

## **A planning model for junior technology classes learning outside the classroom**

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### **Abstract**

This paper presents some preliminary findings of a doctoral project which explores the learning experiences of five year old students outside the classroom. The study follows the journey of two primary school teachers as they plan for a technology unit in which their students make chocolates for Mothers Day. A visit to a local confectionary factory is a central element of the unit as it provides access to expert knowledge and a practice model upon which the students can base their own chocolate making. Several key themes have emerged during the initial analysis of data, one of which is the importance of establishing a ‘need to know’ element to guide and drive student learning. This will be explored along with a description of the intervention model developed as a framework to support teacher planning.

### **Background and project description**

This paper presents initial findings from two case studies of an in-depth investigation into the characteristics of successful practice in junior classes participating in learning experiences outside the classroom (LEOTC). Two classes of New Entrant students and their teachers make up the participants of the study, one class from a large urban school and the other from a smaller rural school. The research methodology adopted in the development of the two case studies is interpretive and sits within the post-positivist paradigm, and more specifically within the interpretive framework of inquiry (Guba, 1990). The study is underpinned by a socio-cultural, constructivist view of learning that recognises the importance of distributed cognition and knowledge sharing between group members (Hatch & Gardiner, 2001; Munsterberg, 1914). This perspective has particular

relevance in the context of this study where students, teachers, site staff and the researcher share knowledge and in so doing, contribute to new understandings, new skills and enhanced capabilities.

The literature review for this project has included a broad sweep of several key areas of research including the cognitive development of children in the 4 – 6 year age range, the nature of schooling and how this relates to LEOTC and also LEOTC as a strategy to enhance student learning. It also examines the nature of Technology Education and the expectations we have of young children participating in this curriculum. The investigation aims at answering the following research questions:

- 1) How can learning experiences outside the classroom improve student learning?
- 2) How can effective learning experiences outside the classroom be designed for junior primary students?
- 3) How can Learning Experiences Outside the Classroom enhance the teaching of Technology Education in the Junior Primary classroom?

### **Defining learning experiences outside the classroom**

LEOTC in New Zealand seems to have emerged from a previously used term EOTC or Education Outside the Classroom. The terms LEOTC and EOTC are sometimes used interchangeably but in fact one has developed specifically to describe learning in physical education i.e. out door education, (EOTC), and the other has a wider application encompassing all excursions outside the school in which specific learning cannot be replicated within the classroom itself.

### **Key ideas emerging from the literature**

For the purposes of this paper I have focused on the cognitive development of five year old students – effectively the transitional group between Early Childhood education in New Zealand and the commencement of Primary School Education. This group is commonly referred to as New Entrant students.

Long-term memory in young school age children is a key feature of this study and links directly to the research questions regarding ‘novel’ experiences and the effect of these on long-term memory. Typically, recalling what happened before the age of five or six is limited, and recalling what happened prior to three years of age results in very vague recollections. The term *infantile amnesia* is frequently used to refer to these very early autobiographical experiences of which adults and older children generally have no recall at all (Hudson & Nelson, 1986). Studying long term memory in young children is complex as it is multifaceted, and factors influencing the speed and completeness of memory may include how knowledge is represented in the memory i.e. the child’s personal understandings of the world around him or her and the parents’ styles of interaction (Seifert, 1993). The child’s knowledge base is a key facet of effective learning experiences and relates to the background knowledge the child brings to the task and the familiarity children have with objects within that task. Chi & Ceci (as cited in Seifert, 1993, p. 13) expand on this idea and suggest that young children’s knowledge “exists in isolated pieces or pockets” and “these bits of knowledge are not coordinated with each other”. As children get older, their ever-increasing experience and knowledge result in these “bits” aligning and blending and becoming a more reliable base from which to draw.

Researchers in the field of memory and cognitive development generally consider long-term memory in terms of *episodic memory* – memories of specific events e.g. a visit to an aquarium, and *semantic memory* – memories of recurring events e.g. weekend visits to the beach. Very young children primarily have episodic memory and as particular events are repeated, they develop generalized or semantic memories for them. By the time children reach school age they have developed internalized “scripts” or expectations for how certain events should unfold, for example their bedtime routine, and as described by Seifert (1993), these give rise to a child’s burgeoning understanding of what makes “the story of my life” – what a child can anticipate from the daily events in his/her life.

The memory of an LEOTC experience would in most cases be viewed as an episodic event – a one-off, focused visit linked to the current classroom programme. Whilst the

work of Hudson (1984) asserts that even four year olds can remember and recount many details of an unusual experience a year later, pre-schoolers' memories are viewed as being somewhat less reliable than those of older children (Siegler & Alibali, 2005). Young children tend to encode lesser amounts of information based on what they notice as being important. Falk (1997) describes this as the "lens" through which the experience is viewed, and which strongly influences what is noticed and remembered. Memories are considered to be a mixture of what is seen, what is known and what is inferred from an event. Siegler & Alibali (2005) also consider that young children store the 'gist' of events they experience rather than verbatim representations and sometimes fail to absorb important details altogether (Siegler & Alibali, 2005). This can make the retrieval of memory less reliable when their understanding and inferences of an event may be incorrect. This provides us with some valuable insights into classroom pedagogy and how to best manage learning experiences.

Storage of information and its later retrieval is influenced by how a child commits information to memory. For effective retrieval of information it seems important to be aware of the child's organisation of stored memory. Storage of information by children below the age of six is relatively fragile and can be easily influenced by events which occur shortly after the event and before retrieval (Bruck & Ceci, 1999). Research relating to the use of evidence from young children as witnesses in court (Foley, Harris & Herman (as cited in Siegler & Alibali, 2005), suggest that the retrieval of episodic memories by young children can be less accurate than those of older children because their memory is more susceptible to leading questions and suggestions. Young children may also be confused in an interview situation and be influenced by what they think the interviewer wants to hear. They will try to give the answers they think the adult wants rather than sharing the ideas they hold (Damon cited in Hatch, 1990). From this we can deduce that although children's memories can be manipulated and altered by outside influences, this can also be advantageous when used to enhance memory recall. For example a common practice in the junior primary classroom is to ask children to draw a picture after a special event. This drawing has the effect of 'cementing' a perception of the event in the child's memory. These ideas along with salient points emerging from

other publications relevant to this study, were combined to construct an intervention model - a model in which the purposes and goals of the LEOTC are clearly identified and students are effectively supported in order to achieve these goals.

**(Figure 4)**

**(Figure 3)**

### **The intervention model**

#### *Setting up*

Working in collaboration with the participating teachers and the staff at the confectionary factory was the starting point for planning both the visit and the technology unit in which it was embedded. Several meetings were held in which I visited the factory site, spoke with the tour conductors and shared ideas for the up-coming visit. It was important the site staff understood the purpose and goals of the visit. As it happened, they were happy to modify their presentations in order to achieve a better match with our teaching goals i.e. a more extensive presentation in the 'chocolate making room' and less emphasis on the making of other sweets which was the usual programme. Three meetings were held with the participating teachers during which we established agreement on the important features of an effective technology unit and the learning experience outside the classroom. A follow-up meeting established the focus of the technology unit and possible sites for a visit. Conveniently, Mothers Day was coming up shortly and it was decided students should be encouraged to decide upon a gift they could give to their mothers. They would be guided towards making chocolates and a visit to a local chocolate making company would provide a relevant site visit. In satisfying the needs of the technology curriculum, these two components would give students an opportunity to examine the practice of others, develop knowledge and skills specific to undertaking their own practice. Modeling and prototyping, two other features of the curriculum, could be achieved with the creation of the chocolates, and the chosen final outcome would establish an important 'need to know' goal for the visit.

**(Figure 2)**

#### *Describing the model*

In order to clearly describe the intervention model, it is presented in a table and divided into three phases:

- 1) planning and preparation prior to the visit
- 2) management of the visit
- 3) follow-up activities

Each phase will consider the role of the teacher, the parent helpers and the students. The table below summarises features which have emerged from a literature review and which are identified as being of significance to the study.

SUMMARY OF AN LEOTC INTERVENTION MODEL			
Considerations when planning an effective learning experience outside the classroom			
	<i>Teachers' preparation and tasks</i>	<i>Parent-helpers preparation and tasks</i>	<i>Students' preparation and tasks</i>
<b>BEFORE THE VISIT</b>	<ul style="list-style-type: none"> <li>• Selects a novel, relevant, real world and age appropriate experience for students</li> <li>• Selects a visit which is short and focused</li> <li>• Selects a site which is free of unnecessary distractions</li> <li>• Identifies students' prior knowledge of topic and builds upon this before the visit</li> <li>• Is knowledgeable about the topic and planning for LEOTC</li> <li>• Identifies clear learning goals and effective assessment strategies</li> <li>• Selects focused experiences based on a 'need to know' basis</li> <li>• Planned to include focused pre and post visit activities</li> <li>• Develops working relationship with site staff</li> <li>• Meets with parent helpers - share teaching goals and provide hand-out to prompt responsibilities during visit</li> <li>• Selects experience which includes hands-on exhibits and experiences</li> <li>• Checks that toilet facilities and refreshment areas are available</li> </ul>	<ul style="list-style-type: none"> <li>• Is briefed on the purpose of the study</li> <li>• Understands that the tasks they have been asked to carry out are designed and selected from previous research and the literature of LEOTC.</li> <li>• Is well prepared for their role during the visit – understands the purpose, the teaching goals and individual responsibilities</li> <li>• Is briefed on the schedule of the visit including time for refreshments and toilet visits and purchases from the site retail outlet.</li> <li>• Meet with teacher</li> </ul>	<ul style="list-style-type: none"> <li>• Effectively prepared for the visit i.e. understands purpose of visit, and that it will inform their technological practice of chocolate making</li> <li>• Choice of topic and visit achieved collaboratively</li> <li>• Understands the 'need to know' driver of the visit – takes part with clear goals and prepared questions</li> <li>• Is familiar with the language of chocolate making, the ingredients and the processes which will be demonstrated during the visit</li> <li>• Is briefed on the schedule of the visit including time for refreshments and toilet visits</li> <li>• Understands the need to follow instructions from their supervising adult.</li> <li>• Understands that factories can be dangerous</li> <li>• Understands that there may be other visitors at the site and their needs must be respected</li> </ul>

	<i>Teachers' role and tasks</i>	<i>Parent-helpers' role and tasks</i>	<i>Students' tasks</i>
<b>DURING THE VISIT</b>	<ul style="list-style-type: none"> <li>• Oversees visit – managing start and finish times and general movement through the factory (Does not supervise a group if possible)</li> <li>• Observes student/parent interactions and their engagement with the site and its exhibits</li> <li>• Provides back-up for parents ensuring students behave appropriately and maintain a focus on the planned tasks</li> <li>• Prompts and encourages parent helpers in carrying out their tasks</li> <li>• Supports and prompts student questions</li> <li>• Records visit with digital camera (or other) for use during follow-up activities</li> <li>• Collects samples of products for use in follow-up activities</li> </ul>	<ul style="list-style-type: none"> <li>• Supervises and works with a group of 3 – 4 students</li> <li>• Follow the guidelines presented by the teacher <ul style="list-style-type: none"> <li>▪ know the learning goals of the visit</li> <li>▪ talk to the children about these learning goals as you go through the factory</li> <li>▪ interpret the presentations and products the children are seeing</li> <li>▪ present the correct language to the children as they view the products and presentations</li> </ul> </li> <li>• Ensure students see and discuss the products or exhibits relevant to their study i.e. <ul style="list-style-type: none"> <li>▪ the different types of chocolate, moulds, fillings and chocolate colourings</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Proceed through the factory under the supervision of their nominated parent helper</li> <li>• Respect the wishes of their parent helper</li> <li>• Ask prepared questions during the chocolate making presentation</li> <li>• Ensure they find out how to achieve their goal of making chocolates for Mothers day</li> <li>• Participate in opportunities to make chocolates and a lollipop</li> <li>• Thank the presenters at the conclusion of the factory tour</li> </ul>
	<i>Teachers' tasks</i>	<i>Parent Helpers' tasks</i>	<i>Students' tasks</i>
<b>FOLLOW-UP TO THE VISIT</b>	<ul style="list-style-type: none"> <li>• Plan follow-up activities which will help cement students' memories of the experience</li> <li>• Encourage and facilitate a detailed account of the visit</li> <li>• Present follow-up activities directly after the visit</li> <li>• Include activities such as imaging, drawing, discussion, viewing photographs and sequencing the production process</li> <li>• Continue to signal the purpose of the visit and how students will use the information gathered i.e. keeping the end product in mind (chocolates for Mothers' Day)</li> <li>• Imbed the selected learning intentions of the Technology unit through this work e.g. planning, market research, design and/or modeling, learning about ingredients and materials for production, prototyping the final product, and evaluating this against the criteria specified by the product receiver</li> </ul>	Nil	<ul style="list-style-type: none"> <li>• Participate in activities directly after the visit which will provide the following opportunities: <ul style="list-style-type: none"> <li>▪ discussion to remind students about the goals of the visit</li> <li>▪ drawing/recording key aspects of the visit</li> <li>▪ review of the language associated with the visit i.e. names of products, ingredients, equipment</li> <li>▪ discussion about the processes involved in chocolate making to ensure a shared understanding</li> <li>▪ discussion and sequencing of the production process</li> <li>▪ viewing photographs of the visit</li> <li>▪ synthesis of the information gathered during the visit to enable students to make their own chocolate</li> <li>▪ planning process, based on the visit, which will be required to help design and make their own chocolates</li> </ul> </li> </ul>

As mentioned earlier, the product development process of the Technology unit was interwoven through the preparation and follow-up to the factory visit. In addition, students were encouraged to investigate the type of chocolate their mother preferred, and, using the ideas they gathered from their visit, create a model which they thought would make an appealing gift. These dough models were matched with existing commercial moulds and together with a group of parents, the students created their final products – chocolate frogs, fish, fairies and butterflies in an array of different colours resulted and these were wrapped and labeled in preparation for Mothers Day. A satisfying project concluded.

The overall effectiveness of this model is best judged by the students' ability to use the factory visit to inform their own practice i.e. making chocolates for Mothers day. Although the findings of this study are not complete, initial indications suggest a refined version of the intervention model will be very useful and in advance of a complete analysis of data, two key ideas have emerged.

**(Figure 1)**

- i) It was important students understood that the purpose of a visit was to gather information so they could make chocolates for Mothers Day. Students who did not grasp this idea, were less likely to link the purpose of the visit to the making of their final products and less likely to transfer new information across to their own product development.
- ii) Parent helpers who understood the goals of the visit were particularly effective in the guidance and support they gave students during the visit and less likely to engage in distracting activities. They were also more likely to understand the final purpose of the visit, i.e. to make chocolates for Mothers' Day, and able to effectively support the teacher in achieving her teaching goals.

The results so far are very encouraging and as the study progresses, I hope to gain an increasingly clear picture of how to maximize experiences for students learning outside the classroom and be able to present a more comprehensive description of the findings.

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