An Evaluation of a Prince Edward Island National Park of Canada Virtual Beach Tour

by

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Abstract

I developed and evaluated a virtual field trip focusing on a beach ecosystem within Prince Edward Island National Park, designed to serve as an introduction to the dynamic coastal beach habitat, to increase students' awareness of interactions within ecosystems, and to identify what organisms could be found within. Two grade 7 classes were tested prior to viewing the DVD presentation, within one week of viewing the presentation, and after five weeks of viewing the presentation.

The results show that Parks Canada can further develop relevant education outreach tools using multimedia presentations as students gained and retained knowledge from *Treasures Ashore*. Although both the pre- and post-test knowledge scores were low, participants showed an increase of 46% in knowledge scores from the pre to first post-test. They also listed 22% more and drew more than twice the number of objects and organisms relevant to the content of the presentation.

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Acknowledgements

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Chapter 1

Introduction

Background

Since 1997, I have been an interpreter for Prince Edward Island National Park of Canada (PEINP) within the Prince Edward Island Field Unit (PEIFU) of the Parks Canada Agency (PCA). Typically, students with strong academic science backgrounds were being hired as interpreters, but I was successful in earning my position while pursuing a Bachelor of Education at the University of Prince Edward Island (UPEI). Teaching about science matters is a key function in the role of an interpreter, and so the position was relevant to my field of study. As an Education student, I had certain training in communication and presentation skills that the science students did not have; however, I did not have the scientific backgrounds of the other interpreters and, therefore, had a lot of information to acquire.

As part of the interpretive team, I began assimilating knowledge about the natural and cultural histories of the park, and was immersed daily in field-based experiential learning while exploring the park's resources. This holistic learning style encompassed auditory, visual, and kinesthetic needs, and had a profound impact on my ability to retain information, allowing me to transfer it to my knowledge and experience base. New to the potential of teaching as a profession, I found more value and meaning in educating via interpretation; I no longer felt stifled as a classroom teacher or as a learner.

The job of an interpreter for the PEIFU is to educate the public in a fun manner about the natural and cultural histories of the site. I became a generalist of Prince Edward

Island's cultural history and have specialized throughout the years as a natural history guide. My work involves developing and delivering a variety of educational programs.

The summer months are a busy time for interpreters as we attend to the large number of tourists who travel to Prince Edward Island (PEI). We are, however, kept well occupied during our "shoulder seasons" (spring and fall) with school groups. I have delivered and assisted with the development of many programs for such school groups both in the park and in the schools across PEI. Because we are currently unable to meet the demands of school groups for our spring and fall in-park beach walk programs, I decided to develop and formatively evaluate a virtual tour of a guided program for my M.Ed. project.

My presentation, *Treasures Ashore,* is a virtual field trip that takes students on a beach walk along Stanhope Main Beach, PEINP. Although it was developed to compensate for the interpretation staff's lack of availability for personal program delivery, teachers are encouraged to use the presentation as part of a pre/post-guided visit to the site if possible. Standing alone, however, it serves as a curriculum supplement for the Grade 7 Atlantic Science Curriculum along with the introductory program that I developed called *Diversity of Life.*

While there are many videos available for teachers to use, not all are developed with the intent to serve as an educational tool. Griffin (2009) reiterates the importance of using videos designed for use in the classroom: "There are a lot of excellent videos available, but a video produced for educational purposes—created with the needs of the classroom in mind—will be structured in a way to most effectively meet your needs." Video is a form of media that both teachers and students are familiar with, and it is an

easy medium to work from. Reviewing the material before presenting it to the students is standard: This allows teachers to familiarize themselves with content and structure lessons, and hone in on aspects of the video presentations that suit their teaching objectives.

Rationale for the Study

I enjoy my work with Parks Canada because it enables me to provide outdoor, experiential, and environmental education. However, when the outdoor experience is not an option, I have discovered that I am still able to facilitate valuable learning experiences within the classroom through virtual touring, using *Treasures Ashore*.

My delivery uses a block of class time, whereas taking students to the site for a presentation involves an extended absence, since students not only have to engage in the program, but they have to travel to and from the site as well. This added travel is not only measured in time, but is an additional cost to the schools. There are no current fees in the PEINP policy for in-park and in-school presentations. It has previously been proposed by the PCA that a fee be charged for its educational services. While this is not the current policy, it remains a continuous possibility; therefore, it is good to have other resources available for school groups.

Parks Canada's in-school outreach programs, offered in PEI during the off-season, are an alternative for groups we are unable to accommodate on-site due to the high demand of in-park excursions. Since we have a limited staff to deliver such presentations, I have structured this new program to function without an interpreter present. The program is a virtual video of a guided beach-walk activity and is designed to engage the students, allowing them to develop an individualized personal experience

through a virtual reality. This new program is in DVD format; therefore, facilitating is as simple as pressing “play”!

The DVD presentation serves as an accurate and useful source of information, enhancing the prescribed Grade 7 Atlantic Science Curriculum. The presentation also serves as a useful outreach tool for the PCA, supporting public education in an informative and entertaining way through interpretation. In the *Interpretive Sourcebook,* Spencer (1999) writes, “Interpretation, education, and entertainment... three ideas that have not often been thought of as going together. However, over the last several years they have come close to being one and the same” (p. 95). Students should enjoy this presentation because it is fun and relevant to their lives as residents of PEI. Teachers should also support this notion as, “science education is clearly heading in the direction that interpretation has been traveling for some time, making learning meaningful” (Saunders & Deyette, 1999, p. 200).

While meaningful learning may be achieved through exploration of the cultures and landscapes of others, we should also be focusing attention on information that is relevant to students. I have previously substituted for a teacher at an elementary school and the class had a block of time in the library where students were working in learning stations. The stations were well set up, and I was impressed with the way in which the students stayed on task. What I found perplexing was the fact that these centers were all about wolves, and we don’t have wolves on PEI. It would have made much more sense if the subject matter were more relevant. A red fox, for example, is a local species. The *Treasures Ashore* program is especially relevant because the students are from PEI;

students have likely been to a beach and encountered some of the beach finds featured in the DVD.

Purpose

While working as a Parks Canada interpreter for over a decade, I have noticed a need for outreach products because we are currently unable to meet the demands of school groups for our spring and fall in-park education offer. After developing a virtual tour of our beach walk program, *Treasures Ashore*, I analyzed and evaluated its content as a curriculum supplement that is linked to the Grade 7 Atlantic Science Curriculum. The main focuses of the DVD were the identification of marine organisms specific to Prince Edwards Island's north shore and an introduction to the natural history of the costal ecosystem along with the features and processes found within.

Research Questions

Throughout the years, it has amazed me how little students from PEI's school groups have known about the Island's north shore. I became interested in testing their awareness of the dynamic marine environment and the coastal ecosystem. I wondered if introducing them to some natural history of the local habitats actually had an impact on them. I therefore posed the following questions for my research study:

1) Prior to and after instruction, to what extent are junior high school students at the grade 7 level aware of the evidence of marine organisms that commonly wash up on the north shore of Prince Edward Island?
2) Is the amount of knowledge gained and retained from the presentation, with respect to the natural history and the names of indigenous organisms, significant?

3) According to participating students, what component of the presentation makes the largest impact?

4) After piloting the curriculum supplement, what recommendations do the selected junior high school science teachers make for improving and implementing this curriculum?

The Instruction Input

The DVD I developed consisted of two presentations: An introductory presentation to the PEINP, *The Diversity of Life*, which focused on the coastal ecosystem; and *Treasures Ashore*, a virtual beach tour at Stanhope Main Beach, which is located on the north shore of central PEI. However, presentations could be delivered independently of one another. For the purpose of my M.Ed. project I focused only on the beach presentation, *Treasures Ashore*, which was developed with its own introduction and served as a virtual experience of a guided beach walk.

The virtual beach walk took students along a boardwalk over a dune system and then onto the beach where they explored PEI's geological formation and the evidence of marine organisms that have washed ashore. These organisms (or their remnants) regularly wash up onto the beach during natural processes. Beach walks are a major component of Parks Canada's educational offerings on PEI.

Because these programs are extremely popular, Parks Canada is unable to meet the requests for all in-park activities. Schools also face numerous logistical challenges, including acquiring busses and recruiting sufficient chaperones for such outings. Therefore, it became my intention to develop an in-school program that offers a virtual

tour of the beaches of PEI and covered the same general outline as the current program offered on-site at the PEINP.

The School Curriculum

The current PEI prescribed curriculum allows for *Treasures Ashore* to be used at any level, but the DVD was developed for Grade 7. When developing programs for school groups, it is important to be aware of the curriculum, as is making the presentation relevant to the students and teachers with respect to their academic needs.

In developing the DVD, I had to take into account Parks Canada's mandate, the themes of the PEINP along with its key messages, and the prescribed Atlantic Science Curriculum. I met several times with curriculum advisors and members of our resource conservation staff to ensure that the language and content of the script were appropriate for the audience. The expert advice proved advantageous, as is the case with teacher-created virtual field trips where "the content can be matched to the actual curriculum, and the language level adjusted to accommodate abilities of students in a class" (Tuthill, 2002, p. 458).

In developing the *Treasures Ashore* presentation, particular attention was given to the Grade 7 Unit on interactions within ecosystems found within the Atlantic Science Curriculum. Students were introduced to the species diversity of and interactions within a coastal ecosystem of PEI's National Park. Examples of curriculum outcomes met by this supplement that students will be expected to achieve at the Grade 7 Level are:

- Identify, delimit and investigate questions related to a local ecosystem such as "what types of species live in a particular ecosystem" (208-2, 208-3)

- Describe interactions between biotic and abiotic factors in an ecosystem (306-3).

From this virtual tour, students learned about the Parks Canada system and the portion of its mandate to protect and preserve ecological integrity. Students explored the coastal ecosystem in detail, examining processes that occur, and discovered the species diversity and interactions that exist there. Students will also receive stewardship messages and review some of the impacts of humans on the coastal ecosystem. Prior to the conclusion, students were introduced to the concept of a "species at risk" with hopes that the awareness would create an interest in protecting Canada's natural resources.

Supporting Documents and Programs

Parks Canada developed a series of lesson plans and resources compiled in *Special Places* in 2002 "to help students in Atlantic Canada become better environmental citizens through the knowledge and appreciation of their region's nationally protected areas" (p. III). At the PEI Teachers' Federation's annual conferences, teachers have often expressed an interest in this resource because it contains information that is relevant to PEI. Using "Eco-lessons," this curriculum supplement is specifically developed for grades 4, 6, 7, 10 and 11 and offers lesson plans and lesson resources for teachers.

There is an emphasis for general outreach educational programming as a foundation of communication activities outlined in the *Engaging Canadians* document, released in 2001. Innovations are given for potential projects and I am hopeful that my M.Ed. project will eventually serve as an online learning resource for teachers.

Other resources linked to the curriculum are in existence. A wonderful example is the *By the Sea* guides (1996) that have been developed by the Department of Fisheries

and Oceans (DFO). There are eleven modules in the series serving as guides to the coastal zones of Atlantic Canada as well as an introductory and activities module. Lesson plans developed by DFO are also available online, but again, this useful resource takes a very different form than an engaging virtual tour.

Study Site

Prince Edward Island boasts amazing aquatic habitats. Even in the middle of the capital city of Charlottetown, the historic Hillsborough River can be found along with an abundance of inlets, bays, and harbours. We are, as an Island, literally surrounded by water. Prince Edward Island National Park is a coastal park and contains waters from oceans, bays, beaches, ponds, salt marshes, rivers, streams, lakes, and springs. I have studied much of the limnology and oceanography of the PEINP, and it is from the waters of the Gulf of St. Lawrence that I developed and delivered a new program for junior high school students on PEI.

The island's landmass is divided into three counties from east to west: King's, Queen's, and Prince. Prince Edward Island National Park is primarily located in Queen's County, centrally along the north shore of PEI, but also extends into King's County since the PCA adopted the Greenwich Peninsula into the system in 1998. The program was piloted by two classroom teachers at the grade 7 level in the English public school system on PEI. The school used in this study is the largest intermediate feeder school in Queen's county: Stonepark Intermediate School.

Participants

Two classes from Stonepark Intermediate School in PEI were chosen to participate in this study. The classes consisted of 34 and 32 students, with random

mixtures of males and females. The students of these 7th grade classrooms were generally 12-13 years old. The demographics on PEI are such that most of the students in the classes who viewed the pilot program were "born and bred" on PEI. They were English speaking and share common white European ancestry. Both classes consisted of standard academic students, which is to say that although the abilities levels ranged in each classroom, the variation was to be reasonably expected. After the study, however, teachers indicated that their classes were comprised of academic grade 7 students, but that neither of them had students enrolled in the French Immersion or Music programs at the school. On average, this demographic apparently scores lower than their more academically engaged counterparts and the teachers were concerned for the implication it would have on my study.

Although Stonepark Intermediate School is located in the capital city of the province (Charlottetown), it belongs to the rural family of schools of the Eastern School District of PEI. Stonepark Intermediate School has a feeder system, taking in former elementary students from various local communities. Participating students, therefore, represented a central rural population of PEI. While the total number of comparables should have been over 60 students, I only used data that was available as a complete set. As a result, the amount of data used for analysis varied among measures.

Methodology

Data Collection Tools

I designed both qualitative and quantitative evaluative tools to help in the analysis of the students' pre and post perceptions for what is representative of a beach scene, their ability to identify marine organisms, and their knowledge of the natural history features

of PEI. These measures were developed in keeping with the appropriate language levels and curriculum outcomes identified by PEI's Department of Education's Curriculum Advisors and were accepted by the Grade 7 Science Curriculum advisor before they were used. The virtual tour itself, *Treasures Ashore*, also had PEI's Department of Education's Curriculum advisors assisting with content along with Parks Canada's team project members.

Teachers were given the following five resources to administer to their students: *Beach Drawings: Students' awareness of marine organisms (Appendix A).*

Prior to watching *Treasures Ashore*, teachers gave their students a sheet of paper that asked them to draw a picture of a beach scene and then to describe their drawing. Students were given 20 minutes to complete this task. This exercise was repeated after watching the DVD.

Taking each drawing from a set (pre- and post-presentation), I counted and recorded each feature appearing in the image. I also paid attention to the write-up that the students gave about their drawings. I would refer to the text when I was unable to identify an object or organism in the drawing. I also had to refer to each paragraph after assessing the drawing to ensure I added inclusions from the writing that may not have been visually represented. Comparing the drawing sets, I was able to look for similarities and changes in students' perceptions of a beach scene (including inclusions of organisms and concepts of ecology) and also identify trends emerging from the drawings.

Student Responses: Students' awareness of and interest in the existence of marine organisms (Appendix B).

Teachers gave their students a set of questions prior to and after watching the DVD presentation that asked them about the value of knowing the names of organisms and their interest in learning about marine organisms that wash up on PEI's north shore. Students were also asked to make a list of as many marine plants and animals that they could think of that inhabit PEI beaches. The compared results were used to test for an increase of positive responses and additionally listed organisms given by the students after having viewed *Treasures Ashore*.

Worksheets: Students' Knowledge of Natural History and Abilities to Identify Marine Organisms (Appendix C).

The students were given three worksheets to assess their knowledge of the *Treasure's Ashore* presentation content prior to its delivery: multiple-choice, fill-in-the blank, and identification by image.

The first worksheet consisted of ten multiple-choice questions, each having three possible answers (a, b, c) from which the students must choose. For example,

1) What species of tree commonly found in the dunes of Prince Edward Island are affected by salt spray and harsh winds?

    a) Red Oak

    b) White Birch

    c) White Spruce

2) What element is the Bayberry plant able to help keep the soil nutrient rich with?

    a) Carbon

b) Nitrogen

c) Oxygen

3) What type of rock is sandstone?

a) Igneous

b) Volcanic

c) Sedimentary

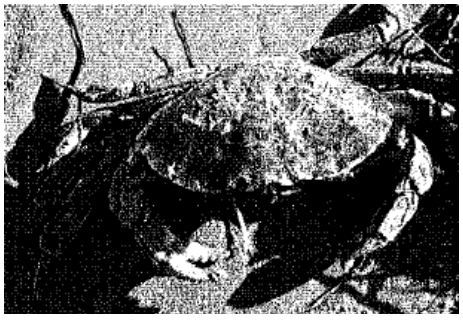
The second worksheet consisted of ten fill-in-the-blank questions with a word bank of fifteen words from which the students were asked to choose from and insert accordingly. For example,

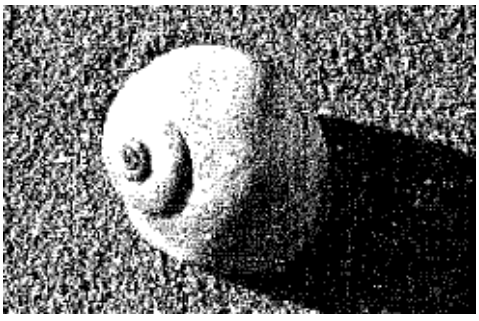
1) A Slipper Limpet is a _____, this means that it has both male and female reproductive parts.

2) An egg case of a skate is called a _____.

3) Mussels anchor themselves in place, forming strong, glue-like attachments called _____.

For the third worksheet, students were given a two-page identification exercise. This was a double-sided sheet consisting of 12 images of organisms that are identified in the presentation. For example, for the images below, students were asked to write the common name of each organism on the appropriate line.





_____ _____

Knowledge quizzes were administered as a set of tests and students had 15 minutes to complete them. A second and third set of tests with identical questions, but written in different orders, were given to the students within one week and after five weeks, respectively, of administering the presentation. The results from the worksheets compared the initial knowledge against that gained in the short term, as well as what was retained over a longer period of time. The complete set of questions is included in Appendix C.

After the data were collected, it was graded and then tabled in excel worksheets (Appendix D) for assessment. I first checked that the test scores were normally distributed by using the Jarque-Bera test for normality. I then performed a mean comparison test with paired data. I chose to run *t-tests* for paired samples as the mean comparison test instrument to measure the significance (with 95% confidence interval) in comparing students' worksheets prior to, within one week, and within five weeks of viewing the presentation. The statistical tests were run using STATA, statistical software accessed through UPEI. Cohen's *d* was also used to determine the results of the effect sizes.

Using students' *t* tests, the results allowed for comparison of the initial knowledge (pre-test) against that gained in the short term (post-test 1) in which the null hypothesis is that there is no difference between the results of the pre-test and post-test 1 and the alternate hypothesis is that there is a difference between the results of the pre-test and post-test 1. I also tested the knowledge retained over a longer period of time (post-test 2) in which the null hypothesis is and that there is no difference between the results of the pre-test and post-test 2 and the alternate hypothesis is that there is a difference between

the results of the pre-test and post-test 2. Finally, comparing the two post-tests also allowed testing for the loss of knowledge over time. Again, having the null hypothesis: there is no difference between the results of the post-test 1 and post-test 2 and the alternate hypothesis: there is a difference between the results of the post-test 1 and post-test 2.

Student Exit Question: Major impacts from the presentation (Appendix E).

Students were given an exit question to complete immediately after viewing the presentation, "Take 5 minutes to write about one thing that impacted you the most from the presentation." The results were assessed by tallying the answers of the students to determine the most significant impact of the presentation according to the participants.

Teacher Interview Questionnaire: Observations and Recommendations (Appendix F).

Teachers were given written interview questionnaires to complete. I had the teachers record observations concerning student interest and engagement during the presentation. Each teacher was also asked to report discussions or questions arising from the presentation. Feedback was also requested pertaining to the presentation and recommendations for future development and use. I collected the teachers' completed questionnaires at the time of student data collection, after all work was completed. The findings are presented in my results, along with all other information resulting from the discussions I had with the teachers at the time of data collection. These conversations were a further opportunity for teachers to give some reflective feedback as I inquired as to the teachers' opinion of the presentation to find out if they would use the presentation to supplement their curriculum in future years.

Procedures for Data Collection

I met individually with the classroom teachers facilitating this study and gave them a copy of the DVD and all required worksheets, which were packaged in groups and placed in envelopes labelled with instruction for the timing of their usage. Teachers put completed work back into the assigned envelopes and kept all of the students' papers filed and stored accordingly for data collection. The onus was on the teachers to administer and reclaim all work being done for the study. This work was then picked up by myself after all sets of drawings, responses, worksheets and all other data was accounted for.

Ethical Concerns

Classroom teachers first read a Recruitment Letter aloud to their students, introducing and explaining the nature of the study. Teachers then handed out a Participant Consent Form/Parental Information Letter (Appendix G). The DVD presentation was not viewed and the data collection did not begin until signed consent forms were returned from the participants. Students were informed that there was no risk to them for their voluntary participation and that they could withdraw at any time without consequence.

The students were also assured that their work would not be used for classroom grading purposes and that their anonymity would be protected. Confidentiality of the results was assured by having students assigned numbers as opposed to putting their names on the worksheet and the data was collected and numbers were paired accordingly to measure the results.

Time Line

The implementation of this program required a phased approach, which began in 2006 and was completed in December of 2008. The initial phase involved consultation for the information of the development of the program. There was also a great deal of research and study that went into the development of the program, which required the use of personal resources and references as well as the use of published sources. The PEI Department of Education's curriculum advisors and a Parks Canada's project supervisor were involved in assisting with content for a script. This phase was completed by the spring of 2007 and included knowledge worksheets for assessment purposes. While some desired images were available, others had to be acquired. Eventually, all images were digitally transferred into a video presentation with voice-over narration.

Representatives of the PCA attend the annual PEI Teachers' Federation Conference held in October. It is at this time that our formal education offer is available to teachers. The new program was available for release in DVD format as part of the 2008/2009 school offer. The program was administered to two grade 7 classes on PEI in the fall of 2008 for the purpose of data collection.

Limitations

The students who participated in this program were taking a mandatory academic level science class that did not allow for many supplements because the curriculum is considered full. Therefore, it was possible that students might have appreciated the experience based more on a change in routine, than from the actual presentation. An apparent limitation of this program was that although it served the Atlantic Science

Curriculum, the program would need modification for usage in any province other than PEI.

Although the results that I measured were from students in standard grade 7 academic English classes, participating teachers expressed concern for the results of the study. Teachers revealed that their students typically scored lower than peers who were in French Immersion and/or Band programs. Teachers also indicated that some of their students were on Modified Learning Plans (MLP) and that there were some English as a Second Language (ESL) students among the group.

Further, students had not begun their unit on *Interactions Within Ecosystems* and much of the vocabulary and concepts presented in *Treasures Ashore* were being encountered for the first time. One of the classroom teachers also expressed concern that a student teacher facilitated much of the process instead of her and she later found out that he has some learning/teaching challenges.

After any form of instruction, it is expected that some learning will have taken place, and so it was challenging to develop constructs to assess the impact of this experience versus another standard of instruction. Students could also have been aware that they were participating in an academic study, so they may have been more likely to pay attention to prove individual performance, although it was stated that their teachers were not formally evaluating them. It was also possible that some students paid particular attention to the presentation and performed better knowing that they did not have the pressure of being evaluated by their classroom teacher.

There could also have been some changes in classroom behavior by the students due to the fact that the DVD was a video reel of a formatted power-point presentation. It

may have been difficult to retain their attention for a twenty-five minute block of time on one task, which was half of their fifty-minutes scheduled block. It may have been challenging to have students appreciate the appropriateness of the presentation knowing that it was not a permanent component to their prescribed classroom sessions.

All research projects are open to bias. I realized that as the curriculum designer and the researcher, I was open to bias. To help reduce bias, I had my university supervisors and park directors review my curriculum prior to presentation, and the research and feedback materials that accompany the presentation. I also attempted to reduce bias by using both qualitative and quantitative methods of evaluation that took into account teachers' word-for-word responses after their students had viewed the presentation.

Related Literature

Qualitative Measures

While qualitative design acknowledges that there could be personal biases and assumptions from the interpretation of the researcher (Janesick, 1994), I used this method for a component of my evaluation because I wanted to share the story within the students' drawings. Taking on a qualitative, phenomenological study allowed me to enter "the field of perception of participants; seeing how they experience, live, and display the phenomenon; and looking for the meaning of the participants' experiences" (Creswell, 1998, p. 31). The meaning extracted from the analysis of my results is what I intended to identify as being significant, with the results being directly representative of the experience of student participation in watching the DVD presentation.

In the mid 1890s, Edmond Husserl presented the emergence of phenomenological methodology. During the last century, successions of specific branches of this methodology have developed. Philosophical phenomenology relates to the overall experience as it is processed individually, and so, it takes into account the metaphysical factors of the personalized experience. As an intrinsic process, the experience is not directly imparted to an objective observer by means of observation. Since the experience is subjective and is personalized based on life experience, it also links into psychological phenomenology of "being-in-the-world" (Langdridge, 2006). Philosophical phenomenology further encompasses being-of-the-world, which allows for external factors to influence the relationships formed of an experience.

I evaluated the impact of my presentation by comparing the drawings of students pre and post instruction. This comparison also identified relevance through "life-worlds" (Schutz, 1973), which is grounded in phenomenological sociology. A life-world is more than a physical environment; rather, it is the way that an environment has meaning for those experiencing it. Heightening students' awareness of the presence of beach finds by visually displaying and naming them in the presentation, allowed students to develop an association with these objects. The new relationship that exists can then be represented through identifying such objects in pictures and through the description of drawings from students themselves. Comparing what a beach scene represents to students prior to and after instruction allowed me to use a refractive, subjective lens through qualitative analysis.

Quantitative Measures

The use of one-tailed *t*-tests was selected for evaluation because the results were expected to show a significant statistical increase after the treatment was administered. A significance represented in the positive directional tail would be the expected alternative hypothesis that there is a significant increase between treatments and control.

Using a quasi-experimental design, internal validity for the results of the intervention is naturally quite good. While threats to internal and external validity occur, the validity of the results being attributed to the treatment was increased by having the PEI Department of Education's curriculum advisors involved in the development of the language for the virtual video's content and worksheet evaluation to ensure that the presentation and evaluation were both language-appropriate. The Eastern School District and participating teachers approved the worksheets prior to distribution. Having such experts assist in the developmental components allowed for an increased confidence that the measurement procedure would be capable of measuring what it is supposed to and that I would be less likely to run the risk of losing students in the study due to a complexity of the design.

Secondly, to increase the validity, the teachers who were involved in the study were well trained in how to distribute and collect the data according to the parameters of the study. Thirdly, after data collection, but prior to analysis, the data was checked three times to ensure the input was accurate. Running multiple measures of the same construct further enhanced the reliability of the study.

Although no control group was used in the study to undergo the same set of repeated worksheets without the treatment, a baseline measure was established within the

group by the use of a pre-test, which also removes the threat of maturation, a potential threat to internal validity. Having the first post-test administered within a week of viewing the presentation reduces the "history threat" of the observed effect. It also limits the "testing threat" as can the results of a second post-test if the mean scores were still higher than the pre-test, but slightly reduced from the tests given in the first week. If a "testing threat" were evident, results would continue to increase, which would reduce the validity. Having worksheets given on three separate occasions consisting of the same questions, but in different orders controls the "Instrumentation Threat".

In order to assess the effect size of the tests, Cohen's *d* was measured. This is a method to affirm that the results are not simply due to change, revealing the actual strength of the relationship that exists between data sets.

Formative Evaluation

A formative evaluation was constructed in developing the data collection tools to partner with the piloting of *Treasures Ashore*. As Weaver (1999) knows, "Formative evaluation is done as an exhibit (or program) is being developed" (p. 251). These constructs are not the formal assessment tools to be used during a summative evaluation. Lefrancois (1997) distinguishes between the evaluation procedures: "Whereas summative evaluation is intended primarily to provide a grade, formative evaluation is an essential diagnostic tool in the teaching process" (p.445). None of the students were graded according to the results, rather, the formative evaluation uses its results to assist in further developing *Treasures Ashore* or future media efforts by Parks Canada for classroom use, for both instruction and evaluation.

Weaver (1999) understands various assessment tools and evaluation practices, "The goal of evaluation is simply to find out whether or not we've been successful creating a program or exhibit that teaches what we want to teach in a way that interests our target audience" (p.251).

It is important to use both formative and summative evaluations in developing a product and assessing results. As Parkay, Hardcastle Stanford & Gougeon (1996) point out: "In the main, teachers use two approaches to evaluating student learning: formative and summative evaluation. Formative evaluation occurs when the teacher measures students' learning for the purpose of planning for teaching" (p. 309). For interpretive programs, the formative assessment is essential as the program evolves to a phase where a summate evaluation is viable.

In developing programs for classroom use, measures need to be developed for teachers to evaluate the learning. Parkay et al. (1996) know the importance of an end result to measure academic achievement, "Summative evaluation is used by teachers to determine grades at the end of a unit, semester, or year and to decide whether a student is ready to proceed to the next phase of their education" (p.309). Since grading is important for teachers, using a formative assessment for *Treasures Ashore* produces results to complete the piloting phase and further develop materials for teachers to formally assess their students at the end of a unit of study.

Chapter 2

Review of the Literature

Introduction

As an interpreter, I use components of the mental, emotional, physical, and spiritual realms to guide me in the development of my projects and the delivery of my presentations. In the first section of this literature review, I will establish the nature of interpretation and will reveal meaning in the importance of such balanced connectedness for cognitive functions. An overview of the philosophy and foundations of interpretation will be explored and will be followed by a section pertaining to the profession of interpretation. Further, sections on both the fundamentals and functions of interpretation will be examined.

Individuals can most effectively relate to content when the learning supports their sense of place. As such, connectedness to and experience in PEI's local diverse and dynamic costal ecosystem is addressed. Having curriculum that is meaningful to the students based on their relationship to the natural history of the habitat is expressed.

The conclusion of this literature review emphasizes that while a Virtual Field Trip (VFT) is not meant to replace authentic experiential learning, it is a form of media education that delivers a quality educational experience. VFTs are tools that can be used to transmit information effectively to the receiver for a favourable learning experience as it offers additional visual stimulation.

Philosophy and Foundations of Interpretation

Enos A. Mills is regarded as the founder of interpretation. Over a century ago, Mills led excursions into America's wilderness, primarily into the Rocky Mountains. He

is known as a naturalist and an interpreter. He had an "insatiable curiosity about nature and contagious enthusiasm" (Regnier, Gross, & Zimmerman, 1994, p. 1) that led him not only to be a successful interpreter, but also a trainer of interpreters as he analyzed his techniques with visitors and began teaching its art and science to others.

Each person is unique, as is each interpretive experience with a nature guide. As a supervisor of the interpretive staff for the summer of 2009, I can attest to the truth of Regnier's words when he states, "You can study the style of successful interpreters and learn from their common attributes, but each one is unique. Their styles developed from their own personal experiences" (Regnier et al., 1994, p. 7). As an interpreter, I seek to convey meaning to my audiences. The information I deliver is the tool from which I develop my presentation, but it is from the insight of my profession, fostering authentic learning, that I create dynamic programming.

My job is more motivational than instructive as I impart enthusiasm of the messages to groups and individuals. I often suggest, provoke, and persuade audiences to alter or enhance their perceptions. With over ten years of experience, I am a knowledgeable interpreter who "opens the door to new dimensions of perception" (Regnier et al., 1994, p. 5), always seeking to inform, enlighten, and have positive interactions with my audience.

Our interpretive team has benefited from having interpreters with various academic backgrounds bringing in their unique life experiences and further acquiring the scientific knowledge as they develop their interpretive art. As an Education student with a sense of wonder for the natural world, I enjoy participants who readily journey with me

into the world of scientific discovery. This insight into my philosophy of interpretation relates well to Mills' words from his book, *The Adventures of a Nature Guide* (1920).

> A nature guide (interpreter) is a naturalist that can guide others to the secrets of nature. It is not necessary for a guide to be a walking encyclopedia. He arouses interest by dealing in big principles, – not with detached and colorless information. (as cited in Regnier et al., 1994, p. 2)

Acquiring information over the years has certainly enhanced my work. I now have more information from which I can relate to a wider audience when tapping into the bigger picture. No matter the group, however, I always incorporate the wonder of an interpretive outing into the excursions that I facilitate. It is best to allow nature to do the teaching and to enjoy the journey. Mills speaks to the value of imparting inspiration:

> A nature guide is not a guide in the ordinary sense of the word, and is not a teacher. At all times, however, he is rightfully associated with information and with some form of education. But nature guiding, as we see it, is more inspirational than informational. (as cited in Regnier et al., 1994, p. 2)

Understanding your audience is key to presenting an interpretive nature tour. If you want them to feel inspired, you have to present the opportunity without attempting to force the result. You have to lead a group to their own conclusions, offering suggestions by sharing your experience without exposing your opinions. Mills knew the value of being multi-faceted and controlling group dynamics for an enhanced experience:

> The nature guide who understands human nature and possesses tact and ingenuity is able to hold divergent interests and scattering members of his party together. He appreciates too, the eloquence of silence and is skillful in controlling, directing,

> and diverting the conversation of members of his party lest the beauty of the outdoors be marred... He is master of the art of suggestion. He is a leader rather than a teacher. (as cited in Regnier et al., 1994, p. 2)

After Mills' death in 1922, the art of interpretation was compromised, often sacrificed for scientific knowledge and processes. The awe and wonder of a place was weakened by the quest for giving information instead of imparting knowledge. When attention to detail and stimulation of the senses (which I consider the "micro significance") is neglected, and relevance (which I consider the "macro significance") is not stimulated, subjects are not engaged. I've witnessed such connections being lost where "interpreters" are regurgitating facts as opposed to evoking and awakening of the senses and the spirit.

The Profession of Interpretation

The first publication aimed at defining interpretation as a profession was *Interpreting our Heritage* (1957) by Freeman Tilden. Tilden had accepted a challenge to analyze the practices of the interpretive profession after years of impressive experience in other fields, as is noted by Regnier et al (1994): "Tilden traveled for years, observing ranger walks, talks, and other ways park professionals communicate with visitors. He noted the public's reaction to different styles and media of presentation" (p. 3).

Today, there are many styles of interpretation. Though there are various philosophies and definitions associated with the act of interpreting, Tilden defined it as "an educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media rather than simply to communicate factual information" (as cited in Regnier et al., 1994, p. 3). Tilden also

stated two concepts as being central to the philosophy of interpretation: “Interpretation is the revelation of a large truth that lies behind any statement of fact” and “interpretation should capitalize on mere curiosity for the enrichment of the human mind and spirit” (as cited in Regnier et al., 1994, p. 3).

Interpretation is not for everyone. I have worked with many interpreters since my employment began. Some interpreters are overly scientific in their delivery, while others lose content and credibility through poor development of a program. There is an inherent balance in both situations that is off. As Regnier et al. (1994) point out,

> Interpreters walk a tightrope, balanced between two extremes. On one side are cold scientific facts. On the other is empty rhetoric filled with “ooh ahh” sentimentality. Good interpreters combine both ideas and emotions. They blend the extremes of taxonomy and tree hugging. Interpretive programs should involve the senses, challenge the intellect, and touch the emotions. They should entertain as well as inform. (p. 6)

In developing a program, there are some fundamental guidelines to follow in order to achieve the desired, balanced, outcome. Good balance of a program providing Interpretive Opportunity (IO) can be measured by coupling Knowledge of the Resource (Kr) and Knowledge of the Audience (Ka) and then combining the result with the Appropriate Technique (AT) to produce the interpretive equation given by Hansen (1999): (Kr + Ka) x AT = IO. All activities can follow this simple formula as Hansen (1999) indicates when stating, “The interpretive equation applies to all interpretive activities, and it is very important to keep the equation balanced” (p. 143). Though

spontaneity is a trait that often flows within an interpreter, fluctuating in extremes, an interpreter is able to plan a sound program using the interpretive equation.

Fundamentals of Interpretation

A large portion of interpretation that the PEINP offers is on-site during the summer season to visitors; however, the PCA also provides interpretive outreach programs off-site. As Regnier et al. (1994) indicate, "Talks are the fundamental tool of interpreters... Talks are also given off-site at schools, service club meetings, and on radio or television" (p. 21). Therefore, there is an adaptability required in my interpretive techniques depending on the requirements of the presentation. In all situations, however, my communication skills and use of speech and language are fundamentally important.

Combining strong interpersonal and communication skills is an asset for a successful program. When delivering a program, a large portion of my time is spent talking to people. As Regnier et al (1994) state, "Interpreters give orientation programs, do demonstrations, present audio-visual programs, use props, do characterizations, and are story tellers. Any successful talk has two elements: structure and substance" (p. 21). My talks are well structured through planning, but are readily improvised though maintaining a central theme. Regnier et al. (1994) supported this notion: "Every successful interpretive presentation has a theme. The theme provides the plot for your story. It must be uppermost in your mind as you plan your presentation" (p. 12).

Functions of Interpretation

In developing interpretive programs for Parks Canada in PEI, it is necessary to ensure that the requirements are met as they relate to the agency. Programs need to include a general introduction to the agency, the system of National Parks in Canada, and

its messages of national significance. The program gets more specific in keeping with the theme of the PEI National Park: the people, the sea, and the changing landscapes. As Manka (1999) points out:

> Presenting an interpretive program that meets the state or national standard should not be the only goal of the program; interpreters must include the teachers' other goals. Teachers want the interpreter to be a role model and to share values with the students that share respect for nature and culture. They want the interpreter to show interest in their students. And most of all, they want the interpreter to give the students an experience they cannot give in the classroom." (p. 84)

When developing programs for school groups, it is important to be aware of the curriculum and to make the presentation relevant to the students and teachers with respect to their academic needs. Aware of the duration of a class period, I use a different energy in delivering a presentation, as an interpreter than I use when teaching, and must keep energy levels high and provide constant stimulation. I provide resources from the PEINP and props (costumes, puppets, artifacts, beach finds, etc.) provided by the agency that teachers do not have access to and, in turn, both the agency and the school benefit from the presentation.

Sense of Place

In my experience as an educator, teachers often take for granted the resources that nature has to offer. Nature is a timeless embodiment of wealth. Throughout my childhood and into my adult years, I was very fortunate to have been nurtured through nature. In PEI, we are blessed with water all around us. The sea has long served as a resource for the people of this land and has much to teach the patient learner. Fishing and aquaculture

are major industries of PEI today, and our waters have long provided food and transport for the early inhabitants and settlers.

Most people of PEI have been to the beach: we live the summer experience of the sun, sand, and surf. Why, then, are students not being formally educated on the dynamic marine environment and associated habitats? It is strange to me that a sense of place within our education system seems to be lost. In an article on sense of place and education, Sanger (1999) states:

> Sense of place refers to an experientially based intimacy with the natural processes, community and history of one's place. Individuals acquire a sense of place through direct conversations with the elements of their place, sharing stories about the land and with their fellow inhabitants, and through education, but not the education that predominates in today's education system. (p. 5)

Even understanding the cultural history of PEI requires some knowledge of the resources of the sea; therefore, the study should be enhanced to provide information that is relevant and meaningful to the students. I believe that PEI students ought to be aware of their surroundings when they are outside, and be familiar with the diversity of organisms that inhabit the marine environments of this province. Without a feeling of connectedness, people seem to have less respect for the diversity of life thriving in local ecosystems. Therefore, it is imperative that both formal and informal educators allow students the opportunity to connect to their sense of place.

There are many different "places" that one encounters in a lifetime. I feel it is important for people to identify with a sense of place when they are experiencing it. When exposed to a new environment, it is enriching to explore and understand the

dynamics of it, and to consider the individual connections that exist for a person in any given location. It is important to consider an individual's prior experience with the natural environment when attempting to understand his/her connection to the world. I am knowledgeable about the natural and cultural histories of PEI. My job is to protect and preserve the ecological and commemorative integrity relating specifically to PEI for present and future generations. I agree with Kriesberg (1999) when he states that:

> A place is a complex interrelationship of all the stories form the past through the present and on into the future. These are the stories of the people, animals, plants, rocks and every other living and nonliving past of the place. A sense of place is knowing the stories and feeling a part of the stories in the land where one lives. Without a sense of place people are disconnected. (p. 81)

I have a keen sense of wonder for natural history and have become a generalist in cultural history interpretation, specialising in natural history interpretation. I agree with Kreisberg's (1999) statement, "A sense of wonder is the first and most important step in gaining a sense of place" (p. 83). With the theme of the PEINP in mind, I always include the people, the sea, and the changing landscapes in my programs. Enthused with the knowledge of the past, I encourage students in identifying with local histories and appreciating their environment as a home. In fostering stewardship, a connection to the land is important. For students to care about their environment, they have to have an interest in it. As Kreisburg (1999) states, they need to develop a sense of wonder:

> If people wonder about something, they begin to care about it. This empathy will translate into learning, a feeling of responsibility, and a greater feeling of

> connectedness to one's homeground. This connectedness will also lead to taking actions to care for the land. (p. 83)

Media Education

Media comes in many forms. This communication tool involves sights, sounds, or prints and is used as a method of expression to convey a message to targeted audiences. In working for Parks Canada, I have been exposed to, and involved with, various techniques of "media broadcasting." The development and delivery of my personal programs, when delivering a multi-media presentation, has evolved over a decade of working, advancing with the technological times.

A basic slide show, running off a carousel (whose development and use were analogous to an overhead projector) became a power-point presentation running off software installed onto a laptop using a Liquid Crystal Display (LCD) projector. These multi-media presentations are still commonly delivered by interpreters in the PEINP during the summer months as evening outdoor theatre activities.

The slide power-point presentation is a resource that interpreters also use in the off-season when we venture into schools. These presentations were made available to schools when we were unable to meet the demand for in-park programming for logistical reasons. In dealing with any distance learning, Zohrer (1999) recognized the barriers teachers experience with taking their classes on field-trips: time, money, and transportation. Having the additional factors of weather conditions to consider and a lack of staff on-strength, we are no longer able to meet the demand for in-class presentations. As a result, I developed two power-point presentations, *Diversity of Life* and *Treasures*

Ashore, which have been converted into video format and are offered on a Digital Versatile Disc (DVD) to educators.

Virtual Field Trips (VFTs)

Over time, Virtual Field Trips (VFTs) have advanced and the term is sometimes now used to identify experiences that deal with virtual realities. Many VFTs are computer based and done in real time. Some VFTs involve a 3D or interactive component, but "the term 'virtual field trip' embraces a range of instructional approaches and technologies but generally denotes a multimedia presentation that brings the sights and sounds of a distant place to the learner through a computer" (Klemm, 2003, p. 178). This is certainly the case with *Treasures Ashore.* Furthermore:

> Virtual Field Trips (VFTs) is not at present an attempt to create a virtual reality, where the intention is to immerse the user fully in an interactive computer-generated environment using sensors and input devices such as data gloves and body suits and output devices such as head mounted displays and surround sound audio systems. Instead, a VFT is simply an attempt to place further autonomy in the user's hands, by allowing observations to be made without being on the actual site or having a lecturer at hand to explain. (Stainfield et al., 2000, pp. 256-257)

The need for a VFT of a beach walk at Stanhope main beach was further evidenced since we often had requests for information from teachers who were unable to book an on-site program with us, but were hoping to take their classes to the park and wanted to make the most of their trip by providing some background information to their students. As interpreters, we amass information and develop our programs with a script from which we deviate according to the needs of our audience. Such scripts are not

appropriate resources to hand off to classroom teachers. Offering the DVD to educators gives them a basis from which they can build a lesson and plan their own field trip.

> VFTs can replace or enhance background lecturing/information transmission and so increase the time spent by students exploring specific issues in a more ‘inquiry-based` manner both in the field and on campus. By providing more of the lecture/background material on-line, students can study it before they come to class or depart for a field trip. (Stainfield et al., 2000, p. 257)

Through this media presentation, I was able to transfer some of the basic information to attentive students that they might not otherwise have the opportunity to encounter. Even those students who have observed the dynamic beach environment before are likely to benefit from the presentation—as Klemm (2003) points out, “most learners are novice observers, meaning that they are developmentally unable to observe and respond the way that experts can when investigating new situations” (p.183). This is true of all print, broadcast, and electronic media formats identified by Tuthill (2002) that serve as alternatives to actual field trips which provide most of the benefits of the authentic experience without most of the associated problems of a field excursion.

Quality of Experience through Media

In developing *Treasures Ashore,* it was important for me to be able to offer a quality experience through the VFT. The quantity of information was not as pertinent as its quality. This was certainly challenging because, as an interpreter, I rely on interpersonal skills and group dynamics to guide my program delivery. Having students enjoy the presentation was equally valuable as investing in tending to their learning needs. I was pleased to discover that the National Teacher Training Institute (NTTI) was

able to offer support for the use of video in the classroom: “Teachers who use instructional video report that their students retain more information, understand concepts more rapidly, and are more enthusiastic about what they are learning” (NTTI, 2006). By providing an alternative forum for learning, such as that provided by the video experience, students are given more option for reception and processing and, therefore, the retention of information.

Griffin (2009) further supports the quality of an experience through media by referencing the reception beyond that in its intellectual capacity: “Video provides another sensory experience that allows concepts to actually be ‘experienced’ and come to life while you guide your students on each adventure.” *Treasures Ashore* attempts to guide the participating students along a beach walk and the teacher is to serve as the classroom facilitator. Should the class be fortunate enough to participate in an on-site program, the use of the VFT as a preliminary activity will enhance the quality of their experience because there will be a sense of familiarity with the activity, thus allowing for more personalized and in depth interaction between the interpreter and the students.

Having made use of the VFT in class, the quality of the experience on-site may be enhanced. From my experience, people attending an interpretive program seem to feel the value of the attention that an interpreter is able to provide to their subject as well as to each attendee. The quality of the personalized experience is one that a good interpreter is aware of and strives to accomplish. This cohesion is often possible with addressing the group as a whole when they have similar needs and expectations, thus allowing *Treasures Ashore* to involve a classroom of students to embark on a journey together.

The exploration of a beach is not one that is easily created for an authentic experience using a virtual field trip, but it seems better to have the option available for individuals who are unable to make it to the seashore and/or as an optional learning opportunity for those who are able to visit. Creating the content for the VFT to support Parks Canada's educational offer in PEI and, specifically, the Grade 7 Atlantic Science Curriculum, was less challenging for me than it would be for a teacher because I am very familiar with the site: "Obviously, a teacher-made VFT requires the teacher to visit and become knowledgeable about the site, but this should be true of teachers who conduct actual field trips as well" (Klemm, p. 182).

Having intimate knowledge and experience of the site was extremely important as the developer of *Treasures Ashore*. Most teachers have not walked and explored the beaches like I have, and they have not served as an interpreter with regard to those beaches. *Treasures Ashore* provides teachers with easy access information, via a VFT, related to the natural history of organisms and beaches, and enables the exploration of PEI seashores vicariously.

Summary

As we move further into this age of technology, it is good to advance with the times and have programs available that address a variety of audiences. The more evolved and interactive VFTs become, the more effective they will be. VFTs are an effective way to use videos in the classroom, allowing participating students to enjoy a quality learning experience. Various media forms, including VFTs, serve as effective methods of information exchange.

As a native of PEI, I feel very connected to the land and the water that surrounds me. Having acquired a marine science background over the years (through coursework for my master's project and serving as park interpreter along the coastal landscape) allows me to further identify with my sense of place. I became familiar with components of both natural and cultural histories of PEI through my research and experience as an interpreter. I know stories and share philosophies of the people indigenous to PEI, who continue to inhabit this land, as well as those of their ancestors. I am also familiar with lifestyles of the early settlers, whose cultural emergence shaped the Island.

The landscape has changed over time and will continue to as time prevails. Through my interpretive profession, I have been able to share the changes that PEI has endured as a result of human impacts and natural processes. As an interpreter, I seek to create learning opportunities and have enjoyed delivering programs along the shoreline to a variety of audiences over the years.

Chapter 3

Results and Analysis

Introduction

In this chapter, an analysis of the qualitative drawing exercise is given and overall similarities in drawings are presented. The pre-presentation drawings are further analyzed, as are the changes in the artwork from the pre- to post-presentation drawings. Examples of the student drawings are given, including those of students showing little change in their work.

The written lists generated from Students' Responses containing the number of plants, animals and objects that can be found at the beach are compared to identify if the amount of responses given during the post-test are more plentiful. Results from students' interest in learning the names of common organisms and their interest in learning about them are presented, examining if there is an increase in interest levels because of the presentation. The results of Students Worksheets are analyzed in an effort to determine the effectiveness of *Treasures Ashore* in providing knowledge that is gained in the short-teem as well as retained over a longer period of time.

Identifying features that impacted students the most from a Student Exit Question are revealed and the most common responses are highlighted. Finally, results of Teacher Interviews are reviewed providing their perspective observations of student behaviour while immersed in the program as well as after the DVD has been viewed.

Research Questions

The results of my research allowed me to analyse their content to answer the following research questions:

1) Prior to and after instruction, to what extent are junior high school students at the grade 7 level aware of the evidence of marine organisms that commonly wash up on the north shore of Prince Edward Island?
2) Is the amount of knowledge gained and retained from the presentation, with respect to the natural history and the names of indigenous organisms, significant?
3) According to participating students, what component of the presentation makes the largest impact?
4) After piloting the curriculum supplement, what recommendations do the selected junior high school science teachers make for improving and implementing this curriculum?

Qualitative Drawing Analysis

As discussed previously, the analysis of the drawings was completed by taking each drawing of a set of pre- and post- presentations, and counting and recording each featured detail of the image. I also had to pay attention to the write-up that the students gave about their drawing. I sometimes had to refer to the writing when I was unable to identify an object or an organism in the drawing, and also had to refer to each paragraph after assessing the drawing in an attempt to accurately portray the visual drawings.

The initial three groupings of the features present in the drawings were: (1) things that were related to the content of the DVD presentation, (2) things that were indicative of humans and their activities, and (3) other things not mentioned in the DVD. Starfish and seals, for example fell into the latter grouping, as did any non-living components that were unrelated to people such as the sky, the water, etc. I tallied the emergence of various features (Appendix H) and organized these findings according to the change in the

number of features appearing pre- and post- presentation as well as the total number of inclusions of features resulting from the drawing exercises. Samples of the total results are extracted in Table 1, showing the number of features appearing in the drawing exercises that have increased by 5 times or more. An extraction from Appendix H's table of the total number of inclusions was also performed as is presented in Table 2, comprised of all features that were included a total of 5 times or more.

Table 1. Change (5+) in the number of features appearing in drawing exercises.

Feature	Pre-DVD	Post-DVD	Change +/-
Related to DVD			
Shell	8	21	+ 13
Endangered species	0	9 + 3 nests	+ 12
Jellyfish	0	12	+ 12
Seaweed	1	8	+ 7
Garbage	1	8	+ 7
Rock	1	8	+ 7
Driftwood	0	7	+ 7
Grass	4	10	+ 6
Dunes	4	9	+ 5
Humans			
Towel	18	3	- 15
People	27	14	- 13
Umbrella	9	0	- 9
Unrelated to DVD			
Starfish	0	6	+ 6

Table 2. Total number of inclusions (5+) featured in the drawing exercises.

Feature	Pre-DVD	Post-DVD	Total Inclusions
Related to DVD			
Bird	35 + 1 nest	36	72
Shell	8	21	29
Grass	4	10	14
Dunes	4	9	13
Endangered species	0	9 + 3 nests	12
Jellyfish	0	12	12
Seaweed	1	8	9
Garbage	1	8	9
Rock	1	8	9
Crab	5	4	9
Driftwood	0	7	7

Humans			
People	27	14	41
Towel	18	3	21
Sand castle	6	5	11
Umbrella	9	0	9
Bucket & shovel	5	3	8
Unrelated to DVD			
Water	33	32	65
Sand	33	30	63
Sun	24	24	48
Sky	6	9	15
Clouds	7	7	14
Fish	5	6 + school of fish	12
Sunset	5	3	8
Starfish	0	6	6
Boat	4	2	6

Most of the pictures included the sky, sun, clouds, birds, water, and sand. While birds fall into the general category of being common and well represented, Piping Plovers and the use of the term "endangered species" was mentioned only after the DVD presentation had been viewed. Post-presentation, the bird was represented nine times, and four students also included mention of the nests and eggs. Jellyfish were also not reflected as part of a beach scene prior to presentation, but the organism was included 12 times in the drawing after the presentation had been viewed.

People were represented 26 times prior to the intervention, with 17 towels showing up in drawings. Other activities associated with humans (umbrellas, volleyball nets, beach balls, bucket and shovels, boats etc.) were represented 39 times prior to the post testing. In the post-test drawings, only 13 people were represented with only three towels found in the artwork and only 11 other representations of objects or activities that are associated with humans.

There were some objects and organisms identified pre- and post-intervention that were identified in all three categories (such as crabs, sandcastles, and fish) that were fairly evenly distributed in each exercise. Other marine life (dolphins, seals, sharks, etc.) not having a direct relationship to human activity on the beach nor featured in the DVD were sporadically represented in both sets of drawings. These components of the drawings were infrequent and did not seem to have an impact on the drawings for comparison purposes.

Drawing similarities

Based on the drawings, being asked to sketch a "beach scene" seems to have initially evoked images of sunny days spent at the beach, indicative of the fact that most students would have experienced days at the beach during the summer months with family and friends. Regardless of one's experience at the beach, it can be expected that attention would have been given to the sky to see if the sun is out. Therefore, it is not surprising that the sky, encompassing sun and occasional clouds were found readily throughout both pre- and post-presentation drawings. The beach is comprised of sand, and the typical visual perspective of most people is looking out at the water. Swimming, playing volleyball, building sandcastles, and sun bathing are common activities of beach-goers during the summer months. As such, it is not surprising that these themes emerged from the students' drawings.

Pre-presentation drawings

Students' drawings were more representative of the beach as a place for human leisure prior to watching the DVD presentation. This was an expected perspective for students to convey based on their experiences. The vast majority of visitors to PEI

National Park of Canada are individuals who enjoy spending time relaxing or playing at the beach. These are the type of activities that people not only participate in themselves, but also witness when spending time at the beach. Daily, the beach is littered with towels, umbrellas, and other beach accessories.

Children are often the most curious when it comes to the organisms that can be found in the shallow waters or washed up on the shores. I have witnessed adults opting out of participating in a guided beach activity; however, children will often gather around when I start picking things up along the water's edge. Most people do not go to the beach with the intention of studying the seashore unless they are specifically there for a guided activity. Thus, the majority of the images that emerged from the pre-presentation drawings did not surprise me.

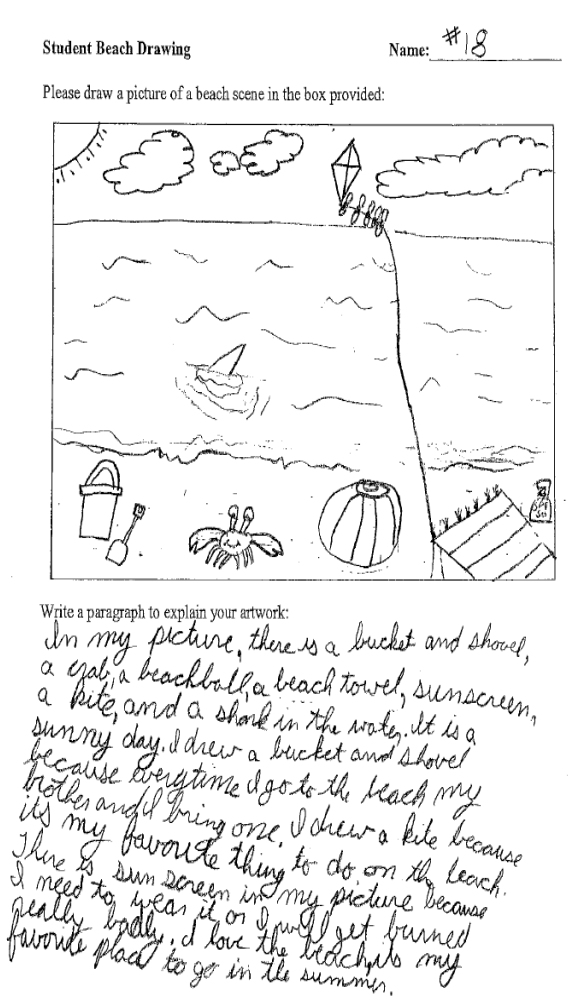
I found it interesting that not all students reflected their beach scene as a busy place. Five drew sunsets, including one of two who drew pictures of beaches where they had vacationed. It seemed that for some, the beach is a place of calm and quiet evenings filled with serenity and beauty.

Changes in artwork from pre- to post-presentation drawings

After viewing the DVD presentation, I was able to detect a change in perspective of the beach as being a habitat and part of an ecosystem emerging by at least 10 students, where it was significant enough (more than just an inclusion or omission) to be comparable. Drawings featured sand dunes and marram grass, sandstone, shells, seaweeds, driftwood, garbage cans and endangered species. This inclusion of features was the anticipated result of the students' drawings after they were exposed to the DVD treatment.

The most abundant visual change in the students' drawings after the DVD presentation was the inclusion of beach "finds" and the reduction of human activity. Specifically, this was reflected by a variety of shells, which was a focal point of the presentation. Seaweeds, rocks, and driftwood were all well represented in the post-DVD viewing drawings, and were also components of the presentation. Even signage and boardwalks were implemented into students' work, although they were not a focal point of the presentation.

Figure 1a. Student Drawing #18-i (pre-test)



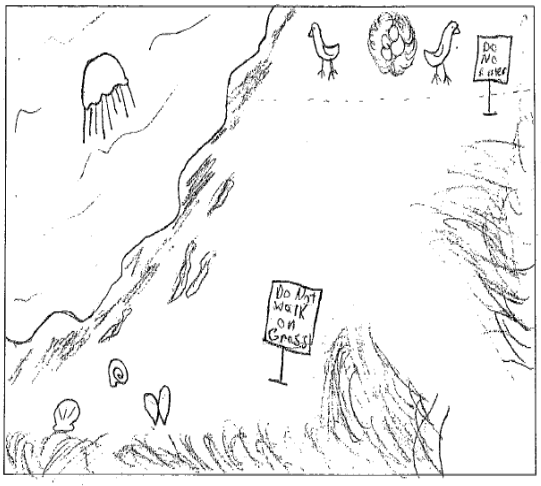
Student Beach Drawing Name: #18

Please draw a picture of a beach scene in the box provided:

Write a paragraph to explain your artwork:

In my picture, there is a bucket and shovel, a crab, a beachball, a beach towel, sunscreen, a kite, and a shark in the water. It is a sunny day. I drew a bucket and shovel because everytime I go to the beach my brother and I bring one. I drew a kite because its my favorite thing to do on the beach. There is sun screen in my picture because I need to wear it or I will get burned really badly. I love the beach, its my favorite place to go in the summer.

Figure 1b. Student Drawing #18-i post-test)



2

Student Beach Drawing Name: 18

Please draw a picture of a beach scene in the box provided:

Write a paragraph to explain your artwork:

In my picture there is a jelly fish in the water, next to the water is seaweed. There are also three types of shells including the fake angel wings. Also there is a peping plover nesting and protected by the public. Also there is grass that creates a pathway, and there is a sign telling people to not walk on the grass or they will kill it

Figure 2a. Student Drawing #21 (pre-test)

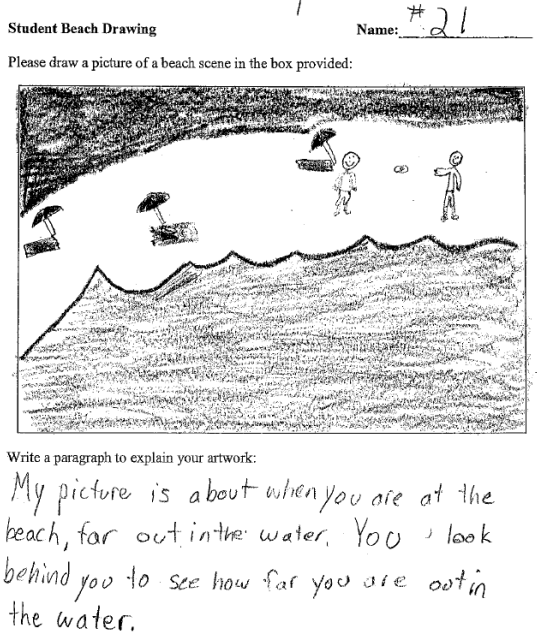


Figure 2b. Student Drawing #21 (post-test)

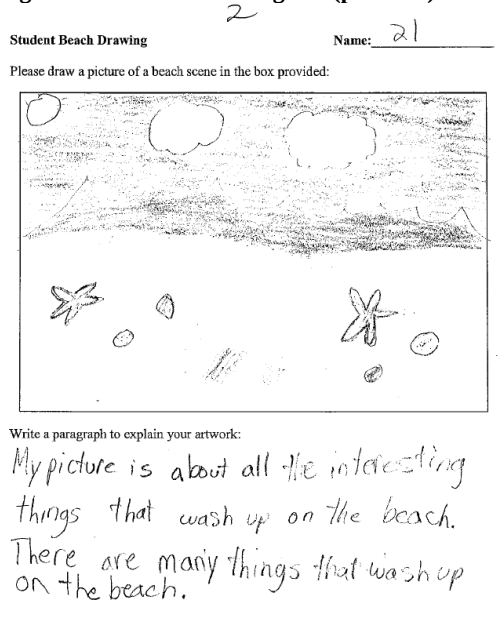


Figure 3a. Student Drawing #19 (pre-test)

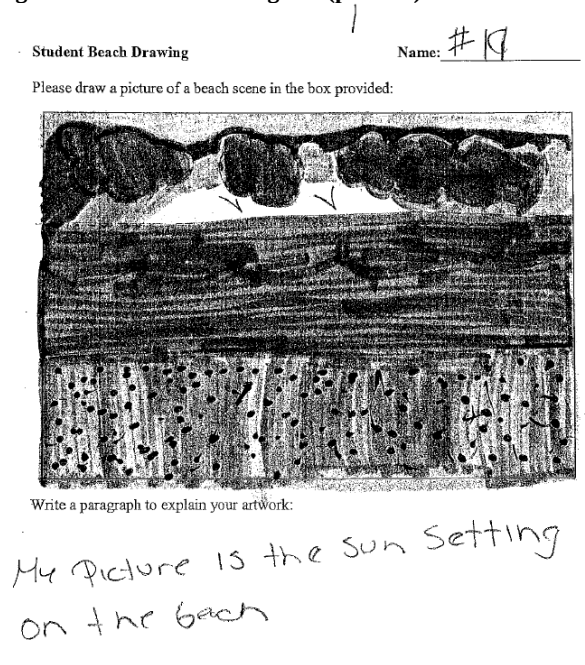
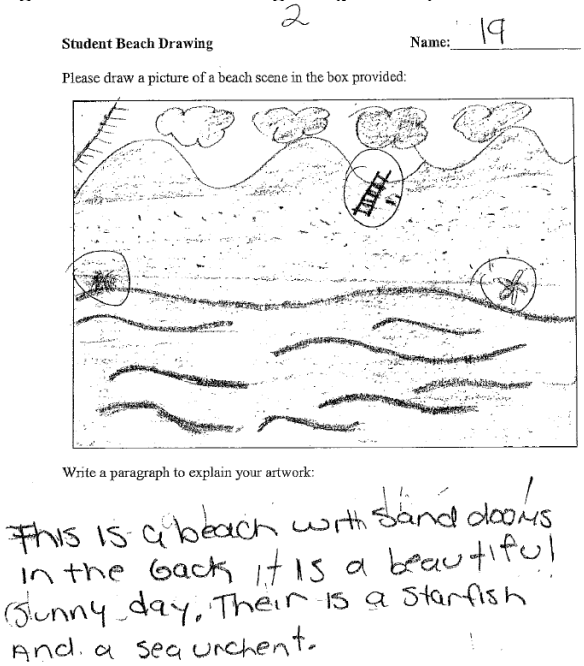


Figure 3b. Student Drawing #19 (post-test)



The presence of sand dunes and marram grass was also apparent in the post drawings. Only four students had included dunes in their initial drawing, and while a total of four had also represented grass, it was not necessarily marram grass as was indicated

by their paragraphs written to describe their drawings. This is in contrast to the nine students who represented sand dunes in their drawing the second time and ten who included grass within their drawing, all of which, with exception of one, refer to the dune/marram grass.

The presence of jellyfish only emerged from the students' drawings in the second set of images (Figure 4b). I found this particularly interesting because I intentionally dedicated a section of the video to jellyfish. Jellyfish are a very misunderstood organism—I grew up calling them "blood suckers" myself! In the post-presentation drawings, their presence was featured 12 times and not once in a menacing way.

Figure 4a. Student Drawing # 17 (pre-test)

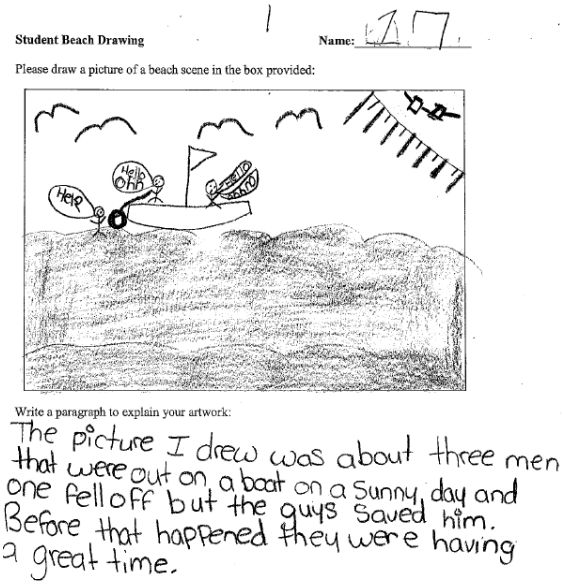
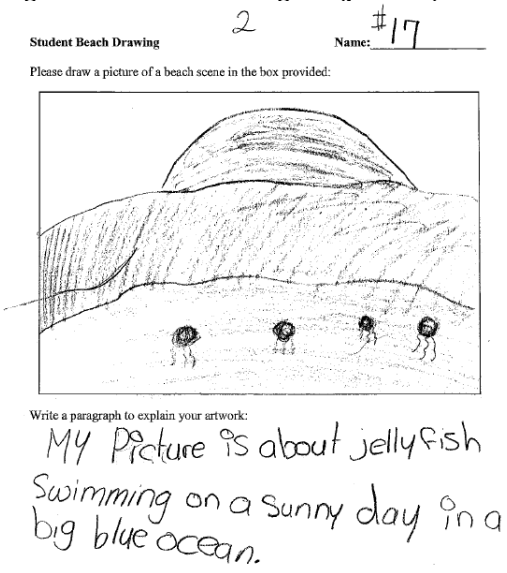


Figure 4b. Student Drawing #17 (post-test)



It was interesting to note the response of students to my mentioning of the negative impact of human activities in my presentation. For example, only one of thirty-two students mentioned garbage in the initial set of drawings, whereas nine students referenced it after they had viewed the presentation.

Student drawings showing little to no change in artwork

I visually identified the drawings where changes between pre- and post- DVD viewing, if any, appeared to be insignificant. All features of those drawing were still recorded in the initial tabling, and so the minor changes are still reflected in the overall results. Of the twenty-two (22) students who showed little change in their drawings, some of these students already had an encompassing concept of what a beach scene could entail from an ecological and human perspective (Figures 5a & 5b). Others maintained the human connection in their work, portraying people and human activities, as it is has been their actual experiential base and is likely to remain as such for a large component of future outings.

Some students did add inclusions of evidence of marine organisms, but did not make it a new focus (Figures 6a & 6b). As such, the drawing remained relatively unchanged with minor inclusions of organisms or exclusions of humans, their impacts, and their activities. It is possible, however, that these new inclusions show the students' increased awareness of the evidence of marine organisms and they might explore the beach the next time that they have the occasion to do so.

Figure 5a. Student Drawing #8 (pre-test)

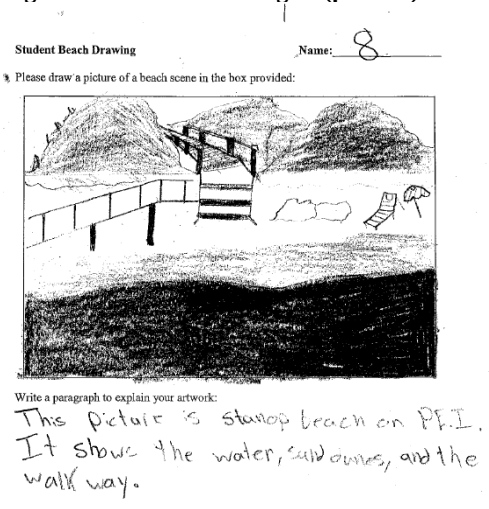


Figure 5b. Student Drawing #8 (post-test)

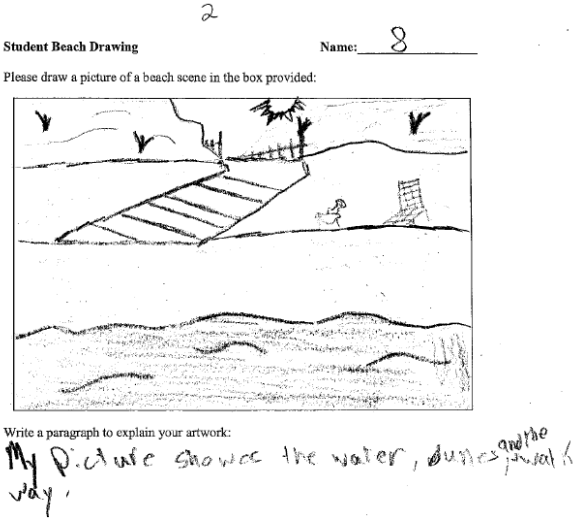


Figure 6a. Student Drawing #18-ii (pre-test)

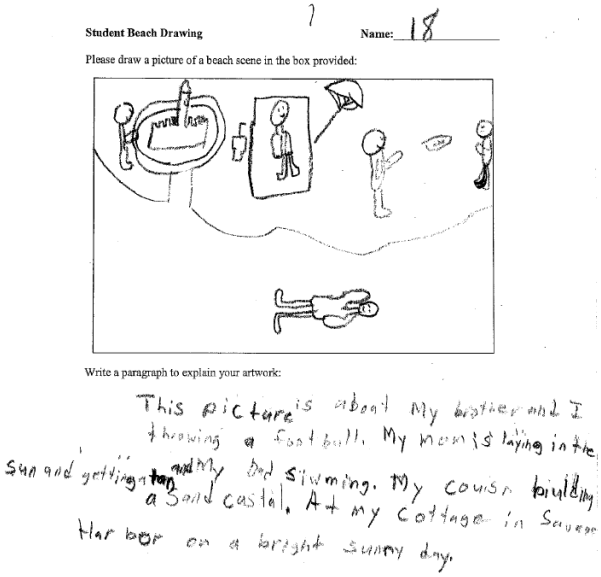
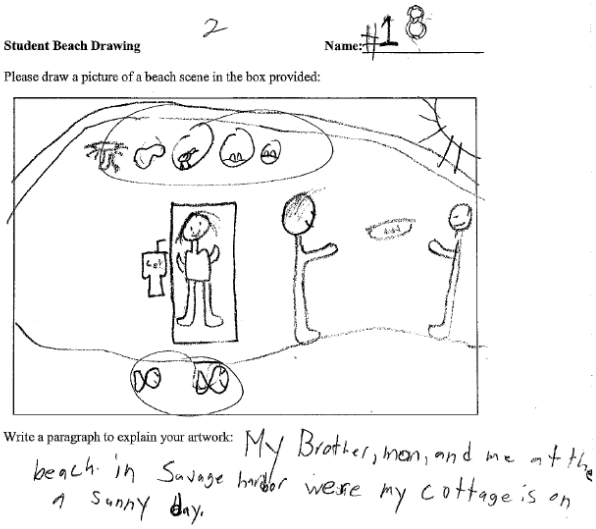


Figure 6b. Student Drawing #18-ii (post-test)



Analysis of the Students' Responses

Results of the students' responses (Table 3) indicate that the students believed that knowing the names of common organisms was important and they had an interest in the subject matter presented to them. There was little change in the results when comparing pre- and post-tests. There was, however, a noticeable increase in the number of plants, animals and objects identified from written lists after the presentation had been viewed.

Table 3. The importance of knowing the common names of organisms

	Pre-test	Post-test
felt knowing the names of organisms was important	26	25
felt knowing the names of organisms was NOT important	4	5

Overall, there were two students from the group whose opinion changed from feeling it was not important to know the common names of organisms to feeling that it was. Furthermore, there were three students whose opinions changed from feeling it was important to feeling that it was not. While there was a majority of students who, in both the pre- and post-testing felt that it was important to know the common names of organisms, the presentation itself had no impact on the opinions of the students.

Number of identified plants, animals and objects from written lists

From a total of thirty students who made a list of all of the plants, animals, and objects that they could think of that can be found on a PEI seashore, a total of 188 items were written prior to the presentation. A total of 240 were recorded after the presentation, which shows an increase of 22%.

The interest in learning about marine organisms that wash up on PEI's north shore

Prior to instruction, from a total of twenty-nine students who responded, less than half, only thirteen students, indicated that they had an interest in learning about marine organisms that wash up on PEI's north shore prior to instruction. The other sixteen indicated that they did not have an interest. After instruction, fifteen indicated that they did, while fourteen did not. An overall change of six students indicated they went from not caring to caring. However, three students who had indicated they cared initially indicated that they did not care during the post-test. While it is possible that the presentation had a negative impact on the students' perspective, the reason is unknown because no negative responses were elaborated on.

Student Worksheets

The results of the *t*-tests are displayed in Tables 1-4 and are shown in figures 4a-4c as a mean with 1 σ error bars (giving confidence range) and using a data swarm option (the small scattered dots are reporting the results of the students on each test). The means are indicated along the lines by a larger black dot. Test results were out of a possible total score of 32. The total number of students measured (n=30) came from two separate grade 7 classes.

There was evidence of a single-group "mortality" threat in that over 60 students were initially sampled, yet paired results for all three sets of tests could only be compared using 30 students. Even though no single student withdrew from the study, the sample size was cut by over half because paired samples were used in evaluating the results. Relating to the validity of the study, this mortality rate may indicate that the 30 students who participated in all three sets of testing were students who regularly attended school.

Table 4. Paired t test, Pre-test vs. Post-test 1

Variable	N	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
					Lower limit	Upper limit
Pre-test	30	6.07	0.47	2.55	5.12	7.02
Post-test 1	30	11.12	0.66	3.60	9.82	12.51

Table 5. Paired t test, Pre-test & Post-test 2

Variable	N	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
					Lower limit	Upper limit
Pre-test	30	6.07	0.47	2.55	5.12	7.02
Post-test 2	30	9.62	0.76	4.15	8.07	11.17

Table 6. Paired t test, Post-test 1 & Post-test 2

Variable	N	Mean	Std. Err.	Std. Dev.	95% Conf. Interval	
					Lower limit	Upper limit
Post-test 1	30	11.12	0.66	3.60	9.82	12.51
Post-test 2	30	9.62	0.76	4.15	8.07	11.17

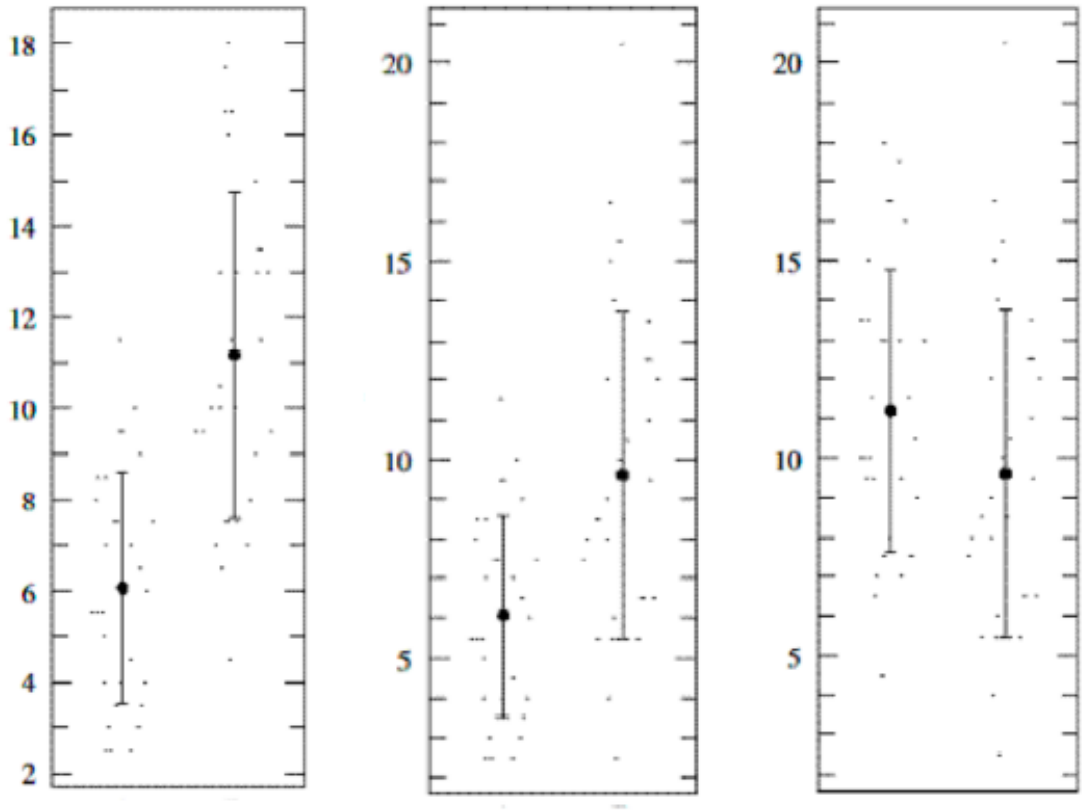
Table 7. Results for significance (P value) and effect size (Cohen's d)

	Pre-test & Post-test 1	**Pre-test & Post-test 2**	**Post-test 1 & Post-test 2**
***t* value**	-9.21	-5.29	2.88
degrees of freedom	29	29	29
P value (one-tailed *t*-test)	<.0001	<.0001	<.0037
Cohen's *d*	-1.63	-1.03	0.4

The results of the *t*-tests (Table 7) indicated that the intervention was statistically significant ($p<.0001$) when both sets of post-tests were compared with the results of the pre-test. The effect size (Cohen's *d*) is considered large for values over 0.8, thus

including the pre-test and both post-test results. The results of the post-tests when compared show a “medium” effect size.

Figure 7a. pre-test vs. post-test 1 **Figure 7b. pre-test vs. post-test 2** **Figure 7c. post-test 1 vs. post-test 2**



The significance in the test results indicates that there is merit in having students participate in the program. Using paired samples (pre- and post-testing), the effect of the virtual tour program, when comparing the scores of the worksheets, yields results that reflect significance. The higher scores achieved on both sets of post-tests show that students both gain and retain intended knowledge from the presentation. However, I did find a significant decrease in scores from post-test 1 to post-test 2, referred to as the ‘teach-test-terminate’ curve (R. Kool, personal communication, January 14th, 2010). This result of having low initial knowledge, then high knowledge gain for the exam, and then a return to lower levels of knowledge is very common.

Student Exit Question – Impacts

In identifying the major components of the presentation that the students felt had made the largest impression, students were asked to identify a single, most significant impact from the presentation. Out of a total of thirty-nine students who responded, fifty-two impacts were identified, indicating that some students included more than one feature of the presentation as being the most important.

Table 8. Results of Student Exit Question

Impact	Total times identified
Piping Plover & Endangered Species	20
Beach finds (shells)	12 (False Angel Wing 3; Moonsnail 2; Shipworm 1; Quahog 1)
Dunes & Beaches	7
Jellyfish	6
Seaweed & Plants	3
Garbage	1
Foxes	1
Other marine species (fish/sharks/whales)	2
	Total: 39 students – 52 impacts

Considering that the objective of the video was to increase students' awareness of the presence of marine organisms that wash up on PEI's north shore and introduce them to the dynamic coastal ecosystem, the impacts identified are as were anticipated. It is possible that students who identified the piping plover as the greatest impact may have done so simply because it was presented at the conclusion of the video. It is possible that the endangered species got the most mention because it was the freshest component of the presentation in the minds of the students, however, the presentation was set up to focus on the presence of the piping plover as well, so it may have just been that it was an effective component of the presentation.

Teacher Interviews

After all student testing was completed, I collected the completed Teacher Interview sheets from the two classroom teachers at Stonepark Intermediate School. While I had anticipated having individual consultation time with each of the teachers, they felt that the information given on the sheet was sufficient. Verbally, they only added that their students were at the lower end of abilities for grade 7 academic students and while the script's reading level was specifically designed for academic 7th grade students with a "fairly easy" Flesch reading ease score, their students likely did not score highly on the tests (R. Kool, personal communication, January 14th, 2010). This proved to be true of their students' results.

The teachers indicated the students appeared to be watching and listening to the presentation attentively at first, but that twenty-five minutes seemed to be too long for them by the end. The students did express regard for the presentation in that they were curious and interested and shared personal stories. Participants also indicated that they appreciated that the program was designed by an Islander for Islanders, prompting them to ask questions about me, and the process I went through in developing the DVD.

A class discussion was generated around what the term "endangered species" meant and other discussions were more personal in nature as students shared stories about their previous trips to the park, family vacations and employees who they know that work in the park, including relatives.

With regard to their own teaching, the teachers indicated that the presentation generated ideas about enrichment and follow-up activities such as taking a field-trip, doing web quests, and inviting guest speakers into their classrooms. They also noted that

job opportunities were discussed and expressed that it would have been nice to have an introduction or additional information about the interpreter to share with the students. It was also noted that the video would be better for an older audience or a higher achieving academic group.

Summary

Junior High students were more aware of the evidence of marine organisms that commonly wash up on the north shore of PEI after instruction. They drew 62% more shells in their drawings after viewing the presentation and listed 22% more organisms in their student responses. Beach finds emerged as the most significant change in the drawing exercise, and the second most represented feature of the drawings. The presence of shells on the beach was also the response given by 23% of the students from the exit question as having the most impact on them, resulting from the presentation.

The amount of knowledge gained and retained from the presentation, with respect to the natural history and the names of indigenous organisms, was also found to be significant. Students were only able to answer 19% of the worksheet questions correctly in the pre-test, while answering 35% correctly within a week of watching *Treasures Ashore.* After five weeks of viewing the presentation, the percentage of total correct responses was reduced to 24%. The decline was expected as memory loss may have occurred, but the results still show an increase of 6% from the pre-test. However, despite these results, the overall knowledge gain was still very small.

While the actual increase from the pre-test to post-test 1 only shows a total increase of 16%, the students went from only providing 182 answers correctly to 335. This is an increase of 153 answers, almost doubling the students' ability from the pre-test, an

increase of 46%. Again, taking into account the total number of correct answers from the pre-test (182) and post-test 2 (228.5), there was an increase of 20% of correct responses given.

According to 38% of participating students, the presence of an endangered species, the piping plover, is the component of the presentation that made the largest impact on them from the presentation. Over 75% of the students gave one of the top three answers as being the most significant: piping plover & endangered species, beach finds (shells), and beaches & dunes. A further 12% listed jellyfish as an impacting feature leaving the remaining 13% to be represented by seaweeds & plants, garbage, foxes and other marine species.

After piloting the curriculum supplement, the selected junior high school science teachers recommended that the presentation be made shorter or broken into segments in order to retain the attention of their students. Participating teachers also recommended that this curriculum would be best served if presented to higher-achieving academic groups. Teachers indicated that their students are non-immersion, non-music students and typically do not score as high as their counterparts. Although they are listed in the regular academic program, some students are on modified learning plans and the classes also include some ESL students.

Chapter 4

Conclusions and Recommendations

It was my intent to develop a curriculum supplement that would serve as a source of information for teachers, school students, and visitors to PEI National Park. I hoped to provide an opportunity for learning that was unique to my artistic interpretation and would be entertaining and actively engage the students through fun. This teaching strategy functions well with the mandate of the PCA, which supports education of the public in an informative and entertaining way through interpretation.

As an offered supplement, teachers are only required to have access to a computer and a projector to simply power up and push play. However, it is important that each teacher watches the presentation and extracts information that is particularly relevant to their lessons. It is for the teacher to decide how to best make use of this resource. The purpose is to enhance a classroom session, allowing additional stimulus for information exchange. It is recommended that teachers review the material and decide when it might be best for them to use functions offered by technology, such as pausing for discussion or rewinding for review.

After completing the formative assessment, it is important to note that in creating future educational DVDs, it would be advantageous to work with targeted audiences as the presentation is being developed. Seemingly, students still enjoy sharing stories and prefer content that they can relate to. It might even be nice to have segments of the presentation where students recount their experiences. In making future presentations, there is also merit in making the content more interactive. This could be done with the addition of games, such as having students place words form a word bank into a still

image or a memory game could be an added feature in paring names and images of organisms.

In *Treasures Ashore*, I identified many beach finds for students, and so the program served as an introduction for identifying marine organisms. Teachers may use some of the information presented to work on classification systems. During an in-park presentation, students will typically find a variety of shells, seaweeds, and rocks along the shore and bring them into the interpretation center for discussion. A benefit of my preparatory time in making this presentation available to them is that I am able to select and present some of the diverse and interesting organisms that they might otherwise overlook.

For Parks Canada, working with the schools and teachers is critical in order to create learning programs that are relevant to the academic learning process. Parks Canada has just recently undergone a structural reorganization where there is now a designated branch for Outreach opportunities. Staff members should consult with schools and teachers regularly to ensure that they are providing worthwhile services and keep up with educational trends. It is most important that in creating supplements to curricula, Parks Canada provides user-friendly products. A teacher needs to be assured that the content is delivered in a manner to their students that enhances their lessons and meets targeted academic objectives outlined in the curriculum.

While an actual field trip is still preferable, Zohrer (1999) communicates a basic fact about changing an interpretive program so that it is applicable to students in a classroom: “Live interactive field trips are not meant to replace hands-on programming, but provide opportunities to schools that would otherwise be unable to travel to specific

natural resource areas, cultural facilities, and historic sites" (p. 240). The main difference between the technology Zohrer refers to (field experiences via microwave or satellite) and my program, is that the students do not tour my site in real-time. In *Treasures Ashore,* students view site-specific images formatted into a DVD with voice-over narration. I developed the DVD presentation using intonation throughout the narration to stimulate the auditory sense. I also relied on video animation tools, used in conjunction with the images, for visual stimulation. This is similar to a basic slide-show or power-point presentation, and, as Regnier (1994) points out, "with new cameras, projectors and computer-assisted technologies, the slide talk has become an even more effective way to share ideas and tell stories about interpretive sites" (p. 33).

My project focused on the unifying concept of diversity as it identified various living organisms that share habitats and support ecosystems. It would be ideal for students to use the resource as a classroom activity prior to an actual on-site interpretive tour. Manka (1994) clearly recognizes the value of such a sequence when he recommends to:

> Create pre-visits that provide the background knowledge for the interpretive program. If the knowledge component of the program is introduced in the classroom, then the interpreter can give students more time to see and experience the exciting things found onsite. (p. 84)

This pre-visit experience would enhance an interpretive program as it provides awareness of specific organisms, knowledge of logistics, and content knowledge related to the concepts of interest prior to the field trip experience.

Implication of the study

Parks Canada now has evidence that teachers using *Treasures Ashore* as a supplement to current Atlantic science curricula on Prince Edward are imparting awareness of marine organisms to their students and are meeting objectives of the Parks Canada's Educational objectives. While the overall knowledge gain is small and an interest in the subject was not noticeably increased, teachers still felt that *Treasure's Ashore* was a productive program and indicated they would continue to use the resource in their classroom. This conclusion may contribute to the justification of developing future virtual touring programs and may also provide a framework of testing that Parks Canada can use in the evaluation of its programming.

There are no other substantial resources available for identification of marine and aquatic organisms on PEI—in stark contrast to the Pacific Coast, which boasts at least a dozen field guides to marine organisms and several teacher resource guides focusing on Pacific Coast marine life. In developing a DVD, I hoped to provide a resource to be used as an organism recognition guide, thereby increasing both teachers' and students' knowledge of the natural history of specific organisms indigenous to PEI.

Treasures Ashore is a resource tool from which teachers can develop and enrich their own programs. The DVD presentation may serve as a catalyst for developing lessons and programs in marine science, which I feel is especially relevant to Island students. The dynamics of coastal ecosystems provide great potential for studies in the sciences and can also be expressed through art, music, and drama activities. Furthermore, *Treasures Ashore* can be used in media studies in exemplifying the ability for students to

create virtual experiences. After viewing the presentation, students could also engage in reflective journaling, thus encouraging literacy skills.

Planning lessons is part of every teacher's regular tasks. Our current education system does not allow for daily experiential learning fundamental to the interpreters' instructional task. However, it is important to have students actively participating in their own learning process. Stimulating these minds can sometimes be challenging, as there are various learning styles and different learning needs for individuals within group settings. Video is a method that can assist educators in immersing their pupils in a dimension for learning apart from popular practices making use of textbooks and pencil-to-paper work. *Treasures Ashore* presents an opportunity for teachers to supplement the curriculum by changing the learning environment through the use of a Virtual Field Trip (VFT).

> As educators, our goal of course, is to get students energized and engaged in hands-on learning experiences, and video is clearly and instructional medium that generates excitement. Using sight and sound, video is the perfect medium for students who are auditory or visual learners. Video taps into emotions which stimulate and enthrall students, and it provides an innovative and effective means for educators to address the curricular concepts. (Griffin, 2009)

Problems can arise when using video in the classroom when it lacks principles of best practices. It is necessary that the information presented be relevant to the students and that it serves a greater function than to "baby-sit" a group. Griffin (2009) supports this notion, stating, "current research reveals that the most effective way to use video is as an enhancement to a lesson or unit of study". *Treasures Ashore* was developed with Island students in mind, touching on their sense of place and anticipating that they would

relate to time spent at the beach. It should provide the teacher with resourceful information relevant to the lives of their students that they can incorporate into their lessons.

Conclusions

The creation of *Treasures Ashore* was intended to provide a supplement for the Atlantic Science grade 7 academic curriculum. Although the DVD presentation was developed with PEI curriculum advisors' input and approval, upon evaluation of the program it was revealed that the program contained a lot of new content and was more advanced than expected for the students. While the students did much better on the worksheets after viewing the presentation, showing a significant positive change, overall, the results were poor.

Students did, however, get exposed to some concepts of ecology found within a coastal ecosystem and became aware of the diversity of organisms that can be found along PEI's seashores. The students were interested in the subject matter presented to them, but the presentation was found to be too lengthy for students to take in during one sitting. While VTFs are an acceptable alternative instructional tool when an on-site visit is not possible, it does not replace an actual field trip experience.

Recommendations

Break the video into shorter segments

The twenty-five minute video demanded too much of the student's attention for one sitting and would likely have more impact if it was broken into shorter segments for viewing. The presentation could easily be divided into chapters and listed in the menu of the DVD. During an on-site visit, there are many activities that are included in the

presentation, which takes twice as long, but with the students moving around outside, the length is not as overwhelming. Regardless, there are times when an activity needs to be cut shorter depending on the interest of the students.

Use the worksheets to guide the students during the video presentation

Teachers may wish to use the worksheets provided as a way to keep student's attention. Often a diversion is a good tool for refocusing attention. Students may read the sheets as they view the presentation and would then have a sort of detailed outline as to what they are looking to extract.

Include lesson plans and extension activities

If teachers are to present this to their classes, it would be best for them to preview the DVD and also have a few lesson plans to follow. Lesson plans would link classroom activities with the presentation and could be appropriately incorporated during the new segment breaks. Some of the activities may include various worksheets, but others could consist of activities such as: classifying organisms, identifying interaction within an ecosystem, creating word walls for new vocabulary, developing a memory game with names of organisms and their images, artistic representations or journaling for students to share their stories or their impressions.

Use the resource as a pre/post visit tool

There are a limited number of resources to supplement current Atlantic Science grade 7 curricula and none that specifically link with Parks Canada's educational offer for PEI. As such, *Treasures Ashore* could be used as a tool for pre/post visits to the PEINP. Viewing the DVD prior to an onsite program allows the teachers and students to

familiarize themselves with content prior to arrival or to refresh their experience during an extension exercise after their field trip.

Add a background component on the interpreter

The human connection seems to remain important to students despite their interest in technology. Students were interested in sharing their personal stories and wondered what mine was. For an on-site visit this is a natural component of a field trip. I neglected to include it in *Treasures Ashore*, and students questioned my background and had questions about me that were unanswered. This section could be added as a separate lesson or component of a lesson for those interested in the interpreter's background. While Treasures Ashore is a virtual tour, students still want to be able to identify with or relate to all components of the presentation, including the presenter.

Significance of Study

Through this study, I provided an opportunity for the elaboration of Parks Canada's outreach programs in the off-season. The project enhanced the annual education offer made by the PEINP and substantiated the need for marine education in the formal curriculum. The junior high school students involved in this study recognized some marine life forms that exist, developed some understanding of basic ecology concepts, and established a connection to sense of place and a respect for the living world. Teachers will have the benefit of a video presentation with links to their science curriculum to add diversity to their students' learning experiences, providing them with an available option in addition to their teaching strategies.

The DVD is now available for use in PEI's classrooms for teachers conducting marine and aquatic studies with their students. It is hopeful further programs will be

developed featuring a variety of habitats and a broader range of marine ecology concepts designed for specific grade levels. To my knowledge, after discussions with curriculum advisors, there are no other comparable resources offered in PEI, or in the Atlantic Region.

In using *Treasures Ashore,* it is important to note that the duration of the DVD has been found to be too long for the students to take in during one sitting. This is primarily due to the new vocabulary and the many large and often abstract concepts introduced to the students. It is therefore important to use the worksheets as guiding material for the students. Students should read over the sheets and become familiar with the expected facts and concepts that are to be extracted from the presentation and the terminology that they will encounter.

Now that a formative evaluation has been completed, the DVD could be edited into sections with more teacher materials to accompany the resource. This would facilitate the ability of a classroom teacher to perform a summative evaluation at the end of their grade 7 Unit on Interactions within ecosystems. With the addition of lesson plans and new constructs with a rubric and activity sheets for assessing the students' academic achievements, *Treasures Ashore* can serve as a beneficial supplement to the current prescribed curriculum.

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Appendix A

Student Beach Drawing

Name:_____

Please draw a picture of a beach scene in the box provided:

Write a paragraph to explain your artwork:

Appendix B

Student Response Questions

Name:_____

Please read and respond to the following questions:

1. Do you think knowing the common names of organisms (living things) is important? Why or why not?

2. List all of the plants, animals and objects that you can think of that can be found on a Prince Edward Island seashore.

3. Do you have an interest in learning about marine organisms that wash up on Prince Edward Island's North shore? Why or why not?

Appendix C

Student Worksheets

Multiple Choice

Name:_____

Multiple choice: Circle the best answer (a, b, or c) for each question.

1) Around what percent of PEI is made up of sandstone?

   a) ~20%
   b) ~60%
   c) ~100%

2) What species of tree commonly found in the dunes of Prince Edward Island are affected by salt spray and harsh winds?

   a) Red Oak
   b) White Birch
   c) White Spruce

3) Other than white, what color is generally found on the inside of a Quahog shell?

   a) Green
   b) Purple
   c) Red

4) What element is the Bayberry plant able to help keep the soil nutrient rich with?

   a) Carbon
   b) Nitrogen
   c) Oxygen

5) Which of the following organisms is an example of a bi-valve?

   a) Slipper Limpet
   b) Razor Clam
   c) Periwinkle Snail

Name:_____

Multiple choice: Circle the best answer (a, b, or c) for each question.

6) What type of rock is sandstone?

a) Igneous
b) Volcanic
c) Sedimentary

7) Which of the following organisms is an example of a crustacean?

a) False Angel Wing
b) American Lobster
c) Blue Mussel

8) What is another word for “seaweed”?

a) Algae
b) Holdfast
c) Coral

9) Which of the following is an example of an endangered species?

a) Piping Plover
b) Northern Moon Snail
c) Common Shipworm

10) Which seaweed is not edible?

a) Irish Moss
b) Dulse
c) Coralina

Fill in the Blanks

Name:_____

Fill in the blanks: Choose the best answer from the table provided and use it to complete the sentences below. Not all words will be used and each word can only be used once.

Mermaid's purse	Sediment	Cellulose	Hermaphrodite	Quahog
Sanderling	Bissel	Carageenan	Nematocyst	Kelp
Radula	Moon Snail	Fledged	Filter	Herbivore

1) When a bird, like the Piping Plover, is able to fly on its own, we say that it has _____.

2) An egg case of a skate is called a _____.

3) _____ is a thickening agent found in many commonly used products.

4) A Slipper Limpet is a _____, this means that it has both male and female reproductive parts.

5) A _____ eats plant material.

6) Shipworms eat the _____ from wood.

7) A _____ looks similar to a clam, but is more curved at the top and has purple on the inside of its shell.

8) A stinging cell of a jellyfish is called a _____.

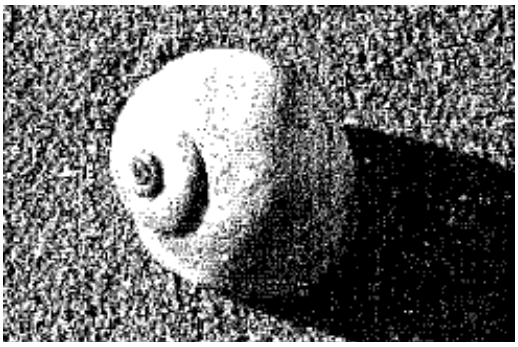
9) Northern Moon Snails use a _____ to make a hole in shellfish in order to feed.

10) Mussels anchor themselves in place, forming strong, glue-like attachments called _____ threads.

Identification by Image

Name:_____

Write the common name of the organism in the space provided below the image.



_____

_____

_____

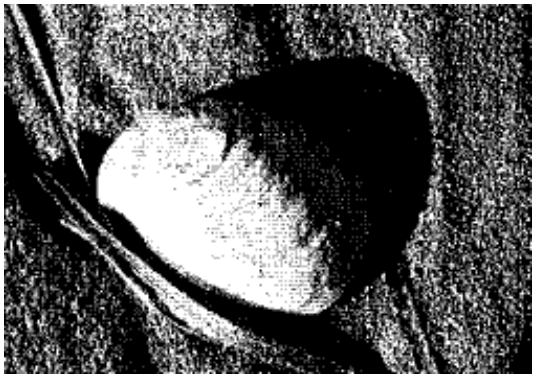
_____

_____

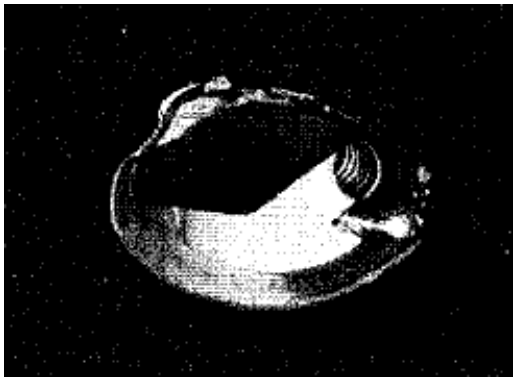
_____

Name:_____

Write the common name of the organism in the space provided below the image.

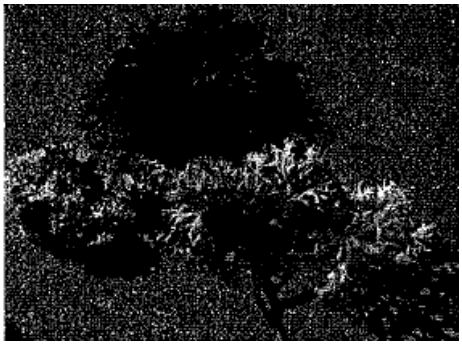


_____

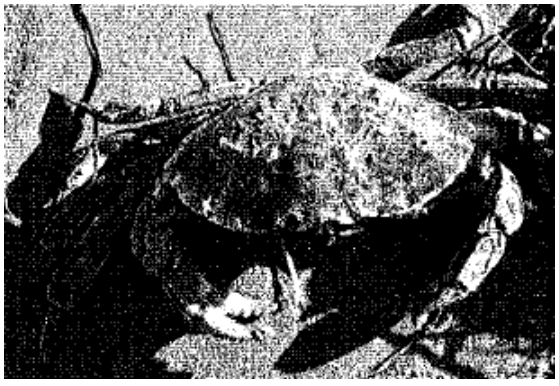


_____

_____



_____



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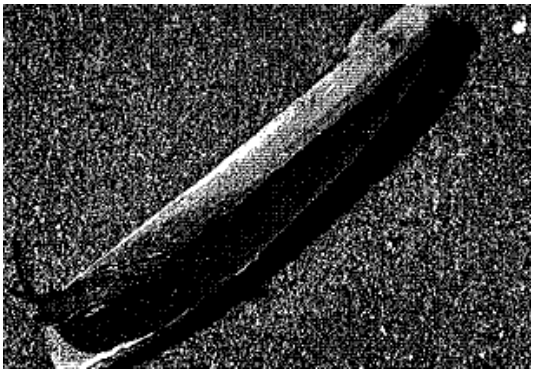

_____

Appendix D

Students' Worksheets Results

Table D1. Total number of correct responses from pretest.

Student #	Multiple choice test (n=10)	Fill-in-the-blanks test (n=10)	Identification by image test (n=12)	# of correct responses (n=32)
1	4	0	1.5	5.5
2	6	2	1.5	9.5
3	4	2	4	10
4	4	0	1.5	5.5
5	6	2	3.5	11.5
6	2	0	1	3
7	4	2	3.5	9.5
8	3	1	2.5	6.5
9	3	2	2.5	7.5
10	3	1	3	7
11	1	2	2	5
12	3	0	0.5	3.5
13	2	0	0.5	2.5
14	6	0	2.5	8.5
15	2	0	2.5	4.5
16	4	1	0.5	5.5
17	1	0	1.5	2.5
18	4	3	2	9
19	4	1	2.5	7.5
20	4	3	0	7
21	3	1	0	4
22	5	1	0	6
23	3	0	0	3
24	1	1	0.5	2.5
25	5	2	0.5	7.5
26	3	0	0.5	3.5
27	3	1	0	4
28	6	2	0.5	8.5
29	4	0	0	4
30	6	2	0	8
Total(s)	109/300	32/300	41/360	**182/960**

Table D2. Total number of correct responses from post-test 1.

Student #	Multiple choice test (n=10)	Fill-in-the-blanks test (n=10)	Identification by image test (n=12)	# of correct responses (n=32)
1	4	1	5	10
2	5	7	5.5	17.5
3	7	2	4.5	13.5
4	4	2	1.5	7.5
5	4	3	3.5	10.5
6	3	3	2	8
7	7	2	7	16
8	7	1	5.5	13.5
9	7	2	2.5	11.5
10	4	1	2.5	7.5
11	4	6	3	13
12	5	1	0.5	6.5
13	6	1	2.5	9.5
14	5	2	3	10
15	5	0	4.5	9.5
16	3	1	5	9
17	5	1	1	7
18	5	3	5	13
19	3	2	2.5	7.5
20	5	4	6	15
21	6	4	3	13
22	5	4	2.5	11.5
23	4	1	2	7
24	4	2	7	13
25	7	5	6	18
26	2	1	1.5	4.5
27	2	5	3	10
28	7	6	3.5	16.5
29	5	1	3.5	9.5
30	7	5	4.5	16.5
Total(s)	147/300	79/300	109/360	**335/960**

Table D3. Total number of correct responses from post-test 2.

Student #	Multiple choice test (n=10)	Fill-in-the-blanks test (n=10)	Identification by image test (n=12)	# of correct responses (n=32)
1	3	1	2.5	6.5
2	8	5	7.5	20.5
3	5	1	2.5	8.5
4	3	0	3.5	6.5
5	5	4	2	11
6	3	0	1	4
7	6	1	7	14
8	6	1	5	12
9	5	1	3	9
10	4	1	2.5	7.5
11	2	1	2.5	5.5
12	2	0	0.5	2.5
13	3	2	0.5	5.5
14	1	2	3	6
15	4	1	1.5	6.5
16	4	0	1.5	5.5
17	4	0	1.5	5.5
18	5	1	2.5	8.5
19	5	2	3	10
20	7	5	3.5	15.5
21	5	3	4.5	12.5
22	6	4	5	15
23	6	1	3.5	10.5
24	4	2	2	8
25	7	4	5.5	16.5
26	4	2	2	8
27	6	2	4	12
28	5	5	2.5	12.5
29	5	2	2.5	9.5
30	7	3	3.5	13.5
Total(s)	140/300	57/300	91.5/360	**288.5/960**

Table D4. Numbers and percentages of total correct responses from pre-test and post-tests.

Student	Pretest (n=32)	%	Post-test 1 (n=32)	%	Post-test 2 (n=32)	%
1	5.5	17%	10	31%	6.5	20%
2	9.5	30%	17.5	55%	20.5	64%
3	10	31%	13.5	42%	8.5	27%
4	5.5	17%	7.5	23%	6.5	20%
5	11.5	36%	10.5	33%	11	34%
6	3	9%	8	25%	4	13%
7	9.5	30%	16	50%	14	44%
8	6.5	20%	13.5	42%	12	38%
9	7.5	23%	11.5	36%	9	28%
10	7	22%	7.5	23%	7.5	23%
11	5	16%	13	41%	5.5	17%
12	3.5	11%	6.5	20%	2.5	8%
13	2.5	8%	9.5	30%	5.5	17%
14	8.5	27%	10	31%	6	19%
15	4.5	14%	9.5	30%	6.5	20%
16	5.5	17%	9	28%	5.5	17%
17	2.5	8%	7	22%	5.5	17%
18	9	28%	13	41%	8.5	27%
19	7.5	23%	7.5	23%	10	31%
20	7	22%	15	47%	15.5	48%
21	4	13%	13	41%	12.5	39%
22	6	19%	11.5	36%	15	47%
23	3	9%	7	22%	10.5	33%
24	2.5	8%	13	41%	8	25%
25	7.5	23%	18	56%	16.5	52%
26	3.5	11%	4.5	14%	8	25%
27	4	13%	10	31%	12	38%
28	8.5	27%	16.5	52%	12.5	39%
29	4	13%	9.5	30%	9.5	30%
30	8	25%	16.5	52%	13.5	42%
Total(s)	**182**	19%	**335**	35%	**288.5**	24%

Appendix E

Student Exit Question

Name:_____

Take 5 minutes to write about one thing that impacted you the most from the presentation.

Appendix F

Teacher Interview Questions

Class: _____

Please observe the following of your students and keep a journal of comments for discussion within the week after the presentation has been experienced:

1) Do the students appear to be watching and listening to the presentation attentively?

2) Do the students express any regard for the presentation?

3) Do the students ask questions of interest during and/or after the presentation? If so, what questions?

4) Did the presentation generate any additional class discussion? If so, please describe.

5) With regard to your own teaching, did the presentation generate ideas for developing enrichment or follow-up activities? If so, please describe.

6) Are there any other comments that you would like to share with me?

Appendix G

PARTICIPANT CONSENT FORM (Parental Information Letter)

For Stonepark Intermediate Student Participation in an Evaluation of a Prince Edward Island National Park of Canada Virtual Beach Tour

My name is Lindsay Oehlke and I am a Masters of Education Student at the University of Victoria in British Columbia. I am in the process of doing of my Masters project, which involves evaluating a "virtual beach tour" of Stanhope Main Beach located within the Prince Edward Island National Park of Canada. This research is being conducted under the supervision of Dr. Richard Kool at Royal Roads University (250-931-2523 or Rick.Kool@RoyalRoads.ca) and Dr. Gloria Snively at the University of Victoria (250-721-7764 or gsnively@uvic.ca). You may contact either of my supervisors if you have any questions or concerns.

Your child is invited to participate in my study evaluating the Virtual Beach Tour. You may contact me during the course of this study if further clarification is needed by phoning (902) 367-0201 or via e-mail at l_ellen_o@hotmail.com.

The purpose of this study is to evaluate the content of Prince Edward Island National Parks' Virtual Beach Tour DVD as a curriculum supplement that is linked to your child's Atlantic Science Grade 7 Curriculum. The main objective is focussed on the identification of marine organisms that wash up on the beaches of Prince Edward Island's North shore. Through this supplement, it is questioned whether students provided with a virtual experience of exploring a beach habitat will increase their knowledge, in general, of natural history and, specifically, with regard to organisms indigenous to PEI. This study is important because it will explore the effectiveness of using media (virtual video) as a teaching method in a classroom.

Your child is being asked to participate in this study because he/she is a 7th grade student at Stonepark Intermediate School and is part of a class that has been selected to participate. Your child's participation in this study is voluntary and he/she may withdraw from the study, at any time, without negative consequences. If your child does decide to withdraw from this study, for any reason, his/her data will not be used in the analysis.

If your child does agree to voluntarily participate in this study, he/she will have some worksheets to complete before and after watching a twenty-five minute DVD presentation in his/her classroom. The total amount of class time required to complete all worksheets is 2 hours. The follow up sessions of worksheets are to be completed up to six weeks after the presentation has been viewed. By signing this consent form, participation is implied for the duration of the study. Students who chose not to participate are welcome to view the DVD presentation, but can do other work or go to the library, as approved by his/her teacher, while the rest of the class completes the work. The students' work will not be marked and will not be used for student grades.

Participation in this study should not inconvenience your child and there are no known or anticipated risks to him/her by participating in this research. There are, however, potential benefits of his/her participation in this research, which includes an opportunity to view a virtual video tour that was developed with him/her in mind, which may contribute to the potential development of future presentations. Also, I think he/she will find the information about PEI seashores and the natural history of our seashore plants and animals very interesting.

In terms of protecting anonymity, no names will be used in the analysis of the data that your child provides for me. Your child's confidentiality and the confidentiality of the data will be protected. I will be keeping a file with all of his/her work in it that will not be accessible to anyone, other than myself, after it has been passed on to me from his/her classroom teacher.

It is anticipated that the results of this study will be published in my M.Ed. dissertation and shared with members of the University of Victoria, the PEI Eastern School District, the PEI Department of Education and the Parks Canada Agency. However, your child's name will never be printed or shared with others. I am asking permission to retain any work collected from your child until I have completed my analysis. All data from this study will be returned to your child via his/her classroom teacher after the completion of my project.

In addition to being able to contact my supervisors, or myself as indicated above, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Once signed and returned to the classroom teacher, a copy of this consent form will be sent home for you to have as a reference. I will keep the original for my files, which will be protected.

I am excited to be sharing this presentation with your child and appreciate your help with this study.

Thank you,
Lindsay Oehlke

Your signatures below indicate that this letter has been read, its contents are understood and that consent is granted for participation in this study:

_____	_____	
Name of Participant	Name of Parent/Guardian	
_____	_____	_____
Signature of participant	*Signature of parent/guardian*	*Date*

A copy of this consent will be returned to you and the researcher will keep the original.

Appendix H

Results of Drawing Exercise

Table H1. Change in the number of features appearing in drawing exercises.

Feature	Pre-DVD	Post-DVD	Change +/-
Related to DVD			
Shell	8	21	+ 13
Endangered species	0	9 + 3 nests	+ 12
Jellyfish	0	12	+ 12
Seaweed	1	8	+ 7
Garbage	1	8	+ 7
Rock	1	8	+ 7
Driftwood	0	7	+ 7
Grass	4	10	+ 6
Dunes	4	9	+ 5
Signage	1	3	+ 2
Boardwalk	1	2	+ 1
Bird		36	= 0
Crab	5	4	- 1
Humans			
Towel	18	3	- 15
People	27	14	- 13
Umbrella	9	0	- 9
Volleyball net	3 + 1 ball	0	- 4
Bucket & shovel	5	3	- 2
Life preserver	3	1	- 2
Lunch basket	3	1	- 2
Sand castle	6	5	- 1
Beach ball	2	1	- 1
Footprints	2	1	- 1
Vending machine	1	0	- 1
Kite	1	0	- 1
Campfire	1	1	= 0
Lawn chair	1	1	= 0
Radio	1	1	= 0
Sunscreen	1	1	= 0
Log for campfire	1	3	+ 2
Unrelated to DVD			
Starfish	0	6	+ 6
Sky	6	9	+ 3
Seal	1	3	+ 2
Fish	5	6 + school of fish	+ 2
Palm tree	1	2	+ 1
Hammock	0	1	+ 1

Dolphin	0	1	+ 1
Sun	24	24	= 0
Clouds	7	7	= 0
Fence	1	1	= 0
Water	33	32	- 1
Lighthouse	1	0	- 1
Horsefly	1	0	- 1
Road	1	0	- 1
Shark	2	1	- 1
Plane	1	0	- 1
Octopus	1	0	- 1
Snowman	1	0	- 1
Hamster wheel	1	0	- 1
Sunset	5	3	- 2
Channel buoy	2	0	- 2
Bridge	2	0	- 2
Boat	4	2	- 2
Sand	33	30	- 3

Table H2. Total number of inclusions featured in the drawing exercises.

Feature	Pre-DVD	Post-DVD	Total Inclusions
Related to DVD			
Bird	35 + 1 nest	36	72
Shell	8	21	29
Grass	4	10	14
Dunes	4	9	13
Endangered species	0	9 + 3 nests	12
Jellyfish	0	12	12
Seaweed	1	8	9
Garbage	1	8	9
Rock	1	8	9
Crab	5	4	9
Driftwood	0	7	7
Signage	1	3	4
Boardwalk	1	2	3
Humans			
People	27	14	41
Towel	18	3	21
Sand castle	6	5	11
Umbrella	9	0	9
Bucket & shovel	5	3	8
Volleyball net	3 + 1 ball	0	4
Life preserver	3	1	4
Lunch basket	3	1	4
Log for campfire	1	3	4

Beach ball	2	1	3
Footprints	2	1	3
Campfire	1	1	2
Lawn chair	1	1	2
Radio	1	1	2
Sunscreen	1	1	2
Vending machine	1	0	1
Kite	1	0	1
Unrelated to DVD			
Water	33	32	65
Sand	33	30	63
Sun	24	24	48
Sky	6	9	15
Clouds	7	7	14
Fish	5	6 + school of fish	12
Sunset	5	3	8
Starfish	0	6	6
Boat	4	2	6
Seal	1	3	4
Shark	2	1	3
Palm tree	1	2	3
Channel buoy	2	0	2
Bridge	2	0	2
Fence	1	1	2
Hammock	0	1	1
Dolphin	0	1	1
Lighthouse	1	0	1
Horsefly	1	0	1
Road	1	0	1
Plane	1	0	1
Octopus	1	0	1
Snowman	1	0	1
Hamster wheel	1	0	1

Appendix I

Student's Responses Results

Table I1. Changes in Student Responses

students 2 classes (30)		Pre Test Y/N	Post Test Y/N	Change +/- ?		Pre Test #	Post Test #	Change +/- ?		Pre Test Y/N	Post Test Y/N	Change +/- ?
1		Y	Y	=		5	5	=		Y	Y	=
2		Y	Y	=		7	5	-2		Y	N	-
3		Y	Y	=		3	7	+4		N	Y	+
4		Y	Y	=		4	10	+6		N	N	+
5		N	Y	+		0	9	+9		N	Y	+
6		Y	Y	=		8	22	+14		N	Y	+
7		Y	Y	=		6	7	+1		N	N	=
8		Y	N	-		11	4	-7		N	N	=
9		Y	Y	=		10	11	+1		N	N	=
10		Y	Y	=		10	5	-5		Y	N	-
11		Y	Y	=		4	5	+1		N	N	=
12		Y	Y	=		2	3	+1		N	N	=
13		Y	Y	=		4	5	+1		Y	Y	=
14		Y	Y	=		7	11	+4		N	N	=
15		Y	Y	=		10	9	-1		Y	Y	=
16		N	N	=		7	6	-1		N	N	=
17		N	Y	+		4	6	+2		Y	N	-
18		Y	Y	=		11	17	+6		N	N	=
19		Y	Y	=		6	7	+1		Y	Y	=
20		Y	N	-		6	6	=		N	Y	+
21		Y	N	-		4	10	+6		N	Y	+
22		Y	Y	=		7	7	=		Y	Y	=
23		Y	Y	=		8	12	+4		Y	Y	=
24		Y	Y	=		5	7	+2		Y	Y	=
25		Y	Y	=		4	8	+4		Y	Y	=
26		Y	Y	=		6	14	+8		N	N	=
27		Y	Y	=		16	19	+3		Y	Y	=
28		N	N	=		2	2	=		N	N	=
29		Y	Y	=		5	6	+1		Y	Y	=
30		Y	Y	=		6	5	-1		N/a	N/a	=
TOTALS		**Y=26 N= 4**	**Y=25 N=5**	**+2 -3**		**188**	**240**	**+52**		**Y=13 N=16**	**Y=15 N=14**	**+6 -3**