‘Poohsticks’
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“‘I think we all ought to play Poohsticks’. So they did. And Eeyore, who had never played it before, won more times than anybody else.”

(A. A. Milne 1928 The House at Pooh Corner)

Introduction
This activity gave the children opportunities to investigate the surface speed of the Cherry Brook River at different points along its course. Their findings had a bearing on those made during the river bed analysis where they discovered that the location of erosion and deposition and the size of the bedload were in part determined by the speed at which the water was flowing.

The Geography National Curriculum Context
The Key Stage 2 Geography programme of study states that “pupils should be given the opportunities to:

Enquiry
(1b) undertake studies that focus on geographical questions…and that involve fieldwork.”
(1c) develop the ability to recognise patterns, e.g. variations between places”.

Skills
(2a) observe and ask questions about geographical features.”
(2b) collect and record evidence to answer the questions.”
(2c) analyse the evidence, draw conclusions and communicate findings.”

During this activity, the children observed, asked questions and collected evidence regarding variations in river flow between different locations. In figures 33 & 34, the children then went on to record that evidence in a combination of tabular and graphic forms of communication. Finally, as the text shows, they then analysed this evidence by offering conclusions as to why they thought the river flowed slower or faster in some places than others.

(3a) use appropriate geographical vocabulary to describe and interpret their surroundings”
(3b) undertake fieldwork, including the use of instruments to make measurements and appropriate techniques.”

The children did not use sophisticated flow meters to measure the surface speed of the water. It was felt that primary age children would develop a sounder grasp of flow and speed by floating oranges down stream. This gives a visual experience of different speeds if the children stand still and watch the orange pass by and a kinaesthetic experience if they follow it by walking along the bank. Two oranges in a “race” like Poohsticks also allows the children to make immediate visual comparisons between surface speeds in different parts of the river channel. A flow meter simply gives numerical readings and not sensory experiences of the speed registered.
Theme

(7) “Children should be taught that rivers have channels……how rivers erode, transport and deposit material.”

The Geography programme of study needs to be interpreted intelligently and creatively by the teacher. If taken literally, the children should simply be taught that “this is a river and this bit is called a channel”. However, by relating the enquiry and skill elements of the programme to the river theme we move well beyond the factual and descriptive. Children are then required to:

- observe variations in the channel e.g. width, bends, speed of flow;
- ask questions about these variations;
- measure, collect, record and analyse evidence of these variations;
- draw conclusions about why these variations exist and their possible effects;
- communicate their findings.

It is important to encourage children of this age to begin to make connections between the speed of the river and the effect this has on the processes of erosion, transportation and deposition. As can be seen from the case study on riverbed investigations, the children had begun to see:

- the relationship between size of stones on the river bed and speed of flow, (transportation);
- the phenomena of deposition on the slow flowing inside of a bend in contrast to undercut banks on the faster flowing outside, (deposition and erosion).

Key questions

- Does the water flow at the same speed everywhere in a river?
- If it flows at different speeds, why does this happen?
- What effect does the speed of flow have on different parts of a river channel?

Key concepts

speed, flow, surface, channel, direction, bend, straight, narrow, wide, similarity, difference, change, cause, effect, distance, time, erosion, deposition, transportation, deposition, river bed.

Activity: ‘Observing and measuring the surface speed of the river at different places along its course

The children conducted two investigations into the surface speed of the river.

In the first investigation, the children chose three “stations” along the river channel for their measurements of surface speed. The first was near the bridge on a straight section the second was approaching a bend and the third was on the bend itself.

The children marked out and then measured a start and finish point on the bank at the first station. This proved to be an arbitrary distance of 7.5 metres. (The issue of choosing an easier interval, e.g. 10 metres for mathematically calculating speed will be discussed later). The same 7.5 metre distance was
also marked out at stations 2 and 3. (see figures 33 & 34). One child stood on the bank with a stop watch and another with a recording sheet while two others stood in the water at a set distance apart to release and retrieve the orange, (see photos 60, 61 & 62).

The children found that the surface speed of the river at the straight section was the slowest, taking the orange an average of 1.5 minutes to travel the 7.5 metres. Approaching the bend, they found the orange gathered speed, taking an average of 26 seconds. On the outside of the bend itself, the orange sped up dramatically, covering the set distance in an average of 8 seconds. The measurements were remarkably consistent as each group in turn conducted their experiments. One group demonstrated a particular concern for checking the accuracy their timings by repeating their measurements four times at each station, (see figure 34). This is an important attitude for children to develop in many areas of mathematics. An opportunity that should not have been overlooked was that of using these repeat measurements to calculate the average speeds. These averages could have been derived from a group’s own repeat measurements and by combining those of all the groups.

In a second investigation, a group of children held a race between one orange on the inside of the bend and the other on the outside of the bend, (see photo 63). No timings were taken, the children simply watched the “race” and found that the orange on the outside of the bend travelled much faster than the one on the inside.

Assessment
Apart from oral evidence arising from questioning and discussion the children’s drawings, charts and writing reveal further evidence of understanding. In figure 33, the children draw the conclusion that, “the nearer you get to a bend in the river the flow gets faster.” They fail to mention that these faster speeds occur at the stations that they have marked on the outside of the bend in their drawing. It was only by oral discussion that the teacher could ascertain whether this omission was through forgetfulness rather than lack of understanding. The children have also grasped that flow increases where it (the channel) got narrower.”

Another group made the written observation that “station 1 was slowest because the river was shallow” and that and the river was flowing faster because the river bed dropped down.”

These observations suggest that the children are beginning to link speed of flow to the width, depth, and gradient of the river channel.

Extension activity: ‘Calculating the speed of flow’
If the children mark out a more convenient distance e.g. 10 metres, they could then more readily calculate the speed of flow by finding how far an orange travelled in one second or one minute. They could then express the speed as x metres / centimetres per second. The formula would be:

\[
\text{distance} = \text{speed} \times \text{time}
\]

The children could also work out problems using this formula e.g. “If the orange travels 10 metres at a speed of ½ metre per second, how long does it take?”
Photographs of children’s activities and examples of their work relating to measuring the speed of flow in a river.

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Please note that the children are not wearing rubber gloves to protect their hands against waterborne diseases. This is not good practice. In this case study the school had left the box of gloves behind and rather than abandon the fieldwork continued without gloves, making sure that children with any cuts did not put their hands in the water.
(Photo 62) A child about to release an orange into the river

(Photo 63) Children race an orange round the inside and outside of a bend in the river.
(Photo 60) Children time an orange over a set distance as it floats down stream.

(Photo 61) Children time an orange over a set distance as it floats down stream.
Measuring the flow of the Cherrybrook river.

How we did it.
First we chose 2 different places, both on the same side of the river. Then we measured the distance between them. The measurement was 7.5 metres. We got 1 person to stand each end of the measurement. We timed the orange sailing from 1 person to the other person. Then we recorded how long it took on a piece of paper. Then we chose 2 more places and did the same.

Where we did it.
We did the experiment in the Cherrybrook river, near the Cherrybrook bridge.

Results.

<table>
<thead>
<tr>
<th>Station</th>
<th>Distance</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>7.5 m</td>
<td>1m35s</td>
</tr>
<tr>
<td>Two</td>
<td>7.5 m</td>
<td>2m50s</td>
</tr>
<tr>
<td>Three</td>
<td>7.5 m</td>
<td>8 secs</td>
</tr>
</tbody>
</table>

Why did we do it?
We got these results because the nearer you get to a bend or rocks the flow gets faster. Also because there was a bend in the river and it got narrower where it flowed fastest. Other groups got different results because of rainfall and evaporation.
First we walked across to the other side of the bank.

Then we got an orange and one person in our group walked about two steps in to the river. Then we put an orange in and timed it until it got to Terrie where she was standing. We timed it and it was about 7.5meters. Then we repeated the test twice on the other side of the Chembrook river.

What our results told us

The water flowed faster on station 3 because it was on a bend and the river was narrower. It was slow on station 1 because it was not on a bend and the river was not narrow.

<table>
<thead>
<tr>
<th>Station 1</th>
<th>Station 2</th>
<th>Station 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matt: 2mins 32secs</td>
<td>Matt: 26 secs</td>
<td>Matt: 7 secs</td>
</tr>
<tr>
<td>Simon: 20 secs</td>
<td>Simon: 23 secs</td>
<td>Simon: 8 secs</td>
</tr>
<tr>
<td>Ben: 46.66 secs</td>
<td>Ben: 27 secs</td>
<td>Ben: 9 secs</td>
</tr>
</tbody>
</table>

Matthew Williams & Simon Shilton
Measuring the River Flow

We found a place to measure the flow. Mrs. Howland chose me to stand further along the bank. We measured the distance from Matthew to me. It was 7.5m. Then we sailed the orange until it reached me.

After that we went over to the other side of the river. We measured the flow again. On the same side of the river, further down, we measured the flow again.

We measured the flow at Cherrybrook River near the bridge.

<table>
<thead>
<tr>
<th>Place</th>
<th>distance</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>7.5 m</td>
<td>9 seconds</td>
</tr>
<tr>
<td>2nd</td>
<td>7.5 m</td>
<td>33 seconds</td>
</tr>
<tr>
<td>3rd</td>
<td>7.6 m</td>
<td>1 second</td>
</tr>
</tbody>
</table>

What our results tell us

Station 1 was slowest because the river was shallow and the current was slow.
Station 3 was quickest because the river bed dropped down and the river was flowing faster.
Station 2 was somewhere in between.
Reference list


SCAA (May 1997) *Geography at Key Stage 2*. Hayes; School Curriculum & assessment Authority.

SCAA (1997) *Expectations in Geography at Key Stages 1 and 2*. Hayes: SCAA.


