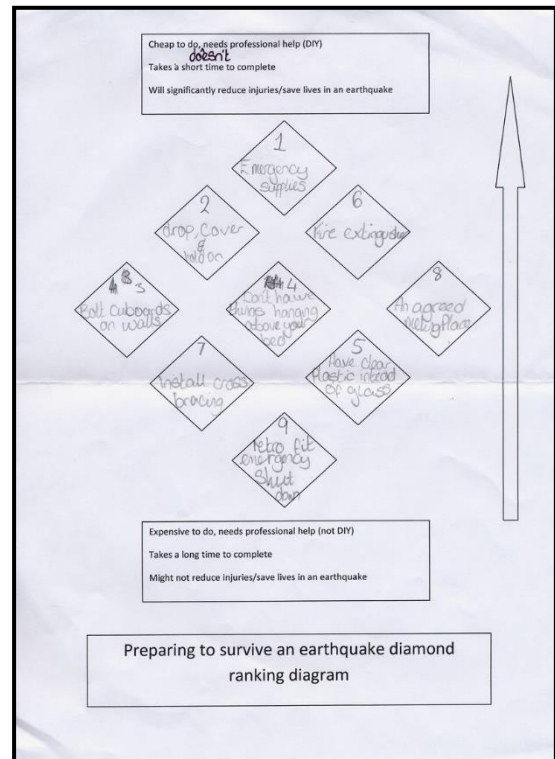
Tara used the diamond ranking exercise to justify why she had selected the items for inclusion in the leaflet. She produced a leaflet in both English and Spanish and also came to the conclusion that make-up and a hairdryer would not be necessary in an earthquake

Tara's leaflet

Tara

Why I chose my ranking

- Emergency Supplies**
I put the emergency supplies first because it is cheap to do, doesn't need professional help, takes a short time to complete and will help your survival if you have all the important things that your body needs inside.
- Drop, Cover and hold on**
This is second because it does save peoples lives if they decide to practise the routine. It is good to use as you can do it anywhere when an earthquake occurs. To do this routine you would have to drop to your hands a knees, cover under something strong like a table (any apart from glass) and hold onto something belonging to your cover. Make sure you protect your face whilst you do it incase it gets hit.
- Fire Extinguisher & Fire Blanket**
These items are very important to keep in a house incase of a fire. When an earthquake happens your house would collapse and mostly everything would be ruined. Everything being ruined means that a live wire would burn your remains of a house if they got in contact.
- Don't have things hanging above your bed**
Having things hanging above your bed is risking your life and during an earthquake. Depending on how bad the earthquake is, the hanging object could fall whilst the ceiling is collapsing as well.



The quality of written English in this work shows issues with literacy and in other subjects there

There is no known way to prevent earthquakes, but it is possible to lessen the impact. The amount of devastation from an earthquake can be greatly diminished by building structures using earthquake resistant design, making the interiors of buildings safe from falling objects, and educating people about earthquake safety.

No hay forma conocida de prevenir los terremotos, pero es posible disminuir el impacto. El importe de la devastación de un terremoto se pueden disminuir notablemente por la construcción de estructuras con diseño sismorresistente, haciendo que el interior de los edificios a salvo de la caída de objetos, y educar a la gente sobre la seguridad contra terremotos.

would be time to review, refine and improve this aspect of the assessment. However literacy was not being assessed in this task. It was more about getting students to develop empathy and understanding that once TV cameras move on, people in earthquake-devastated areas do not suddenly return to normality.

Victoria's storyboard

Victoria's detailed storyboard enabled her to write an informed story of an earthquake focusing on both the initial consequences and the longer term effects.

Victoria

First few seconds

Emotions = you would panic and feel worried about if it was going to get worse, trying to remember things from lectures
few minutes after

Emotions = in a way relieved it's over you may be trapped under a building or them you would smell smoke taste dust, see people running

few hours later
see people running so like trying to find their family
see dead bodies either drowned or crushed

Days later
helicopters sending emergency supplies
hospitals been destroyed so starting to put up tents hospitals

weeks or months later
grieving in loss of friends or family or still trying to find families
shelters being put up to send people and give them a place to sleep

years later
buildings starting to be put back up

Few seconds
(ground shaking)

People panicking not even knowing what to do hiding under tables petrified of what might happen in the next few minutes

input
what I could smell, hear, taste see

Story plan hours later

Buildings and homes destroyed not knowing what to do looking for lost family members searching for food and shelter.
Talk about
smell, hear, see and feel

Days later

getting to terms with loss of family members grieving looking for shelter and food supplies being dropped in by helicopters.
Talk about
touch, see, smell hear and see

Weeks later

everything used in supply bag so no fresh clothes or water or food nothing but the clothes on my back talk about what I could hear, sense, smell, touch see.

Months later

some charity clothes donated so we have all picked some fresh items of clothing we are all in shelters writing everything's rebuilt talk about hear, sense and smell and touch

Year later

Some building been put back up, not many so some around to go in those buildings for a bit while talk about, touch, see, sense, smell, see

Student reflection

Overall impressions of the topic

All students found the topic interesting. They particularly enjoyed learning about earthquakes, why they happen, where they happen and how they affect people.

Although the human impacts did feature in comments many focused only on the physical tectonic processes.

'The most interesting thing I learnt is what the earth is made up with and was surprised it had layers' - Tom

'The most interesting thing I learned is how earthquakes can happen so quickly' - Kathryn

'The most interesting thing I have learnt would have to be that two plate margins have to rub against each other for there to be an earthquake' - Paige

The imaginative story

Many students enjoyed the imaginative story and were proud of it. The preparation helped the students produce work that they had put a lot of effort into.

'The work I enjoyed most was writing the story because you had to write it as if you were there. This is the work I am most proud of.' - Tara

'I am most proud of my imaginative story because you could decide what happened yourself' - Alex

Favourite teaching methods

The two teaching methods that featured in responses from all students were watching video clips and the teacher's demonstration of what could happen during an earthquake.

The videos were very short clips and included actual CCTV footage, selected because they enabled students to understand the earthquake experience.

'The best teaching method was having a demonstration what it would feel like in an earthquake because it gave you some inspiration for your assessment. Watching some of the film clips shown by our teacher also helped me understand the kind of events that take place.' - Amy

'The videos helped me imagine I was there' - Tyler

'I liked it when sir did a practical demonstrating when big rocks hit the table with someone underneath' - Tom

'Listening the teacher and watching video clips helped me the most because I am a visual learner. Also everything the teacher says is important and you will need to know!' - Paige

Teacher reflection

Looking back on the unit

The teacher felt that several factors contributed to the success of the unit:

- The use of video clips, particularly CCTV footage, helped to bring the experience of being in an earthquake to life
- The practical demonstration of rocks falling on a desk while a student hid below it really engaged the students
- The mixture of resources and techniques worked well and enthused the students

Improving the unit

In this short interview Ian explains that in the creative writing task the geography was sometimes overshadowed by the dramatic nature of earthquakes and so the unit was modified accordingly. He also suggests using giant world maps to show the plate boundaries.

(<https://youtu.be/mFm5Tqsa0nl>)

Assessing the students' work

All three pieces of work were assessed together and given a level (NB this project was taught when teachers were required to use Attainment Levels (2007)).

Level 3 You-

- Describe the location of earthquakes worldwide
- Draw simple diagrams
- Begin to use appropriate geographic vocabulary

Level 4 You have done what is necessary for level 3, plus-

- Describe and begin to explain earthquake location worldwide
- Draw and label diagrams
- Begin to offer simple effects that earthquakes have using appropriate vocabulary

Level 5 You have done what is necessary for level 4, plus-

- Write a factual report using keywords and phrases, which begins to explain earthquake locations and effects
- Draw accurate labelled diagrams
- Write a story that includes possible events that may occur during an earthquake

Level 6 You have done what is necessary for level 5, plus-

- Write an accurate and factual report using technical geographic words and phrases, which explains earthquake locations and effects; uses case studies
- Offer accurate labelled diagrams, which convey messages understandable in both USA and Japan
- Write an imaginative story that offers realistic events that would occur during an earthquake; begin to include references to actual events

Level 7 You have done what is necessary for level 6, plus-

- Begin to select and add additional materials and information which is accurately analysed
- Accurately evaluate sources of evidence, and begin to reach substantiated conclusions

Students were given a list of ways they could have improved this project.

- Present your work neater
- Complete all sections of the project
- Offer more detail in section 1
- Research in more detail actual earthquake events

- Convey the messages better in the leaflet
- Finish off unfinished work
- Write a more realistic story for section 3
- Do all work to the best of your ability

Like many assessment mark schemes this includes generic statements and does not clearly show how the students can make progress in geography. This could be adapted to include geographical criteria such as 'clearly locate all the places mentioned in the work', 'show a clear understanding of the processes that cause earthquakes' and 'explain the long term impacts as well as the short term impacts of an earthquake'.

Unit: Changing Places (Year 8)
Module: Violent Earth

Big Picture Whole Curriculum Dimension		Links to Importance Statement / High Quality Outcomes
<p>Learning and undertaking activities in geography contribute to achievement of the curriculum aims for all young people to become:</p> <ul style="list-style-type: none"> ✓ <i>Successful learners who enjoy learning, make progress and achieve;</i> ✓ <i>Confident individuals who are able to live safe, healthy and fulfilling lives;</i> ✓ <i>Responsible citizens who make a positive contribution to society.</i> (Link to SEAL) <p>PLTS (see separate sheet)</p>		<p>The study of geography stimulates an interest in and a sense of wonder about places. It helps young people make sense of a complex and dynamically changing world. It explains where places are, how places and landscapes are formed, how people and their environment interact, and how a diverse range of economies, societies and environments are interconnected. It builds on pupils' own experiences to investigate places at all scales, from the personal to the global.</p> <p>Geographical enquiry encourages questioning, investigation and critical thinking about issues affecting the world and people's lives, now and in the future. Fieldwork is an essential element of this. Pupils learn to think spatially and use maps, visual images and new technologies, including geographical information systems (GIS), to obtain, present and analyse information. Geography inspires pupils to become global citizens by exploring their own place in the world, their values and their responsibilities to other people, to the environment and to the sustainability of the planet.</p>
Key Concepts Covered	Key Processes Developed	Achievement by the end of the module
1.1 Place 1.2 Space 1.3 Scale 1.5 Physical and human processes 1.6 Environmental interaction and sustainable development 1.7 Cultural understanding and diversity	2.1 Geographical Enquiry 2.3 Graphicacy and visual literacy 2.4 Geographical communication	<ul style="list-style-type: none"> ▪ All students will know how the earth is split into plates; ▪ Most students will be able to recall PT confidently and understand how people live with the dangers; ▪ Some students will accurately describe PT, along with realistic story telling of what it must be like to live through an earthquake
Cross-Curricular Links	Whole-School Dimensions	Teaching and Learning Strategies

Science (Plate Tectonics- Chemistry syllabus)	Numeracy Literacy Oracy	Paired / Group work ICT / Web browsing Map work Essay Writing Inspire- Awe and Wonder
ICT (Web-based research)	ICT SEAL	
English (Writing skills & Oracy)	Assessment for Learning Citizenship S.E.N Building Learning Power Gifted and Talented PLTS	

Key Concepts

Key Concepts Covered	Key Processes Covered	Lesson Objectives / Key Questions / Key Terms	Teaching and Learning Activities	Assessment for Learning / Assessment of Learning
1.1 1.2 1.3 1.5	2.1	<p>1. <u>What is Plate Tectonics?</u></p> <p><i>Lesson Objectives:</i></p> <ul style="list-style-type: none"> ✓ All students will map the plate boundaries ✓ Most will understand the 'make-up' of the earth ✓ Some students will be able to recall key facts about plate boundaries 	<ul style="list-style-type: none"> ➤ Describe and demonstrate the structure of the earth (oral feedback) ➤ Map plate boundaries ➤ Demonstrate how plates move (Custard and crackers??) ➤ Plate boundary diagrams ➤ Key Vocab ➤ Introduce 'Test Essay' title-time with textbooks to research a case study (Places Texts- Kobe eq) 	<ul style="list-style-type: none"> ❖ Homework- Complete worksheet for next lesson
1.1 1.2 1.3 1.5	2.1 2.3	<p>2. <u>Plate Tectonics 2</u></p> <p><i>Lesson Objectives:</i></p> <ul style="list-style-type: none"> ✓ All students will use key vocab correctly ✓ Most will understand how earthquakes are caused and their effects ✓ Some students will complete their research about earthquakes 	<ul style="list-style-type: none"> ➤ Test Essay ➤ Writing frame for SEN ➤ Video (Kobe 1995 if possible- GCSE bitesize) ➤ Discuss using ppt slide on what to include in an eq kit ➤ Produce leaflet 	<ul style="list-style-type: none"> ❖ Homework- research either Kobe 1995 or San Francisco 1989 earthquake for inclusion in test essay
1.1	2.1	<p>3. <u>Earthquake Portfolio 1- Test Essay</u></p>		

1.2 1.3 1.5	2.3 2.4	<p><i>Lesson Objectives:</i></p> <ul style="list-style-type: none"> ✓ All students will complete a test essay on Plate Tectonics <p><i>“Where and why do earthquakes occur? What effects do earthquakes have?”</i></p>	<ul style="list-style-type: none"> ➤ Video- 3 parts – second part is very technical. 3rd part relates directly to SF ➤ PowerPoint gives students the first line- they have to complete the story from then on ➤ Students to start story in lesson 	<ul style="list-style-type: none"> ❖ AoL- Test essay is part 1 of 3 (Earthquake Portfolio assessment)
1.5 1.6 1.7	2.1 2.4	<p>4. <u>Earthquake Portfolio 2- Leaflet</u> (ICT if possible)</p> <p><i>Lesson Objectives:</i></p> <ul style="list-style-type: none"> ✓ All students will watch a video on earthquakes ✓ Most students will contribute to a discussion about preparing yourself and your home for earthquakes ✓ Some students will make an effective start to the leaflet 		<ul style="list-style-type: none"> ❖ Homework- To complete the Earthquake preparation leaflet for next lesson
1.1 1.2 1.3 1.5 1.7	2.4	<p>5. <u>Earthquake Portfolio 3- Imaginative Story</u></p> <p><i>Lesson Objectives:</i></p> <ul style="list-style-type: none"> ✓ All students will watch a video of the 1989 earthquake in San Francisco ✓ Most Students will begin to imagine what it must've been like to be there, based on their knowledge of the previous four lessons ✓ Some Students will make a confident start to their story 		<ul style="list-style-type: none"> ❖ <u>Homework –</u> Complete the story for next lesson- at the beginning of next lesson put the 3 pieces of work together with the mark scheme to form the completed portfolios- Chance here for