Case Study F: You're the experts

Social sciences

Introduction

> Scaffolding was working because what they [students] knew to start with was built on in the classroom, and then that was reinforced by what they found out at the museum. (Jane, teacher)

This case study followed the work of a Year 3 and 4 class, as they prepared for and visited an art and history museum in a central New Zealand city. The children spent time in the museum classroom discussing volcanoes, and in particular the volcanic eruptions which have occurred within the region. This was followed by an informal session in the museum where the children and their parent supervisors explored the exhibits on display, including photographs and artefacts from some of the eruptions. The visit was described as an 'end-of-study treat', and was combined with a visit to the hot pools nearby.

The children in this class attended a rural full primary school with a roll of 82 students. The school had a decile rating of 9 and was situated near a small rural town in the centre of the North Island. The ethnic composition was as follows: 66 students are classified as New Zealand Pakeha, 14 students are Māori and two are from other ethnic groups. The gender split was 32 girls and 50 boys. The teacher, referred to as Jane in this case study, described the class as a mixed group of Year 3 and 4 students.

Jane had accumulated 20 years' teaching experience. She had a Diploma of Teaching, and had taught at all levels of the primary school. She had been teaching at her current school since part way through 1992 and she regularly included LEOTC activities in her programme.

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The programme director at the museum was Sophie. She had a Bachelor of Education and a Diploma of Teaching. Her previous teaching experience had been at both primary and intermediate levels. She had worked at the museum since 1998, and had recently employed a young male colleague who assisted her with the teaching programmes at the museum.

Before the visit

Teacher views and planning

Goals and rationale

Jane was an experienced teacher, and had taken students on many visits before. She had previously been to the museum, and was therefore familiar with the exhibits, and the programme that was offered by the education officers. The students had been studying volcanoes for several weeks and, in particular, the eruption which had occurred in their own region. Jane anticipated that the visit, video and earthquake simulator, which the children would experience during the visit would be an exciting way to conclude the work - a valuable 'end of study' visit.

Teacher preparation

As mentioned previously, this visit was planned as part of the end-of-year activities, but was linked to the current science unit – it was to be a fun end-of-year treat, and would include a swim at some hot pools at the end of the day. Along with the organisational arrangements for the trip, Jane had made use of a Blackline Master from *The Essential Planning Book* to give her a framework for planning the unit on volcanoes. She had identified four specific learning outcomes that she hoped to achieve by the end of the unit. These were as follows:

- understand that heat from deep inside the earth melts rock into what is known as magma;
- know that there is a pattern where volcanoes can be found on earth and these include volcanoes on land and under the sea;
- understand that when a volcano erupts it can change its appearance, and can affect both animals and the atmosphere;
- know there are three distinctive volcano shapes, and that different types of volcanoes form different types of rocks.

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Jane had also planned a range of learning activities, during which she hoped to find out about the earth's layers, how volcanoes erupt, and language and activity associated with volcanic eruptions. The new terms she hoped students would become familiar with included the following: caldera, magma, lava, fissure, vent, secondary vent, shield volcano, dome volcano, magma chamber, molten rock, plates, eruption, crater, laha, and papahoe.

Student views

Views about the site

Five students were selected to participate in this case study, but as one was away sick on the day the interviews took place, only four students were interviewed. Three students were nine years old and in Year 4 and one student was eight and in Year 3. None of the children involved in this research had been to the museum before, although they had been to other LEOTC sites with various school parties; for example, Kelly Tarlton's Antarctic Encounter and Underwater World, a museum and a zoo located in a nearby city. Each student, with the exception of one, had some special memory about their previous visits and what they had learnt:

> At Kelly Tarlton's we learnt that penguins have an extra layer of blubber.
>
> Well it (Kelly Tarlton's) got me quite a bad experience with sharks. The glass was actually magnifying, and a school shark came up to me and it was sniffing the glass right in front of me. I think it smelt my blood 'cos my finger was bleeding 'cos I hurt it in the car.
>
> [I learnt] about Māori tools.

Preparation

The children all had ideas about how they had prepared for the trip, and these responses varied from the purely organisational through to aspects of their volcano study:

> Our teacher tells us what to have to get ready and all that, and um, tells us what we have to bring.
>
> Getting ready to ask questions that we're asking. Getting ready what we're going to do and how we're going to be polite and stuff,
>
> We talked about what we're going to do and our teacher tells us what to bring.
>
> We got ready when we were studying [volcanoes].

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The children all had clear ideas about the purpose of their visit; they referred to volcanoes, learning about them, perhaps seeing photographs, rock samples and videos. They also knew that an education officer was going to work with them and maybe give them activities to do:

> We're looking at volcanoes. [We might see] bits of rocks from the volcanoes, pictures of volcano eruptions, some villages that have been damaged.

> We're probably going to see a movie first and then we'll probably go and see pictures of volcanoes. We might see some fossils.

Three of the four students anticipated that they would learn more about volcanoes during their visit to the museum, and one student didn't know. The Year 3 student had this to say:

> Hopefully, I'm going to learn a lot of stuff. I'll probably learn about more volcano names and more types of volcanoes, craters and that.

Help with learning

These children had little to offer when asked why they thought going on a trip would help them learn more. They all agreed that it was a good way of learning new things, but were unable to articulate why this would be. One student contributed this idea.

> Student: I think it's better if I've actually seen things and seen the person.

> Researcher: What is so good about actually being there and having the person there to talk to?

> Student: We could ask questions and get answers.

The final questions put to these students were how they would know the trip had been worthwhile. They had these thoughts to share:

> Just have fun and we might find out some interesting facts.

> If I have a great time I'll tell everyone about it and probably write a story about it at home.

> I get to learn and do more stuff.

The visit

Jane and her students, along with a good number of parents, were transported from their school to the museum by bus. On arrival they had morning tea, and then lined up outside the museum and waited for Sophie to come and meet them. After brief introductions she led them upstairs to

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the classroom. This was a spacious room, with a carpeted area up at the front for children to sit and work in, and a high tech 'smart board' for Sophie to write on, or use to show a power point presentation. The focus of this session was volcanic activity in the local area. Linking with the science curriculum, Sophie had identified a strand, achievement objective, and three specific learning outcomes, which would provide the framework for her work with the students. These were as follows:

Strand of the curriculum: Making Sense of Planet Earth and Beyond

Specific learning outcomes

- Students will be able to identify two types of volcanoes and three types of geothermal activity found in this area.
- Students will be able to describe some of the physical features of volcanoes and geothermal areas.
- Students will be able to talk about the process that gives rise to volcanoes in this district.

Sophie delivered a very interactive session, with plenty of questions to encourage the children to participate in the discussion. She had identified five main questions, which she put to the children during this time:

1. Why do we have volcanoes in this district?
2. Which types of volcanoes are found in this area?
3. What is a caldera eruption?
4. Which type of volcano is our mountain?
5. What occurred when our mountain erupted?

Sophie used a range of strategies to engage the children in the discussion, including a 'yes/no/maybe' continuum. At particular points in the discussion she asked the children to make decisions or 'put a stake in the sand', to state their beliefs about various issues relating to volcanoes and volcanic eruptions. This had the advantage of getting the children up off their seats and moving them around the room, as well as allowing the less confident children to participate in the discussion without having to physically articulate their thinking. The students were shy at first, but were clearly engrossed with Sophie's presentation. As they realised that they, too, had a good knowledge of this topic, their confidence grew and they began to relax, enjoy the session and join in.

The permanent exhibition of the local volcano, and its fifth and most significant eruption, was the next activity for the children. Sophie introduced the exhibition to them, pointed out various

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sections of particular interest, and then gave each of them a worksheet to try and fill out, using the exhibition as their reference. The exhibition focused on the story of the most recent volcanic eruption, and how it had changed the course of history for the people who lived in its shadow, as well as on significant changes to the local landscape. It included hands-on displays, recorded stories, taonga, text, models and enlarged photographs from the period. Each section of the display had a combination of these features and most had a wall telephone which visitors could use to listen to a recorded story relating to the eruption and the artifacts being viewed. This activity provided a good contrast with the previous teacher directed session, and groups of children quickly moved off with their parent supervisors to find answers for their worksheet. They were given approximately 15 minutes to complete this task. For some, this was perfect timing and for others, a longer period would have been preferred, or an opportunity to revisit at the end of the guided tour. The worksheet gave a useful focus to their investigations, and pieces of information gathered during this time were remembered and repeated during the student interviews:

> I didn't know that the mountain erupted five times, and I didn't know that the littlest explosion was the most destructive.

> I saw a picture of how it looks today (the caldera) and, oh God, what it looked like when it was bursting. I feel sorry for the people who died in the eruption.

The quantity of text in this exhibition may have challenged some students, but Sophie encouraged the parent supervisors to help the children and to explain aspects of the eruption they did not understand. The exhibition text boards provided sufficient information for this to occur without any difficulty. These were large and attractive, and contained information which was easy to read and understand.

The next phase of the visit was to watch a video about the eruption. This was called the 'Active Cinema Experience', and although some of the children knew they would be viewing a video, they were not aware of how active it was going to be – this was to be a surprise. The viewing room was a small cinema that held approximately 50 people. The video was brand new, only recently launched, and it showed an exciting story of the eruption. It effectively combined traditional Māori myths of the Fire God with the legends surrounding the eruption, and the sequence of events leading up to the explosion. Animations were combined with real footage, still photographs and acted sequences. At the appropriate moment, the audience became part of a simulated cluster of earthquakes, as the seats in the little cinema creaked and rocked in time to

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rocks and larva bursting from the top of the volcano in the video. Squeals of surprise rippled around the room, as the audience came to grips with their unexpected, multi-sensory experience.

The final phase of the visit was to explore a new permanent exhibition, termed the 'Mud Bath Basement'. The children and Sophie set off down a dimly lit corridor to learn a little about the inner workings of the old bath house. At the end, the corridor opened into the original mud bath treatment area used from 1908 until 1966. They were able to hear about and imagine the patients who, during those early times, had received treatments for their various ailments. This added another dimension to the visit, and again provided an active phase, in which children were able to freely wander and explore the new facility.

After the visit

In the classroom

Once the students were back at the classroom, the concluding tasks were to complete the model volcanoes they had begun earlier, and to write in their journals, reflecting on the trip and the new things they had learnt. Jane also intended to organise a quiz. The students were to think up questions and answers from their volcano study which, once checked, would become the quiz questions. The children had enjoyed this activity before, and it was a useful way of assessing the learning that had been achieved. Unfortunately, at the time of the interviews, this activity had not been carried out. As Jane had mentioned previously, the visit to the museum was the 'grande finale' of an extensive focus on volcanoes and volcanism in New Zealand, and the trip effectively brought the unit to a close. There were no plans for further discussions or follow up directly linked to the museum visit. When asked about this, the students were mostly satisfied that their needs had been met. Two students commented that they would have liked more time with the programme director at the museum, in order to have more of their questions answered:

> Yes, I would have wanted to ask – it's really hard to explain, I wanted to ask, 'Has she ever been around a volcano?'
>
> And I wanted to know how did she get to work at the Museum.

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Student views

The four students interviewed about their experiences at the museum thought the visit had been worthwhile, and when prompted to think about their time there, they had a variety of ideas to contribute.

> We saw lots of things and Sophie taught us things.
>
> We got to go in the museum and we got to see a movie.
>
> You get to learn more facts about stuff.

One student had a slightly different view:

> Oh not really the movie in the basement. When I saw the movie started, at first I thought it was good, but after that I really didn't think it was good. When they went down in the basement – but the bathhouse, looking at stuff in that – that was quite fun and then it became wilder and wilder until the seats shook. Then even the mothers shrieked. I tried to talk to my friend and he didn't speak back!

The students were all able to describe details of what they had seen; two students spoke firstly about the movie and the shaking seats, one spoke about the classroom and the work they had done there, and one talked about how they had explored the old bath house:

> We saw how a volcano was made which was interesting. It's under the ground and its larva and if it gets under pressure it can come up and it makes the volcano take shape.
>
> We saw the inner core, the outer core and the crust. Sophie had the big screen and she showed us pictures on it.
>
> Well, we went down to the place where they've got all the information about the eruption and we got a sheet of paper, we got to listen to phone, what people were actually saying, and saw some big paintings of the pink and white terraces and some olden day things.

It is difficult to gauge the learning that occurred as a result of the visit, because the students came to the museum reasonably conversant with details of the topic. This became obvious during the classroom session when, once Sophie had 'broken the ice' with them, they were able to participate confidently in the discussions, and to answer most of the questions she put to them. From their point of view, these were some of the things they felt they had learnt:

> That the ash (from the eruption) covered the village. It could be heard from Auckland, Wellington and Christchurch.
>
> That it [the mountain] had five craters 'cos it had erupted five times, so it blew its top off five times.

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> That things can be fossilised by volcanoes, 'cos I saw some fossilised shoes, little baby shoes.
>
> We learnt that there was a Mäori priest. He knew that there was going to be a bad omen. [Prompt] It was that war canoe and something that struck the land and then there was that mountain eruption.
>
> I think it was that 120 died in the eruption. [Prompt] We started talking about it in the classroom and then when we went there it showed us the explosion and how the pink and white terraces broke [up] and disappeared.

One of the interview questions also asked the children if work they had done in the classroom beforehand helped them to learn during the museum visit. They all gave positive responses to this:

> It helped a lot. [Prompt] 'cos if she'd started talking about, for example, a caldera, we wouldn't know what that was.
>
> Because we didn't know very much until Miss C told us and then we went to the museum and Sophie told us some more facts.
>
> If we went straight to the museum and she would ask us some questions, we wouldn't know them.

A final question put to the students was the advice they would give, either to other students visiting the site, other teachers taking their students to this site, or to the programme director.

The four students who answered this question thought their friends should 'just have fun' and 'be excited' about the visit. One student, on a more serious note, thought that her friends should listen carefully, so that they might learn a bit more. Advice for the teacher could be summarised by this student's suggestion.

> Well, make sure they have a good time and (I) hope they've been taught some stuff before they went so they can answer the questions. And I'd probably say to just have a good time.

Advice for the programme director was hugely variable, ranging from the slash and burn of changing the exhibit entirely, to the proposal for extending both the exhibit and the timeframe. These were some of the children's ideas:

> I'd probably say see if they can ask more questions, and to make it fun, to give them clues. And it would probably improve to have more time to look at some stuff – a bit more time at that area, and then go to the next area.
>
> They could make a working volcano.
>
> I'd probably like to look at it by myself, 'cos me and my friend we went with a partner, so I said, "you look at that and I'll look over here."

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> I'd have a different exhibition. Instead I'd get – still the seats shaking, but I'd put in a tricky exhibition. Yeah, and a 3D truck movie and you'd have 3D glasses.

Teacher reflections

Jane was satisfied with the visit to the museum and all that it had to offer. Her first comment confirmed the advantage of the children being well prepared for the visit, and being familiar with the topic which was going to be discussed. The work she had carried out in the classroom prior to the visit ensured that the children were familiar with many of the ideas and the vocabulary associated with the topic, which Sophie was then able to build on.

> [It was] really good, because the kids knew what to look for and they already had a focus and they could pin their information on the things that they already knew. That new term scaffolding was working because what they knew to start with was built on in the classroom, and then that was reinforced by what they found out at the museum.

Jane felt that the new learning, which the children achieved through seeing the movie, the PowerPoint, and the photographic displays, allowed them to contextualise the knowledge that they came with. The eruption and the events which followed were discussed in terms of the people and the environment that they affected this included the way in which traditional Māori beliefs, and stories that emerged out of the eruption period, became interwoven.

> I suppose they learnt some finer details about the eruption and also about the people and how they felt. That movie looked at the people's lives as if they were happening now and I think those were probably the new things.

> And the fact that it isn't just the lake, that's the caldera. It's also actually part of the township that's also the caldera. And I think another new bit would have been that the people that survived the eruption went and lived in that township basin, in that caldera part.

Jane also spoke very positively about the environment in which the students worked, both in the classroom and in the downstairs exhibition area:

> There was plenty of room for them to move around and discover. It's a nice roomy place – things were written in big print, visually stimulating. The classroom chats were not too long – the video wasn't too long and she broke it up with the kids moving and making choices. They had us move to different places, asking lots of questions – getting the kids involved so they were not just sitting and listening. That was really good.

The issue of having to work to an adequate but inflexible timeframe was raised, and although this was initially discussed in terms of the museum visit, it eventually emerged as a problem experienced at three other sites:

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> We needed more time down there, (in the exhibition area) or if we had an opportunity to go back down there after we'd finished, but they didn't actually give us that option. I don't think the kids had all listened to the telephone conversations which were actually quite good because they gave the information that was on the board, like from somebody narrating it and telling them about it.

> It's happened to us once before when we were at Waitomo Caves – a busload of Japanese tourists arrived and we were hurried through the caves and that's a disappointment to us because it's the sort of place you like to linger. It happened when the older ones were on camp in Auckland and they went to Kelly Tarlton's the same thing happened – they were rushed through because tourists were coming through.

Jane further elaborated on this point, and she suggested that education groups should be dealt with in a different way to groups of tourists. She believed that their needs were different, as the age and ability of the children were different. Schools were not generally rushing to meet the tight timeframe that tourist groups might be, and she wanted time for students to explore and linger over exhibits that they were particularly interested in. She felt that the needs of international tourists should not be allowed to impact adversely on the needs of students on an educational visit.

The final question put to Jane was how LEOTC fostered learning in terms of different people, different places, tools and motivation. She felt it was primarily the stimulation that the students experienced during a visit that was important, and which inevitably resulted in better quality work afterwards. As an experienced teacher, Jane was able to provide a long-term perspective, and she made this comment about the various LEOTC site programmes:

> I think it's the quality of the education officers and the programmes that we have now. In the last 10 years, that has been the biggest plus and the biggest change, how these places deliver their programmes. We've got the education officer at another site and she's fantastic – she brings the whole aspect of the glowworms and their life cycle and what they actually do to life. The same with the zoo programme. The children got so much more out of it than if I'd just taken them there. These people are experts.

Jane also cautioned that the responsibility was not only the prerogative of the education officers:

> And also you need to gear them up before you go with key questions and things that you want them to find out. If you give them key things to discover or find out, it makes it more valuable so that they actually have a focus and they know what they've looking for. You could just take them somewhere and some kids are going to find out lots and others are not going to find out anything if you don't give them a focus.

In reflecting on the overall visit, Jane said that she had several parents come to her and say that it was a fantastic day. From her point of view:

> It was a perfect day. Everything about the whole day was perfect. I think they've done a marvellous job over there [site], absolutely marvellous.

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Programme director reflections

As mentioned previously, Sophie had been programme director at the museum since 1998. Her enthusiasm for the work bubbled over as she spoke about the programmes she and her colleague delivered. As well as meeting the needs of teachers and addressing the various curricula, she spoke about the on-going professional development they were involved in, and the effort made to improve the work that they did in museum education. Under the guidance and involvement of Museum Education New Zealand (MEANZ), regular national and regional workshops were held, which looked at various issues pertaining to museum education in New Zealand, for example, the provision of assessment in certain activities for school students.

She spoke about the difficulty of obtaining both evaluations from teachers, and assessment of student gains achieved during their visit. Teachers were often resistant to filling out evaluations after the visit, as they were busy with the students, and not in the right frame of mind to stop and consider the day. The challenge of assessing students was also complicated, because each group was different, and could be at the site from anything between half an hour to an hour and a half. After a recent Ministry of Education workshop on assessment, Sophie spoke about her plans for trialling a new pre-visit task sheet, which, she thought, might assist in finding out more about how students learn at the site:

> The students might have some burning focusing questions that they want answered when they come to the museum, then they let us know what they are, and the student can even set their own learning goals, you know, after the museum visit you want to be able to explain how …, or whatever it might be. So these are just guidelines and we get these back. I can start really focusing and tailoring what this programme is and what they want out of the programme and making sure that they do that.

Sophie also spoke about the successful use of mind maps, to get a picture of student learning achieved during a visit to the museum:

> I've seen mind-maps done in primary schools and then in secondary schools with our geography students and they were wonderful. They sent me back colour copies of the mind-maps they had done as their assessment task for geography and it was so simple and easy to see the learning that they had – you know, it was all these key facts that we had gone over here, and there it was all in their mind-maps.

The organisation leading up to visits was time-consuming, but with the increasing use of email by schools, some aspects of this had been streamlined. In terms of support given by the visiting teachers, Sophie felt the most important thing for the museum staff was that teachers had familiarised themselves with the information sent to them, filled in the information sheets provided, and made sure that their students were aware of what the day's programme would

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involve. She said it was particularly helpful if they completed the section on questions they wanted to ask, as this allowed the museum staff to focus their preparation, as a result of which the students were able to enjoy a 'richer experience'. Sophie spoke at length on the role of parents who attended with their school party:

> I'll tell what's a biggie – well can become a biggie, is the parent help, because parent helpers are sometimes confused about what their role is on trips. After this Ministry [MOE] visit we were given an idea which is what we are starting to utilise. He talked about the three 'Ps' how at the start, as we do the introduction to the kids and asking them questions, you involve the parents from there, and let them know that the best way that they could contribute to this programme is to concentrate on the students' learning and be an active participant in the learning. These are the three 'Ps' to point, prompt and praise. And then that from the start gets them that role.

Sophie went on to describe how parents interacted with their groups in very different ways. Some wanted to be involved, to take over the activities, and all but fill in the task sheets themselves while others wandered off to the café and sat there all day. She also mentioned that some teachers did the same. Another interesting comment from Sophie related to the way that she and her colleague were perceived by the visiting teachers and parents:

> Some teachers come in and don't think that we're trained teachers, and we're just guides, and so they'll take over the whole time, and take the whole session themselves, and some at the total opposite extreme that have no involvement.

In addition, there were some significant themes which ran through the work at this museum, but which were never referred to during any of the interviews. These themes included the traditional folklore of the tribal people and stories of the ghost canoe on the lake, which emerged after the eruption. These were interwoven through the classroom work, the exhibition and the movie. Sophie and John made references to these themes; they were a valuable and appropriate inclusion for this site, and added a richness to the stories that they shared with the students.

Key points from Case Study F

On reflection, several key points emerge from this case study:

- Time to explore and investigate on their own during the visit was important for these students.
- Good teaching practice by the programme director and education officer was vital. There was evidence of the education officer and programme director interacting easily with the

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students, provision of an interesting and varied presentation, and the provision of information at an appropriate level for the students. All of these factors helped students to gain a great deal from their experience.

- The experts in this programme brought with them a repertoire of traditional legends and stories. These stories seemed to make some memorable links which aided student learning, for example, the story of the Fire God, the story of Pihanga and how he saved his brother from freezing to death by bringing larva from a Hawaiian volcano, and the story of the ghost canoe on the lake just prior to the eruption of the volcano.

- Clarity about the purpose of the visit helped students to focus on, and participate more effectively in, the tasks provided. For example, extensive classroom work had been undertaken on volcanoes prior to the visit. As a result, students were able to engage confidently in both discussions, and in the activities provided.

- This study showed the value of having the opportunity to access expertise and resources not normally available in the classroom.

- The issue of experiencing pressure from tourist groups, who needed to move through the facility quickly, was raised. In this study, it was suggested that a longer time frame be provided for education groups, and efforts made to avoid these two types of groups from overlapping.

Evidence of learning

Evidence of learning from Case Study F is provided in the commentaries in Table 1 below and the summary of teacher and programme director comments.

Table 1. Student commentary on their learning

Before the visit	After the visit
We're looking at volcanoes. [We might see] bits of rocks from the volcanoes, pictures of volcano eruptions, some villages that have been damaged. No, I don't really know what I might learn. It will be good if I get to learn and do more stuff. (Kate,	We saw the inner core, the outer core and the crust. We saw what happened in the Y eruptions. She [EO] was telling us about the rumbles underneath us and she showed us the things that collide into each other. I learned that 120 died in the eruption. It destroyed the pink and white terraces. There was an old legend about a fire monster. (Kate, 9)

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Before the visit	After the visit
9)	
We're going to learn things and we're going to do activities. We're probably going to see a movie first and then we'll probably go and see pictures of volcanoes. We might see some fossils. We'll learn about different types of volcanoes. We might learn something about what comes out and the shape. We might find out what kind of volcano erupted. [It will be worthwhile] if I have great time. (Gina, 8)	We saw lots of things and she [EO] taught us that Mt Y erupted five times and the fifth time was the smallest. I learnt that it erupted on 1886, 10th June, five days after my birthday. There was a Maori priest and he knew that there was going to be a bad omen. It was that war canoe. The EO told us about how all the magma was under the ground, the pressure came up and up, then all the smoke came out, then the larva came out and made the shape of the volcano. The mountain would have a crater. We heard what people were actually saying and we saw some paintings of the pink and white terraces and some olden day things. [Talking in the class before helped us] cos when she [EO] started talking about a caldera we wouldn't know what it was. When it's finished it turns into a lake, it's got this really big dip in, and all you can see is the crater, like Lake X. We didn't know what was a larva dome, cos we hadn't learned that before. It was just real fun and it was worth it. (Gina, 8)
I'll see pictures of volcanoes, a model of a volcano. We'll talk about volcanoes. We might be allowed to have a little look around [at the museum]. I might learn about some of the eruptions that have happened in New Zealand. People telling stuff [will help me learn]. We might find out some interesting facts and just have fun. (Carol, 8)	We saw how a volcano was made which was interesting. It's under the ground and its larva and if it gets under pressure it can come up and it makes the volcano take shape. Y erupted five times and the fifth was the biggest. I learnt that the ash covered the village. It could be heard from Auckland. And how volcanoes were formed. It really helps you [to go on a visit] like, see it in your mind, what it is like. The EO was good to help me learn. We got some more information and the same thing so it makes us understand it a bit more. (Carol, 8)
[mostly look at] volcanoes and a bit of history about volcanoes. [We'll see] model volcanoes, how they erupted, there might be activities, might be machines there that you pull down and make the volcano explode like glass. We might get taken	We saw about what's under the earth, which comes up onto the land and what happened in town Z and Y. I didn't know that the mountain erupted five times, and I didn't know that the littlest explosion was the most destructive. Now I've experienced a shaking volcano demo, which was something very scary. I found out that things can be fossilised by volcanoes, cos I saw some

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Before the visit	After the visit
around and do activities right throughout the museum. Hopefully going to learn a lot of stuff. I'll probably learn about more volcano names and more types of volcanoes, craters and that. People that know much more about volcanoes than us [will help]. I hope I wont get any growlings and I hope it will be fun. (Marcus, 8)	fossilised baby shoes. I saw a picture of how it looks today (the caldera) and, oh God, what it looked like when it was bursting. I feel sorry for the people who died in the eruption – 150. I learnt about town Z in the old days. It was very old-fashioned and quite good at medical, cos the baths are what they used for medical with warm water. You can relax in them. It's like thermal water, it's a heat thing and it keeps you warm and it can soothe your body down. (Marcus, 8)

Before-visit student comments are related to the possibilities of them seeing volcanoes. Students thought that they would undertake activities of some kind. For example, 'might be machines there that you pull down and make the volcano explode like glass'. All commented on the possibility of having fun and learning.

After-visit comments indicated student thinking about the influence of 'being there', and the impact of LEOTC on memory. For example, 'It really helps you [to go on a visit] like, see it in your mind, what it is like'. Although the visit occurred at the end of the student study on volcanoes, student comments appear to indicate that the visit reinforced their learning. For example, 'we got some more information, and the same thing, so it makes us understand it a bit more'. They also indicated that they learnt new ideas. For example, 'we didn't know what was a larva dome, cos we hadn't learned that before'.

Jane, the teacher, indicated that she thought her students had used the experience to reinforce their learning. They had also developed more breadth and depth of knowledge. She acknowledged the involvement of her students, and that the visit was stimulating for them. Finally, she indicated that visits impact positively on student work in the classroom.

Sophie, the programme director, told how she shaped programmes on the basis of the information she received beforehand from students. She was responsive to student needs, and endeavoured to match their queries to the programme she provided especially for them.

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