

Deepening Secondary Students’ Understanding of Coastal Management at Labrador Park through Fieldwork

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The impetus for action research on experiential learning of geography stems from a desire to introduce a more “engaged” form of geography, whereby students move beyond the academic study of geography in the classroom to making sense of geography in relation to their reality (Morgan, 2012). Through an environmental scan of the inclusion of fieldwork into the new Geography syllabus commencing 2013, we sought to find out how fieldwork is integral to the study of geography in Singapore schools. The choice of coastal geography as a topic for inquiry was strategically aligned to its inclusion in the new syllabus and its relevance to Singapore’s geography as an island. The feedback obtained from teachers participating in Professional Learning Circles (PLCs) also suggested that students found it challenging to understand abstract geography concepts, in particular, physical geography processes and how they take place in real world contexts. As such, a “disconnect” or a learning gap has been created between geography presented to the students in the textbook to that of their real world contexts. The decision to explore how to bridge students’ learning gaps through fieldwork as a pedagogical practice was also guided by our Humanities Department action plan to effectively engage our students through Outdoor Classroom Experiences (OCE). We chose Labrador Park as a research site due to various factors, such as its geographical proximity to the school, evidence of human management of coasts, preservation of historical features, and availability of resource materials.

Methods

The research was conducted from April to October 2011 and consisted of three key phases: planning, data collection and data analysis (see Table 1).

Table 1: Key phases in the Action Research

Phase	Focus	Time frame
1	Planning <ul style="list-style-type: none"> ▪ Environmental and subject scanning ▪ Brainstorming of research ideas ▪ Formulation of thesis question and sub-questions ▪ Defining research scope ▪ Recce of field sites ▪ Development of fieldwork booklet 	April to June
2	Data Collection <ul style="list-style-type: none"> ▪ Administration for fieldwork (e.g., information to students and 	July to August

	<p>parents)</p> <ul style="list-style-type: none"> ▪ Selection of students ▪ Fieldwork activity on 20th July ▪ Class reflection 	
3	<p>Data Analysis</p> <ul style="list-style-type: none"> ▪ Transcription of interviews ▪ Categorization of student responses ▪ Evaluation of student responses ▪ Consolidation of findings 	September to October

A total of 38 students from the best Secondary Three geography class participated in the fieldwork at Labrador Park. One of the goals of this fieldwork activity was to stimulate curiosity and interest in the topic. After a pre-fieldwork briefing upon arrival at Labrador Park, we divided students into two smaller groups to work on different sites. The sub-activities at the learning sites were aligned to different stages of the learning cycle in a sequential manner. Next, students had to conduct a reflective observation by consciously being aware of their experience and sorting their observations into categories typically associated with physical and/or human environments (see Appendix 1). Students then had to make sense of their observations by providing explanations and justifications for grouping them into different categories. Subsequently, they had to locate the new place-based information which they observed on a map. Finally, students drew conclusions and made recommendations based on their observations in the reflection section (see Reflections in Appendix 1, Question 3: Which coast, station A or B, requires more protection? Provide reasons for your choice).

The team adopted a qualitative approach to address the key research question: How does fieldwork enhance students’ understanding of coastal management? To achieve this, the team focused on three key areas: (1) the development of a fieldwork booklet focusing on Kolb’s experiential learning theory; (2) qualitative interviews of students, and (3) exploring the concept of understanding through the Understanding by Design Framework by Wiggins and McTighe (2005).

Fieldwork Activities

Based on the four stages of Kolb’s learning cycle: concrete experience, reflective observation, abstract conceptualization, active experimentation (Jenkins, 1998; cited in Healey & Jenkins, 2000), we modified the fieldwork booklet developed by Singapore teachers in collaboration with the Ministry of Education (Singapore) Curriculum Planning and Develop Division (CPDD) for the national Humanities Camp in 2010.

Qualitative Interviews

To investigate the role of fieldwork in enhancing students’ understanding of coastal management, 3 students were selected out of the 38 students based on their past academic performance in the first semester of 2011. Student 1 had the highest test scores while student 3 had the lowest. In-depth and open-ended interviews were conducted one week after the fieldwork activity with the three selected students (see Appendix 2), and a general post-event feedback questionnaire was distributed to all 38 students (see Appendix 3). The interview questions focused on the areas of student experience, the structure of fieldwork activities, and the students’ understanding of coastal management. The interview questions provided guidelines for helping students to construct their reflections. However, students who were academically weaker required more prompting from the teacher interviewers who had to simplify the questions in order to scaffold their thought

processes.

Understanding by Design framework

We utilized Wiggins and McTighe's (2005) definition of understanding to delineate the scope of our research. The authors defined understanding as "a transferable, big idea having enduring value beyond a specific topic" (p. 128) which is "best acquired by "uncovering" and "doing" (p. 129). Understanding has also been defined by the authors to encompass six distinct areas: (1) explanation; (2) interpretation; (3) application; (4) perspective; (5) empathy; (6) self-knowledge. Of these six areas, explanation and empathy were chosen as key areas of focus for the research. Explanation is defined as providing "knowledgeable and justified accounts of events, actions and ideas," and empathy is defined as "[one's] ability to get inside another person's feelings and worldview" (pp. 85 & 98).

Discussion of Students' Responses

affective engagement

The students were asked about the links between their observations of coastal management strategies. Two students spoke about the vulnerability of coastal environments; purpose of seawalls and the nature of waves:

Student 1: To protect the coast maybe from certain retreating inland. I think the seawalls ...and then planting trees along coasts. If you go parks, you'll see like historical landmarks...introduce to us to young people what they do to protect the coasts, seawalls, signs... In school, when we say protect the environment (but when do we see it?)...we can actually appreciate the beauty of nature, we can actually cherish it, protect, try to protect and conserve it and you actually know the impact...and how we affect each other, nature and us.

Student 3: Yes, we need to have coastal protection and coastal management like no fishing. There must be seawalls.

From both students' responses, it can be inferred that they have some idea that hard engineering is needed to protect Singapore's coasts and that they have made attempts to conceptualise their observations at Labrador Park. Student 1 connected his observations of coastal features such as the presence of vegetation to that of coastal processes, the possibility of sediment removal due to coastal erosion. The students also made connections between personal responsibility, the environment, and society if the coast is not well-managed. Student 1's reflection showed an appreciation for nature's beauty and this has been translated into a personal conviction about the need for environmental conservation in Singapore. Fieldwork also exposes students to the complex processes that shape environments, enabling them to realise that environments are managed spaces and this reflects the important role that humans have/have not played (Hmelo, Duncan, & Chinn, 2007). In response to a follow-up question on the challenges for the Singapore government to protect other coastal areas of Singapore, Student 1 commented:

I think a challenge is to get the cooperation of people, I think, a very good example, is fishing, and...to stop fishing. There is actually a sign like the government say "don't litter" but [people] litter. [These people] must have the mind, erm everyone must have the consciousness that protecting coasts, it will work, because not just one-sided but also people protecting together.

For Student 1 at least, the field experience has provided experiential platforms for students to be affectively engaged with the environment and develop critical perspectives about the challenges of coastal management at the individual, community and national scales (Dummer, Cook, Parker, Barrett, & Hull, 2008). Student 1's response also indicated that direct experience enabled him to develop a greater awareness of the complexities and dynamism of decision making in the management of environments.

deepening geographical knowledge and

experience through structured fieldwork

This section explores the integral place of fieldwork in the learning of geography to help students learn about the real world. Observation skills were included in each site to encourage students to get a sense or “feel” of the environment as part of the stage of “concrete experience” whereby students learn to encounter or “grasp new information or experience” (Jenkins, 1998; Healey & Jenkins, 2000, p. 187). We deliberately structured questions to help students become sensitive to the environment through inquiry (Roberts, 2003). When asked about what was most enjoyed about their learning at Labrador Park, Student 2 replied:

It's something I've never experienced before and cos' it's an outdoor learning journey. [pause] The environment and the part where my teacher explained to me regarding tides and how they came about. The one that is on the deck, Station 2. The one where you close your eyes in Station 2, to feel the environment around me...Can make me reflect...on how the environment has made an impact on my life. It was enriching...[pause] enriching as in...there are a lot of new things that I can learn from this trip. For example, how effects can lead to great impacts. [pause] boring as in as there are only two questions and in each station we spent quite a long time in it. I feel there should be more stations.

The facilitator (teacher) is fundamental to how the activity is carried out and affects how the students come to appreciate, understand and relate to their environment. It has also enabled Student 2 to develop new ways of seeing how she has a personal relationship with the environment and the multitude of cause-effect relationships that can occur in a particular context. Student 3 also described how sketching and map-reading (see Activity 3 in Appendix 1), was important to her sensing of the environment:

Sketching... because it makes us observe about the colonial house and cable cars. People were fishing, but I remember the

littering and saw the seawall. Also, I have never done it before. I never thought I could draw.

Student 1, however, noted that the map-reading exercise required more guidance from the teacher as there was a dissonance between map-reading skills taught in a geography classroom and his/her ability to apply the skills in a real world context:

Yup map-reading also, but I think the map-reading should be more, more guided. Yeah, and then because, maybe because we are not, we are not doing on paper and real surroundings and then can be lost.

This reflects the importance of closing the gap between what is taught in the classroom and the real world. Teachers should therefore focus on the transferability of these skill sets. However, these “gaps” in learning also provided fertile ground for students to develop personalised ways to make sense of new information gathered. As such, the structuring of activities using Kolb's learning cycle also offered intellectual room for “active experimentation” as students thought of ways to collect and process information. These processes can lead to a more meaningful and extended learning experience. Fieldwork experiences should also take into consideration the sequencing of activities, students' prior experiences, and collaboration between learners (Roberts, 2003).

Conclusion and Future Research

This action research has highlighted the positive relationship between fieldwork, affective engagement and students' understanding of coastal environments and management (Boyle et al., 2007). Fieldwork is a highly conducive platform for the facilitation of students' affective engagement with the environment. Affective engagement has also created possibilities for deeper and critical understanding of a geography; deeper appreciation of local environments and challenges facing environmental management; and active citizenship in relation to environmental conservation. However,

students also emphasized the need for personal space and time to observe the field sites prior to the activities to develop a more individualized sense of the place. Hence, the incorporation of time for free play in the fieldwork experience could be vital to allowing students to develop their personal sense and understanding of their environments. Such experiences within a typically structured school fieldwork activity sequence are potential platforms whereby students learn to see the world as a classroom that caters to their interests and needs. Through a purposefully structured fieldwork booklet in alignment with Kolb's learning cycle, the action research has shown that this theory remains relevant to strengthening students' abilities to construct self-knowledge. However, a more critical application of the theory requires sensitivity towards a differentiation of students' ability and learning styles (Fielding, 1994 as cited in Healey and Jenkins, 2000). This includes, more scaffolding for lower-ability learners in terms of instruction and variety of activities. Future fieldwork research could explore the influence of diagnostic scanning of students' prior knowledge in relation to meeting certain desired learning outcomes and the possibilities of differentiated modes of assessment in the field (Scheyvens, Griffin, Jocoy, Liu, & Bradford, 2008; Healey & Jenkins, 2000; Pawson & Teather, 2002). Finally, it could also be useful to examine prior resources given to students about a topic to be explored during the field experience as such would also constitute as a type of scaffold to develop students' ability to interpret phenomena through their personal lenses.

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Acknowledgements

The author acknowledges the members of the Action Research Team from New Town Secondary School:

1. Mdm Rosnah Ghazali
2. Ms Christine Tan
3. Ms Revathi Balasubramaniam
4. Mdm Nazmunisah Abdul
5. Ms Noraiha Abdul Rahman

Appendices

Appendix 1: Sample activities in Fieldwork Booklet

Activity 1: Warming Up (10 min)

Let's get to know our environment!

For this activity, you will need to sit down and close your eyes.

Pick out five different sensations (including your sense of touch, smell and sound). Remember them and record in the table below. How about classifying them under the categories provided?	From human activities [√]	From the physical/ natural environment [√]
E.g. sound of people talking in the distance	√	
1		
2		
3		
4		
5		
<i>I would like to experience this more (a sound, smell or sensation):</i>		

Activity 2: Human impact on the environment (15 min)

As Geographers, we are often interested in studying how people interact with the physical environment. Do you think people have been clever in finding ways to make use of the coastline? How has the coastline been developed to accommodate the various needs of people? Let's find out!

Recording of Human Impact on the Environment

Look around you (*from Keppel Bay to the edge of Sentosa Island*) and observe the activities or features around you. You may refer to Map A and B to identify some of the landmarks which you see around you.

Observe the surroundings around you and the coast opposite from the Lookout Deck. Can you pick out as many examples of human impact as possible?

Identify these examples of human impact and classify them under three broad categories: economic, social and environmental activities, using the table provided below. Give a short description of each observation.

Human impact in terms of...	Observations from the field site (include a short description)
1. Economic activities/features	
2. Social activities/features (include recreational and residential uses)	
3. Environmental activities/features	
4. Others:	

Activity 3: Mapping the area (15 min)

With the maps provided, locate Sentosa, Pulau Keppel and Keppel Golf Course and mark them on Map A. Use symbols or labels to indicate their respective positions.

From the lifebuoy on the Lookout Deck, provide the answers to the following features in the table below. (*You need to locate the North first.*)

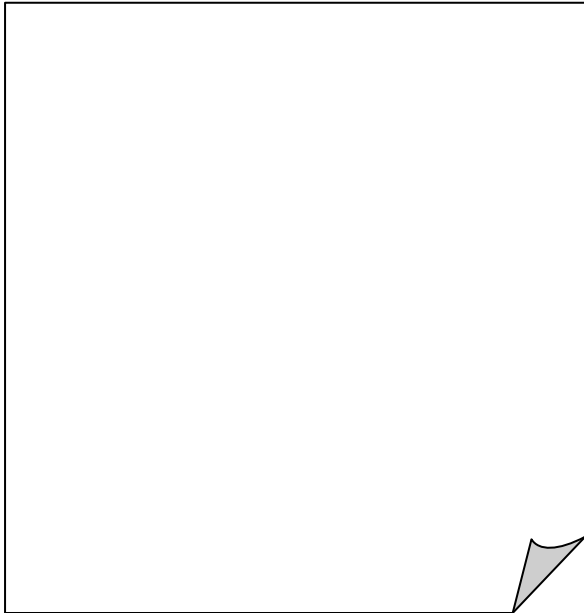
Features	Compass Direction	Observations
1. Green Marker (in the water, near the edge of Sentosa Island)		
2. Cable Car Tower (on Sentosa Island)		
3. Colonial White House		
4. Shelter on Pulau Keppel		

Reflections: Why protect the coast at Labrador Park? (10 min)

This activity is to be done after groups have completed Station A & B.

The Lookout Deck is located near the mouth of a small stream and along the coast. What do you observe about the land found at the coast?

1. Write down 5 differences that you will use to describe the coast that you see at the Lookout deck as compared to the photograph on the right?



Photograph taken by Elissa Goh on 21st June 2011, 9.05 a.m.

2. What do you notice about the banks, water level and energy found at the coast at the Lookout Deck? Compare this to the coast observed near the Red Beacon? Provide at least two similarities and two differences:
3. Which coast (Station A or B) requires more protection? Provide reasons for your choice.
4. NParks is trying to preserve Singapore's legacy.
What are some historical landmarks that have been preserved?
Why is there a need to preserve these landmarks/monuments?

Appendix 2: Interview Questions

1. Before the fieldtrip, what impressions did you have of going to the beach?
2. What did you know about the coast before the fieldtrip?
3. Did you enjoy the trip to Labrador Park?
4. What about the fieldtrip did you enjoy the most?
5. Do you think there is a need to protect the coasts?
6. Which fieldwork activity did you enjoy the most and why?
7. Did the skills you apply help you increase your awareness of coastal management? If so, how?
8. How did the fieldwork activities better help you to appreciate the relationship between man and the environment?
9. What did you see at the park which shows the government's efforts to protect the coast at Labrador?
10. After this fieldtrip, do you think it is more critical to protect the coast?
11. How did the fieldtrip increase your understanding of the coast and coastal management?

Appendix 3: Post-event Feedback

1. How would I rate the fieldwork experience?
2. What are two ways in which the fieldwork experience could have been improved?
3. What are three things that I have learnt about the topic of coasts?

Appendix 4: Responses from Post-event Feedback

(collected on 4th August 2011, all quotations in verbatim)

Question 3: What are three things that I have learnt about the topic of coasts?

- Man-made structures along the coasts are designed to withstand erosion by waves.
- Seawalls protect inland flora and fauna.
- We should protect our coasts as the coasts are part of the land we are living on.
- Erosion also happens along the coastline. Seawalls are thus built to prevent erosion.
- Waves change speed at a rapid rate.
- Waves carry rubbish and dispose [them] to one part of the coast.

- Coasts are very vulnerable.
- Different waves can cause positive or negative [effects] to coasts.
- The coast can be very beautiful if we continue to preserve it.
- Coasts are important for the shipping and trading between places.
- Coasts can change over a period of time.
- Tourists attractions located near [the coast] to enhance our country's economy.